SURFACE WATERS OF VERMONT

BY

C. H. PIERCE

WASHINGTON
GOVERNMENT PRINTING OFFICE
1917

CONTENTS.

ILLUSTRATIONS.

SURFACE WATERS OF VERMONT.

By C. H. PIERCE.

INTRODUCTION.

From the days of the earliest settlements in Vermont the rivers of the State have figured largely in its growth and development. Following Indian trails along river valleys, over routes which later were to become main highways of travel and commerce, the hardy pioneers were quick to recognize the importance of mill sites and to utilize the water powers in providing themselves with food, clothing, and shelter. Gristmills were soon built to grind the grain raised in the clearings made along the meadows and valleys. Next the sawmill, with vertical saw, appeared, and houses of pine logs were replaced by comfortable frame structures constructed from the same abundant material by the aid of power developed on small streams in the neighborhood. For many years clothing was largely the product of the spinning wheel and the hand loom, and when wool for the winter clothing could be prepared in the carding mill, instead of by hand in the household, a big saving in labor was made. With the clearing away of the virgin forests, changes in methods of agriculture, and improvements in facilities for transportation the community sawmill and gristmill and the old-time carding mill gave place to other uses of power. As capital became more plentiful larger power units were demanded, and sites on larger streams, affording higher heads, were developed. The milling industry was continued on a larger scale with wheat and corn brought from the Western States; cotton and woolen factories employed many operatives; hydroelectric power was developed for use in mines and quarries, on railroads, and for lighting; shoe shops, box factories, manufactories of leather, and other industries continually increased the demand for power. With the rapid increase in the application of electricity for lighting, heating, and power during the last decade, there is now hardly a town in the State which is not dependent in some way on power derived from falling water. How the waters of Vermont can be best used to serve the interests of the citizens of the State is a vital question. Fortunately pure water is abundant, so that the higher use for municipal supply need not seriously interfere with its use for other purposes.

5

Municipal ownership and operation of hydroelectric plants has probably been worked out as successfully in Vermont as in any other State, a good illustration being afforded by the Morrisville electric-light and power plant on Lamoille River, where an installation of 1,700 horsepower provides light, heat, and power for the people of the town and furnishes power for operating an electric railway. One of the features of this plant is the creation of an artificial lake covering 150 acres and rivaling as a summer resort the natural lakes scattered among the Green Mountains.

The trend of modern power development is seen by the unified systems of power plants in some sections of the State, notably in the Winooski River valley, where eight plants, with an aggregate of 7,500 horsepower, are brought together on the same line. Another example is the Vernon plant of the New England Power Co., at Vernon, Vt. (see Pl. XIII), and the Readsboro plant on Deerfield River at Readsboro, Vt., which are tied in with other hydroelectric plants of the same company to form a system of 75,000 horsepower. In regard to the combination of water powers, Director George Otis Smith[1] has said:

The engineering fact that stands out in the utilization of water power is the comparitively high efficiency of large systems. Lower costs of operation and better service are results that appear to follow naturally the creation of these combinations of power plants.

The combination of several water powers differing in character in order to serve many markets having diversified service requirements makes possible an economic adjustment of supply to demand, and thus the result is a natural tendency to State-wide, and even interstate, units of operation. Nature's irregularities are thus equalized and man's varied requirements are similarly balanced. * * *

Cheap power promises to be in some future century this country's largest asset in the industrial rivalry among nations. Our unsurpassed coal reserves reinforced by these water-power resources constitute a strong line of national defense in that they form the real basis for an industrial organization of the Nation's workers. It is only through abundant and well-distributed power that the other material resources of the country can be put to their highest use and made to count most in the Nation's development. The people's interest in water power is greatest in its promise of future social progress, and such an interest is well worth protecting.

The history of water-power development shows that the financial success of a project depends largely on the relation of fixed charges, due to construction and operation, to the returns from marketing the power. In most plants the initial cost of construction, including the installation of power units, must be paid by returns from a number of years of operation. Therefore, before construction is undertaken it is necessary to have data showing the power available and whether the run-off throughout the year, on which the effective power will depend, will be so distributed as to correspond to the

[1] Smith, G. O., The people's interest in water-power resources; U. S. Geol. Survey Water-Supply Paper 400, pp. 2, 7-8, 1916.

requirements of the market. The conditions of stream flow in any one year are not likely to be duplicated exactly in any succeeding year, but a knowledge of the conditions existing for a series of years may be used in predicting the occurrence of critical periods on which the design of a successful power development must largely depend.

To meet the increasing need for stream-flow data in all parts of the country, the United States Geological Survey began systematic stream gaging in 1888, by establishing at Embudo, N. Mex., a training school for engineers to be employed in this new work. The methods developed in that school, modified and improved by added experience, have now been generally adopted by engineers not only in this country but in other countries in both the Western and Eastern hemispheres. The work of collecting systematic records of river discharge has been extended to all parts of this country, and records of greater or less length are now available for about 3,800 gaging stations.

The first Survey stations in Vermont were installed in 1903. Since that date 25 stations have been established either by the Survey acting alone or by the Survey in cooperation with the State. This report contains all records collected at these stations and all other available records of river discharge collected on streams in Vermont or on its borders. They have been compiled from many reports and from unpublished data and are here brought together in such form that they are readily accessible to all who are interested in the use of the water resources of the State.

Most of the stream-flow records on rivers in Vermont cover relatively short periods, periods which may not in themselves include either the maximum or minimum limit of the range of variation that may be expected. The value of these records may be materially increased, however, by comparing them with the records for the 16-year period of Connecticut River at Orford, N. H. (Fairlee, Vt.), which are considered accurate, and by a more extended comparison with the 42-year records of Lake Champlain outlet. Owing to the conditions under which the stage-discharge relation of Lake Champlain outlet was deduced, the computations based upon it may not be highly accurate throughout, but they are given here for their value in comparing the conditions during the last few years with the conditions prior to the establishment of more accurate measuring stations in the tributary river basins.

The data presented in this report should not be considered final or conclusive, for each additional year's record, when used in connection with previous records, adds a value to the total record much greater in proportion than the time ratio of the one year to the total period covered.

The hydrologic data are presented in this form with the hope and expectation that they will aid not only in developing the water resources of Vermont, but in upbuilding industries that depend in some degree on the utilization of the water resources.

COOPERATION.

Under authority conferred by Federal and State legislation the investigations have been carried on under cooperative agreements between the Director of the United States Geological Survey and successive governors of Vermont. The principal features of this agreement are:

1. The United States Geological Survey assumes the responsibility of gathering, analyzing, and publishing the data.

2. During the progress of the work all notes, maps, and data gathered as a result of field studies are at all times open to inspection by the representative of the State, and if they are not entirely satisfactory the agreement can be terminated.

3. Accounts for payment of salaries, travel and subsistence, supplies, or other expense necessary to the completion of the work shall be rendered in the manner required by the laws and regulations of the contracting parties, and vouchers shall be referred to either party for payment according to convenience or to the balance remaining in the respective allotments.

4. The cost of publication is borne entirely by the Geological Survey.

Assistance in obtaining stream-flow records has been rendered by several engineers and by representatives of power companies and business organizations. The engineering schools of the State have also shown an active interest in the work. Specific acknowledgment of individual cooperation is made in connection with the description of the station.

DIVISION OF WORK.

Investigations of the water resources in Vermont were begun by H. K. Barrows under the direction of F. H. Newell, chief hydrographer, and N. C. Grover, district hydrographer; from 1904 to 1909 the work was carried on by H. K. Barrows, district engineer; by T. W. Norcross in 1910; from 1910 to 1914, by C. C. Covert, district engineer; and subsequent to 1914 by C. H. Pierce. Various assistants whose names appear in connection with discharge measurements listed in this report have participated in the work. Special acknowledgment should be made to Prof. A. D. Butterfield and to Prof. G. M. Brett, who made the special investigation and survey of the Winooski River basin in 1910. The ratings, computations, estimates of flow during winter periods, and special studies of data for this report have been made by C. H. Pierce, district engineer, assisted by Hardin Thweatt and Hope Hearn.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miners' inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in depth of inches, acre-feet, and millions of cubic feet. The principal terms used in this report are second-feet, second-feet per square mile, run-off in inches, and millions of cubic feet. They may be defined as follows:

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel 1 square foot in cross section at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (p. 136).

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off (depth in inches)" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth of inches.

"Millions of cubic feet" is applied to quantities of water stored in reservoirs, most frequently in connection with studies of flood control and of storage.

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream below the gage which determine the discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.

The "point of zero flow" for a given gaging station is that point on the gage—the gage height—to which the surface of the river would fall if there were no flow.

EXPLANATION OF DATA.

The data presented in this report are divided into periods beginning October 1 and ending September 30 of the following year. In Vermont on the 1st of January in most years much of the precipitation during the preceding three months is stored as ground water, in the form of snow or ice, or in ponds, lakes, and swamps, and this

stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year is practically all derived from precipitation within that year.

The base data collected at gaging stations (Pl. V, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff or chain gage or from a water-stage recorder (Pl. VI) that gives a continuous record of the fluctuations. Measurements of discharge are made with a current meter (Pl. V, *A*) by the general methods outlined in standard textbooks on the measurement of river discharge.

From the discharge measurements rating tables are prepared that give the discharge for any stage, and these rating tables, when applied to the gage heights, give the daily discharge from which monthly and yearly mean discharge is determined.

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off. If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of channel, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to rapid changes in stage the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with automatic gages the true mean daily discharge may be obtained by applying the rating table to gage heights at short intervals throughout the day.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest
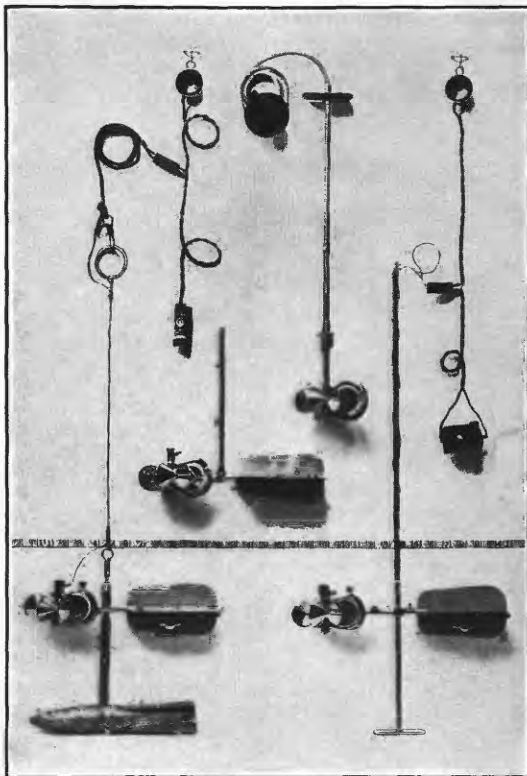
A. PRICE CURRENT METERS.
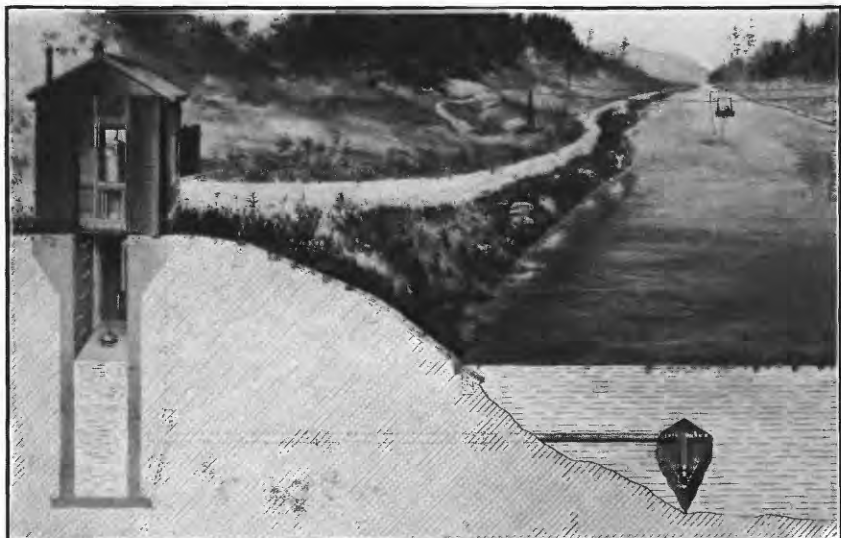
B. TYPICAL GAGING STATION.
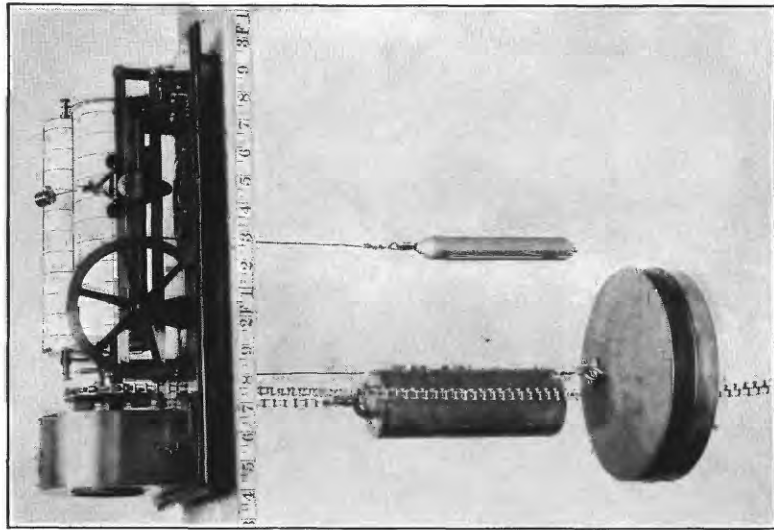
A. STEVENS.
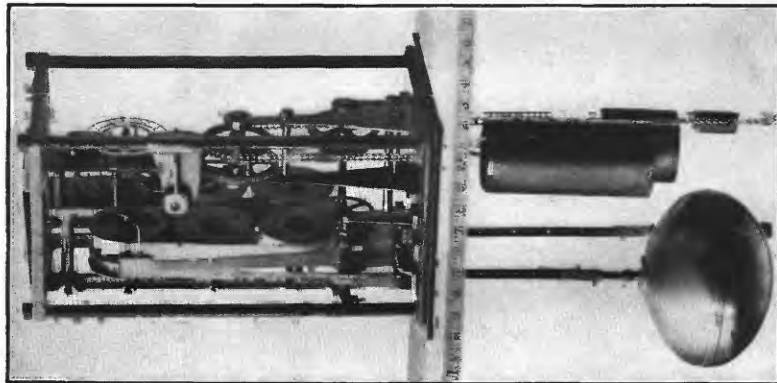
B. GURLEY PRINTING.
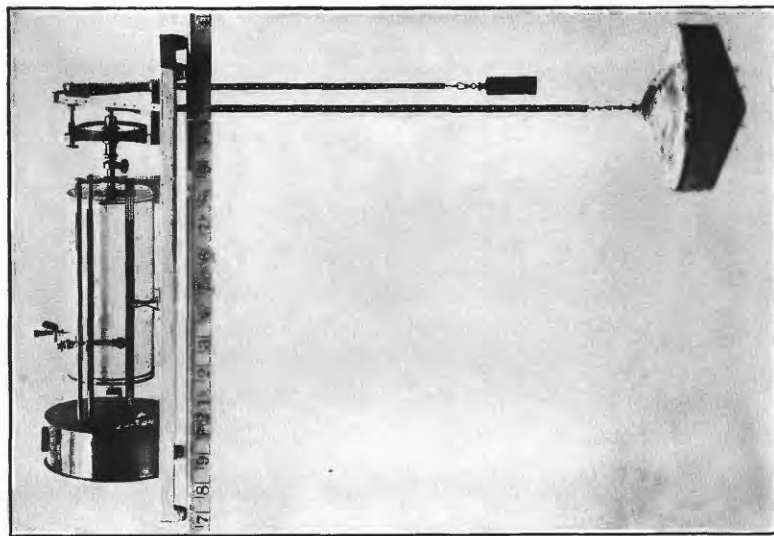
C. FRIEZ.

WATER-STAGE RECORDERS.

height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on pages 9–10, are based.

The deficiency table presented for some of the gaging stations shows the number of days in each year on which the mean daily discharge was less than the discharge given in the table. By subtraction the table gives the number of days each year that the mean daily discharge was between the discharges given in the table and, also by subtraction, the number of days that the mean daily discharge was equal to or greater than the discharge given. For convenience the theoretical horsepower per foot of fall corresponding to the discharge is also given. In using the table for studies of power, allowance should be made for the various losses, the most important being wheel loss and head loss.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of stream-flow data depends primarily (1) on the permanence of the stage-discharge relation and (2) on the accuracy of observation of stage, measurements of flow, and interpretation of records.

Footnotes added to the daily discharge tables give information regarding the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables, "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The letter in the column headed "Accuracy," in the monthly discharge table, rates the accuracy of the monthly mean and not that of the maximum or minimum discharge or the discharge for any one day. The rating is determined by considering the accuracy of the rating curve, the probable reliability of the observer, the number of gage readings per day, the range of the fluctuation in stage, and local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches

may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off (depth in inches)" are therefore not computed if such errors appear probable. All figures representing "Second-feet per square mile" and "Run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the engineers making the computations.

The table of monthly discharge gives a general idea of the flow at the station and should be used only for preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

GAGING STATIONS MAINTAINED IN VERMONT.

The following list comprises the gaging stations in Vermont maintained by the United States Geological Survey and cooperating parties. The stations are grouped by river basins and arranged in downstream order, with tributaries of main streams indicated by indention. The dates indicate the years or parts of years for which records are available. A dash following the date indicates that the station was being maintained September 30, 1916. (See Pl. I, at end of volume.)

ST. LAWRENCE RIVER BASIN.

Lake Champlain at Burlington, 1907–
Lake Champlain outlet (Richelieu River) at Chambly, Province of Quebec, 1875–1916.
    Poultney River near Fair Haven, 1908.
    Otter Creek at Middlebury, 1903–1907; 1910–
        East Creek near Rutland, 1911–1913.
    Winooski River above Stevens Branch, 1909–1913.
    Winooski River at Montpelier, 1909–
    Winooski River at Richmond, 1903–1907; 1910.
    Winooski River near Winooski, 1903.
        Stevens Branch of Winooski River near Montpelier, 1910.
        North Branch of Winooski River at Montpelier, 1909–1914.
        Dog River at Northfield, 1909–
        Dog River near Montpelier, 1910.
        Mad River near Moretown, 1910.
        Waterbury River near Waterbury, 1910.
        Huntington River at Jonesville, 1910.
    Lamoille River at Cadys Falls, 1909–10; 1913–
    Lamoille River at Johnson, 1910–1913.
    Lamoille River at West Milton, 1903.
        Green River at Garfield, 1915–
    Missisquoi River near Richford, 1909–
    Missisquoi River at Swanton, 1903.
St. Francis River: Clyde River at West Derby, 1909–

Connecticut River at Orford, N. H. (Fairlee Vt.), 1900–
    Passumpsic River at Pierce's Mills, near St. Johnsbury, 1909–
    Passumpsic River at St. Johnsbury Center, 1903.
    White River at Sharon, 1903–1904; 1909–1912.
    White River at West Hartford, 1915–
    Deerfield River: East Branch of Deerfield River at Somerset, 1912–

ST. LAWRENCE RIVER BASIN.

LAKE CHAMPLAIN DRAINAGE BASIN.

GENERAL FEATURES.

Lake Champlain occupies a long, narrow valley lying between the Green Mountains on the east and the Adirondacks on the west. A very small part of the lake is in the Province of Quebec, Canada, and the boundary between northeastern New York and northwestern Vermont passes through its center. The lake outlet is Richelieu River, which flows northward from Rouses Point, on the international boundary, to St. Lawrence River. The elevation of the lake surface at ordinary stage is about 95 feet above tide and the area of the water surface is 436 square miles.

The valley is irregular in form, being about 75 miles wide from a point opposite Middlebury, Vt., northward to Rouses Point, and about 35 miles in average width south of Middlebury. The lake itself is somewhat more than 100 miles long and is narrow. For 40 miles below Whitehall, N. Y., at its head, it is in no place more than a mile wide and in general not over a quarter of a mile, forming virtually a drowned river. Opposite Port Henry, at the point on which stands the ante-Revolutionary Fort Frederick, it offsets sharply to the west, and then resumes with increasing width its northerly course. In the widest part, which is just north of Burlington, Vt., 10 miles of clear water intervenes between shore and shore. The northern end contains many islands, both large and small. The depth of the northern part of the lake is in general 200 to 300 feet, but south of Fort Frederick it is much less.

The region tributary to Lake Champlain is very rugged, and the soil has little depth except in the stream valleys. On the west the foothills of the Adirondacks extend in one or two places down to the water, but in general the main ridges lie 10 to 25 miles back from the shore. On the Vermont side the slopes are less rugged than those on the New York side, and the surface ascends gradually from the lake shore to the summits of the Green Mountains, 20 miles or more away. The entire region is picturesque and beautiful in the highest degree.

The lake is fed almost entirely by large tributaries, including Mettawee, Big Chazy, Saranac, Ausable, and Bouquet rivers and the Lake George outlet from the New York side, and Poultney, Otter

Breek, Winooski, Lamoille, and Missisquoi rivers from Vermont. There are a few intermediate streams and brooks flowing directly into the lake, but the area drained by these is relatively small.

Estimates of the drainage area of Lake Champlain differ considerably. The total area of the lake and tributary drainage basins above Chambly, Province of Quebec, as determined from the best available maps, is 8,440 square miles, distributed as follows:

Square miles.

Land area in Vermont, except islands	4, 428
Land area in New York, except islands	2, 724
Islands	55
Land area in Canada above outlet	487
Total land area above outlet	7, 694
Water surface in Canada	17
Water surface in United States	419
Total water surface	436
Total area above outlet	8, 130
Richelieu River, Rouses Point to Chambly	310
Total area above Chambly	8, 440
Richelieu River, Chambly to mouth	630
Total area above mouth	9, 070

Records of elevation of water surface at the outlet of the lake have been kept at Fort Montgomery, Rouses Point, N. Y., by the United States Engineer Corps since 1875, and the discharge of the lake has been determined from observations made at the Chambly dam in 1898 by the United States Board of Engineers on Deep Waterways. Since May, 1907, records of elevation of the lake have been kept at a gage near the dock of the Champlain Transportation Co. at Burlington, Vt., and referred to the datum of the Fort Montgomery gage by a series of comparative readings.

GAGING-STATION RECORDS.

LAKE CHAMPLAIN AT BURLINGTON, VT.

LOCATION.—On south side of roadway leading to dock of Champlain Transportation Co., at foot of King Street, Burlington, Vt.

RECORDS AVAILABLE.—May 1, 1907, to September 30, 1916.

GAGE.—Staff; read once daily. Comparison of gage readings indicates that zero of gage at Burlington is at practically the same elevation as that of gage at Fort Montgomery—92.5 feet above mean sea level.

EXTREMES OF STAGE.—1907–1916: Maximum stage recorded, 8.20 feet April 7, 1913; minimum stage, −0.25 foot December 4, 1908.

ICE.—Lake does not usually freeze over in its wider parts until late in January, and in some years not until February, and then for only a few days. At its northern end, above the outlet, the lake is usually covered with ice from the middle of December to the middle of April.

COOPERATION.—Gage heights furnished through the courtesy of Mr. D. A. Loomis, general manager of the Champlain Transportation Co.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1907–1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1907.												
1								5.5	4.16		2.15	1.00
2								5.63				
3									4.0		2.10	1.00
4								5.7	3.93	2.9		
5									3.8	2.9	2.10	1.25
6								5.95		2.85	2.05	1.30
7								5.95	3.71		2.00	1.40
8								5.95	3.65	2.82	2.00	
9								5.92	2.8		1.90	1.44
10									3.52			1.44
11								5.85	3.5	2.8		1.42
12									3.42	2.76	1.80	
13								5.62	3.32	2.7	1.75	1.50
14								5.62	3.2		1.75	1.60
15								5.45	3.2	2.65	1.75	
16								5.38		2.6	1.65	1.60
17								5.37		2.55	1.55	1.50
18								5.3	3.0	2.55		1.50
19										2.5	1.50	1.50
20								5.1		2.45	1.45	1.50
21											1.40	1.40
22								5.0	2.9	2.45	1.40	
23								4.9		2.4	1.35	1.35
24								4.82	2.85	2.4	1.30	1.30
25								4.72		2.35	1.35	
26										2.35	1.25	1.30
27								4.5		2.3	1.20	1.30
28									2.85		1.20	1.29
29								4.4	2.9	2.25	1.15	
30								4.3	2.9	2.2	1.10	1.30
31								4.23		2.18	1.10	
1907–8.												
1	1.30	2.65					5.95	6.0	5.1	2.95	1.7	.98
2	1.40	2.60	2.90	4.5		a 4.45	5.85	6.15	5.1	2.9		.98
3			2.80	4.5			5.95		5.0	2.8	1.65	.98
4	1.47	2.80	2.75	4.5			5.95	6.35	4.9		1.6	.98
5	1.47		2.90	4.3				6.3	4.85		1.5	
6		2.95	2.80	4.3			5.8	6.3	4.75	2.6	1.5	
7	1.50	3.10	2.75	4.3			5.78	6.3		2.6	1.5	
8		3.30		4.3			5.8	6.3	4.5	2.55	1.4	
9		3.50	2.85	4.3				6.4	4.45	2.5		
10	1.90		2.80	4.3			5.85		4.35		1.4	
11	1.90	3.60	3.25	4.3			5.9	6.45	4.3	2.3	1.4	
12	2.00	3.65	3.70			4.2			4.8		1.35	
13		8.60	3.60	4.3			6.0	6.5	4.05	2.2	1.3	
14	2.17	3.64		4.2	3.5	3.75	6.0			2.2	1.25	
15	2.18	3.55		4.15			6.0	6.45	4.0	2.1	1.2	
16	2.20	3.50		4.1			5.9		3.9	2.0		
17	2.20	3.35		4.1	4.22		5.8		3.9	2.0	1.2	
18	2.20	3.40		4.05	4.4		5.8		3.9	2.0	1.2	
19		3.40				4.5			3.9	2.0	1.2	
20		3.20	3.75	3.95			5.7		3.85	2.0		
21		3.20				4.45	5.7	6.0		2.0	1.2	
22		3.20	3.70	4.0	4.55		5.7		3.6	1.95	1.2	
23	2.10	3.20	3.70	3.95		4.4			3.55	1.9		
24	2.08					4.4			3.5	1.9	1.1	
25	2.00	3.18				4.6	5.45	5.65	3.4	1.9	1.1	
26	2.00	3.15				4.6			3.3		1.05	
27		3.15			4.5	4.8	5.6	5.5	3.25	1.85	1.0	
28		3.13	4.00			5.02	5.7	5.4		1.8	.99	.27
29	2.20	3.10				5.9	5.3		1.8	.99		
30	2.50	3.05	4.25			5.75	6.0		3.0	1.8	.98	
31	2.65		4.40			5.85				1.75	.98	

a Gage height to top of ice.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1907–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1						3.48		6.95	6.00			1.00
2	0.25						a 4.10		5.92	3.40	1.85	1.00
3			−0.10		1.33			6.90	5.78	3.35	1.80	1.00
4			− .25					6.90	5.65		1.78	1.00
5			− .18	−0.05			a 4.45	6.80		3.25	1.70	
6										3.15	1.65	.90
7								6.70	5.45	3.10	1.60	.88
8				.25	1.67	3.60	5.37	6.70	5.40			.85
9	.12						5.80		5.35	3.00	1.52	.83
10								6.70	5.20	2.90	1.50	.80
11		−0.18		.33	1.90			7.00	5.10		1.49	.80
12	.12						5.95	7.17	5.00	2.75	1.45	
13								7.18		2.65	1.40	.75
14	.05							7.10	4.80	2.65	1.35	.72
15	.05				2.06	3.55	6.55	7.08	4.72	2.60		
16							6.95			2.60	1.33	.80
17		− .18					7.05	7.00		2.60	1.30	.75
18			− .05					7.08		2.50	1.30	.70
19					2.30		7.35	7.08		2.45	1.30	
20	.075	− .18		.50			7.56	7.04		2.40	1.30	.60
21							7.61	6.95	4.30	2.37	1.30	.58
22					2.66	3.30	7.50	6.90	4.25	2.30		.51
23		− .21		.53			7.54		4.20	2.25	1.20	.50
24					2.90		7.52	6.68			1.15	.60
25				.70	3.06			6.65			1.12	.59
26				.93	3.02		7.41	6.45	3.95	2.10	1.10	
27				1.03	3.36		7.31	6.30		2.05	1.10	
28		− .15		1.17			7.13	6.20		2.00	1.10	.70
29			− .08	1.20		3.67	7.13	6.15		1.98		.70
30				1.25						1.95	1.10	.80
31										1.90	1.05	
1909–10.												
1	.75	.40			a 1.80	2.55	5.40		3.80	3.15	1.90	1.40
2	.75	.40				2.97	5.50		3.80	3.10	1.85	
3		.42	.50					4.30	3.70	3.65	1.80	
4		.42				●		4.40	3.65		1.80	
5	.80	.42					5.40	4.50		2.95	1.80	1.33
6	.80	.42					5.30	4.50	3.60	2.90	1.80	1.30
7	.80						5.38	4.50	3.60	2.85	1.80	1.25
8	.80	.35			a 1.80		5.40		3.78	2.80	1.80	1.30
9	.80	.35				4.53	5.40	4.50	3.85	2.70		1.30
10		.30				4.63	5.40	4.40	3.90		1.75	1.40
11	.75	.30					5.38	4.00	3.90	2.65	1.75	1.40
12	.75	.38				4.70	5.35	4.35		2.60	1.70	1.40
13	.70	.40					5.30	4.30	3.85	2.50	1.70	1.35
14	.70		.75	a .71	1.80	4.78	5.20	4.28	3.85	2.45		1.33
15	.65					4.80	5.10		3.80	2.40	1.70	1.30
16	.60	.40				4.75	5.05	4.05	3.75	2.40	1.70	1.30
17						4.70		4.00	3.75		1.70	1.30
18	.60	.45		a .70		4.70	4.85	3.90	3.70	2.40	1.65	1.25
19						4.55	4.85	3.85		2.35	1.65	1.25
20	.55	.25					4.85	3.85	3.65	2.30	1.65	1.25
21	.50				1.90	4.60	4.80	3.80	3.60	2.25		1.20
22	.50					4.68	4.75		3.55		1.65	1.20
23	.52					4.65	4.70	3.75	3.50	2.15	1.60	
24				1.15		4.65	4.65	3.75	3.45		1.60	1.10
25	.50			1.40		4.75	4.60	3.60	3.40	2.10	1.60	
26	.45					4.95	4.52	3.70		2.00	1.35	1.05
27	.45		.73				4.45	3.75	3.40	1.95	1.35	
28	.45			1.60	2.00	5.15	4.45	3.75	3.40	1.95		1.05
29						5.20	4.40			1.95	1.35	1.05
30	.42					5.30			3.15	1.95	1.40	1.05
31						5.25		3.80			1.40	

a Gage height to top of ice.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1907–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	1.00	1.20	1.35	......	......	......	......	6.00	3.75	2.15	......	0.60
2		1.20	1.35	......	......	......	......	6.05	3.65	......	1.10	.60
3	1.00	1.20	1.37	1.50	......	2.94	6.25	3.55	2.10	1.10		
4	1.00	......	1.37	......	......	2.97	6.23		......	1.10	.60	
5	1.00	1.25	1.37	......	......		6.15	3.48	......	1.10	.60	
6	1.00		1.35	......	......		3.05	6.10	3.40	2.00		.60
7	1.05		1.35	......	......		3.38	5.95	3.30	1.95	1.05	.60
8	1.10	1.40	1.33	......	......		3.82		3.25			
9	......	1.40	1.30	2.00	......			5.85	3.15	1.80	.85	
10	1.15	1.47	......	......	......		4.48	5.80	3.12	......	.85	
11	1.15	1.40	......	......	......		4.64	5.70	......	1.80	.85	
12	1.15	1.45	......	......	......	a2.10	4.75	5.55	3.05	1.70	.85	.65
13	1.17		......	......	......	a2.20	4.90	5.40	3.00	1.65		
14	1.17	1.45	......	......	......	a2.10	5.05	5.25	2.95	1.60	.80	.55
15	1.20	1.45	......	......	......	a2.10	5.33		2.90	1.58	.80	
16	1.20	1.45	......	......	......	1.70	......	5.12	......		.80	.52
17	1.15	1.45	......	2.20	......	1.70	5.82	5.05	......	1.55	.78	
18	1.15	1.45	......	......	......		5.90	4.95	......	1.51	.78	.56
19	1.10	1.43	......	......	......		5.92	4.85	......	1.45	.78	.60
20	1.10	......	......	......	......		5.93	4.80	2.75	......		.60
21	1.10	1.40	......	......	......	1.80	5.94		2.68	1.40	.70	.58
22	1.10	1.40	......	......	......		5.95	4.55	2.60	1.40	.70	
23	......	1.40	......	......	......				2.55	......	.70	
24	1.10	1.35	......	......	2.10		5.90	4.40	2.50	1.30	.65	
25	1.10	1.35	......	......	......		5.90	4.30		1.25	.64	
26	......	1.35	......	......	......		5.89	4.20	2.40	1.20	......	.60
27	1.15	......	1.25	......	......	1.90	5.90	4.10	2.35	1.20	.60	.57
28	......	1.35	......	......	......	2.15	5.95		2.30	1.20	.52	
29	1.20	1.35	......	......	......	2.40	5.95	4.00	2.25	1.15	.60	.52
30	......	1.35	......	......				3.90	2.20		.60	.52
31	1.20	1.35	......	......		2.80		3.80		1.15	.60	
1911–12.												
1	......	1.10	1.50	......	2.30		3.50	7.20	6.08	3.80	2.05	
2	......	1.10	1.50	2.80	2.30	1.72	3.78	6.89	......	3.70	2.00	1.50
3	......	1.10	......	2.80	2.30		3.90	6.80	6.40	3.60	2.00	1.48
4	......	1.00	1.50	2.80			3.90	6.70	6.40	3.60		1.48
5	......	1.05	1.50	2.70	2.30	1.72	3.98		6.40	3.50	2.00	1.45
6	......	1.10	1.50	2.65	......		4.25	6.60	6.30	3.50	1.95	1.45
7	.65	1.10	1.55	......	......			6.40	6.20		1.90	1.43
8	......	1.10	1.55	2.57	......		5.39	6.20	6.10	3.30	1.90	
9	.65	1.10	1.50	2.55	......	1.74	6.00	6.10	6.00	3.20	1.90	1.43
10	.65	1.10	......	2.40	2.10		6.29	6.00	6.00	......	1.85	1.40
11	.68	1.05	1.55	2.40	......		6.38	5.93	5.90	......	1.85	1.40
12	.68	......	1.60	2.30	......	1.74	6.41		5.83	3.00	1.85	1.40
13	.70	1.10	1.70	2.28	......		6.49	5.70	5.75	2.90	1.85	1,38
14	.70	1.10	1.90	......	2.10			5.60	5.66	......	1.80	1,38
15	......	1.10	2.10	2.15	......		6.45	5.50	5.50	2.75	1.80	......
16	.65	1.10	2.20	2.15	2.00	1.78	6.65	5.50	......	2.60	1.75	1.40
17	.65	1.15	......	2.18	2.00		6.87	5.50	5.40	2.55	1.75	1.45
18	.65	1.20	2.30	2.18	1.90	1.88	7.05	5.50	5.20	2.50	......	1.50
19	.75	......	2.30	2.18	......	2.05	7.20		5.00	2.48	1.75	1.60
20	.85	1.22	2.30	2.18	1.70		7.32	5.50	4.90	2.48	1.72	1.60
21	.90	1.28	2.30	......	......	2.28		5.50	4.82	......	1.70	1.65
22	......	1.30	2.30	2.25	......	2.48	7.25	5.65	4.70	2.50	1.70	......
23	1.00	1.30	2.45	2.47	1.72	2.58	7.33	5.65	......	2.50	1.70	1.80
24	1.05	1.30	......	2.60	......		7.35	5.63	4.60	2.40	1.65	1.88
25	1.05	1.30	2.50	2.60	......	2.65	7.42	5.60	4.50	2.30	1.62	1.90
26	1.10	......	2.70	2.60	1.72	2.68	7.48	5.60	4.50	2.30	1.56	1.90
27	1.10	1.30	2.90	2.60	......	2.68	7.55		4.20	2.20	1.53	1.88
28	1.10	1.35	2.90	......	......	2.70			4.10	......	1.50	1.88
29	......	1.40	2.90	2.60	1.72	2.82	7.55		4.00	2.20	1.50	
30	1.10	1.40	2.80	2.60	......	3.00	7.30	5.90	......	2.10	1.50	1.90
31	1.15	......	......	2.60	......			5.95	......	2.05	1.50	......

a Gage height to top of ice.

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1907–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	1.90	2.38	2.90	......	4.35	......	7.80	5.62	......	2.52	1.48	0.83
2	1.90	2.35	2.90	3.00	......	......	7.85	5.59	3.87	2.43	1.48	.72
3	1.88	......	2.90	3.10	4.28	......	7.90	5.55	3.82	2.40	......	.70
4	1.88	2.35	2.90	3.12	4.20	......	8.00	......	3.82	2.38	1.43	.70
5	1.88	2.40	2.90	......	......	......	8.10	5.35	3.80	2.38	1.40	.68
6	......	2.40	3.00	3.25	......	......	......	5.25	3.80	......	1.38	.65
7	1.85	2.40	3.03	3.25	4.00	......	8.20	5.08	3.80	2.35	1.28	......
8	1.85	2.70	......	3.20	3.95	......	8.10	4.98	......	2.32	1.28	.65
9	1.80	3.00	3.05	3.20	......	......	8.05	4.85	3.78	2.32	1.23	.60
10	1.80	......	3.00	3.20	3.90	......	7.90	4.72	3.65	2.28	......	.60
11	1.78	3.20	2.97	3.20	......	......	7.70	......	3.58	2.25	1.23	.58
12	1.75	3.22	2.98	......	......	......	7.65	4.54	3.54	2.22	1.20	.55
13	......	3.30	2.95	3.33	......	......	......	4.48	3.52	......	1.20	.50
14	1.75	3.35	2.95	3.40	......	......	7.52	4.43	3.47	2.20	1.18	......
15	1.70	3.40	2.93	3.40	......	3.50	7.40	4.38	......	2.10	1.15	.50
16	1.70	3.50	2.90	3.42	......	......	7.20	4.26	3.39	2.07	1.11	.50
17	1.70	3.50	2.90	3.50	......	4.10	7.20	4.20	3.18	2.04	......	.50
18	1.70	3.48	2.90	3.60	......	4.15	7.13	......	3.10	1.98	1.09	.50
19	1.70	3.45	2.90	......	......	4.25	7.00	4.00	3.02	1.90	1.28	.50
20	......	3.40	2.90	4.10	......	4.40	......	3.88	2.95	......	1.23	.50
21	1.70	3.40	2.90	4.25	......	4.45	6.80	3.88	2.90	1.82	1.22	......
22	1.70	3.40	......	4.35	......	4.63	6.70	3.83	......	1.80	1.18	.50
23	1.80	3.40	2.95	4.40	......	......	6.52	3.78	2.86	1.70	1.10	.50
24	1.85	3.60	2.98	4.60	......	4.85	6.48	3.75	2.75	1.70	......	.50
25	1.92	3.58	2.98	......	......	5.15	6.38	......	2.75	1.65	1.08	.50
26	2.28	3.42	2.95	......	......	5.65	6.28	3.72	2.75	1.62	1.05	.50
27	......	3.40	2.93	......	......	6.48	......	3.72	2.75	1.00	1.00	.50
28	2.50	3.20	2.93	......	......	7.20	6.05	3.75	2.68	1.60	1.00	......
29	2.45	3.10	......	4.60	......	7.56	5.95	3.85	......	1.54	.98	.50
30	2.42	3.00	2.90	4.50	......	......	5.78	......	2.56	1.54	.90	.50
31	2.40	......	2.90	4.40	......	7.64	......	3.90	......	1.52	......	......
1913–14.												
1	.50	.80	1.05	......	......	......	3.52	7.50	4.50	2.52	1.55	1.03
2	.50	......	1.05	1.32	1.17	......	3.80	7.45	4.38	2.50	......	1.05
3	.55	.80	1.08	1.32	1.17	......	4.00	......	4.29	2.50	1.48	1.05
4	......	.80	1.10	......	1.15	......	4.12	7.30	4.22	......	1.48	1.08
5	.60	.78	1.10	1.28	1.15	1.65	......	7.28	4.16	2.43	1.47	1.10
6	.63	.78	1.15	1.28	1.10	......	4.21	7.24	4.02	2.43	1.43	......
7	.65	.80	......	1.25	1.05	......	4.26	7.18	......	2.38	1.42	1.10
8	.65	.80	1.15	1.25	......	......	4.34	7.12	3.90	2.38	1.42	1.08
9	.65	......	1.18	1.25	......	1.80	4.55	7.05	3.78	2.32	......	1.06
10	.63	.80	1.20	1.22	......	......	4.90	......	3.65	2.30	1.37	1.06
11	.62	.82	1.20	......	......	......	4.99	6.95	3.60	2.30	1.36	1.04
12	......	.82	1.20	1.22	......	......	......	6.88	3.55	......	1.36	1.03
13	.60	.85	1.20	1.20	......	......	5.13	6.78	3.48	2.24	1.33	......
14	.60	.85	......	1.20	......	......	5.18	6.60	......	2.22	1.32	1.00
15	.60	.85	1.20	1.20	......	......	5.20	6.55	3.30	2.18	1.32	1.00
16	.62	......	1.20	......	......	1.68	5.24	6.50	3.22	2.16	......	1.00
17	.62	.87	1.22	1.20	......	1.80	5.32	......	3.15	2.16	1.29	.95
18	.63	.87	1.22	......	......	......	5.38	6.30	3.03	2.16	1.25	.95
19	......	.90	1.25	1.19	......	......	......	6.08	2.90	......	1.21	.90
20	.65	.90	1.25	1.19	......	2.10	5.74	5.82	2.78	2.13	1.17	......
21	.65	.92	......	1.18	......	......	6.35	5.72	......	2.13	1.16	.87
22	.65	.92	1.25	1.18	......	......	6.73	5.60	2.68	2.12	1.12	.87
23	.65	......	1.28	1.18	......	......	6.98	5.50	2.65	2.12	......	.87
24	.65	.92	1.30	1.18	......	2.17	6.98	......	2.62	1.94	1.08	.85
25	.65	......	......	......	......	......	6.95	5.25	2.58	......	1.05	.85
26	......	.95	1.30	1.17	......	2.22	......	5.16	2.55	1.72	1.03	.85
27	.70	.95	1.30	1.17	......	2.30	7.05	5.08	2.55	1.61	1.00	......
28	.75	.98	......	1.17	......	2.60	7.10	4.90	......	1.60	1.00	.83
29	.80	1.00	1.32	1.17	......	......	7.20	4.75	2.55	1.59	1.00	.82
30	.80	......	1.32	1.18	......	3.12	7.35	4.60	2.52	......	......	.82
31	.80	......	1.32	1.18	......	3.40	......	......	......	......	1.03	......

Daily gage height, in feet, of Lake Champlain at Burlington, Vt., for the years ending Sept. 30, 1907–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	0.82		0.85	0.87			2.85	3.35	2.28	1.49		1.25
2	.82	0.57	.87				2.80		2.25	1.47	1.59	1.25
3	.82	.57	.88				2.78	3.32	2.23	1.43	1.57	1.25
4		.56	.90	.83				3.30	2.19		1.55	1.25
5	.80	.56	.90				2.75	3.26	2.11	1.41	1.54	
6	.80	.56					2.72	3.20		1.40	1.52	1.18
7	.79	.56	1.00	.79			2.72	3.18	2.03	1.40	1.51	1.15
8	.79	.55	1.00	.79	1.35	3.40	2.74	3.12	1.95	1.38		1.12
9	.76	.55	1.02	.79			2.75		1.90	1.54	1.48	1.11
10	.75	.54	1.02				2.80	3.06	1.85	1.59	1.47	1.10
11		.54	1.04	.80				3.04	1.82		1.47	1.10
12	.70	.53	1.04	.83			3.18	3.01	1.82	1.68	1.45	
13	.67	.53		.84			3.45	2.95	1.70	1.70	1.45	1.09
14	.67	.52	1.08	.84			3.63	2.91	1.80	1.70	1.45	1.09
15	.65		1.10	.87		3.45	3.64	2.87	1.80	1.70		1.09
16	.65	.50	1.10	.87			3.65		1.78	1.68	1.43	
17	.63	.50	1.08		1.70		3.65	2.80	1.78	1.66	1.43	1.09
18		.50	1.05	.93				2.73	1.75		1.43	1.09
19	.68	.55	1.04	1.18			3.68	2.69	1.74	1.71	1.42	
20	.70	.57					3.70	2.64		1.74	1.42	1.10
21	.70	.63	1.02				3.64	2.60	1.72	1.78	1.40	1.10
22	.72		1.00				3.60	2.56	1.70	1.76		1.10
23	.72	.70	1.00		1.88	2.90	3.58		1.70	1.72	1.38	1.10
24	.72	.78	.97		1.98		3.55	2.50	1.69	1.70	1.35	1.10
25		.78			2.28			2.50	1.68		1.35	1.10
26	.67	.78	.94			2.96	3.50	2.50	1.65	1.66	1.33	
27	.66	.78					3.46	2.43		1.65	1.32	.98
28	.64	.83	.89				3.40	2.38	1.56	1.61	1.30	.92
29	.60		.88				3.38	2.35	1.52	1.66		.86
30	.58	.85	.87				3.38		1.45	1.64	1.27	.83
31			.87					2.30		1.63	1.25	
1915–16.												
1	.78	.68	.83		3.08		3.85	5.60	4.55	3.75	2.40	1.53
2	.75	.68	.83		3.30			5.52	4.55		2.35	1.50
3		.68	.87	1.62		3.30	4.62	5.48	4.52	3.75	2.31	1.47
4	.73	.67	.90	1.68			4.80	5.42		3.69	2.25	1.44
5	.80	.67		1.71			4.90	5.38	4.43	3.67	2.17	1.41
6	.90	.67	.94				5.00	5.33	4.37	3.62		1.38
7	.90		.94		3.30		5.03		4.30	3.58	2.14	1.35
8	.88	.66	.96				5.10	5.20	4.23	3.55	2.13	1.31
9	.88	.66	.97					5.09	4.20		2.12	1.28
10		.65	.97	1.85			5.15	4.98	4.15	3.47	2.10	1.25
11	.85	.65	1.02				5.15	4.93		3.43	2.10	1.23
12	.85	.65					5.18	4.87	4.08	3.35	2.08	1.20
13	.82	.65	1.08				5.19	4.80	4.08	3.27		1.20
14	.80		1.11			3.18	5.22		4.03	3.18	2.03	1.20
15	.78	.67	1.12				5.32	4.60	3.96	3.13	2.00	1.20
16	.78	.67	1.15					4.50	3.94		1.96	1.20
17		.67	1.15	2.00			5.33	4.55	3.91	3.04	1.96	1.20
18	.75	.68	1.18			3.05	5.40	4.70		2.98	1.93	1.20
19	.75	.68						4.88	3.87	2.94	1.87	1.20
20	.80	.69	1.20			2.93	5.44	4.90	3.85	2.90		1.20
21	.80		1.20				5.45		3.85	2.87	1.82	1.20
22	.78	.71	1.22				5.45	4.83	3.84	2.85	1.80	1.20
23	.77	.73	1.22					4.80	3.83		1.83	1.23
24		.78	1.25	2.05			5.60	4.80	3.83	2.76	1.82	
25	.73	.78		2.10		2.80	5.65	4.74		2.73	1.81	1.25
26	.71	.78		2.20			5.68	4.68	3.80	2.71	1.80	1.18
27	.71	.78	1.28	2.30		2.60	5.75	4.62	3.79	2.68	1.75	1.10
28	.70		1.30	2.45		2.65	5.72.		3.77	2.63	1.70	1.13
29	.69	.81	1.30	2.60			5.68	4.42	3.76	2.55	1.65	1.18
30	.69	.81	1.45			3.05		4.40	3.75		1.60	1.20
31			1.60	2.95		3.48		4.48		2.43	1.55	

LAKE CHAMPLAIN OUTLET (RICHELIEU RIVER) AT CHAMBLY, PROVINCE OF
QUEBEC.

MEASURING POINTS.—Elevation of water surface recorded at Fort Montgomery, near
Rouses Point, N. Y., and at Burlington, Vt. Discharge computed at the dam
at Chambly, Province of Quebec.

DRAINAGE AREA.—8,130 square miles above outlet; 8,440 square miles above dam
at Chambly, Province of Quebec (place of measurement), including 436 square
miles of water surface.

RECORDS AVAILABLE.—January 1, 1875, to September 30, 1916.

GAGES.—Reference points on the base of the scarp wall at Fort Montgomery and on
a flagstone in a well within the fort inclosure. Staff gage at dock of Champlain
Transportation Co. at Burlington. Both gages are referred to a datum 92.5 feet
above mean sea level.

DETERMINATION OF DISCHARGE.—Observations of depth and discharge at the Chambly
dam were made in 1898 by the United States Board of Engineers on Deep Water-
ways. A discharge rating curve has been constructed from the observations at
the Chambly dam referred to the gages at Fort Mongtomery and Burlington.

EXTREMES OF STAGE.—Maximum stage: From observations at St. Johns, Province of
Quebec, in April, 1869, the computed elevation of water surface in Lake Cham-
plain was 103.28 feet above mean sea level (flow at Chambly not determined);
minimum stage, 91.9 feet above mean sea level at the Fort Montgomery gage,
November 13, 1908 (flow not determined).

ICE.—The effect of the ice cover at the outlet of the lake on the discharge rating
curve is unknown but is probably small. Open water rating curve used in
determining discharge throughout the year.

ACCURACY.—Comparison with run-off records on tributary streams and with rainfall
records in the basin indicates that the determinations of monthly discharge may
be considered fair, but it should be noted that several months may elapse between
heavy precipitation and high stages in streams in the upper basin and the corre-
sponding increase in the run-off at the outlet of Lake Champlain. Records of
precipitation at Burlington, Vt., are given for purposes of comparison only, as
they are not considered fairly representative of the average rainfall over the
Champlain basin; the precipitation is much greater near the headwaters of
the tributary drainage basins than at Burlington or other places along the lake.

*Monthly discharge of Lake Champlain outlet (Richelieu River) at Chambly, Province of
Quebec, for the years ending Sept. 30, 1875–1916.*

[Drainage area, 8,440 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Precipi- tation in inches at Burling- ton, Vt.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Precipi- tation in inches at Burling- ton, Vt.
	Mean.	Per square mile.				Mean.	Per square mile.		
1875.					1875–76.				
January.....	5,800	0.687	0.79	1.26	October.....	9,300	1.10	1.27	3.54
February....	5,900	.699	.73	.86	November...	12,300	1.46	1.63	1.34
March.......	8,700	1.03	1.19	1.12	December...	11,300	1.34	1.54	.75
April........	19,200	2.27	2.53	1.38	January.....	14,400	1.71	1.97	1.60
May.........	21,500	2.55	2.94	3.56	February....	13,900	1.65	1.78	1.31
June........	15,900	1.88	2.10	3.00	March.......	16,100	1.91	2.20	3.11
July........	11,900	1.39	1.60	2.73	April........	22,700	2.69	3.00	2.38
August......	9,500	1.13	1.30	2.84	May.........	30,400	3.60	4.15	2.30
September...	8,200	.972	1.08	4.56	June........	20,700	2.45	2.73	2.91
					July........	13,900	1.65	1.90	2.49
The period	11,800	1.40	14.26	21.31	August......	9,400	1.11	1.28	2.66
					September...	6,600	.782	.87	4.82
					The year..	15,100	1.79	24.32	29.21

Monthly discharge of Lake Champlain outlet (Richelieu River) at Chambly, Province of Quebec, for the years ending Sept. 30, 1875–1916—Continued.

Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.	Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.
1876–77.					**1881–82.**				
October.....	6,000	0.711	0.82	0.92	October.....	5,400	0.640	0.74	1.54
November...	5,700	.675	.75	1.51	November...	6,900	.818	.91	1.30
December...	5,000	.592	.68	1.52	December...	8,500	1.01	1.16	1.89
January.....	4,900	.581	.67	1.43	January.....	12,100	1.43	1.65	.44
February....	5,200	.616	.64	.32	February....	11,500	1.36	1.42	1.10
March........	8,300	983	1.13	2.52	March........	16,800	1.99	2.29	2.34
April........	19,100	2.26	2.52	2.53	April........	15,600	1.85	2.06	1.23
May.........	17,200	2.04	2.35	.95	May.........	14,700	1.74	2.01	2.00
June........	11,700	1.39	1.55	3.11	June.........	17,200	2.04	2.28	3.17
July........	10,900	1.29	1.49	4.06	July.........	13,800	1.64	1.89	2.37
August......	10,100	1.20	1.38	4.74	August......	9,700	1.15	1.33	3.49
September...	8,600	1.02	1.14	3.45	September...	7,600	.900	1.00	5.22
The year..	9,370	1.11	15.12	27.06	The year..	11,600	1.38	18.74	26.09
1877–78.					**1882–83.**				
October.....	8,100	.960	1.11	6.33	October.....	7,200	.853	.98	1.21
November...	10,900	1.29	1.44	2.21	November...	5,500	.652	.73	1.47
December...	12,300	1.46	1.68	1.46	December...	4,400	.521	.60	1.60
January.....	10,400	1.23	1.42	7.52	January.....	4,000	.474	.55	.93
February....	8,700	1.03	1.07	.79	February....	5,000	.592	.62	1.07
March........	12,000	1.42	1.64	1.65	March........	6,800	.806	.93	1.15
April........	19,300	2.29	2.56	3.06	April........	17,800	2.11	2.35	1.37
May.........	21,200	2.51	2.89	3.05	May.........	21,800	2.58	2.97	3.67
June........	13,800	1.64	1.83	2.49	June.........	17,700	2.10	2.34	4.69
July........	10,100	1.20	1.38	5.18	July.........	13,500	1.60	1.84	3.15
August......	13,100	1.55	1.79	5.18	August......	9,700	1.15	1.33	3.68
September...	12,700	1.50	1.67	1.13	September...	6,300	.746	.83	3.33
The year.	12,700	1.51	20.48	40.05	The year..	9,960	1.18	16.07	27.32
1878–79.					**1883–84.**				
October.....	8,600	1.02	1.18	4.78	October.....	4,700	.557	.64	3.27
November...	9,300	1.10	1.23	3.38	November...	4,700	.557	.62	1.59
December...	17,800	2.11	2.43	3.24	December...	4,900	.581	.67	1.44
January.....	14,800	1.75	2.02	.78	January.....	5,300	.628	.72	2.14
February....	12,700	1.50	1.56	1.11	February....	8,700	1.03	1.11	2.68
March........	13,800	1.64	1.89	1.45	March........	14,900	1.77	2.04	2.89
April........	19,400	2.30	2.57	.97	April........	25,300	3.00	3.35	1.92
May.........	27,000	3.20	3.69	.38	May.........	23,400	2.77	3.19	3.60
June........	16,600	1.97	2.20	4.52	June.........	16,100	1.91	2.13	1.36
July........	12,000	1.42	1.64	2.71	July.........	10,300	1.22	1.41	2.95
August......	8,900	1.05	1.21	2.39	August......	8,900	1.05	1.21	3.24
September...	6,800	.806	.90	2.82	September...	5,500	.652	.73	3.22
The year..	14,000	1.66	22.52	28.53	The year..	11,000	1.31	17.82	30.30
1879–80.					**1884–85.**				
October.....	5,600	.664	.77	1.36	October.....	5,000	.592	.68	3.82
November...	6,100	.723	.81	3.56	November...	5,700	.675	.75	2.95
December...	11,000	1.30	1.50	2.22	December...	8,300	.983	1.13	2.60
January.....	11,300	1.34	1.55	1.87	January.....	11,400	1.35	1.56	2.36
February....	14,000	1.66	1.79	.62	February....	11,200	1.33	1.38	1.40
March.......	15,900	1.88	2.17	.97	March........	9,900	1.18	1.36	.86
April........	17,100	2.03	2.26	1.73	April........	19,600	2.32	2.59	2.53
May.........	15,800	1.87	2.16	1.46	May.........	24,900	2.95	3.40	2.48
June........	11,400	1.35	1.51	1.33	June.........	15,300	1.81	2.02	2.52
July........	8,500	1.01	1.16	2.30	July.........	11,600	1.37	1.58	3.80
August......	6,300	.746	.86	2.26	August......	9,600	1.14	1.31	3.41
September...	4,400	.521	.58	3.26	September...	9,700	1.15	1.28	3.50
The year..	10,600	1.26	17.12	22.94	The year..	11,800	1.40	19.04	32.23
1880–81.					**1885–86.**				
October.....	3,800	.450	.52	6.22	October.....	6,000	.711	.82	4.77
November...	9,100	1.08	1.20	2.57	November...	16,800	1.99	2.22	3.94
December...	8,300	.983	1.13	.62	December...	16,700	1.98	2.28	2.07
January.....	6,900	.818	.94	.97	January.....	17,000	2.01	2.32	1.68
February....	8,200	.972	1.01	1.79	February....	16,000	1.90	1.98	1.06
March.......	13,900	1.65	1.90	1.56	March........	15,400	1.82	2.10	1.33
April........	15,500	1.84	2.05	.62	April........	22,900	2.71	3.02	1.68
May.........	20,300	2.41	2.78	2.27	May.........	19,200	2.27	2.62	2.61
June........	14,500	1.72	1.92	7.89	June.........	13,900	1.65	1.84	1.98
July........	10,100	1.20	1.38	2.22	July.........	10,300	1.22	1.41	3.04
August......	8,000	.948	1.09	2.69	August......	8,100	.960	1.11	3.22
September...	6,500	.770	.86	2.34	September...	6,200	.735	.82	3.73
The year..	10,500	1.24	16.78	31.67	The year..	14,000	1.66	22.54	32.01

SURFACE WATERS OF VERMONT.

Monthly discharge of Lake Champlain outlet (Richelieu River) at Chambly, Province of Quebec, for the years ending Sept. 30, 1875–1916—Continued.

Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.	Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.
1886–87.					**1891–92.**				
October.....	6,200	0.735	0.85	1.25	October.....	5,400	0.640	0.74	3.02
November...	8,400	1.00	1.12	4.29	November...	5,000	.592	.66	2.73
December...	13,100	1.55	1.79	1.70	December...	7,200	.853	.98	2.23
January.....	10,700	1.27	1.46	1.87	January.....	13,400	1.59	1.83	2.76
February....	15,000	1.78	1.85	1.67	February....	12,700	1.50	1.62	1.67
March.......	13,100	1.55	1.79	1.87	March.......	11,300	1.34	1.54	.92
April........	23,600	2.80	3.12	2.21	April........	20,000	2.37	2.64	1.02
May.........	29,000	3.44	3.97	2.00	May.........	17,300	2.05	2.36	4.28
June.........	19,500	2.31	2.58	4.38	June.........	19,100	2.26	2.52	6.72
July.........	13,400	1.59	1.83	2.22	July.........	23,900	2.83	3.26	7.66
August......	9,900	1.17	1.35	2.80	August......	18,700	2.22	2.56	8.36
September...	7,400	.877	.98	2.01	September...	15,300	1.81	2.02	3.22
The year..	14,100	1.67	22.69	28.27	The year..	14,100	1.67	22.73	44.59
1887–88.					**1892–93.**				
October.....	5,300	.628	.72	1.99	October.....	10,400	1.23	1.42	1.35
November...	5,000	.592	.66	4.67	November...	11,000	1.30	1.45	3.28
December...	9,700	1.15	1.33	3.44	December...	11,000	1.30	1.50	1.00
January.....	10,600	1.26	1.45	1.06	January.....	8,400	1.00	1.15	.70
February....	10,900	1.29	1.39	.79	February....	7,900	.936	.97	1.24
March.......	12,900	1.53	1.76	3.71	March.......	9,700	1.15	1.33	.52
April........	23,900	2.83	3.16	I.93	April........	16,200	1.92	2.14	1.70
May.........	30,200	3.58	4.13	3.26	May.........	21,700	2.57	2.96	3.17
June.........	19,700	2.33	2.60	3.95	June.........	15,800	1.87	2.09	1.73
July.........	12,900	1.53	1.76	1.47	July.........	9,800	1.16	1.34	3.74
August......	9,200	1.09	1.26	4.10	August......	8,000	.948	1.09	8.31
September...	9,900	1.17	1.30	5.68	September...	11,800	1.40	1.56	2.45
The year..	13,300	1.58	21.52	36.05	The year..	11,800	1.40	19.00	29.19
1888–89.					**1893–94.**				
October.....	11,700	1.39	1.60	3.94	October.....	8,500	1.01	1.16	1.72
November...	15,200	1.80	2.01	3.60	November...	6,600	.782	.87	1.41
December...	16,200	1.92	2.21	1.63	December...	6,700	.794	.91	2.35
January.....	19,300	2.29	2.64	3.57	January.....	9,900	1.17	1.35	1.30
February....	16,200	1.92	2.00	1.59	February....	10,100	1.20	1.25	.99
March.......	14,300	1.69	1.95	2.35	March.......	16,200	1.92	2.21	1.31
April........	20,200	2.39	2.67	1.51	April........	17,300	2.05	2.29	.86
May.........	19,600	2.32	2.68	4.28	May.........	14,900	1.77	2.04	3.54
June.........	17,500	2.07	2.31	6.26	June.........	12,800	1.52	1.70	1.45
July.........	15,300	1.81	2.09	4.09	July.........	9,800	1.16	1.34	1.57
August......	12,900	1.53	1.76	2.48	August......	6,900	.813	.94	1.49
September...	9,600	1.14	1.27	4.82	September...	5,300	.628	.70	2.88
The year..	15,700	1.86	25.19	40.12	The year..	10,400	1.23	16.76	20.87
1889–90.					**1894–95.**				
October.....	11,400	1.35	1.56	3.32	October.....	5,200	.616	.71	3.59
November...	12,000	1.42	1.58	2.46	November...	6,900	.818	.91	1.96
December...	14,900	1.77	2.04	I.48	December...	7,100	.841	.97	2.02
January.....	13,900	1.65	1.90	2.05	January.....	7,800	.924	1.07	1.31
February....	16,000	1.90	1.98	1.98	February....	7,400	.877	.91	1.16
March.......	18,800	2.23	2.57	2.11	March.......	7,600	.900	1.04	.77
April........	20,800	2.46	2.74	1.93	April........	17,600	2.09	2.33	1.65
May.........	25,500	3.02	3.48	6.12	May.........	21,300	2.52	2.90	3.79
June.........	26,200	3.10	3.46	2.57	June.........	14,200	1.68	1.87	2.78
July.........	14,000	1.66	1.91	3.33	July.........	9,400	1.11	1.28	2.46
August......	9,700	1.15	1.33	6.76	August......	7,600	.900	1.04	4.84
September...	14,200	1.68	1.87	3.84	September...	7,200	.853	.95	3.64
The year..	16,400	1.95	26.42	37.95	The year..	9,950	1.18	15.98	29.97
1890–91.					**1895–96.**				
October.....	13,800	1.64	1.89	2.02	October.....	5,400	.640	.74	.23
November...	14,200	1.68	1.87	2.31	November...	6,700	.794	.89	4.32
December...	13,300	1.58	1.82	1.90	December...	12,500	1.48	1.71	1.74
January.....	12,700	1.50	1.73	2.85	January.....	14,800	1.75	2.02	.63
February....	16,000	1.90	1.98	1.01	February....	11,800	1.40	1.51	1.94
March.......	23,400	2.77	3.19	1.70	March.......	18,000	2.13	2.46	3.54
April........	28,600	3.39	3.78	2.77	April........	30,500	3.61	4.03	.60
May.........	23,100	2.74	3.16	2.16	May.........	24,900	2.95	3.40	1.25
June.........	14,200	1.68	1.87	1.48	June.........	14,100	1.67	1.86	3.13
July.........	9,900	1.17	1.35	3.48	July.........	10,300	1.22	1.41	3.83
August......	8,200	.972	1.12	3.25	August......	7,900	.936	1.08	4.09
September...	7,300	.865	.97	2.44	September...	6,100	.723	.81	3.59
The year.:	15,400	1.82	24.73	27.37	The year..	13,600	1.61	21.92	28.89

Monthly discharge of Lake Champlain outlet (Richelieu River) at Chambly, Province of Quebec, for the years ending Sept. 30, 1875–1916—Continued.

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.
	Mean.	Per square mile.				Mean.	Per square mile.		
1896–97.					**1901–2.**				
October	6,500	0.770	0.89	2.52	October	6,380	0.756	0.87	2.88
November	9,100	1.08	1.20	2.43	November	6,080	.720	.80	1.84
December	9,700	1.15	1.33	.83	December	10,500	1.24	1.43	3.69
January	8,300	.983	1.13	2.50	January	12,300	1.46	1.68	.66
February	7,900	.936	.97	1.08	February	10,900	1.29	1.37	1.82
March	10,600	1.26	1.45	2.49	March	28,700	3.40	3.92	2.82
April	21,600	2.56	2.86	4.01	April	31,300	3.71	4.14	2.37
May	24,800	2.94	3.39	5.00	May	22,200	2.63	3.02	4.46
June	21,900	2.59	2.89	5.63	June	20,500	2.43	2.71	5.29
July	19,300	2.29	2.64	8.48	July	16,300	1.93	2.22	6.23
August	18,400	2.18	2.51	4.08	August	13,300	1.58	1.82	3.17
September	12,300	1.46	1.63	2.13	September	10,200	1.21	1.35	3.68
The year	14,300	1.69	22.89	41.18	The year	15,700	1.86	25.31	38.91
1897–98.					**1902–3.**				
October	8,500	1.01	1.16	1.53	October	8,660	1.03	1.19	4.95
November	9,800	1.16	1.29	4.41	November	10,800	1.28	1.43	1.29
December	15,400	1.82	2.10	2.10	December	10,400	1.23	1.42	1.62
January	14,400	1.71	1.97	2.60	January	11,200	1.33	1.53	2.18
February	14,900	1.77	1.84	2.98	February	14,100	1.67	1.74	1.92
March	22,900	2.71	3.12	1.04	March	29,400	3.48	4.01	3.53
April	24,500	2.90	3.24	2.33	April	34,200	4.05	4.52	1.63
May	18,600	2.20	2.54	2.14	May	17,600	2.09	2.41	(a)
June	13,800	1.64	1.83	2.93	June	11,700	1.39	1.55	4.92
July	9,800	1.16	1.34	1.51	July	10,800	1.28	1.43	6.68
August	7,400	.877	1.01	4.58	August	10,200	1.21	1.40	4.02
September	6,500	.770	.86	5.01	September	8,120	.962	1.07	.80
The year	13,800	1.64	22.30	33.16	The year	14,800	1.75	23.75	33.54
1898–99.					**1903–4.**				
October	8,700	1.03	1.19	4.01	October	6,850	.812	.94	4.55
November	10,300	1.22	1.36	1.90	November	6,670	.790	.87	1.21
December	9,600	1.14	1.31	.75	December	6,240	.739	.85	1.42
January	10,600	1.26	1.45	1.12	January	6,840	.810	.93	1.36
February	9,620	1.14	1.19	1.24	February	7,310	.866	.90	.90
March	13,300	1.58	1.82	4.12	March	11,600	1.37	1.58	1.00
April	21,700	2.57	2.87	1.88	April	23,100	2.74	3.05	3.06
May	24,600	2.91	3.36	2.01	May	22,300	2.64	3.04	2.99
June	13,900	1.65	1.84	2.43	June	15,600	1.85	2.07	2.37
July	9,620	1.14	1.31	5.37	July	10,900	1.29	1.49	4.19
August	6,880	.815	.94	3.82	August	8,060	.955	1.10	2.56
September	5,170	.613	.68	6.38	September	7,740	.917	1.02	5.84
The year	12,000	1.42	19.32	35.03	The year	11,100	1.31	17.83	31.45
1899–1900.					**1904–5.**				
October	4,530	.537	.62	2.81	October	10,300	1.22	1.41	3.29
November	8,950	1.06	1.18	3.42	November	10,500	1.24	1.33	.52
December	11,400	1.35	1.56	2.65	December	7,800	.924	1.07	1.63
January	10,900	1.29	1.49	3.32	January	7,890	.935	1.07	1.28
February	14,500	1.72	1.79	2.17	February	7,610	.902	.94	.75
March	16,000	1.90	2.19	3.19	March	9,230	1.09	1.23	1.82
April	22,200	2.63	2.93	.91	April	22,300	2.64	2.94	2.15
May	18,000	2.13	2.46	2.45	May	17,500	2.07	2.39	2.58
June	18,800	2.23	2.49	1.96	June	14,100	1.67	1.83	4.70
July	12,000	1.42	1.64	2.73	July	15,500	1.84	2.12	7.67
August	9,300	1.10	1.27	5.25	August	15,000	1.78	2.05	3.98
September	7,180	.851	.95	3.20	September	14,600	1.73	1.92	4.32
The year	12,800	1.52	20.57	34.06	The year	12,700	1.51	20.43	34.69
1900–1901.					**1905–6.**				
October	6,590	.781	.90	1.90	October	12,400	1.47	1.70	2.59
November	8,040	.953	1.06	5.74	November	10,100	1.20	1.34	1.38
December	13,300	1.58	1.82	1.42	December	10,200	1.21	1.40	1.51
January	11,900	1.41	1.63	1.76	January	12,000	1.42	1.64	1.00
February	9,890	1.17	1.22	.67	February	14,300	1.69	1.76	2.02
March	10,300	1.22	1.41	2.73	March	13,200	1.56	1.80	1.75
April	30,700	3.64	4.06	3.11	April	17,500	2.07	2.31	1.29
May	28,400	3.36	3.87	3.96	May	19,600	2.32	2.67	2.83
June	20,900	2.48	2.77	4.70	June	17,200	2.04	2.27	5.28
July	13,200	1.56	1.80	2.29	July	14,000	1.66	1.91	2.33
August	10,100	1.20	1.38	3.18	August	10,400	1.23	1.42	2.26
September	7,600	.900	1.00	3.07	September	8,070	.956	1.07	3.59
The year	14,300	1.69	22.92	34.53	The year	13,200	1.57	21.31	27.83

a Trace.

Monthly discharge of Lake Champlain outlet (Richelieu River) at Chambly, Province of Quebec, for the years ending Sept. 30, 1875–1916—Continued.

Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.	Month.	Discharge in second-feet. Mean.	Per square mile.	Run-off (depth in inches on drainage area).	Precipitation in inches at Burlington, Vt.
1906–7.					**1911–12.**				
October	6,580	0.780	0.90	2.93	October	5,650	0.669	0.77	2.84
November	6,650	.788	.88	2.60	November	6,970	.826	.92	1.56
December	8,370	.992	1.14	1.99	December	10,100	1.20	1.38	2.51
January	11,700	1.39	1.60	1.02	January	11,300	1.34	1.54	.86
February	11,400	1.35	1.41	.67	February	9,350	1.11	1.20	1.94
March	11,000	1.30	1.50	1.37	March	10,200	1.21	1.40	2.97
April	20,900	2.48	2.77	2.56	April	27,300	3.23	3.60	2.97
May	23,300	2.76	3.18	1.54	May	25,700	3.05	3.52	5.55
June	15,000	1.78	1.99	4.21	June	22,800	2.70	3.01	1.18
July	12,200	1.45	1.67	3.68	July	12,700	1.50	1.73	3.24
August	8,940	1.06	1.22	1.05	August	8,770	1.04	1.20	2.55
September	8,160	.967	1.08	4.70	September	8,470	1.00	1.12	5.26
The year	12,000	1.42	19.34	28.32	The year	13,300	1.57	21.39	33.43
1907–8.					**1912–13.**				
October	10,100	1.20	1.38	3.59	October	9,420	1.12	1.29	2.95
November	14,400	1.71	1.91	2.67	November	13,500	1.60	1.78	3.51
December	15,500	1.84	2.12	2.61	December	13,500	1.60	1.84	1.15
January	17,900	2.12	2.44	1.54	January	16,400	1.94	2.24	2.38
February	17,100	2.03	2.19	2.27	February	16,000	1.90	1.98	.56
March	18,800	2.23	2.57	1.74	March	17,900	2.12	2.44	4.53
April	25,600	3.03	3.38	1.93	April	33,200	3.94	4.40	1.72
May	27,000	3.20	3.69	3.47	May	18,400	2.18	2.51	2.56
June	17,800	2.11	2.35	2.46	June	14,100	1.67	1.86	2.22
July	11,000	1.30	1.50	2.66	July	9,280	1.10	1.27	2.83
August	7,790	.923	1.06	1.70	August	6,670	.790	.91	1.10
September	5,340	.633	.71	1.15	September	4,690	.556	.62	2.56
The year	15,700	1.86	25.30	27.79	The year	14,400	1.71	23.14	28.17
1908–9.					**1913–14.**				
October	3,780	.448	.52	1.95	October	4,630	.549	.63	2.90
November	2,310	.274	.31	1.03	November	5,750	.681	.76	.68
December	2,570	.305	.35	1.59	December	6,770	.802	.92	1.61
January	4,730	.560	.65	2.38	January	6,700	.794	.92	1.60
February	10,100	1.20	1.25	4.18	February	8,090	.959	1.00	.41
March	15,000	1.78	2.05	1.81	March	9,730	1.15	1.33	1.84
April	27,900	3.31	3.69	2.67	April	23,000	2.73	3.05	4.27
May	31,300	3.71	4.28	5.58	May	26,900	3.19	3.68	.36
June	20,600	2.44	2.72	3.57	June	14,400	1.71	1.91	3.30
July	12,400	1.47	1.70	4.06	July	9,450	1.12	1.29	1.94
August	8,090	.959	1.11	2.83	August	6,770	.802	.92	2.78
September	5,920	.701	.78	4.36	September	5,990	.710	.79	2.36
The year	12,100	1.43	19.41	36.01	The year	10,700	1.27	17.20	24.05
1909–10.					**1914–15.**				
October	5,440	.645	.74	1.13	October	5,710	.677	.78	1.10
November	4,590	.544	.61	1.66	November	5,410	.641	.72	1.41
December	5,070	.601	.69	1.53	December	6,630	.786	.91	1.25
January	5,540	.656	.76	2.70	January	6,700	.794	.92	1.16
February	8,710	1.03	1.07	3.00	February	9,080	1.08	1.12	3.28
March	18,300	2.17	2.50	.51	March	14,300	1.65	1.90	.22
April	21,500	2.55	2.84	2.10	April	14,600	1.73	1.82	.73
May	17,400	2.06	2.38	3.42	May	13,000	1.54	1.78	1.73
June	15,700	1.86	2.08	3.10	June	9,520	1.13	1.26	2.18
July	11,500	1.36	1.57	3.06	July	8,570	1.02	1.18	5.46
August	8,840	1.05	1.21	2.76	August	8,160	.967	1.11	2.88
September	7,380	.874	.98	2.75	September	7,040	.834	.93	.97
The year	10,800	1.28	17.43	27.72	The year	8,950	1.06	14.43	22.37
1910–11.					**1915–16.**				
October	6,900	.818	.94	3.34	October	5,950	.705	.81	2.74
November	7,550	.895	1.00	2.43	November	5,680	.673	.75	1.72
December	7,310	.866	1.00	2.46	December	7,710	.843	.97	2.61
January	9,560	1.13	1.30	1.32	January	10,100	1.20	1.38	.87
February	9,420	1.12	1.17	1.39	February	14,700	1.74	1.88	2.32
March	9,250	1.10	1.27	2.44	March	13,900	1.65	1.90	1.31
April	20,500	2.43	2.71	.83	April	22,800	2.70	3.12	1.85
May	22,000	2.61	3.01	1.13	May	21,300	2.52	2.90	4.69
June	13,100	1.55	1.73	2.54	June	17,600	2.09	2.33	4.32
July	8,600	1.02	1.18	2.47	July	14,100	1.67	1.92	1.67
August	5,950	.705	.81	3.83	August	10,000	1.18	1.36	1.06
September	5,030	.596	.66	3.46	September	7,580	.898	1.00	4.06
The year	10,500	1.24	16.78	27.64	The year	12,600	1.49	20.32	29.22

POULTNEY RIVER NEAR FAIR HAVEN, VT.

LOCATION.—At the Delaware & Hudson Railroad bridge about half a mile above Castleton River and 2 miles from Fair Haven.

DRAINAGE AREA.—74 square miles.

RECORDS AVAILABLE.—August 26 to December 2, 1908.

GAGE.—Vertical staff attached to remnant of masonry dam directly under railroad bridge; read twice daily by Frank Brooks.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control at medium and high stages probably affected by backwater from Castleton River.

REGULATION.—Flow probably not seriously affected by regulation.

ACCURACY.—Records considered fair.

COOPERATION.—Station established and maintained during the summer of 1908 by the State engineer and surveyor of the State of New York.

Discharge measurements of Poultney River near Fair Haven, Vt., during 1903 and 1908.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1903. Sept. 17	R. E. Horton..........	*Feet.*	*Sec.-ft.* 15.1	1908. Aug. 26	G. M. Brett............	*Feet.* 0.92	*Sec.-ft.* 4.7
				26	.....do.................	.92	5.5
				Sept. 20	C. R. Adams...........	.64	1.5

Daily discharge, in second-feet, of Poultney River near Fair Haven, Vt., for 1908.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1........	....	2.1	2.1	7.0	4.8	16......	....	1.2	4.8	7.0	....
2........	....	2.1	2.1	7.0	5.9	17......	....	1.2	4.8	4.8	....
3........	....	2.6	7.0	4.8	....	18......	....	1.2	4.8	7.0	....
4........	....	4.0	2.1	4.8	....	19......	....	1.2	4.0	7.0	....
5........	....	3.2	2.1	7.0	....	20......	....	1.2	3.2	7.0	....
6........	....	3.2	4.0	8.5	....	21......	....	.9	3.2	7.0	....
7........	....	4.0	3.2	4.8	....	22......	....	.6	3.2	7.0	....
8........	....	3.2	3.2	4.8	....	23......	....	.6	3.2	4.8	....
9........	....	3.2	3.2	3.2	....	24......	....	.6	3.2	7.0	....
10........	....	2.1	3.2	4.8	....	25......	....	.6	2.6	7.0	....
11........	....	1.2	3.2	4.8	....	26......	4.8	.6	2.6	5.9	....
12........	....	.6	3.2	4.8	....	27......	4.8	.6	3.2	7.0	....
13........	....	.6	5.9	5.9	....	28......	3.2	.6	3.2	4.8	....
14........	....	1.2	4.8	7.0	....	29......	2.6	1.2	4.8	7.0	....
15........	....	1.2	4.8	7.0	....	30......	2.1	1.2	7.0	7.0	....
						31......	2.1	....	7.0	....	....

Monthly discharge of Poultney River near Fair Haven, Vt., for 1908.

[Drainage area, 74 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
August 26–31.................................	4.8	2.1	3.8	0.446	0.10
September.....................................	4.0	.6	1.6	.216	.24
October.......................................	7.0	2.1	3.8	.514	.59
November.....................................	8.5	3.2	6.1	.825	.92

OTTER CREEK AT MIDDLEBURY, VT.

LOCATION.—At the railroad bridge about half a mile south of the rai`road station at Middlebury, 3½ miles below mouth of Middlebury River and 3½ miles above mouth of New Haven River.

DRAINAGE AREA.—615 square miles.

RECORDS AVAILABLE.—April 1, 1903, to May 1, 1907; October 5, 1910, to September 30, 1916.

GAGE.—Chain fastened to lower downstream chord of railroad bridge.

DISCHARGE MEASUREMENTS.—Made from a boat just below the railroad bridge, at the stone-arch highway bridge just above the dam, or by wading.

CHANNEL AND CONTROL.—Channel deep and current sluggish for several miles above station. Control for low stages, gravel and boulder rips about 800 feet below gage; possibly somewhat shifting; control at high stages is near the dam 800 feet farther downstream.

EXTREMES OF STAGE.—Maximum stage recorded, 21.07 feet March 30, 1913 (discharge, 8,000 second-feet); minimum stage, 11.45 feet September 15, 1913 (discharge, 138 second-feet). A somewhat lower discharge has probably occurred at various times when the stage-discharge relation has been affected by ice.

WINTER FLOW.—Stage-discharge relation affected by ice; winter records based on gage heights, observer's notes, weather records, and results of current-meter measurements.

REGULATION.—Probably little if any effect from power developments above the station. (See Pls. VII, VIII.) Very little storage in the basin.

ACCURACY.—Results good except for low stages when there exists some uncertainty as to permanence of stage-discharge relation.

COOPERATION.—Data for 1910 to 1915 furnished by H. K. Barrows, consulting engineer, Boston. Gage readings from June to September, 1916, by an employee of the Vermont Marble Co.

Discharge measurements of Otter Creek at Middlebury, Vt., during 1903–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1903.		*Feet.*	*Sec.-ft.*	**1906.**		*Feet.*	*Sec.-ft.*
Apr. 3	C. B. Brownell.........	15.90	3,730	Sept. 26	A. D. Butterfield......	12.35	316
18	H. K. Barrows.........	13.62	1,340	Nov. 8	.....do.................	12.27	344
28	.....do.................	12.75	640	**1910.**			
May 9	.....do.................	12.35	455	Aug. 8	H. B. Alvord..........	12.47	621
19	.....do.................	12.20	235	13	Alvord and Moore.....	12.05	402
June 24	.....do.................	13.05	835	13	.....do.................	12.03	396
July 7	.....do.................	12.20	245	15	C. A. Moore............	11.79	274
18	N. C. Grover...........	12.00	284	15	.....do.................	11.80	273
Aug. 6	H. K. Barrows........	12.25	337	15	.....do.................	11.81	284
Sept. 14	.....do.................	11.71	190	16	.....do.................	11.91	354
Nov. 21	.....do.................	12.48	484	16	.....do.................	11.92	341
				16	.....do.................	11.92	357
1904.				17	.....do.................	11.94	344
Oct. 29	H. K. Barrows........	13.68	1,300	17	.....do.................	11.95	344
				17	.....do.................	11.96	337
1905.				22	.....do.................	11.70	223
Mar. 29	Butterfield and Brett..	15.65	3,760	Sept. 10	.....do.................	12.06	442
Apr. 1	A. D. Butterfield......	16.72	4,900	Oct. 1	.....do.................	12.56	639
4	.....do.................	17.22	5,560	3	.....do.................	12.22	510
10	.....do.................	15.52	3,750				
10	.....do.................	15.50	3,430	**1911.**			
May 1	Butterfield and Brett..	13.40	1,370	Jan. 5	C. A. Moore............	a14.61	2,110
12	G. M. Brett............	12.90	946	6	.....do.................	a14.61	2,110
				6	.....do.................	a14.60	2,040
1906.				6	.....do.................	a14.60	2,100
Mar. 10	H. K. Barrows.........	13.40	1,160	11	.....do.................	a13.48	1,130
Apr. 14	G. M. Brett............	14.25	2,100				

a Stage-discharge relation affected by ice.

POWER STATION ON OTTER CREEK AT PROCTOR, VT.

A. POWER STATION ON OTTER CREEK AT CENTER RUTLAND, VT.

B. POWER STATION AT HUNTINGTON FALLS, VT.

Discharge measurements of Otter Creek at Middlebury, Vt., during 1903–1916—Contd.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1911.				1913.			
Apr. 15	C. A. Moore	15.66	3,070	June 25	C. A. Moore	11.99	396
15	....do	15.66	3,100	25	....do	11.99	385
18	....do	15.38	2,880	1916.			
18	....do	15.39	2,900	Aug. 3	C. H. Pierce	12.27	390
19	....do	15.30	2,540	Sept. 29	Hardin Thweatt	12.03	299
20	....do	15.14	2,620	30	....do	12.07	332
21	....do	15.00	2,450				
June 8	....do	12.03	433				

NOTE.—Several discharge measurements made subsequent to September 30, 1916, were used in determining the rating curve used for 1915–16.

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1903.							1903.						
1....	3,960	566	159	450	360	360	16....	1,370	360	866	290	403	283
2....	3,840	555	242	599	360	403	17....	1,390	360	705	290	302	302
3....	3,720	555	248	566	242	369	18....	1,320	320	599	276	352	320
4....	3,600	491	248	475	313	360	19....	1,210	360	501	302	340	320
5....	3,480	475	242	360	360	360	20....	1,070	360	475	202	403	360
6....	3,370	475	217	320	360	403	21....	992	320	501	328	501	283
7....	3,320	460	242	360	352	302	22....	866	320	775	450	610	313
8....	3,200	450	159	340	360	320	23....	845	320	1,240	1,500	528	320
9....	3,100	426	202	320	360	320	24....	740	328	880	1,210	369	313
10....	2,980	426	255	320	255	320	25....	726	168	640	775	360	283
11....	2,760	360	382	290	328	320	26....	670	242	566	566	412	265
12....	2,540	382	441	299	582	290	27....	610	265	726	528	475	232
13....	2,270	382	1,130	183	824	283	28....	640	276	622	528	544	175
14....	1,850	360	1,600	217	622	202	29....	610	265	475	412	441	217
15....	1,460	360	1,320	276	475	232	30....	582	248	441	412	412	276
							31....		248		382	320	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1.	283	403	290				3,960	3,040	582	555	381	283
2.	283	360	320				3,480	3,150	555	610	403	301
3.	283	394	320				3,150	3,150	501	880	450	301
4.	320	369	302				2,600	3,040	475	705	501	450
5.	290	360	302				1,950	2,820	475	475	426	320
6.	340	475	320				1,550	2,380	450	501	360	360
7.	501	544	223				1,645	1,900	955	450	360	381
8.	491	555	283				2,050	1,370	705	403	248	360
9.	658	412	302				2,380	1,030	1,030	360	283	340
10.	1,020	450	283				2,710	955	845	340	320	320
11.	1,110	412					2,710	1,030	705	248	301	320
12.	845	403					2,820	1,110	582	265	340	248
13.	658	403					2,820	992	450	426	381	248
14.	491	382					2,710	880	450	426	381	283
15.	450	403					2,380	810	403	403	301	501
16.	394	290					1,800	880	403	360	320	1,240
17.	360	369					1,420	1,750	403	320	360	1,190
18.	460	705					1,370	1,900	360	248	340	918
19.	670	866					1,460	1,650	320	320	301	775
20.	940	705					1,500	1,950	232	320	301	670
21.	726	475					1,370	2,160	320	283	501	810
22.	599	403					1,370	2,160	360	283	670	705
23.	512	369					1,370	1,850	360	248	740	610
24.	610	412					1,460	1,370	340	283	670	501
25.	610	450					1,700	1,070	320	217	582	810
26.	528	328					2,050	1,030	320	232	475	1,070
27.	501	283					2,050	1,070	265	320	403	1,280
28.	501	320					2,320	918	320	450	403	1,150
29.	450	394					2,760	740	320	403	248	1,030
30.	450	248					3,040	610	320	450	283	2,050
31.	426							582		501	320	

*Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916—*Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	2,160	880	450				4,910	1,300	400	1,300	2,730	735
2	2,050	810	450				5,270	1,210	335	1,880	2,670	655
3	1,460	705	403				5,630	1,120	367	2,620	2,400	1,160
4	1,190	670	360				5,570	1,120	470	2,510	1,830	2,130
5	992	640	248				5,150	1,210	400	2,080	1,300	2,340
6	810	610	320				4,670	1,210	615	1,530	902	2,290
7	740	582					4,430	1,210	1,030	1,210	695	2,290
8	670	555					4,070	1,160	1,070	1,030	695	1,880
9	670	501					3,830	1,070	1,070	860	860	1,390
10	610	450					3,560	1,120	860	695	775	987
11	740	450					3,220	1,070	695	615	615	817
12	1,110	450					3,110	902	695	540	615	860
13	1,110	450					3,060	775	817	470	695	987
14	1,030	450					3,060	817	902	695	695	1,030
15	955	450					2,950	775	695	615	695	902
16	845	450					2,840	987	540	470	945	775
17	740	450					2,510	1,070	540	335	1,630	735
18	670	360					1,980	945	1,030	470	1,430	1,210
19	610	403					1,480	860	1,430	540	1,120	2,510
20	610	426					1,210	860	1,780	540	817	2,730
21	705	450					1,250	860	1,480	470	615	2,890
22	2,490	775					2,130	695	2,180	400	615	2,840
23	2,490	775					2,290	615	2,400	400	540	2,780
24	2,320	740					1,980	540	2,340	220	505	2,510
25	1,900	610					1,680	470	1,880	400	470	2,080
26	1,460	610					1,430	470	1,630	505	470	1,530
27	1,500	528					1,300	578	2,400	540	400	1,300
28	1,750	381					1,300	615	2,400	470	305	1,120
29	1,460	340				3,500	1,300	505	2,080	435	400	902
30	1,190	403				4,250	1,300	470	1,630	655	400	860
31	955					4,790		400		2,510	655	
1905–6.												
1	775	470	1,580				3,610	1,880	3,440	1,830	1,120	615
2	695	470	735				3,500	1,630	3,500	2,080	775	505
3	655	470	1,300				3,120	1,880	3,560	1,680	615	435
4	655	470	2,130				2,680	2,340	3,280	1,300	540	695
5	615	615	1,980				2,340	2,400	2,840	1,480	655	615
6	615	735	1,880				2,510	2,130	2,130	1,300	860	540
7	540	1,030	1,780				2,400	1,980	1,780	1,030	1,080	470
8	470	1,210	1,630				2,080	1,680	1,980	818	945	470
9	400	1,030	1,480				1,780	1,390	2,400	695	735	470
10	400	860	1,210				1,580	2,030	2,400	775	578	275
11	400	775	1,210				1,580	2,290	2,340	945	540	368
12	470	695	1,030				1,780	2,240	2,080	818	615	400
13	775	615	1,030				1,830	2,180	1,580	695	540	400
14	860	615	860				2,130	2,400	1,120	615	540	470
15	735	615					3,280	2,400	902	540	470	470
16	655	540					3,500	2,180	860	470	470	400
17	578	578					3,500	1,930	945	470	470	220
18	540	540					3,720	1,680	1,580	505	470	305
19	540	540					4,010	1,480	1,580	470	368	400
20	578	400					4,430	1,160	1,210	470	220	400
21	695	400					4,550	1,030	945	470	540	335
22	775	400					4,610	902	860	470	540	335
23	695	400					4,490	775	818	860	505	400
24	655	400					4,370	775	1,120	860	540	335
25	615	400					4,250	817	1,390	695	540	400
26	540	470					3,950	1,030	1,300	540	615	435
27	540	505					3,660	1,390	1,030	470	987	400
28	470	540					3,280	2,510	818	470	2,620	335
29	470	540					2,840	2,840	695	695	1,480	335
30	400	1,430					2,400	3,060	860	1,300	1,120	400
31	470							3,280		1,480	775	

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	335	615					3,610					
2	775	615					3,610					
3	400	540					3,610					
4	400	540					3,500					
5	335	435					3,220					
6	305	470					2,780					
7	275	470					2,290					
8	220	435					1,680					
9	275	400					1,300					
10	335	400					1,120					
11	335	400					1,030					
12	435	400					1,120					
13	470	615					1,480					
14	615	615					1,730					
15	275	578					1,730					
16	400	540					1,780					
17	400	470					1,680					
18	368	505					1,630					
19	305	1,480					1,440					
20	248	2,180					1,340					
21	945	2,080					1,210					
22	945	1,730					1,030					
23	818	1,480					1,030					
24	540	1,210					2,290					
25	540	1,075					2,840					
26	695	860					3,390					
27	860	1,160					3,950					
28	735	1,390				3,280	3,830					
29	615	1,340				3,440	3,950					
30	615	1,030				3,610	4,250					
31	615					3,660						
1910–11.												
1		465	415	1,140	830	1,090	1,980	2,190	465	370	370	972
2		415	415	1,230	585	1,020	1,890	2,210	490	370	370	875
3		565	393	2,360	475	860	1,800	2,180	440	393	320	675
4		790	370	2,190	600	600	1,720	2,190	393	335	320	609
5	430	1,040	370	2,110	530	440	1,890	2,070	335	289	320	565
6	406	1,240	370	2,110	585	390	2,060	1,750	393	289	320	550
7	393	1,080	370	2,020	585	390	2,320	1,250	375	345	243	535
8	393	778	370	1,930	530	390	2,980	1,020	384	490	263	525
9	393	702	320	1,920	475	365	3,160	907	355	360	271	475
10	393	620	317	1,720	425	350	3,080	778	388	267	289	440
11	393	620	270	1,140	375	355	3,030	730	360	345	243	440
12	393	620	205	1,030	375	340	2,980	730	227	345	255	430
13	384	565	240	1,060	370	320	2,980	675	370	320	247	415
14	370	515	290	1,030	395	630	2,980	592	375	255	207	415
15	370	565	290	990	420	1,040	2,980	565	430	195	219	415
16	335	555	290	960	420	1,110	2,980	540	465	195	280	440
17	255	515	365	700	395	1,180	2,900	445	440	110	267	415
18	311	465	365	600	370	880	2,850	490	415	110	271	393
19	345	455	365	370	370	630	2,760	465	393	146	384	415
20	345	415	365	450	470	545	2,670	440	370	175	465	440
21	320	415	365	450	525	600	2,500	440	375	183	284	465
22	311	465	290	450	470	685	2,230	465	370	195	302	440
23	335	415	290	470	470	750	2,020	465	360	219	320	440
24	370	384	1,120	440	420	750	1,850	465	350	231	505	402
25	430	393	1,060	370	395	780	1,720	465	345	267	465	384
26	465	455	990	340	370	910	1,800	465	360	275	505	440
27	465	415	930	1,270	695	1,730	1,890	440	379	335	430	440
28	480	415	860	1,910	1,200	2,240	1,980	440	402	345	465	415
29	465	415	790	1,680		2,240	2,060	397	406	370	1,120	415
30	455	415	990	1,460		2,160	2,100	425	406	370	1,170	415
31	440		1,060	1,320		2,130		455		370	1,080	

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	415	637	1,340	760	460	620	3,620	2,320	2,760	195	320	392
2	415	692	1,100	855	510	590	3,620	2,100	2,760	320	320	345
3	415	748	952	778	460	610	3,520	1,600	2,820	320	320	515
4	465	664	760	609	560	390	3,440	1,290	2,870	320	345	540
5	465	609	697	581	440	650	3,390	1,070	2,900	215	255	490
6	465	582	425	770	490	620	3,440	952	2,800	275	392	465
7	515	637	648	770	460	390	3,570	1,050	2,650	297	370	490
8	565	822	680	560	435	390	4,010	1,050	2,410	175	345	675
9	540	842	648	505	480	430	3,960	985	1,980	275	320	505
10	505	742	703	505	590	560	4,640	1,020	1,440	345	320	465
11	465	637	784	560	670	470	4,950	1,050	1,080	297	345	440
12	430	626	868	560	400	530	4,780	1,260	887	297	255	465
13	515	1,050	1,820	560	670	530	4,370	873	790	275	392	465
14	540	939	1,800	560	590	620	4,010	1,180	730	297	392	440
15	565	842	1,480	470	480	820	3,700	1,150	675	255	415	440
16	620	748	1,250	430	540	1,400	3,620	1,020	620	415	370	620
17	675	675	1,470	480	485	2,610	3,480	1,400	565	345	370	1,080
18	842	719	1,580	430	485	2,570	3,390	1,930	565	345	370	1,050
19	2,060	1,520	1,370	455	385	2,650	3,390	2,000	530	297	255	730
20	2,160	1,520	1,040	535	485	2,650	3,480	1,850	490	345	392	730
21	2,150	1,280	742	800	560	2,610	3,520	1,980	465	320	760	1,330
22	2,150	1,080	790	800	600	2,520	3,520	2,280	490	370	370	1,290
23	2,150	875	2,040	740	710	2,610	3,620	2,320	490	540	392	952
24	1,980	790	2,360	675	710	2,970	3,570	2,280	620	440	345	790
25	1,640	822	2,320	620	710	2,970	3,390	2,170	415	392	415	647
26	1,330	875	2,170	560	620	2,880	3,300	1,890	392	370	297	565
27	1,220	778	1,970	535	680	2,610	3,210	1,520	392	345	370	540
28	1,150	790	1,630	535	660	2,430	3,080	1,150	392	345	565	490
29	920	1,180	1,130	480	620	2,500	2,830	952	370	195	465	565
30	790	1,560	1,040	535	....	2,650	2,580	1,970	320	297	415	515
31	702	....	920	590	....	2,750	....	2,360	....	345	415	....
1912–13.												
1	702	2,280	702	1,680	1,330	555	6,700	1,050	2,280	345	335	167
2	760	1,930	675	1,560	1,890	540	5,850	1,260	1,980	302	311	235
3	675	1,720	1,350	1,440	1,640	647	5,400	920	1,640	293	307	267
4	565	1,330	1,930	1,890	1,560	620	4,950	822	1,260	297	191	255
5	515	1,050	2,020	1,960	1,180	565	4,460	730	1,080	251	284	255
6	490	887	1,890	1,640	1,150	540	4,050	691	855	275	302	255
7	415	920	1,720	1,590	1,210	592	3,620	637	730	267	275	255
8	465	2,020	1,560	1,890	1,120	530	3,300	620	675	330	280	155
9	440	2,190	1,260	1,800	1,000	465	3,030	592	675	335	284	195
10	440	2,230	1,020	1,980	920	592	2,720	565	650	355	293	235
11	465	2,230	920	2,140	887	1,850	2,410	540	555	397	191	227
12	490	2,060	887	1,680	790	1,930	2,140	515	505	350	267	215
13	702	1,760	760	2,320	790	1,930	1,980	540	490	379	297	235
14	592	1,440	760	2,630	592	1,980	1,760	515	450	288	255	215
15	540	1,520	920	2,540	555	1,560	1,680	515	392	370	235	138
16	490	1,470	760	1,760	581	2,900	1,560	515	430	335	235	175
17	465	1,280	1,020	1,600	540	2,900	1,370	540	530	320	267	247
18	465	1,120	702	2,280	592	2,940	1,220	565	470	302	155	255
19	440	1,020	730	2,630	565	2,900	1,190	565	420	297	215	155
20	392	952	1,180	2,670	465	2,670	1,250	582	392	297	275	247
21	345	920	1,150	2,900	515	2,540	1,150	540	383	215	255	235
22	440	920	760	2,800	620	2,900	1,050	490	334	345	235	175
23	415	887	760	2,800	1,430	2,620	1,020	790	284	355	235	480
24	1,600	842	730	2,850	1,760	2,580	1,190	1,800	374	275	155	540
25	2,460	790	730	2,760	1,400	2,620	1,150	2,060	365	284	195	440
26	2,410	1,020	647	2,760	920	3,480	1,070	2,020	335	302	215	345
27	2,580	985	565	2,500	675	4,100	1,050	1,850	345	293	275	320
28	2,630	920	565	2,230	565	5,640	952	1,400	350	195	275	311
29	2,720	760	540	2,060	....	7,500	887	2,140	316	311	275	175
30	2,720	730	592	1,210	....	8,000	1,120	2,390	219	374	275	235
31	2,580	....	1,050	1,330	....	7,300	....	2,360	....	355	297	....

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	275	636	370	460	1,220	475	4,420	3,660	370	370	2°8	887
2	275	565	465	380	1,150	400	4,680	3,570	430	345	255	702
3	370	465	440	370	1,090	1,470	4,500	3,610	415	320	1°5	540
4	415	505	505	390	920	2,050	4,280	3,570	440	370	215	555
5	320	465	515	370	810	1,930	4,190	3,480	647	320	311	515
6	370	440	530	370	810	1,710	3,870	3,280	790	297	275	430
7	370	415	540	370	790	1,470	3,660	3,160	675	392	2°5	370
8	345	392	592	350	680	1,190	3,670	3,030	490	370	247	415
9	345	415	952	370	600	980	3,830	2,890	465	455	275	392
10	297	465	702	400	700	895	3,610	2,760	370	415	1°5	370
11	320	1,190	702	430	540	765	3,660	2,500	392	415	2°7	370
12	345	1,120	887	360	580	710	3,790	2,230	370	465	275	345
13	155	855	702	390	430	650	3,610	1,970	392	370	275	275
14	620	647	730	410	370	670	3,830	1,870	345	370	255	235
15	490	620	675	350	410	650	3,750	1,680	235	320	275	320
16	415	592	790	320	320	595	3,660	1,520	370	345	275	360
17	392	515	647	330	460	1,200	3,570	1,480	384	311	2°5	370
18	370	515	675	340	460	1,890	3,440	1,050	384	515	430	288
19	370	480	920	280	480	1,930	3,440	920	345	415	370	275
20	255	465	565	330	510	1,670	3,700	820	335	297	3°5	288
21	565	565	530	390	570	1,420	4,140	760	384	320	4°0	195
22	760	620	515	420	710	1,170	4,320	730	275	320	7°2	297
23	730	540	540	430	630	990	5,220	719	345	311	675	297
24	490	480	415	380	800	840	5,540	691	345	320	4°5	255
25	647	465	465	410	740	740	5,450	592	275	320	4°5	320
26	920	455	440	340	540	960	5,000	565	320	297	3°3	320
27	1,400	465	465	600	520	1,970	4,490	565	297	255	345	297
28	1,400	470	550	640	480	2,410	4,140	530	215	275	3°0	207
29	1,190	470	380	670	....	2,410	3,830	515	215	297	335	297
30	920	470	430	920	....	2,520	3,790	465	297	320	7°0	370
31	702	....	420	1,180	....	3,120	....	440	....	275	1,080	....
1914–15.												
1	320	345	415	220	340	3,050	403	528	265	248	4°0	283
2	320	235	465	200	330	3,320	403	880	265	340	3°0	283
3	298	320	465	220	320	3,410	403	810	265	610	2°3	265
4	320	345	465	150	320	3,140	450	775	248	640	3°2	248
5	195	311	415	200	320	2,870	403	670	232	810	3°0	248
6	275	284	370	300	320	2,510	426	555	232	670	3°0	202
7	275	298	275	440	420	2,330	450	528	202	582	4°6	188
8	275	370	298	1,480	600	1,970	555	501	217	475	4°3	248
9	298	203	255	1,560	550	1,520	740	528	232	1,270	3°0	283
10	298	311	320	1,260	450	1,110	1,090	501	232	1,880	3°0	302
11	284	370	298	822	400	880	1,700	450	217	1,790	3°0	283
12	203	370	255	592	400	810	2,510	403	248	1,270	3°0	265
13	255	345	275	515	4 0	880	2,420	403	232	810	3°0	202
14	298	345	175	490	480	610	2,510	360	188	610	2°3	232
15	298	370	195	440	580	501	2,600	360	232	501	2°8	248
16	275	415	255	392	2,060	501	2,690	382	232	450	232	232
17	275	730	227	370	2,060	475	2,510	302	283	340	2°5	188
18	370	760	235	320	2,140	450	2,240	382	302	320	3°0	202
19	320	515	235	1,480	2,140	403	1,880	382	320	302	3°2	202
20	415	415	255	1,800	2,140	382	1,440	360	320	320	3°2	188
21	392	415	175	1,800	1,980	360	1,190	340	232	340	2°8	217
22	345	370	170	1,800	1,640	403	1,030	302	283	320	175	265
23	360	284	170	1,640	1,480	501	810	302	302	360	4°3	360
24	298	320	170	1,260	1,400	555	705	265	265	382	4°3	360
25	320	345	170	1,180	2,060	705	670	283	232	340	5°2	302
26	255	345	130	1,050	2,320	810	705	283	248	320	5°5	288
27	298	298	170	920	2,500	775	610	382	202	320	5°1	202
28	275	515	100	730	2,670	670	555	360	163	360	4°6	248
29	298	565	170	560	....	555	501	320	217	382	3°0	265
30	298	440	190	480	....	501	501	302	248	426	2°3	265
31	345	....	190	400	....	426	....	360	....	475	3°2	....

Daily discharge, in second-feet, of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1910–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	248	340	501	1,610	2,330	2,510	2,690	2,420	640	450	450	301
2	217	320	450	1,110	2,240	2,330	3,140	2,330	528	403	426	283
3	283	301	381	955	2,150	2,150	3,410	2,150	475	360	381	320
4	232	301	360	955	2,060	1,700	4,400	1,970	528	1,790	360	248
5	283	320	320	1,030	1,790	1,440	4,850	1,700	740	1,790	360	232
6	340	501	320	955	1,440	1,110	4,760	1,440	670	1,610	320	248
7	360	283	320	1,520	1,110	810	4,490	1,190	582	1,270	283	265
8	340	248	283	1,610	1,030	700	4,130	1,110	528	880	320	248
9	302	283	283	1,190	670	640	3,770	1,110	475	670	360	248
10	283	283	265	810	670	610	3,500	955	426	670	555	283
11	217	265	265	705	610	580	3 230	810	475	555	555	248
12	248	283	283	810	580	555	3,059	740	528	555	450	248
13	283	283	232	810	580	530	2,870	640	1,030	528	450	265
14	248	320	248	1,190	610	530	2,690	582	955	450	320	248
15	248	248	265	955	530	500	2,690	501	740	475	360	283
16	360	381	283	640	500	500	2,510	528	582	381	320	360
17	670	450	320	555	475	500	2,510	775	582	360	320	450
18	450	381	320	555	475	475	2,510	1,970	810	381	320	360
19	450	340	610	501	475	475	2,510	2,150	955	381	283	340
20	403	360	880	501	475	475	2,510	2,150	810	340	301	360
21	360	670	810	475	475	475	2,420	1,970	1,110	360	217	283
22	320	640	670	450	475	475	2,330	1,610	955	381	283	265
23	301	555	555	1,440	450	500	2,420	1,190	740	1,110	283	265
24	301	450	501	1,790	450	530	2,510	1,110	610	670	283	320
25	232	403	475	1,790	450	530	2,510	1,110	555	582	283	265
26	283	320	582	1,700	705	530	2,690	955	501	475	283	301
27	283	360	1,790	1,970	2,240	670	2,690	705	501	450	283	320
28	283	340	1,970	2,240	2,420	955	2,690	610	528	955	248	301
29	248	360	1,970	2,240	2,510	1,520	2,690	555	555	955	283	283
30	283	450	1,970	2,240	....	2,240	2,510	610	555	610	320	301
31	360	....	1,700	2,330	....	2,510	....	640	....	475	301	....

NOTE.—Stage-discharge relation affected by ice Dec. 11, 1903, to Mar. 31, 1904; Dec. 7, 1904, to Mar. 28, 1905; Dec. 15, 1905, to Mar. 31, 1906; Dec. 1, 1906, to Mar. 27, 1907; Dec. 10, 1910, to Mar. 31, 1911; Jan. 6 to Mar. 31, 1912; Dec. 28, 1913, to Mar. 30, 1914; Dec. 22, 1914, to Jan. 6, 1915; Jan. 29 to Feb 15, 1915; Feb. 12–24, and Mar. 8–27, 1916. Daily discharge given for these periods for the years 1910 to 1916 determined from gage heights, observer's notes, and weather records. Several discharge measurements were made during the winter of 1911.

Monthly discharge of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903– 1907 and 1911–1916.

[Drainage area, 615 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1903.					
April	3,960	582	1,970	3.20	3.57
May	566	168	370	.602	.69
June	1,600	159	570	.927	1.03
July	1,500	183	446	.725	.84
August	824	242	417	.678	.78
September	403	175	304	.494	.55
1903-4.					
October	1,110	283	541	.880	1.01
November	866	248	431	.701	.78
December	....	....	a385	.626	.72
January	....	....	a370	.602	.69
February	....	....	a400	.650	.70
March	4,200	....	a1,700	2.76	3.18
April	3,960	1,370	2,200	3.58	3.99
May	3,150	582	1,590	2.59	2.99
June	1,030	232	471	.766	.86
July	880	217	396	.644	.74
August	740	248	398	.647	.75
September	· 2,050	248	661	1.07	1.19
The year	4,200	....	796	1.29	17.60

a Estimated from gage heights, observer's notes, and comparison with records of other streams.

Monthly discharge of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1911–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1904–5.					
October	2,490	610	1,230	2.00	2.31
November	880	340	545	.886	.99
December			a 300	.488	.56
January			a 240	.390	.45
February			a 230	.374	.39
March	4,790		a 1,070	1.74	2.01
April	5,630	1,210	2,950	4.80	5.36
May	1,300	400	871	1.42	1.64
June	2,400	335	1,210	1.97	2.20
July	2,620	220	904	1.47	1.70
August	2,730	305	951	1.55	1.79
September	2,890	655	1,570	2.55	2.84
The year	5,630		1,010	1.64	22.24
1905–6.					
October	860	400	590	.960	1.11
November	1,430	400	625	1.02	1.14
December	2,130	600	969	1.58	1.82
January	3,550	775	1,400	2.28	2.63
February			a 714	1.16	1.21
March			a 900	1.46	1.68
April	4,610	1,580	3,130	5.09	5.68
May	3,280	775	1,870	3.04	3.50
June	3,560	695	1,710	2.78	3.10
July	2,080	470	881	1.43	1.65
August	2,620	220	738	1.20	1.38
September	695	220	421	.685	.76
The year	4,610	220	1,160	1.89	25.66
1906–7.					
October	945	220	498	.810	.93
November	2,180	400	869	1.41	1.57
December	815		a 487	.795	.92
January			a 960	1.56	1.80
February			a 350	.569	.59
March	3,660		a 1,040	1.69	1.95
April	4,250	1,030	2,320	3.77	4.21
1910–11.					
October (5–31)	480	255	387	.629	.63
November	1,240	384	572	.930	1.04
December	1,120	205	500	.813	.94
January	2,360	340	1,200	1.95	2.25
February	1,200	370	500	.813	.85
March	2,240	320	900	1.46	1.68
April	3,160	1,720	2,400	3.90	4.35
May	2,210	397	875	1.42	1.64
June	490	227	387	.629	.70
July	490	110	286	.465	.54
August	1,170	207	405	.659	.76
September	972	384	490	.797	.89
The period b	3,160	110	746	1.21	16.27
1911–12.					
October	2,160	415	963	1.56	1.80
November	1,560	582	876	1.42	1.58
December	2,360	425	1,240	2.02	2.33
January	855	430	600	.976	1.13
February	710	385	550	.894	.96
March	2,970	390	1,600	2.60	3.00
April	4,950	2,580	3,630	5.90	6.58
May	2,360	873	1,550	2.52	2.90
June	2,900	320	1,220	1.98	2.21
July	540	175	318	.517	.60
August	760	255	376	.611	.70
September	1,330	345	634	1.03	1.15
The year	4,950	175	1,130	1.84	24.94

a Estimated from gage heights, observer's notes, and comparison with records of other streams.
b 361 days.

Monthly discharge of Otter Creek at Middlebury, Vt., for the years ending Sept. 30, 1903–1907 and 1911–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1912–13.					
October	2,720	345	1,010	1.65	1.90
November	2,280	730	1,340	2.18	2.43
December	2,020	540	995	1.62	1.87
January	2,900	1,210	2,130	3.46	3.99
February	1,890	465	973	1.58	1.65
March	8,000	465	2,530	4.11	4.74
April	6,700	887	2,380	3.87	4.32
May	2,390	490	1,000	1.63	1.88
June	2,280	219	659	1.07	1.19
July	397	195	312	.507	.58
August	335	155	256	.416	.48
September	540	138	255	.414	.46
The year	8,000	138	1,150	1.87	25.49
1913–14.					
October	1,400	155	543	.883	1.02
November	1,190	392	559	.909	1.01
December	952	370	582	.946	1.09
January	1,180	280	444	.722	.83
February	1,220	320	654	1.06	1.10
March	3,120	400	1,350	2.20	2.54
April	5,540	3,440	4,100	6.67	7.44
May	3,660	440	1,790	2.91	3.36
June	790	215	387	.629	.70
July	515	255	348	.566	.65
August	1,080	195	371	.603	.70
September	887	195	372	.605	.68
The year	5,540	155	957	1.56	21.12
1914–15.					
October	415	195	302	.491	.57
November	760	203	385	.626	.70
December	465	100	257	.418	.48
January	1,800	150	810	1.32	1.52
February	2,670	320	1,170	1.90	1.98
March	3,410	360	1,210	1.97	2.27
April	2,690	403	1,170	1.90	2.12
May	880	265	437	.711	.82
June	320	163	245	.398	.44
July	1,880	248	589	.958	1.10
August	582	175	348	.566	.65
September	360	188	252	.410	.46
The year	3,410	100	594	.966	13.11
1915–16.					
October	670	217	314	.511	.59
November	670	248	368	.598	.67
December	1,970	232	651	1.06	1.22
January	2,330	450	1,210	1.97	2.27
February	2,510	450	1,070	1.74	1.88
March	2,510	475	970	1.58	1.82
April	4,850	2,330	3,060	4.98	5.56
May	2,420	501	1,240	2.02	2.33
June	1,110	426	656	1.07	1.19
July	1,790	340	688	1.12	1.29
August	555	217	341	.554	.64
September	450	232	291	.473	.53
The year	4,850	217	901	1.47	19.99

Days of deficiency in discharge of Otter Creek at Middlebury, Vt., during the years ending Sept. 30, 1911–1916.

Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.					
		1910–11 a	1911–12	1912–13	1913–14	1914–15	1915–16
150	17.0	3	....	1	....	2	....
200	22.7	8	3	14	4	21	....
250	28.4	18	4	32	13	66	23
300	34.1	39	19	66	48	119	63
350	39.8	66	41	88	86	175	101
400	45.4	136	63	103	133	209	127
450	51.1	188	84	112	162	239	132
500	56.8	225	114	126	193	255	168
550	62.5	236	136	145	213	271	194
600	68.2	247	158	166	227	284	216
700	79.5	260	193	179	249	294	240
800	90.9	271	221	200	271	303	249
900	102	276	235	208	280	313	259
1,000	114	284	243	220	290	314	271
1,100	125	296	256	233	293	317	274
1,200	136	303	263	244	300	320	287
1,400	159	309	273	257	302	324	288
1,600	182	310	283	270	309	331	294
1,800	204	316	286	284	312	335	308
2,000	227	327	296	301	318	342	315
2,500	284	347	315	323	322	352	336
3,000	341	358	338	350	326	361	355
4,000	454	361	360	354	352	365	361
8,000	909	....	366	365	365	....	366

a Period Oct. 5, 1910, to Sept. 30, 1911.

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge and shows the number of days on which the discharge and corresponding horsepower were less than the amounts given in the columns for discharge and horsepower. In using this table allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

EAST CREEK NEAR RUTLAND, VT.

LOCATION.—At Lester Bridge, on road from Rutland to Brandon, about 3 miles north of Rutland, 2½ miles below the union of the two branches that drain Blue Ridge Mountain, and 3½ miles above confluence with Otter Creek.

DRAINAGE AREA.—47 square miles.

RECORDS AVAILABLE.—August 9, 1911, to December 26, 1913.

GAGE.—Vertical staff on left bank, downstream side of bridge; read twice daily by M. Lester.

DISCHARGE MEASUREMENTS.—Made from the highway bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvial deposits; control probably permanent.

EXTREMES OF STAGE.—1911–1913: A stage of about 8.3 feet occurred during the high water of March 26–27, 1913, as determined from high-water marks by an engineer of the Geological Survey. Observer's records indicate that this maximum stage occurred about midnight, March 27. Minimum stage recorded, 3.1 feet at 5.45 a. m. September 25, 1911, and 5.30 a. m. October 21, 1912.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; observations discontinued during winter months.

REGULATION.—Distribution of flow affected by the operation of two dams above the station.

ACCURACY.—Data insufficient for determination of daily discharge. Gage heights and discharge measurements are given as they furnish general information in regard to the flow of the stream.

Discharge measurements of East Creek near Rutland, Vt., during the years 1911 and 1913.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911.		*Feet.*	*Sec.-ft.*	1913.		*Feet.*	*Sec.-ft.*
Aug. 7	G. H. Canfield.........	3.59	46	Mar. 24	R. S. Barnes...........	4.24	144
9	.....do.................	3.69	57	May 2	.....do...............	4.09	115
				Sept. 17	G. H. Canfield........	4.16	118
				Nov. 1	C. S. DeGolyer........	4.18	118

Twice-daily gage height, in feet, of East Creek near Rutland, Vt., from August, 1911, to December, 1913.

Day.	August. A. M.	August. P. M.	September. A. M.	September. P. M.	Day.	August. A. M.	August. P. M.	September. A. M.	September. P. M.
1911.					1911.				
1			3.25	3.55	16	3.55	3.7	3.6	3.62
2			3.55	3.7	17	3.68	3.7	3.6	3.42
3			3.72	3.65	18	3.62	3.6	3.32	3.62
4			3.55	3.02	19	3.72	3.62	3.25	3.5
5			3.48	3.55	20	3.45	3.55	3.22	3.55
6			3.1	4.0	21	3.55	3.75	3.2	3.6
7			3.55	3.5	22	3.52	3.7	3.25	3.68
8			3.35	3.45	23	3.45	3.75	3.2	3.65
9		3.52	3.25	3.85	24	3.52	3.7	3.22	3.15
10	3.65	3.7	3.52	3.52	25	3.48	3.75	3.1	3.62
11	3.68	3.7	3.35	3.5	26	3.45	3.62	3.35	3.62
12	3.4	3.75	3.22	3.65	27	3.4	3.45	3.5	3.68
13	3.35	3.5	3.3	3.62	28	3.7	4.5	3.65	3.7
14	3.4	3.7	3.25	3.58	29	3.4	3.9	3.5	3.72
15	3.6	3.7	3.2	3.7	30	3.65	3.62	3.62	3.65
					31	3.35	3.55		

Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.	January. A. M.	January. P. M.	February. A. M.	February. P. M.	March. A. M.	March. P. M.
1911–12.												
1	3.32	3.35	3.8	3.9	3.6	3.7						
2	3.6	3.8	3.55	3.8	3.55	3.65						
3	3.4	3.62	3.45	3.75	3.4	3.68						
4	3.32	4.05	3.42	3.68	3.45	4.05						
5	3.68	3.82	3.4	3.7	3.4	3.9						
6	3.52	3.5	3.38	3.8	3.4	3.92						
7	3.58	3.7	3.65	3.98	3.42	3.9						
8	3.5	3.52	3.55	3.9	3.4	3.9						
9	3.55	3.6	3.6	3.72	3.5	3.95						
10	3.42	3.6	3.3	3.7	3.5	3.62						
11	3.4	3.65	3.4	3.75	3.6	4.02						
12	3.3	3.45	3.42	3.2	3.8	4.1						
13	3.32	3.38	3.65	3.6	3.82	4.2						
14	3.25	3.5	3.3	3.6	3.8	3.88						
15	3.3	3.62	3.4	3.72	3.8	3.85						3.8
16	3.22	3.6	3.42	3.68	3.75	3.8					3.85	3.7
17	3.28	3.6	3.4	3.7	3.8	3.8					3.7	4.0
18	3.25	5.0	3.55	4.2	3.75	3.72					3.85	4.3
19	4.3	4.15	3.7	3.68	3.6	3.7					3.9	4.45
20	4.02	4.0	3.55	3.7	3.6	4.0					4.2	4.0
21	3.7	4.0	3.6	3.68	3.7	3.85					3.8	4.0
22	3.85	3.92	3.58	3.65	3.65	3.85					3.88	3.7
23	4.0	4.2	3.45	3.65	4.35	4.2					3.7	3.78
24	3.9	4.05	3.4	3.68	3.9	3.72					3.65	3.6
25	3.5	3.8	3.4	3.45	3.62	3.65					3.5	3.62
26	3.55	3.72	3.45	3.4	3.65	3.85					3.6	3.65
27	3.6	4.0	3.4	3.4	3.7	3.8					3.5	3.85
28	3.45	3.7	3.45	3.72	3.75	3.7					3.58	3.9
29	3.48	3.65	4.2	4.05	4.0	4.1					3.85	4.7
30	3.4	3.72	3.8	3.7							3.95	4.05
31	3.45	4.02									3.72	4.2

Twice-daily gage height, in feet, of East Creek near Rutland, Vt., from August, 1911, to December, 1913—Continued.

Day.	April. A.M.	April. P.M.	May. A.M.	May. P.M.	June. A.M.	June. P.M.	July. A.M.	July. P.M.	August. A.M.	August. P.M.	September. A.M.	September. P.M.
1912.												
1	4.05	4.35	4.0	4.08	......	......	3.35	3.5	3.75	3.7	3.55	3.85
2	3.82	4.2	3.85	3.9	4.7	4.75	3.3	3.55	3.6	3.7	3.98	3.95
3	3.7	3.7	3.8	3.9	4.7	4.7	3.5	3.5	3.65	3.9	3.7	3.8
4	3.65	3.8	3.72	3.8	4.62	4.6	3.4	3.6	3.85	3.8	3.7	3.75
5	3.72	4.75	3.68	3.6	4.55	4.5	3.55	3.62	3.7	3.8	3.6	3.7
6	4.2	5.0	3.6	3.9	4.25	4.3	3.4	3.6	3.9	3.75	3.9	3.85
7	4.6	5.35	3.75	3.82	4.25	4.0	3.45	3.48	3.7	3.7	3.5	3.72
8	5.12	4.7	3.7	3.8	3.85	3.9	3.5	3.65	3.68	3.65	3.55	3.7
9	3.88	3.8	3.62	4.0	3.72	3.7	3.4	3.9	3.6	2.85	3.5	3.62
10	3.75	3.85	3.75	4.0	3.75	3.62	3.65	3.68	3.58	3.7	3.6	3.7
11	3.8	3.82	3.8	3.6	3.4	3.4	3.55	3.6	3.75	3.7	3.55	3.9
12	3.7	4.15	3.6	3.6	3.25	3.5	3.5	3.55	3.85	3.9	3.8	3.8
13	4.0	4.02	3.75	3.8	3.55	3.65	3.5	3.6	3.75	3.55	3.78	3.9
14	4.0	3.8	3.85	3.9	3.42	3.6	3.65	3.65	3.8	3.82	3.7	3.8
15	3.75	4.4	3.72	3.88	3.48	3.5	3.4	3.55	3.8	3.95	3.58	3.8
16	4.35	5.0	3.7	4.05	3.42	3.68	3.4	3.55	3.9	3.8	4.2	3.75
17	4.7	4.7	4.65	4.5	3.6	3.6	3.3	3.7	3.8	3.72	3.4	3.8
18	4.62	4.52	4.02	4.15	3.45	3.6	3.48	3.6	3.65	3.52	3.3	3.7
19	4.95	5.0	4.1	4.2	3.4	3.5	3.65	3.78	3.6	3.85	3.55	3.95
20	4.7	4.75	4.3	4.4	3.35	3.9	3.55	3.7	3.48	3.7	4.15	4.12
21	4.7	4.7	4.6	4.68	3.3	3.2	3.55	3.75	3.7	3.88	4.2	3.9
22	4.65	4.62	4.85	4.7	3.3	3.6	3.9	3.7	3.88	3.75	3.65	3.8
23	4.7	4.7	4.62	4.6	3.25	3.4	3.55	3.75	3.7	3.8	3.48	3.85
24	4.55	4.75	4.45	4.5	3.22	3.6	3.6	3.7	3.5	3.72	3.45	3.78
25	4.6	4.6	4.12	4.0	3.2	3.58	3.6	3.75	3.52	3.65	3.4	3.45
26	4.55	4.6	3.88	3.9	3.22	3.7	3.6	3.7	3.55	3.92	3.32	3.72
27	4.75	4.55	3.75	3.8	3.3	3.7	3.55	3.7	3.8	3.7	3.75	3.75
28	4.5	4.35	3.7	3.75	3.25	3.6	3.58	3.7	3.35	3.82	3.3	3.8
29	4.3	4.3	3.5	3.85	3.2	3.55	3.75	3.78	3.8	3.75	3.22	3.75
30	4.25	4.25	4.3	4.8	3.5	3.42	3.7	3.75	3.58	3.8	3.8	3.7
31	......	......	5.0	5.35	......	......	3.7	3.8	3.6	3.85	......	......

Day.	October. A.M.	October. P.M.	November. A.M.	November. P.M.	December. A.M.	December. P.M.	January. A.M.	January. P.M.	February. A.M.	February. P.M.	March. A.M.	March. P.M.
1912-13.												
1	3.22	3.98	3.6	3.92	3.55	3.5	3.8	3.5	3.95	3.72	3.45	3.8
2	3.65	3.85	3.7	3.8	3.42	4.4	3.5	3.98	3.7	3.9	3.4	3.4
3	3.45	3.7	3.55	3.6	3.65	4.0	3.7	4.5	3.92	3.85	3.8	3.82
4	3.4	3.82	3.5	3.8	3.88	4.05	4.0	3.95	3.7	3.72	3.4	3.7
5	3.4	3.78	3.65	3.68	3.7	4.0	3.7	3.5	3.7	3.7	3.45	3.55
6	3.4	3.82	3.5	3.65	3.95	4.05	3.65	4.05	3.68	3.82	3.4	3.6
7	3.6	3.85	3.7	3.95	3.6	4.02	4.5	4.3	3.95	5.65	3.8	3.6
8	3.48	3.9	4.25	4.0	3.6	3.6	4.15	4.25	3.6	3.6	3.8	3.72
9	3.4	3.92	3.8	3.62	3.55	4.0	3.9	3.9	3.45	3.4	3.5	3.4
10	3.25	3.9	3.5	3.8	3.7	3.85	3.85	4.15	......	......	3.72	4.2
11	3.2	4.0	3.65	3.9	3.68	3.95	4.0	4.1	......	......	3.7	3.85
12	3.2	3.88	3.72	3.92	3.6	3.9	4.15	4.0	......	......	3.5	4.1
13	3.32	3.45	3.7	3.95	3.7	3.9	3.88	3.85	......	......	3.65	3.75
14	3.25	3.82	3.75	3.9	3.6	3.85	3.7	4.1	......	......	4.2	4.9
15	3.15	3.78	3.8	3.85	3.6	3.78	3.85	4.0	......	......	4.65	4.75
16	3.4	3.8	3.5	3.72	3.55	3.9	3.95	4.1	......	......	4.4	4.0
17	3.45	3.9	3.6	3.52	3.75	3.88	4.3	4.5	......	......	3.75	3.92
18	3.4	3.88	3.6	3.7	3.65	3.85	4.5	4.72	......	......	3.7	3.9
19	3.35	3.8	3.5	3.72	4.0	4.2	4.4	4.25	......	......	3.65	3.95
20	3.3	3.75	3.55	3.9	4.05	3.92	4.1	4.3	......	3.8	3.7	4.4
21	3.1	3.92	3.6	3.85	3.7	3.9	4.68	4.6	3.92	3.9	4.4	4.55
22	3.12	3.88	3.62	3.7	3.68	3.5	4.45	4.45	3.75	4.6	4.62	4.1
23	3.25	4.6	3.6	3.72	3.55	3.88	4.3	4.4	4.3	3.62	3.78	4.0
24	4.45	4.7	3.55	3.42	3.5	3.72	4.6	4.3	3.7	3.6	4.25	4.2
25	4.6	4.28	3.4	3.8	3.6	3.5	4.15	4.22	3.65	3.65	4.45	6.38
26	4.05	4.22	3.6	3.85	3.7	3.9	3.15	4.08	3.6	3.7	5.92	6.42
27	3.85	3.72	3.62	3.85	3.58	3.8	4.0	4.15	3.45	3.75	6.2	6.6
28	3.7	3.8	3.7	3.5	3.65	3.68	4.1	4.0	3.4	3.68	6.25	5.35
29	3.68	3.78	3.5	4.0	3.5	3.4	3.92	3.95	......	......	5.2	5.2
30	3.7	3.75	3.65	3.65	3.45	4.15	3.8	3.9	......	......	5.2	4.95
31	3.6	3.7	......	......	4.0	4.1	3.8	3.85	......	......	4.78	4.95

Twice-daily gage height, in feet, of East Creek near Rutland, Vt., from August, 1911, to December, 1913—Continued.

Day.	April. A. M.	April. P. M.	May. A. M.	May. P. M.	June. A. M.	June. P. M.	July. A. M.	July. P. M.	August. A. M.	August. P. M.	September. A. M.	September. P. M.
1913.												
1	4.6	4.65	3.9	3.98	3.7	3.75	3.4	3.95	3.9	4.1	4.12	4.15
2	4.4	4.6	3.6	3.9	3.98	3.9	3.45	3.98	3.5	3.9	3.72	3.85
3	4.3	4.4	3.7	3.92	3.9	3.8	3.4	3.9	3.52	3.9	3.5	4.1
4	4.35	4.4	3.6	3.32	3.9	3.92	3.55	3.8	4.15	4.1	3.5	4.08
5	4.38	4.45	3.4	3.6	3.88	3.9	3.5	3.88	3.98	3.9	3.98	4.1
6	4.25	4.2	3.6	3.5	3.6	3.78	3.55	3.7	4.0	3.88	3.55	4.1
7	4.2	4.38	3.42	3.62	3.5	3.85	3.48	4.18	4.0	4.1	3.52	3.8
8	4.02	4.15	3.4	3.6	3.58	3.5	3.98	4.2	4.0	4.0	3.6	4.15
9	3.95	4.2	3.42	3.72	3.42	3.7	3.55	4.0	3.5	3.8	4.1	4.2
10	3.55	3.95	3.4	3.7	3.4	3.68	4.12	4.1	3.4	3.8	4.15	4.15
11	3.5	3.8	3.45	3.62	3.45	4.0	4.15	3.98	4.1	4.0	3.6	4.15
12	3.75	3.9	3.4	3.88	3.38	3.9	3.6	3.9	4.15	4.0	4.15	4.1
13	3.82	3.8	3.35	3.6	3.3	3.85	3.9	3.6	4.1	4.18	3.55	4.15
14	3.85	3.78	3.4	3.92	3.3	3.85	3.65	4.0	4.0	4.1	3.45	3.8
15	3.8	3.8	3.35	3.9	3.5	3.5	4.0	4.0	3.98	4.0	3.6	4.0
16	3.7	3.75	3.42	3.65	4.0	3.98	4.08	3.85	3.5	4.0	3.6	4.1
17	3.62	4.02	3.42	3.65	3.55	4.0	4.0	4.0	3.38	3.75	3.6	4.12
18	3.6	3.95	3.3	3.9	3.5	3.85	3.6	4.0	3.40	4.0	3.65	4.0
19	3.6	3.88	3.55	3.85	3.28	3.8	3.7	4.0	4.12	4.15	3.5	4.0
20	3.6	3.72	3.52	3.75	3.25	3.98	3.5	3.68	4.1	4.2	3.5	4.0
21	3.5	3.9	3.3	3.7	3.3	3.85	4.05	4.0	4.05	3.85	3.48	3.78
22	3.52	3.7	3.45	4.2	3.45	3.6	4.08	3.98	3.6	3.98	3.78	4.5
23	3.6	3.7	4.4	4.05	3.5	3.88	4.05	4.0	3.85	3.9	4.2	4.15
24	3.62	3.88	4.48	4.4	3.5	3.9	4.1	4.2	3.42	3.75	3.6	4.1
25	3.6	3.8	4.08	4.0	3.4	3.95	4.1	4.1	3.8	4.0	3.65	4.15
26	3.65	3.6	3.9	3.88	3.5	3.88	3.6	3.95	3.9	4.0	3.62	4.2
27	3.65	3.52	3.9	3.8	3.5	3.6	3.6	3.8	4.0	4.4	3.58	4.1
28	3.5	3.6	3.78	4.3	3.55	3.82	3.98	4.2	4.2	4.2	3.4	3.8
29	3.92	4.0	4.5	4.42	3.9	3.65	3.75	3.9	4.2	3.92	3.5	3.9
30	3.62	4.02	4.2	4.1	3.42	3.4	3.7	4.2	4.0	3.8	3.55	4.18
31	......	......	4.0	3.8	......	......	3.5	4.18	3.32	3.82	......	......

Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.
1913.						
1	3.5	3.95	3.62	4.0	3.7	4.2
2	3.5	4.2	3.65	3.8	3.45	4.25
3	3.8	4.2	3.4	4.0	3.6	4.3
4	3.8	4.0	3.6	4.15	3.68	4.2
5	3.6	3.88	3.4	4.0	3.55	4.2
6	3.6	4.2	3.5	4.2	3.4	4.18
7	3.7	4.15	3.6	4.25	3.48	4.0
8	3.6	4.1	3.65	4.0	3.7	4.15
9	3.7	4.15	3.5	4.4	3.75	4.2
10	3.65	4.2	4.2	4.3	3.7	4.25
11	3.62	4.2	3.9	4.2	3.72	4.2
12	3.4	3.9	3.78	4.0	3.8	4.2
13	3.65	4.3	3.72	4.0	3.7	4.12
14	3.8	4.2	3.65	4.1	3.4	3.82
15	3.8	4.18	3.6	3.92	3.6	3.7
16	3.78	4.25	3.58	4.0	3.48	3.72
17	3.7	4.3	3.5	4.25	3.4	4.2
18	3.7	4.3	3.55	4.28	3.6	4.18
19	3.7	3.98	3.5	4.28	3.5	4.2
20	3.7	4.4	3.8	4.3	3.55	4.15
21	4.1	4.25	3.68	4.25	3.55	3.98
22	3.9	4.32	3.65	4.3	3.5	4.15
23	3.85	4.3	3.5	3.98	3.5	4.2
24	3.8	4.3	3.55	4.3	3.45	4.2
25	3.78	4.7	3.62	4.2	3.6	3.95
26	4.2	4.3	3.58	4.3	3.9	4.1
27	4.15	4.3	3.4	4.0	......	......
28	4.0	4.2	3.4	3.95	......	......
29	3.8	4.15	3.6	4.2	......	......
30	3.7	4.1	3.48	3.92	......	......
31	3.7	4.1	......	......	......	......

NOTE.—Gage read at about 6 a. m. and 6 p. m.

WINOOSKI RIVER ABOVE STEVENS BRANCH, NEAR MONTPELIER, VT.

LOCATION.—About half a mile above the mouth of Stevens Branch and 3 miles from Montpelier.

DRAINAGE AREA.—196 square miles.

RECORDS AVAILABLE.—May 18, 1909, to November 15, 1913.

GAGE.—Vertical staff attached to a boulder on right bank.

DISCHARGE MEASUREMENTS.—Made from lower railroad bridge about half a mile below the gage or by wading.

CHANNEL AND CONTROL.—Channel covered with rocks and boulders; control not permanent.

WINTER FLOW.—Stage-discharge relation seriously affected by ice.

REGULATION.—Distribution of flow affected by operation of power plant a short distance above the gage.

ACCURACY.—Data insufficient for determination of daily discharge subsequent to 1910.

Discharge measurements of Winooski River above Stevens Branch, near Montpelier, Vt., during 1909–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1909.		*Feet.*	*Sec.-ft.*	1911.		*Feet.*	*Sec.-ft.*
May 18	D. M. Wood............	4.15	888	Aug. 5	G. H. Canfield.........	1.75	8.5
27	.....do................	3.25	394	6	.....do................	2.38	72
June 26	.....do................	2.86	196				
July 2	.....do................	2.60	107	1912.			
22	.....do................	2.59	104	Feb. 20	G. H. Canfield.........	2.67	150
22	.....do................	2.29	59	June 15	C. C. Covert...........	3.27	*a* 226
22	.....do................	2.28	54	Sept. 5	J. G. Mathers..........	2.75	130
				Oct. 12	Covert and DeGolyer ..	2.30	47
1910.							
Apr. 22	T. W. Norcross........	3.14	274	1913.			
Oct. 26	C. C. Covert..........	2.8	*a* 223	Sept. 16	G. H. Canfield.........	2.56	88
1911.				1914.			
June 21	G. H. Canfield.........	2.64	136	Apr. 27	C. H. Pierce and R. S.	4.58	1,340
21	.....do................	2.19	44		Barnes.		
Aug. 5	.....do................	2.19	44				

a Uncertain.

Daily discharge, in second-feet, of Winooski River above Stevens Branch, near Montpelier, Vt., for 1909–10.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1909.							1909.						
1............	......	337	76	41	47	482	16............	......	235	58	30	47	65
2............	......	327	73	41	43	368	17............	......	206	69	78	47	68
3............	......	308	96	45	252	428	18............	886	374	60	73	50	72
4............	......	261	179	63	422	632	19............	710	322	76	68	56	68
5............	......	337	124	57	179	379	20............	886	235	99	60	54	66
6............	......	668	103	78	38	347	21............	680	202	73	57	50	.70
7............	......	455	86	86	44	289	22............	532	190	73	56	48	65
8............	......	358	56	64	44	248	23............	532	157	83	51	50	64
9............	......	298	73	57	46	202	24............	466	160	73	41	53	68
10............	......	270	78	70	44	110	25............	395	136	68	39	57	64
11............	......	252	73	64	44	90	26............	389	168	66	32	64	64
12............	......	235	63	63	44	96	27............	374	98	60	28	68	60
13............	......	206	64	54	37	80	28............	363	92	50	31	592	64
14............	......	482	63	43	37	92	29............	592	76	48	34	710	66
15............	......	308	64	35	39	78	30............	466	65	48	33	565	65
							31............	358	......	44	46	......	65

Daily discharge, in second-feet, of Winooski River above Stevens Branch, near Montpelier, Vt., for 1909-10—Continued.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1910.											
1...........	....	968	1,120	482	860	171	96	24	210	210	231
2...........	....	830	1,060	455	680	231	48	44	252	252	171
3...........	....	740	1,060	400	428	210	48	44	210	455	171
4...........	....	680	740	1,060	482	70	190	48	210	482	210
5...........	....	510	680	740	400	107	210	96	171	455	171
6...........	....	510	680	800	428	136	86	252	171	400	86
7...........	....	770	800	482	680	136	107	374	210	275	128
8...........	298	592	830	468	740	136	122	190	231	252	171
9...........	171	538	710	455	592	136	122	107	252	252	171
10...........	210	455	740	400	400	78	107	122	231	252	210
11...........	190	455	620	455	428	122	122	86	210	252	86
12...........	136	420	592	428	400	136	136	86	136	252	136
13...........	70	380	428	298	428	136	107	148	171	171	86
14...........	171	347	347	252	347	136	107	210	154	210	64
15...........	136	347	374	252	374	136	86	96	136	190	171
16...........	107	322	400	275	347	107	107	86	58	171	146
17...........	231	298	322	252	298	70	86	70	107	252	122
18...........	210	347	275	252	322	96	107	86	107	252	48
19...........	171	275	298	275	275	86	86	96	122	231	86
20...........	154	400	322	298	252	171	136	136	70	252	86
21...........	107	538	322	275	231	70	122	58	64	252	210
22...........	171	592	347	252	347	70	107	64	78	190	136
23...........	136	770	428	252	455	86	64	58	58	....	107
24...........	70	800	347	171	275	122	39	171	107	....	252
25...........	136	1,280	275	455	252	70	39	48	139	....	347
26...........	210	1,460	275	1,380	210	70	24	78	171	....	347
27...........	107	925	1,060	770	231	70	86	122	322	....	347
28...........	620	990	680	592	482	107	70	1,090	374	....	565
29...........	....	1,090	455	538	252	136	58	400	298	....	347
30...........	....	1,120	620	482	252	122	44	171	231	....	374
31...........	....	1,220	....	565	....	78	48	....	171	....	510

Monthly discharge of Winooski River above Stevens Branch, near Montpelier, Vt., for 1909-10.

[Drainage area, 196 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1909.					
May 18-31.................................	886	358	545	2.78	1.45
June.....................................	668	65	261	1.33	1.48
July......................................	179	44	74.8	.382	.44
August..................................	86	28	52.2	.266	.31
September...............................	710	37	129	.658	.73
October..................................	632	60	160	.816	.94
1910.					
February 8-28............................	620	70	181	.923	.72
March...................................	1,460	275	676	3.45	3.98
April....................................	1,120	275	574	2.93	3.27
May.....................................	1,380	171	468	2.39	2.76
June.....................................	860	210	405	2.07	2.31
July......................................	231	70	116	.592	.68
August..................................	210	24	94.1	.480	.55
September...............................	1,090	24	155	.791	.88
October..................................	374	58	175	.894	1.03
November................................	482	171	252	1.29	1.44
December................................	565	48	203	1.03	1.18

NOTE.—Daily discharge determined from rating curve well defined above 48 second-feet. Mean discharge Nov. 23–30, 1910, estimated as 200 second-feet.

A. CABLE CAR AND CABLE SUPPORT.

B. GAGE HOUSE.

WINOOSKI RIVER (RIGHT BANK) AT MONTPELIER, VT.

A. MEASURING SECTION ON WINOOSKI RIVER AT MONTPELIER, VT., LOOKING UPSTREAM.

B. GAGE HOUSE ON RIGHT BANK OF LAMOILLE RIVER AT CADYS FALLS, VT.

WINOOSKI RIVER AT MONTPELIER, VT.

LOCATION.—One mile downstream from the Central Vermont Railway station in Montpelier, about three-eighths mile above the mouth of Dog River and 1¼ miles below mouth of Worcester Branch. From May 19, 1909, to June 30, 1914, station was maintained at the highway bridge just above the Central Vermont Railway station.

DRAINAGE AREA.—420 square miles (measured on post-route map, edition of 1915).

RECORDS AVAILABLE.—May 19, 1909, to September 30, 1916.

GAGES.—Gurley 7-day water-stage recorder installed July 4, 1914, on right bank. Gage heights referred to gage datum by means of a hook gage inside the well. An outside staff gage is used for auxiliary readings. From June 16 to July 3, 1914, records were obtained from the staff gage. A chain gage was maintained at the highway bridge from May 19, 1909, to June 30, 1914. (See Pl. IX, B.)

DISCHARGE MEASUREMENTS.—Made from a cable (Pl. IX, A) or by wading (Pl. X, A). Prior to July, 1914, measurements were made from the highway bridge, the railroad bridge, and from a suspension footbridge.

CHANNEL AND CONTROL.—Channel deep and of fairly uniform section at the gage. The control for the gage at new site is defined by a rock outcrop about 500 feet downstream. Control section for gage at highway bridge formed by a reef of rocks about 200 feet downstream.

EXTREMES OF DISCHARGE.—Maximum stage recorded at new gage datum, 17.31 feet April 7, 1912, found by leveling from flood marks preserved on building near the gage (discharge not determined); minimum stage 1914–1916, 2.77 feet August 13, 1914, and October 24, 1915 (discharge, 19 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice during the winter months. Records based on gage heights corrected for backwater by means of discharge measurements, observer's notes, and climatic records.

DIVERSIONS.—Water for the cities of Montpelier and Barre is obtained from tributaries of the river. The sewer systems of both cities, however, discharge into the river above the gage.

FIGURE 1.—Gage-height record, Winooski River at Montpelier, Vt.

REGULATION.—A study of the discharge records indicates that 1,220,000,000 cubic feet of storage might be required to insure a continuous flow of 210 second-feet or 0.5 second-foot per square mile at Montpelier for 90 per cent of the time during a year of extremely low flow; a storage of 404,000,000 cubic feet would probably insure this rate of flow for 90 per cent of the time during the average year. The operation of power plants on the main stream and tributaries above the station causes large diurnal fluctuations in stage. (See fig. 1.)

ACCURACY.—Results good since relocation of station in 1914. Mean daily discharge can not be accurately determined from the two observations a day obtained prior to 1914.

Discharge measurements of Winooski River at Montpelier, Vt., during 1909–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1909.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
May 20	D. M. Wood	6.40	1,750	May 15	C. S. DeGolyer	5.07	592
27	....do	4.69	457	16	....do	4.99	574
June 25	....do	4.17	259	29	....do	4.46	311
July 22	....do	4.17	242	July 1	....do	3.86	257
1910.				1	....do	3.92	268
Apr. 22	T. W. Norcross	4.67	466	2	....do	4.19	361
23	....do	5.06	676	19	....do	3.00	39.1
July 24	Butterfield and Brett..	3.72	79	21	....do	3.63	170
Oct. 26	C. C. Covert	4.70	589	Oct. 5	C. H. Pierce	3.68	216
1911.				Nov. 25	C. S. DeGolyer	3.83	255
June 20	G. H. Canfield	4.18	236	Dec. 22	....do	a 4.14	248
Aug. 6	....do	3.35	17.1	1915.			
1912.				Jan. 9	C. H. Pierce	a 4.98	394
Feb. 19	G. H. Canfield	a 4.77	174	Feb. 11	R. S. Barnes	a 4.66	254
Sept. 4	J. G. Mathers	4.08	203	Mar. 16	C. H. Pierce	3.84	254
Oct. 12	C. S. DeGolyer	4.01	180	25	....do	4.85	823
13	....do	4.85	554	May 3	R. S. Barnes	4.74	754
14	....do	4.51	341	3	....do	4.72	738
1913.				June 6	C. H. Pierce	2.905	34.6
Mar. 8	C. S. DeGolyer	a 4.33	203	6	....do	3.34	117
25	R. S. Barnes	8.41	4,140	Nov. 16	G. F. Adams	4.10	386
26	....do	9.54	5,850	Dec. 20	R. S. Barnes	a 4.23	247
Apr. 26	....do	5.40	895	1916.			
Sept. 15	G. H. Canfield	3.87	93	Jan. 12	R. S. Barnes	a 5.08	367
16	....do	3.97	105	Feb. 13	....do	a 5.24	408
1914.				Mar. 22	....do	a 5.65	385
Apr. 23	Pierce and Barnes	7.86	2,760	Apr. 6	....do	5.58	1,330
25	....do	7.38	2,580	6	....do	5.52	1,310
27	....do	7.85	3,170				

a Stage-discharge relation affected by ice.

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914

[Chain gage at highway bridge.]

Day.	May.		June.		July.		Aug.		Sept.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1909.										
1			1,290	1,060	206	150			116	73
2			1,060	1,060	126	73		154	107	78
3			430	334	15	5	136	110	116	73
4			405	272			119	89	126	47
5			371	620			103	136		
6			480	381	267	206	119	103	150	
7			480	311	198	176	210			100
8			330	242	246	187			132	86
9			312	357	129	103	154		126	95
10			405	330	113	97		81	116	73
11			298	321			103	89	107	78
12			590		146	103	129	97	116	73
13					97	136	119	89	116	69
14				455	202	183	110		100	73
15			535	405	136	113			116	
16			430	316	122	76	97	44	100	69
17			371	316	222		71	53	116	78
18			590	507			64	76	126	73
19		1,380	535	405	263	183	97	76		
20	1,760	1,760			234	172	89	81	132	78
21	1,380	1,130	480	316	195	136	103	81	126	86
22	1,050	910	250	230	161	116	116		116	73
23		945	307	316	129	103	119	84	126	62
24	840	840	353	230	210		103	119	100	51
25	807	775	250	430			202	154	132	73
26	535	480	381	298	154	103	172	143		
27	507	455			89	76	154	110	139	86
28	535	680	267	161	110	89	164	119	620	1,210
29	1,060	840	226	176	129	103			1,130	910
30	910		246	187	119	97	150	100	480	
31					129		126	86		

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914—Continued.

Day.	October. A.M.	October. P.M.	November. A.M.	November. P.M.	December. A.M.	December. P.M.
1909.						
1	381	289	289	246	334	289
2	357		334	246	334	246
3			334	246	289	226
4	334	267	357	246	334	
5	303	246	357	246		
6	289	206	289	226	357	246
7	267	198			289	168
8	226	206	267	206	226	168
9	267	226	267	187	246	206
10			267	206	289	
11	334	289	289	206	267	226
12	311	267	289	206		
13	289		267	187	267	
14	334	267			289	
15	246	206	334	246	289	226
16	246	187	311	206	289	246
17			357	246	289	226
18	246	206	334	206	334	289
19	267	206	357	246		
20			334	226		
21					311	206
22			357	246	289	206
23	289	226	334	226	187	132
24			334	267	246	246
25	357	289				
26	334	267	334	246		
27	334	267	334			
28	334	246				
29	289	267	334	246		
30	289	226	334	226		
31						

Day.	April. A.M.	April. P.M.	May. A.M.	May. P.M.	June. A.M.	June. P.M.	July. A.M.	July. P.M.	August. A.M.	August. P.M.	September. A.M.	September. P.M.
1910.												
1			1,050		1,860	1,560			289		206	168
2			1,050						206	168	206	246
3			1,130						246	168	132	206
4	1,470		4,050	2,420	650				132	168		
5	1,470		1,560	1,380				381	650	590	281	
6	1,560		980	840	980	980	480	381	381	381	590	480
7	1,860	1,970	650	590	1,970	2,080	246	246	381		430	430
8	1,760	1,760		710	1,050	980	206	206	710		430	334
9	1,470		650	710			132	168	246	206	334	289
10		1,860	1,470	1,380	910	775	73		246	246	289	246
11	2,080	1,130	650	590	650	650	73	132	334	381	246	
12	910	910	650	480			381	246	430	381	289	289
13	775	775	430	430	840	775	289	289	381	430		
14	775	775	381	334	775	775	334	289	430			
15	775	710			650	710	289	246	246	246		
16	590	590	381	334	840	775	289	246	246	289		
17		535	910	334	710	650	334	168	289	334		
18	535	562	334		590	590	246	168	334	381		
19			650	590			132	168	289	289		
20			430	480	381		168	206	334			
21			334	381	430	430	246	206	246		206	289
22					381	334	168	206	168	132	246	246
23			381	289	535		289		168	132	246	
24			381	289	480	381	246		206	132	289	
25			381	710	381		168	168	226	187		289
26			5,020	3,920			206	168	246	206	212	246
27			1,860	1,300	289	381	100	100	206	168	234	289
28	1,300		980	980	775	840	246	206			710	535
29	1,130						381	246	246	187	19	73
30							289	246	226	168	590	535
31			840	1,130			381	289	246	206		

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914—Continued.

Day.	October.		November.		December.		Day.	October.		November.		December.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.		A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1910.							**1910.**						
1	......	......	334	206	100	51	16	......	......	430	334	168	100
2	......	......	289	187	168	.....	17	289	168	535	480	132	51
3	......	......	381	334	132	73	18	206	150	590	430	......	168
4	......	......	430	507	......	51	19	168	100	535	405	267	132
5	......	......	650	590	100	51	20	206	132	......	......	206	132
6	......	......	......	......	73	51	21	206	100	430	381	168	......
7	......	......	590	535	73	33	22	246	168	480	381	......	......
8	......	......	650	562	132	51	23	......	......	535	430	......	......
9	......	......	535	480	100	62	24	289	226	430	357	......	......
10	......	......	590	430	73	33	25	206	168	480	334	......	......
11	......	132	480	381			26	289	206	381	289	......	......
12	206	132	480	535	73	15	27	312	206	......	......	......	......
13	168	116	......	......	168	73	28	334	268	246	168	......	......
14	206	100	381	289	100	19	29	381	289	289	132	......	......
15	168	100	480	381	168	62	30	......	......	100	73	......	......
							31	289	206	......	......	......	......

Day.	June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1911.								
1			132	226	334	206	246	289
2			5	11	168	206	206	168
3			132	150	246	246	73	168
4			100	15	267	246	168	206
5			132	168	168	150	312	289
6			206	132	2	33	289	289
7			132	206	206	132	535	430
8			116	168	206	168	334	334
9			11	11	226	206	246	226
10			100	100	73	132	289	289
11			100	206	100	132	381	334
12			116	168	132	132	246	357
13			100	150	19	19	246	246
14			100	11	168	206	246	289
15			19	19	132	100	100	289
16			2	3	206	246	650	480
17			206	86	168	206	430	381
18			334	507	168	289	334	381
19			334	334	246	246	289	334
20			334	246	33	168	289	168
21		206	206	187	289	289	168	289
22		100	132	86	246	246	289	206
23	206	....	5	5	206	246	289	100
24			132	267	246	267	100	132
25			187	246	206	246	206	289
26	168	....	267	334	168	132	334	334
27	132	....	206	168	11	11	246	334
28	73	....	168	246	168	289	334	334
29	168	....	381	775	1,560	1,050	334	381
30	100	....	480	334	535	430	289	381
31			334	246	381	334		

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914—Continued.

Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.	Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.
1911.							**1911.**						
1	289	.....	480	480	650	590	16	381	381	535	480	.....	.....
2	430	480	480	430	590	535	17	334	289	430	480	.....	.....
3	430	381	430	381	430	381	18	289	381	480	650	.....	.....
4	334	1,210	430	381	334	334	19	3,140	2,540	775	840	.....	.....
5	1,130	1,050	334	289	334	334	20	1,210	1,050	1,050	1,050	.....	.....
6	710	590	430	381	381	430	21	775	710	1,050	980	.....	.....
7	480	430	480	710	381	405	22	590	535	1,050	980	.....	.....
8	381	.....	775	775	430	381	23	775	910	650	381	.....	.....
9	480	381	590	535	480	381	24	840	710	535	480	.....	.....
10	381	381	590	535	.....	.....	25	590	650	535	480	.....	.....
11	381	381	535	480	.....	.....	26	480	480	289	334	.....	.....
12	206	246	430	405	.....	.....	27	431	405	480	430	.....	.....
13	381	289	1,210	1,050	.....	.....	28	380	334	480	381	.....	.....
14	334	334	775	590	.....	.....	29	334	334	1,470	1,560	.....	.....
15	168	.....	590	535	.....	.....	30	430	430	710	650	.....	.....
							31	334	334	.....	.....	.....	.....

Day.	April. A. M.	April. P. M.	May. A. M.	May. P. M.	June. A. M.	June. P. M.	July. A. M.	July. P. M.	August. A. M.	August. P. M.	September. A. M.	September. P. M.
1912.												
1	.....	1,210	775	710	4,600	4,050	246	246	289	246	198	206
2	.....	1,300	710	650	2,900	2,660	206	246	246	246	132	246
3	.....	1,660	590	620	2,420	1,970	168	168	246	289	430	334
4	.....	1,660	650	680	1,660	1,660	132	100	289	381	238	246
5	.....	2,900	650	650	1,380	1,470	100	62	289	289	279	246
6	.....	3,530	775	1,380	1,560	1,210	51	33	289	289	332	334
7	.....	15,000	1,210	840	910	980	33	33	289	289	334	358
8	9,500	6,340	775	710	840	875	26	19	289	289	158	168
9	5,020	4,180	650	680	775	710	33	51	299	289	295	268
10	2,780	3,270	710	650	840	775	51	51	289	334	206	206
11	2,780	3,020	650	535	840	840	168	206	381	381	295	246
12	2,540	3,270	535	480	775	710	334	289	381	430	295	334
13	3,140	2,540	535	535	710	710	289	246	289	268	226	226
14	3,020	3,140	1,970	1,470	650	535	289	246	206	206	226	246
15	3,270	4,460	910	910	535	480	289	289	168	206	470	650
16	6,340	7,900	1,060	775	480	508	246	289	206	226	535	590
17	6,490	5,440	3,020	2,660	430	406	246	246	206	246	520	480
18	4,050	4,320	1,560	1,380	406	381	246	226	289	289	535	535
19	3,920	3,660	1,060	910	381	381	206	206	206	168	508	535
20	3,790	3,020	840	910	334	381	168	132	168	168	520	1,060
21	3,020	2,660	5,440	4,600	430	334	51	168	206	206	920	840
22	2,540	2,190	4,180	3,400	334	334	480	246	206	206	650	535
23	4,460	3,140	2,900	2,900	334	334	381	289	100	132	430	381
24	2,540	2,660	2,190	1,970	334	334	289	289	73	51	430	381
25	2,080	1,760	1,760	1,660	381	334	246	206	51	51	331	381
26	1,660	1,710	1,560	1,210	358	334	132	62	206	187	331	334
27	1,560	1,380	1,060	1,060	289	289	168	168	168	168	334	312
28	1,300	1,210	910	840	289	246	187	168	187	168	334	381
29	1,130	1,130	980	2,080	246	246	168	168	168	168	910	910
30	980	840	5,890	6,190	268	268	206	246	206	206	520	508
31	.....	.....	6,190	6,640	.....	.....	246	289	132	132	.....	.....

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914—Continued.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1912–13.												
1	480	480	480	480	535	535	5C3	535	945	980	....	....
2	455	381	480	535	480	480	563	563	508	406	289	246
3	334	334	430	455	650	535	508	508	563	620	289	289
4	268	206	430	430	535	535	5C3	808	563	590	334	334
5	246	168	430	381	840	910	1,560	1,560	535	480	289	289
6	132	100	430	480	775	650	1,210	1,210	381	381	334	381
7	289	289	430	430	650	535	1,0C0	980	381	406	289	289
8	289	289	2,420	2,190	535	535	945	875	334	289	289	334
9	289	246	1,5C0	1,380	535	590	808	563	289	381	358	590
10	289	289	910	840	535	535	563	563	381	381	1,130	1,210
11	206	246	650	710	480	535	563	742	......	......	775	775
12	206	206	910	910	535	535	875	945			710	742
13	480	381	775	650	535	480	742	775			710	710
14	334	334	2,420	2,300	480	535	563	563			6,500	8,180
15	334	430	1,660	1,380	535	535	563	620			6,540	5,700
16	334	334	910	840	430	455	563	563			4,620	4,500
17	312	289	840	840	430	480	563	563			3,680	3,680
18	268	268	775	650	480	480	742	1,060			960	890
19	1C8	132	535	535	650	840	3,400	3,140			890	755
20	132	132	535	535	710	535	1,380	1,210			820	820
21	289	289	480	535	535	430	3,400	4,180			4,020	4,260
22	226	206	535	535	312	289	2,190	945			5,700	5,700
23	168	334	535	535	289	289	1,060	945			1,660	1,760
24	6,790	4,740	535	590	289	289	1,060	1,060			1,760	1,760
25	3,660	2,780	535	535	334	334	808	875			3,900	8,100
26	1,660	1,380	535	535	334	312	742	742			5,340	8,340
27	980	840	590	535	334	406	1,0C0	1,0C0			6,300	9,300
28	650	710	535	535	381	381	875	945			3,460	2,160
29	480	480	535	535	381	358	875	875			1,860	1,760
30	480	590	480	508	381	381	808	875			1,660	1,700
31	480	480	....	....	710	775	808	742			1,760	1,760

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913.												
1	1,300	1,390	348	348	755	505	133	133	121	146	160	174
2	960	890	309	309	820	690	133	133	272	204	160	133
3	890	788	309	309	505	505	109	121	204	237	109	98
4	820	890	272	290	535	505	133	109	204	204	68	87
5	960	890	309	309	455	432	109	98	204	220	87	160
6	1,300	1,570	309	309	368	368	78	78	204	204	133	109
7	1,300	1,300	290	272	505	565	87	78	174	174	109	121
8	1,390	1,660	272	309	368	328	78	78	121	146	160	109
9	1,660	2,060	309	309	290	328	87	78	146	160	133	109
10	1,660	1,390	272	272	328	328	121	204	204	160	121	133
11	1,300	1,300	254	254	328	328	174	189	146	160	109	133
12	1,300	1,300	272	309	290	254	189	189	174	174	121	133
13	1,300	1,300	309	309	290	290	146	146	174	174	133	133
14	1,300	1,300	309	309	328	309	133	146	146	160	109	121
15	1,300	1,300	272	290	290	290	174	174	160	174	87	51
16	1,300	1,300	290	290	290	290	121	146	174	174	44	20
17	1,120	1,120	309	309	160	328	121	121	146	160	78	98
18	855	855	290	272	328	309	121	146	174	204	133	174
19	855	890	272	272	328	328	174	121	189	189	109	98
20	788	855	272	309	254	254	98	78	174	189	146	160
21	788	788	309	309	220	254	121	146	160	......	146	146
22	788	788	480	595	189	189	146	121	98	109	133	189
23	690	722	1,120	1,660	133	146	121	78	220	290	368	328
24	658	658	1,960	2,060	133	133	121	121	455	535	290	220
25	535	595	2,160	2,580	160	133	98	121	755	690	189	146
26	535	535	2,580	2,470	189	204	121	133	410	505	133	174
27	535	565	2,060	2,160	220	254	121	121	625	455	146	133
28	535	535	2,160	2,260	87	87	174	389	254	189	109	51
29	565	535	2,160	1,860	87	87	237	160	160	189	25	37
30	535	480	1,570	1,480	109	121	204	121	189	189	68	87
31	....	....	1,040	890	....	....	78	121	160	189	....	....

Twice-daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for 1909–1914—Continued.

Day.	October.		November.		December.		March.		April.		May.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913–14.												
1	109	121	290	254	272	309			1,300	1,390		
2	133	160	189	160	272	272			2,260	2,360	2,160	2,060
3	37	25	254	290	272	290			1,480	1,390	2,160	1,860
4	189	220	220	254	309	348			1,040	1,120	2,160	1,860
5	160	133	254	272	328	309			1,040	820	2,260	2,260
6	68	87	254	254	272	237			565	625	2,060	1,860
7	87	78	254	220	204	237			625	625	1,660	1,570
8	87	109	204	254	389	595			1,760	2,260	1,890	1,210
9	109	133	220	254	432	368			3,460	3,570	1,120	890
10	121	160	254	254	309	309			2,800	2,360	890	890
11	160	160	204	174	290	309			2,060	1,960	755	722
12	146	160	174	189	309	309			2,800	3,460	722	625
13	160	160	204	174	309	309			2,260	1,960	708	755
14	254	290	237	309	290	309			1,960	1,960	755	690
15	254	254	432	272	309	290	220	254	1,960	1,960	625	535
16	220	254	204	174	272	272	290	368	1,960	1,760	535	410
17	189	160	204	237	237	254	455	625	2,160	3,130	389	410
18	109	133	237	237	237	290	505	368	3,130	3,350	389	410
19	51	68	272	348	272	309	328	368	4,500		410	389
20	254	290	595	960	272	272	368	389			410	389
21	565	690	688	432	204	160	505	410			410	389
22	432	410	348	309	309	348	368	455	4,020	3,790	389	348
23	455	505	204	237	272	254	389	410	3,460	3,240	410	254
24	505	565	272	309	237	272	505	368	2,800	2,580	309	272
25	565	595	272	290	237	237	410	328	2,800	2,470	348	328
26	625	625	237	237	237	254	389	565	2,470	2,690	328	328
27	565	625	189	174	309	348	1,480	2,160	3,020	3,240	309	328
28	455	410	174	237	348	368	2,360	2,470	3,460	3,240	328	254
29	368	389	237	272	309	309	2,160	1,660	3,570		290	328
30	368	348	204	174	348	348	1,300	1,480			204	189
31	290	328					1,040	1,120			220	174

Day.	June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1914.								
1	220	290	229	279	160	168	312	279
2	254	272	343	416	129	24	272	239
3	220	220	416	366	155	198	272	246
4	290	328	246	223	198	201	268	275
5	505	410	187	204	196	193	268	
6	328	204	264	268	198	198		
7	189	189	264	275	196	190		
8	254	290	246	343	187	155		
9	254	410	264	279	22	17		
10	220	220	291	279	163	155		291
11	189	204	275	210	150	136	155	279
12	189	220	113	131	173	120	213	220
13	220	189	201	201	158	155	63	59
14	15	109	86	253	136	124	220	246
15	160	220	232	168	138	120	155	193
16	143	223	213	136	66	22	216	223
17	48	217	201	108	66	120	239	210
18	63	232	242		74	143	176	210
19	108	220			131	204	196	173
20	126	226		232	49	196	22	22
21	184	213	155	226	155	229	181	165
22	171	229	171	173	131	272	136	173
23	141	232	176	198	196	145	168	196
24	108	246	155	204	260	242	216	204
25	198	242	196	160	213	155	181	133
26	74	198	97	21	236	168	275	236
27	141	198	108	190	108	120	155	86
28	68		131	201	58	201	232	279
29	122	187	190	155	49	232	300	216
30	117	210	204	213			150	246
31			204	204		343		

NOTE.—Gage read at about 8.30 a. m. and 4.30 p. m. Chain gage on highway bridge read until June 15, 1914; staff gage at new station read June 16 to July 3, 1914; after that date two readings a day were taken from automatic gage record for comparison. Discharge determined as follows: Prior to June 16, 1914, from a fairly well defined rating curve; June 16 to Sept. 30, 1914, from a well-defined rating curve. The discharge figures given in the above table correspond to the observed gage heights and do not represent the mean discharge for the day.

SURFACE WATERS OF VERMONT.

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1914–1916.

[New gage.]

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1914.					**1914.**				
1	....	260	104	198	16	170	95	43	101
2	....	395	56	170	17	158	99	52	104
3	....	410	76	153	18	148	136	76	86
4	....	231	86	160	19	173	135	63	99
5	....	192	70	158	20	183	133	70	34
6	....	198	72	158	21	207	104	99	66
7	....	195	68	158	22	225	74	165	59
8	....	160	108	157	23	195	74	175	78
9	....	180	43	157	24	189	64	165	104
10	....	204	51	157	25	219	131	106	82
11	....	160	49	155	26	168	42	78	148
12	....	110	54	155	27	160	63	66	108
13	....	155	76	84	28	162	63	97	165
14	....	124	66	141	29	165	70	117	143
15	....	108	72	120	30	175	90	236	131
					31	....	108	355	....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	198	68	240	108	90	930	445	790	195	204	120	180
2	189	136	445	120	108	825	470	970	155	345	320	155
3	201	131	482	66	131	620	380	741	168	260	350	141
4	64	131	345	86	155	578	355	584	143	225	222	150
5	131	120	240	86	168	620	488	512	120	288	204	72
6	120	132	168	108	155	590	518	460	86	292	198	122
7	108	143	180	2,030	175	518	488	400	131	210	178	155
8	115	115	113	2,530	240	530	825	720	120	958	150	150
9	131	186	133	375	240	470	1,300	685	126	2,300	410	140
10	66	180	97	260	195	420	1,640	494	131	860	470	130
11	22	180	90	195	153	420	3,050	415	108	470	316	125
12	86	143	97	180	160	370	4,190	360	560	320	234	120
13	97	143	21	143	150	345	1,880	345	288	260	210	115
14	86	168	58	131	120	320	1,220	315	210	272	195	106
15	86	150	72	86	155	320	1,040	285	180	231	163	108
16	86	530	70	86	370	320	916	256	168	195	207	99
17	131	530	78	49	602	240	860	272	395	195	450	95
18	268	300	66	131	355	234	720	300	470	335	320	86
19	225	225	49	1,460	231	225	678	292	300	296	228	54
20	219	210	34	1,300	180	260	664	292	435	390	195	108
21	195	195	74	430	175	210	572	248	288	260	170	122
22	175	204	95	231	192	222	500	260	216	260	124	201
23	168	260	97	201	201	288	455	240	210	560	626	201
24	126	180	86	189	225	560	445	225	168	320	460	136
25	86	210	42	204	1,000	720	530	210	143	234	590	133
26	143	143	28	175	1,400	1,000	790	225	143	225	445	66
27	155	460	28	150	1,640	560	685	470	115	240	853	155
28	131	590	42	150	1,100	518	536	320	180	225	222	198
29	131	312	86	117	....	435	500	225	143	210	170	145
30	108	280	120	86	....	300	560	198	155	225	204	113
31	120	....	120	86	....	372	....	192	....	168	178	....

Daily discharge, in second-feet, of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1914–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1...............	113	163	300	1,180	1,730	530	3,830	909	566	350	228	130
2...............	86	133	210	1,140	1,220	470	4,450	839	370	300	168	145
3...............	58	136	195	1,140	825	445	2,380	755	430	420	121	105
4...............	158	115	195	1,040	620	395	1,780	1,070	1,100	470	115	135
5...............	216	108	110	1,040	420	300	1,420	818	909	602	108	155
6...............	430	141	178	1,600	560	280	1,500	692	818	380	90	145
7...............	234	74	148	1,460	530	280	1,550	608	657	256	90	135
8...............	189	108	145	790	395	280	1,340	626	500	280	108	120
9...............	153	115	143	530	420	300	1,380	602	790	240	370	115
10...............	97	104	131	420	445	320	1,220	524	1,380	234	930	100
11...............	153	120	120	320	370	320	1,420	530	1,380	195	471	135
12...............	124	108	42	240	345	300	1,680	465	1,460	204	269	125
13...............	110	165	108	210	370	300	1,550	420	1,000	204	225	105
14...............	115	51	97	180	345	300	1,600	330	825	186	213	115
15...............	108	175	108	168	320	300	1,600	375	620	195	160	125
16...............	195	225	97	143	320	320	1,730	536	590	155	155	225
17...............	82	228	108	180	300	300	2,030	2,480	811	195	150	150
18...............	148	148	131	168	300	260	2,430	3,650	755	198	126	145
19...............	136	150	280	168	300	240	1,880	1,550	584	183	131	140
20...............	165	440	280	143	240	280	1,460	1,070	1,140	153	73	140
21...............	168	445	180	155	240	240	1,420	867	776	183	113	135
22...............	150	365	155	180	210	260	1,600	734	530	204	117	125
23...............	145	296	131	355	195	225	2,700	818	470	207	110	110
24...............	52	248	120	500	195	210	2,030	811	430	210	101	70
25...............	117	138	86	395	225	240	1,640	650	395	186	113	140
26...............	113	216	168	500	1,140	260	1,420	530	415	160	120	150
27...............	115	175	860	1,600	1,300	445	1,220	494	460	148	64	125
28...............	117	158	2,700	5,790	970	970	1,140	415	839	155	120	128
29...............	124	240	2,430	2,230	650	1,550	1,040	440	554	108	130	155
30...............	124	360	1,380	1,140	....	3,110	965	650	430	56	152	1,010
31...............	82	....	1,260	1,070	....	6,070	....	902	....	148	120	....

NOTE.—Discharge determined from a rating curve well defined between 30 and 5,000 second-feet. Stage-discharge relation affected by ice, Dec. 7, 1914, to Feb. 26, 1915; Dec. 10–27, 1915, and Jan. 8 to Mar. 31, 1916; records for these periods based on gage heights corrected for backwater by means of discharge measurements, observer's notes, and weather records.

Monthly discharge of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1914–1916.

[New gage; drainage area, 420 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914.						
June 16–30.................	225	148	180	0.429	0.24	C.
July.....................	410	42	147	.350	.40	B.
August...................	355	43	97.2	.231	.27	B.
September.................	198	34	126	.300	.33	B.
1914–15.						
October...................	268	22	134	.319	.37	A.
November.................	590	68	225	.536	.60	A.
December.................	482	21	126	.300	.35	C.
January..................	2,530	49	373	.888	1.02	C.
February.................	1,640	90	359	.855	.89	C.
March....................	1,000	210	463	1.10	1.27	A.
April....................	4,190	355	923	2.20	2.46	B.
May.....................	970	192	397	.945	1.09	A.
June.....................	560	86	208	.495	.55	A.
July.....................	2,300	168	382	.910	1.05	A.
August...................	853	120	296	.705	.81	A.
September.................	201	54	129	.307	.34	B.
The year.................	4,190	21	334	.795	10.80	

Monthly discharge of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1914–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accu-racy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1915–16.						
October	430	52	141	0.336	0.39	A.
November	445	51	188	.448	.50	A.
December	2,700	42	406	.967	1.11	C.
January	5,790	143	844	2.0˙	2.32	C.
February	1,730	195	534	1.2˙	1.37	C.
March	6,070	210	648	1.54	1.78	C.
April	4,450	965	1,780	4.2˙	4.73	B.
May	3,650	330	844	2.0˙	2.32	A.
June	1,460	370	733	1.75	1.95	A.
July	602	56	231	.550	.63	C.
August	930	64	180	.429	.49	B.
September	1,010	70	161	.3˙3˙	.43	B.
The year	6,070	42	556	1.32	18.02	

Days of deficiency in discharge of Winooski River at Montpelier, Vt., during the years ending Sept. 30, 1915–16.

Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.		Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.	
		1914-15	1915-16			1914-15	1915-16
25	2.8	2	....	1,000	114	˚48	302
50	5.7	9	1	1,200	137	˚52	318
75	8.5	21	8	1,500	171	˚57	335
100	11.4	46	18	2,000	227	360	351
125	14.2	75	60	2,500	284	362	358
150	17.1	110	99	3,000	341	363	360
200	22.7	173	149	4,000	455	364	363
250	28.4	223	179	6,000	682	365	365
300	34.1	245	192	8,000	909	....	366
350	39.8	264	213				
400	45.5	276	227				
500	56.8	303	251				
600	68.2	325	267				
700	79.6	333	278				
800	90.9	339	284				

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

WINOOSKI RIVER AT RICHMOND, VT.

LOCATION.—At the steel highway bridge about one-fourth mile from Richmond railway station on the road to Huntington, 2 miles below mouth of Huntington River.

DRAINAGE AREA.—985 square miles.[a]

RECORDS AVAILABLE.—June 25, 1903, to April 30, 1907; July 8 to October 31, 1910.

GAGE.—Chain on highway bridge; read twice daily by George Champang and J. N. Buley.

DISCHARGE MEASUREMENTS.—Made from the bridge or by wading.

CHANNEL AND CONTROL.—Channel of gravel and alluvium. Control somewhat shifting.

[a] Erroneously given as 885 square miles in reports previously published.

EXTREMES OF DISCHARGE.—Maximum open water stage recorded, 18.7 feet at 7 a. m. March 26, 1904 (approximate discharge from extension of rating curve, 29,300 second-feet); minimum stage, 3.45 feet August 20, 1906 (discharge, 225 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements, observer's notes and records of precipitation and temperature.

DIVERSIONS.—No diversions except from tributaries for municipal use.

REGULATION.—Power developments above the station affected the distribution of flow at low stages.

Discharge measurements of Winooski River at Richmond, Vt., during 1903–1907 and 1910.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
1903.		*Feet.*	*Sec.-ft.*	1905.		*Feet.*	*Sec.-ft.*
June 6	H. K. Barrows	4.00	202	Mar. 3	H. K. Barrows	a 5.45	206
25	....do	5.05	1,040	4	....do	a 5.58	262
July 6	....do	4.50	545	Apr. 3	A. D. Butterfield	6.65	3,070
22	N. C. Grover	5.33	1,320	May 13	....do	4.97	1,180
Aug. 7	H. K. Barrows	4.23	392				
13	....do	4.40	450	1906.			
13	....do	4.42	475	Mar. 9	H. K. Barrows	a 5.53	585
Sept. 15	....do	3.70	146	29	A. D. Butterfield	6.96	3,190
15	....do	3.78	154	Apr. 13	....do	6.57	3,500
Nov. 11	....do	4.42	452	18	Butterfield and Nye...	9.55	9,180
				25	A. D. Butterfield	6.50	3,380
1904.				25	G. M. Brett	6.50	3,210
May 4	H. K. Barrows	7.10	3,610	May 23	Butterfield and Brett..	4.97	1,240
7	J. H. Ayres	6.16	2,360	23	....do	4.97	1,290
10	....do	5.89	1,930	Sept. 25	Butterfield and Pierce.	3.92	389
Aug. 18	H. K. Barrows	4.08	352	Nov. 30	A. D. Butterfield	5.10	1,350
Oct. 31	....do	5.08	1,210				
				1910.			
				July 9	Butterfield and Brett..	4.31	408
				Aug. 29	G. M. Brett	3.80	148

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Winooski River at Richmond, Vt., for the years ending Sept. 30, 1903–1907 and 1910.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1903.					1903.				
1		435	800	285	16		285	235	195
2		620	755	235	17		400	260	180
3		710	630	260	18		370	260	195
4		470	500	235	19		285	235	165
5		370	370	235	20		340	850	165
6		505	435	235	21		1,630	710	140
7		540	400	215	22		1,300	505	195
8		435	340	215	23		2,350	370	140
9		340	285	235	24		1,850	340	180
10		260	285	235	25	1,000	950	340	140
11		285	340	195	26	800	850	340	180
12		285	340	215	27	665	950	340	140
13		215	505	195	28	505	665	315	140
14		260	400	165	29	470	580	285	165
15		260	340	195	30	435	1,000	235	165
					31		1,410	235	....

Daily discharge, in second-feet, of Winooski River at Richmond, Vt., for the years ending Sept. 30, 1903–1907 and 1910—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1	140	1,050	505				3,600	6,520	755	315	285	195
2	195	800	470				3,260	5,170	755	400	340	215
3	235	665	540				3,430	4,280	710	800	340	235
4	195	540	505				2,630	4,110	620	470	285	1,100
5	285	505	505				2,930	3,600	540	370	340	800
6	340	540					3,940	2,780	580	400	260	540
7	285	665					4,990	2,350	620	340	235	435
8	260	540					4,990	2,220	800	260	195	370
9	620	470					7,770	1,970	1,300	285	235	285
10	1,200	540					7,770	1,850	900	235	235	260
11	800	470					6,120	1,850	620	235	235	235
12	620	435					4,630	1,740	470	235	260	180
13	435	400					4,280	1,410	470	900	235	195
14	400	400					2,930	1,300	400	800	235	235
15	315	340					2,490	1,100	370	505	400	400
16	260	285					2,090	2,490	470	315	340	1,150
17	285	470					1,850	4,450	340	260	315	620
18	285	1,410					2,350	2,350	235	235	215	370
19	710	950					2,490	2,090	235	235	195	540
20	900	710					2,220	4,990	260	195	235	800
21	710	710					2,350	3,770	285	195	2,930	2,930
22	505	900					2,350	2,350	340	195	1,250	1,410
23	435	710					3,260	1,970	370	195	1,250	900
24	800	505					3,770	1,740	340	195	710	1,050
25	755	470					6,120	1,630	285	152	470	3,090
26	620	710					6,520	1,630	235	215	340	1,850
27	620	540					4,450	1,630	315	435	285	1,740
28	540	620					4,630	1,360	260	620	235	1,300
29	505	620				8,840	7,140	1,000	285	540	180	1,000
30	620	540				3,090	9,500	900	315	435	195	6,520
31	1,150					3,260		800		340	195	
1904–5.												
1	4,630	800	540				6,520	2,040	1,040	840	5,350	1,920
2	5,350	800	580				3,770	1,810	940	6,720	2,890	1,360
3	2,930	710					3,020	1,810	1,640	7,140	1,810	1,250
4	2,090	710					2,640	2,640	1,420	3,020	1,250	6,930
5	1,520	710					4,280	2,160	1,250	2,040	990	3,940
6	1,410	620					4,630	1,920	2,520	1,520	1,090	2,760
7	1,300	620					4,110	1,920	2,040	1,250	1,250	2,520
8	1,000	540					3,150	1,810	1,420	990	1,040	1,920
9	1,000	540					2,640	1,700	1,300	790	940	1,420
10	900	435					2,760	1,580	1,090	695	790	1,090
11	1,200	400					3,940	1,360	1,360	790	650	940
12	1,250	400					4,630	1,140	2,280	650	570	1,090
13	1,050	470					3,940	1,040	2,040	570	610	1,300
14	1,150	470					3,300	1,040	2,640	650	425	1,140
15	1,200	540					2,760	1,520	2,280	740	425	990
16	1,100	470					2,280	2,040	1,090	740	3,600	790
17	900	540					2,160	1,810	1,250	1,090	2,760	1,200
18	800	435					1,920	1,580	1,420	940	1,470	7,350
19	710	710				11,700	1,700	1,580	1,040	990	1,090	8,620
20	710	620				12,600	1,810	1,470	1,200	1,040	840	3,020
21	1,850	665				6,930	3,150	1,300	1,520	695	·790	5,350
22	9,500	1,100				4,990	6,120	1,140	1,700	570	650	3,020
23	2,930	710				4,630	3,300	990	1,250	495	570	2,280
24	2,090	620				5,350	2,760	840	940	425	495	1,810
25	1,630	620				12,200	2,520	740	650	495	495	1,580
26	1,410	620				8,620	2,280	840	840	460	425	1,360
27	1,850	470				8,840	2,160	3,940	2,760	570	460	1,140
28	1,740	470				9,060	2,280	2,160	1,810	570	610	1,250
29	1,630	540				9,940	2,280	1,470	1,700	460	392	1,090
30	1,410	620				14,200	2,400	1,200	1,140	2,890	570	890
31	1,100					12,600		1,040		9,260	2,890	

Daily discharge, in second-feet, of Winooski River at Richmond, Vt., for the years ending Sept. 30, 1903-1907 and 1910—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1905-6.												
1	840	940	1,470	......	......	......	2,120	3,460	1,740	1,800	1,3'0	465
2	940	1,140	1,150	......	......	......	1,740	2,830	1,560	1,390	'7'5	355
3	940	990	1,700	......	......	......	1,620	3,960	1,620	1,010	595	1,990
4	940	940	3,150	......	......	......	1,860	3,620	1,390	1,170	5'8	2,830
5	840	1,140	1,920	......	......	......	3,300	3,140	1,120	1,500	4'5	1,280
6	695	1,090	1,810	......	......	......	4,830	2,830	1,390	1,060	5'5	870
7	650	1,580	1,700	......	......	......	2,980	2,250	3,460	745	2,2'0	705
8	570	1,810	1,580	......	......	......	3,140	1,860	2,390	668	9'0	465
9	570	1,360	1,580	......	......	......	2,680	2,250	2,680	630	5'5	408
10	650	1,250	1,470	......	......	......	2,390	4,650	1,990	630	5'8	528
11	2,160	1,040	......	......	......	......	1,990	3,300	1,860	1,680	5'8	495
12	1,810	940	......	......	......	......	3,460	2,530	1,500	1,120	3'0	355
13	1,520	1,580	......	......	......	......	3,620	10,600	1,220	785	3'5	408
14	1,090	1,810	......	......	......	......	5,570	6,750	1,060	630	4'8	408
15	1,090	1,300	......	......	......	......	14,000	3,790	785	465	4'5	408
16	940	1,250	......	......	......	......	13,300	3,140	785	595	3'5	310
17	840	1,360	......	......	......	......	9,710	2,680	785	408	3'5	290
18	840	990	......	......	......	......	8,420	2,680	1,800	408	3'0	355
19	1,140	890	......	......	......	......	8,420	2,250	1,340	630	2'8	528
20	990	840	......	......	......	......	8,840	1,680	960	465	2'5	355
21	840	740	......	......	......	......	9,050	1,440	785	915	4'8	355
22	1,200	840	......	......	......	......	9,930	1,560	960	1,440	3'0	355
23	1,360	740	......	......	......	......	6,150	1,220	1,680	828	3'0	310
24	1,040	740	......	......	......	......	4,130	1,120	5,380	595	4'5	408
25	890	1,090	......	......	......	......	3,140	2,250	3,140	465	4'8	408
26	740	1,360	......	......	......	......	2,980	3,300	2,120	435	275	408
27	650	1,200	......	......	......	......	2,680	4,470	1,500	528	5'8	528
28	650	1,040	......	......	......	5,190	2,530	6,350	1,060	408	5,7'0	435
29	570	840	......	......	......	3,960	2,390	3,620	380	1,390	1,3'0	560
30	650	3,770	......	......	......	3,140	3,140	2,680	1,680	3,460	8'8	915
31	650	......	......	......	......	2,980	......	1,990	......	2,530	6'8	......

Day.	Oct.	Nov.	Dec.	Apr.	Day.	Oct.	Nov.	Dec.	Apr.
1906-7.					**1906-7.**				
1	595	785	1,440	8.420	16	960	1,060	......	2,980
2	465	705	1,860	5,010	17	745	1,170	......	3,140
3	495	630	1,740	3,790	18	560	1,620	......	3,300
4	330	630	......	3,960	19	528	5,950	......	3,140
5	330	668	......	6,350	20	1,860	3,460	......	2,390
6	380	630	......	5,380	21	2,120	2,250	......	1,990
7	495	595	......	3,790	22	1,280	2,120	......	1,990
8	330	495	......	3,620	23	960	2,250	......	2,980
9	528	435	......	3,140	24	828	1,620	......	11,500
10	595	560	......	2,530	25	1,060	1,170	......	7,580
11	595	435	......	2,390	26	1,620	1,220	......	9,270
12	1,010	870	......	2,830	27	1,170	2,120	......	10,600
13	960	870	......	3,140	28	870	2.830	......	9,270
14	870	705	......	3,140	29	960	2,120	......	8,420
15	785	630	......	3,790	30	785	1,440	......	10,600
					31	705	......	......	......

Day.	July.	Aug.	Sept.	Oct.	Day.	July.	Aug.	Sept.	Oct.
1910.					**1910.**				
1	......	340	260	540	16	312	340	34?	285
2	......	340	235	1,200	17	170	370	34?	285
3	......	312	260	1,300	18	235	400	26?	400
4	......	370	285	800	19	285	400	26?	435
5	......	850	400	620	20	312	370	26?	340
6	......	950	1,520	710	21	260	285	31?	400
7	......	1,050	2.220	900	22	312	370	31?	370
8	......	850	1,460	710	23	340	312	285	312
9	......	665	950	580	24	235	285	26?	620
10	......	470	505	665	25	340	340	21?	665
11	340	665	312	755	26	285	312	31?	1,200
12	400	665	340	580	27	260	285	37?	1,410
13	400	580	370	540	28	1,050	190	2,84?	1,720
14	400	370	340	580	29	800	212	2,09?	1,300
15	340	370	370	505	30	620	212	95?	1,000
					31	312	235	......	900

Monthly discharge of Winooski River at Richmond, Vt., for 1903–1907 and 1910.

[Drainage area, 985 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).
	Maximum.	Minimum.	Mean.	Per square mile.	
1903.					
June 25–30	1,000	435	646	0.656	0.15
July	2,350	215	684	.694	.80
August	850	235	406	.412	.48
September	285	140	194	.197	.22
1903–4.					
October	1,200	140	517	.525	.61
November	1,410	285	617	.626	.70
December			a 670	.680	.78
January			a 720	.731	.84
February			a 500	.507	.55
March			a 1,970	2.00	2.31
April	9,500	1,850	4,230	4.30	4.80
May	6,520	800	2,500	2.54	2.93
June	1,300	235	483	.490	.55
July	900	152	364	.370	.43
August	2,930	180	434	.441	.51
September	6,520	180	1,030	1.05	1.17
The year		140	1,170	1.19	16.18
1904–5.					
October	9,500	710	1,910	1.94	2.24
November	1,100	400	599	.608	.68
December			a 455	.462	.53
January			a 375	.381	.44
February			a 350	.355	.37
March	14,200		a 4,140	4.20	4.84
April	6,520	1,700	3,170	3.22	3.59
May	3,940	740	1,600	1.62	1.87
June	2,760	650	1,520	1.54	1.72
July	9,260	425	1,620	1.64	1.89
August	5,350	425	1,230	1.25	1.44
September	8,620	790	2,340	2.38	2.66
The year	14,200		1,620	1.64	22.27
1905–6.					
October	2,160	570	910	.924	1.07
November	3,770	740	1,220	1.24	1.38
December	3,150		a 1,270	1.29	1.49
January			a 2,250	2.29	2.64
February			a 1,180	1.20	1.25
March	5,190		a 985	1.00	1.15
April	14,000	1,620	5,000	5.08	5.67
May	10,600	1,120	3,230	3.28	3.78
June	5,380	785	1,700	1.73	1.93
July	3,460	380	960	.975	1.12
August	5,760	225	756	.768	.89
September	2,830	310	615	.624	.70
The year	14,000	225	1,670	1.70	23.07
1906–7.					
October	2,120	330	831	.844	.97
November	5,950	435	1,400	1.42	1.58
December			a 872	.885	1.02
January			a 1,370	1.39	1.60
February			a 490	.500	.52
March			a 1,600	1.62	1.87
April	11,500	1,990	5,010	5.09	5.68
1910.					
July 11–31	1,050	170	381	.387	.30
August	1,050	190	442	.449	.52
September	2,840	212	641	.651	.73
October	1,720	285	730	.741	.85

a Estimated from gage heights, observer's notes, and comparison with records of other streams.

WINOOSKI RIVER NEAR WINOOSKI, VT.

LOCATION.—At a highway bridge known as High Bridge, on the road from Winooski to the lime kilns, 4 miles below Muddy Brook and 7 miles above mouth of river.

DRAINAGE AREA.—1,080 square miles.

RECORDS AVAILABLE.—March 18 to November 29, 1903.

GAGE.—Chain; read twice daily by John De Forge.

DISCHARGE MEASUREMENTS.—Made from railroad bridge about a mile-downstream from the gage.

CHANNEL AND CONTROL.—Channel deep, with rock bed. Control at dam about a mile downstream from the gage. Crest of dam 37.5 feet above gage datum.

EXTREMES OF STAGE.—Maximum stage recorded, 49.7 feet at 6 p. m. March 24; minimum stage, 28.7 feet at 6 a. m. September 22.

DIVERSIONS.—No diversions except from tributaries for municipal use.

REGULATION.—Power developments above the station affected the distribution of flow at low stages.

ACCURACY.—Stage-discharge relation affected by operation of gates at the dam 1 mile below the gage. As power was used for electric lighting only and practically no water drawn during the daytime in the period for which records were obtained, the gage heights at high and medium stages may be considered fairly good indices of the flow. At low stages of the river, however, the water level might be below the crest of the dam and water stored during the day to be drawn down during the night; consequently gage heights below 37.5 feet afford no indication of flow other than that the stage of the river was low.

Discharge measurements of Winooski River near Winooski, Vt., during 1903.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 19	H. K. Barrows	43.25	7,450	Apr. 15	A. D. Butterfield	39.45	2,210
Mar. 31	A. D. Butterfield	40.80	4,476	20	H. K. Barrows	39.00	1,575
Apr. 8	.....do	41.30	5,510	27	A. D. Butterfield	38.70	1,165
8	.....do	41.30	5,595	May 9	H. K. Barrows	38.35	740
13	H. K. Barrows	39.65	2,510	18	A. D. Butterfield	38.05	355
15	A. D. Butterfield	39.50	2,415				

Daily gage height, in feet, of Winooski River near Winooski, Vt., for 1903.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	....	41.85	38.7	37.6	38.1	38.3	....	34.1	39.55
2	....	40.7	38.6	37.6	38.3	38.1	....	35.3	39.7
3	....	40.35	38.6	37.6	38.25	37.9	....	37.3	39.5
4	....	42.35	38.4	37.7	38.0	37.9	....	37.2	39.5
5	....	40.85	38.4	37.55	38.0	37.9	....	37.4	39.5
6	....	40.6	38.4	37.5	38.0	37.9	....	37.8	39.45
7	....	40.5	38.25	37.3	38.1	37.9	....	38.55	39.5
8	....	41.1	38.3	37.3	38.15	37.8	....	39.0	39.4
9	....	41.1	38.3	36.65	38.05	37.75	....	39.4	39.4
10	....	41.1	38.3	36.5	38.0	37.45	....	40.1	39.4
11	....	40.2	38.2	37.85	38.0	37.65	....	40.0	39.4
12	....	39.85	38.25	38.85	38.0	37.8	37.5	39.75	39.3
13	....	39.65	38.15	39.65	37.95	37.7	37.35	39.1	39.3
14	....	39.5	38.1	40.05	38.1	37.55	36.45	39.1	39.1
15	....	39.45	38.1	40.1	38.05	37.55	35.35	38.95	39.1
16	....	39.5	38.1	39.45	37.95	37.5	33.55	38.75	39.1
17	....	39.6	38.1	38.6	37.9	37.5	33.3	38.7	39.25
18	43.0	39.3	38.1	38.5	37.9	37.55	35.45	38.95	40.3
19	43.3	39.15	38.1	38.4	37.9	37.55	35.15	39.4	40.8
20	46.4	39.05	38.05	38.4	38.0	37.8 ɪ	34.5	39.75	40.7
21	46.4	38.95	38.0	38.6	38.4	37.95	34.55	39.7	40.05
22	....	38.9	37.95	38.9	39.3	37.5	31.5	38.9	39.6
23	44.7	38.8	37.9	38.85	39.3	37.5	33.4	38.95	39.5
24	49.7	38.75	37.9	39.0	39.3	37.55	33.75	38.9	39.35
25	47.4	38.8	37.85	38.9	39.0	37.5	34.65	38.85	39.2
26	....	38.7	37.75	38.5	39.0	....	34.1	39.3	39.1
27	41.7	38.6	37.7	38.5	39.0	....	33.6	39.2	39.25
28	41.4	38.65	37.7	38.5	38.85	....	33.75	38.95	38.8
29	41.1	38.6	37.7	38.4	38.6	....	34.4	38.9	....
30	40.55	38.65	37.7	38.2	38.3	....	33.9	39.2	....
31	40.75	....	37.7	....	38.3	....	....	39.5	....

Monthly discharge of Winooski River near Winooski, Vt., for 1903.

Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.
March 18–31	23,400	4,020	11,900
April	7,790	1,030	2,870
May 1–21	1,160	305	616
June 12–30	3,240	537	1,420
July 1–15, 20–31	2,000	305	810
August 1, 2	657	420	538
October 7–31	3,240	970	1,870
November 1–28	4,500	1,300	2,330

NOTE.—Discharge computed from a rating curve well defined between 350 and 6,000 second-feet. Discharge not applied to gage heights below 38.0 feet.

STEVENS BRANCH OF WINOOSKI RIVER NEAR MONTPELIER, VT.

LOCATION.—Near highway bridge on Marvin farm, about one-fourth mile above the confluence of Stevens Branch with Winooski River and 3 miles from Montpelier.

DRAINAGE AREA.—130 square miles.

RECORDS AVAILABLE.—July 5 to September 30, 1910.

GAGE.—Vertical staff on left bank 60 feet below the bridge; read twice daily by W. B. Marvin.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvium; control probably permanent throughout period covered by records.

REGULATION.—Distribution of flow throughout the 24 hours probably affected by operation of power plants. Very little storage in the basin.

ACCURACY.—Data insufficient for determination of daily discharge. Results of discharge measurements and gage reading twice daily show in a general way the flow during the period.

Discharge measurements of Stevens Branch of Winooski River near Montpelier, Vt., during 1910.

[Made by G. M. Brett.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 5......................	1.79	77	Aug. 10......................	1.75	64
23......................	1.38	14.3	23......................	1.63	46.2

Daily gage height, in feet; of Stevens Branch of Winooski River near Montpelier, Vt., from July 5 to Sept. 30, 1910.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1.........	....	1.65	1.55	11.........	1.5	1.5	1.8	21.........	1.48	1.65	1.55
2.........	....	1.6	1.5	12.........	1.45	1.85	1.65	22.........	1.5	1.6	1.5
3.........	....	1.5	1.5	13.........	1.55	1.75	1.65	23.........	1.45	1.6	1.6
4.........	....	2.25	1.7	14.........	1.8	1.35	1.75	24.........	1.25	1.5	1.6
5.........	1.8	2.25	1.6	15.........	1.65	1.6	1.85	25.........	1.45	1.45	1.75
6.........	1.65	2.6	2.9	16.........	1.5	1.7	1.75	26.........	1.35	1.55	1.85
7.........	1.5	1.95	2.5	17.........	1.3	1.8	1.75	27.........	1.5	1 45	1.95
8.........	1.5	1.65	1.9	18.........	1.4	1.65	1.65	28.........	1.62	1.4	3.15
9.........	1.6	1.55	1.85	19.........	1.45	1.65	1.55	29.........	1.6	1.55	2.35
10.........	1 4	1.55	1.85	20.........	1.45	1.75	1.5	30.........	1.6	1.5	1.95
								31.........	1.4	1.55	....

NORTH BRANCH [1] OF WINOOSKI RIVER AT MONTPELIER, VT.

LOCATION.—A short distance below dam of Lane Manufacturing Co. at Montpelier, about half a mile above the confluence of North Branch with Winooski River.

DRAINAGE AREA.—78 square miles (measured on post-route map of Vermont, edition of 1915).

RECORDS AVAILABLE.—May 15, 1909, to December 31, 1914.

GAGE.—Vertical staff attached to stone wall and tree on left bank; read twice daily by S. A. Luke.

DISCHARGE MEASUREMENTS.—Made from steel highway bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with boulders and gravel; somewhat shifting. Control influenced by backwater from Winooski River at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 10.3 feet at 4.30 p. m. April 20, 1914 (approximate discharge from extension of rating curve, 4,540 second-feet); minimum discharge of about 2 second-feet at various times when water held back by dam.

WINTER FLOW.—Stage-discharge relation usually affected by ice.

REGULATION.—Distribution of flow during the day affected by operation of power plant above station.

ACCURACY.—Several rating curves have been used; apparently impossible to develop a single rating curve for all stages owing to shifting of channel and varying effect of backwater from Winooski River. Mean daily stage not determinable from two gage readings a day owing to diurnal fluctuations caused by operation of power plants above. Following tables show discharge corresponding to each gage reading. Comparison of records with records obtained at other stations indicates that the determination of mean monthly flow derived from two gage readings a day and special computations may be fairly good, except for periods of high water in Winooski River, when data for this station are uncertain.

_____

[1] Sometimes called Worcester Branch.

Discharge measurements of North Branch of Winooski River at Montpelier, Vt., during 1909–1914.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
1909.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
May 17	D. M. Wood...........	3.10	557	Oct. 12	C. S. DeGolyer.........	1.11	23
19	....do..................	2.60	327	13	....do..................	2.79	329
28	....do..................	1.50	82	14	....do..................	1.95	131
June 25	....do..................	1.10	30				
25	....do..................	.80	a 4	1913.			
July 2	....do..................	b 1.02	21	Mar. 26	R. S. Barnes...........	7.20	1,030
2	....do..................	.78	a 2	26	....do..................	6.50	2,700
23	....do..................	1.43	67	Apr. 28	....do..................	1.87	126
1910.				1914.			
Apr. 21	T. W. Norcross.........	1.76	126	Apr. 25	C. H. Pierce and R. S. Barnes...............	3.21	520
21	....do..................	1.72	116	27	R. S. Barnes...........	3.40	632
Oct. 26	C. C. Covert............	2.20	201	May 15	C. S. DeGolyer.........	1.62	108
1911.				16	....do..................	1.59	89
June 20	G. H. Canfield.........	1.07	28	29	....do..................	1.44	68
Aug. 6	....do..................	.80	4.9	July 1	....do..................	.82	3.9
1912.							
Feb. 20	G. H. Canfield.........	c 1.59	31				
Sept. 4	J. G. Mathers..........	1.45	70				

a Estimated.   b Gage height uncertain.   c Stage-discharge relation affected by ice.

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914.

Day.	May. A.M.	May. P.M.	June. A.M.	June. P.M.	July. A.M.	July. P.M.	August. A.M.	August. P.M.	September. A.M.	September. P.M.
1909.										
1			79	79		a 19		4		a 25
2			87	79		a 19		c 20		a 22
3			79	79		a 20		c 20		a 22
4			79			26		c 20		a 15
5			51	182	64	26		c 22		4
6				159		a 21		a 22		a 35
7			105	79		a 22		a 14		a 29
8			79	40		a 11		4		a 22
9			79	35		a 10		a 22		a 20
10			87	40		a 2		a 22		a 20
11			64	40		a 18		a 20		a 14
12			71	45		a 20		a 20		12
13				45		a 20		a 20		a 22
14			115	30		a 20		a 14		a 20
15		190	79	21		a 20		4		a 20
16		482	64	21		a 20		a 20		a 18
17		530	79		35	64		a 30		a 18
18		490	64	96		79		a 44		a 14
19			125	105	64	79		a 50		4
20	530	490		51	64	79	30	79		a 20
21	320	260		a 25		a 40	64	51		a 20
22	230	205		a 26		a 20		51		a 20
23		182		a 20		a 26		a 45		a 18
24	159	115		a 20		a 17		a 40		a 18
25	*136	51		a 19		21		a 39		a 15
26	79	79		a 21	21	4		a 29		12
27	64	79		a 20	12	30		a 20		a 29
28	96	205		a 20		a 16		a 14	40	650
29	490	182		a 20		a 16		12	290	136
30		182		a 20		a 16		a 29	79	30
31		136				a 10		a 29		

a Mean flow for 24 hours, determined by special computations.

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1909–10.												
1	51	21	40	21	79	21					2,650	2,450
2	51	21	40	21	64	40					1,700	1,200
3		64	51	30	51	21					775	820
4		a 51	57	30	51	12					820	380
5		a 40	51	30		51					350	290
6		a 30	51	12	51	30						230
7		a 25		40	40	4					350	650
8		a 20	40	21	30	21					530	415
9		a 8	51	25	4	21					320	350
10		30	64	25	40	21					205	260
11		a 25	51	40	30	21					182	205
12		a 20	45	25		35					136	182
13	40	21	51	30	30	30					79	
14		a 30	45		35	32					159	136
15		a 30	45	25	40	21					96	115
16	21	4	30	25	40	21					96	96
17		a 21	30	21	40	21					96	136
18		a 20	51	21	40	21					96	115
19		a 20	40	12		45					96	159
20		a 18	40	30	40	21						182
21		a 40	51		35	30					290	350
22	136	205	79	35	25	35					290	415
23	136	64	115	136	40	21					415	490
24	25	30	125	51	40	21					450	650
25	64	4	64		45	40					1,150	2,200
26	40	21	205	96		40					1,400	910
27	51	40	79	51	40	35						610
28	40	40	96			a 38					570	260
29	40	30	260	205		a 38					775	1,000
30	30	4	96	79		a 38					1,100	1,300
31	40					a 38					1,000	865

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1909–10.												
1	1,000	690		182	380	320	35	51	30	64	40	64
2	610	650	182	182	230	182	40	35	25	79	30	51
3		690	170	182	205	159		51	51	64	30	51
4	350	290	910	530	115	115		40	40	320	64	
5	350	350	380	290		136	35	51	40	30	40	64
6	415	380	230	205	182	350	30	30	30		260	320
7	530	415	182	159	570	650	4	79	35		320	182
8	350	320		115	350	320	2	79	64		79	159
9	260	260	115	136	290	205	30	51	30	79	40	79
10		260	182	205	182	159			35	79	30	40
11	290	230	115	115	136	182	21	40	64		30	
12	205	205	96	96		182	40	71	79	51	30	30
13	182	182	79	79	182	159	4	79	51		21	30
14	159	182	51	64	159	96	4	51	40		40	
15	159	182		57	64	64	35	2	30	64	30	51
16	136	136	51	51	79	87	4		30	79	30	40
17		96	45	51	51	79			35		30	51
18	96	125	40	45	51	115	4	71	30	79	30	
19	159	205	51	136		64	2	51	35		30	64
20	182	159	79	87	51	79	2	57	30		21	40
21	136	136	57	96	64	51	2	79	30		21	40
22	96	115		79	40	21	2	35			21	30
23	159	136	79	96	96	96	2		25		21	30
24		96	51	96	35	79				51	21	30
25	96	115	40	350	79	45	2	79		51		30
26	79	136	2,050	1,000		40	2	71	21	40	30	51
27	775	820	490	350	35	51	51	96		40	30	40
28	320	320	290	205	79	147	2	182	21		1,400	380
29	205	159		159	64	79	35	79		40	205	51
30	205	320	96	115	40	71	51	64		30	40	64
31			136	230			40			30		

a Mean flow for 24 hours, determined by special computations.

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—Continued.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1910–11.												
1	30	51	79	96	51	79	115	115				
2	490		64	87	45	71	115	115				
3	205	79	320	380	40	79						
4	205	51	290	260	51							
5	30	40	450	450	45	71						
6	64	79			45	64						
7	40	64	205	159	51	79						
8	30	40	205	136	45	87						
9	40		136	115	51	87						
10		79	96	96	40	79						
11	57	79	96	64								
12	40	79	79	51	51	96	⸱					
13	30	64	96		51	96						
14	30	64	79	79	51	96						
15	30	79	64	79	45	79						
16	51		64	79	45	136						
17	45	64	79	96	96	159						
18	35	30	51	79								
19	40	64	64	79	79	115						
20	35	64	51		64	96						
21	30	57	40	71	71	96						
22	30	79	40	79	79	136						
23	64		40	71	64	105						
24	87	79	51		51	115						
25	64	96	57	64								
26	182	230	45	51	64							
27	136	182	64		51	115						
28	290	230	40	79	45	79						
29	217	182	40	64	45	115						
30	79		51	79	51	182						
31	79	96			490	205						

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1910–11.												
1	182	230	690	570	21	64	30	30	51	51	40	30
2		230	1,050	690	79	96	1	1	40	79	40	
3	230	136	415	350	30	71	40	51	51	40		
4	260	136	320	260					40	51		
5	96	136	205	205	21	64	30	40	30	12	51	25
6	136	182	182	159	21	51	30	30		3	64	30
7	670	1,400		182	21	51	30	40	3	30	115	79
8	955	955	182	182	21	64	30	40	3	2	96	64
9		450	159	136	21	64		4	3	2	79	40
10	350	415	136	136	21	64	30	64	3	30		
11	350	450	115	115			30	40	2	2	79	51
12	415	610	96	96	21	79	12	4		3	79	51
13	530	1,000	64	79	30	79	30	30		3	79	40
14	1,150	1,050		64		25	30	30	30	2	64	40
15	1,450	2,050	51	79	30	79	30	4	3	2	64	51
16			51	79	30	64		4	21	1	96	
17	690	570	40	79	21	64	30	30	12	3		
18	490	610	49	45		25	40	96	21	25	79	51
19	650	820	35	51	12	40	40	64			64	51
20	690	865	30	51	21	51	30	64			64	40
21	690	775		35	12	64	30	40			51	40
22	610	570	30	79	79	64	40	30	30	3	64	30
23		570	30	64	51	64			25	21	79	
24	570	820	21	51	45	51	30	40	30	25		
25	1,000	865	25	79		21	40	45	30	2	51	30
26	910	865	40	21	79	79	40	51	21		64	40
27	955	865	30	25	64	64					64	64
28	955	1,000		21	51	64	64	51	30	21	64	51
29	955	820	21		35	4	64	51	40	40	79	51
30		775		51	3	40		51	30	21	79	40
31			40	71			64	57	40	30		

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—Continued.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1911–12.												
1			79	96	230	159					79	
2	96	64	64	79	115	136					64	
3	96	115	64	79								64
4	320	350	64	79	79	79					79	
5	350	380			159	79					96	
6	320	260	64	79	79	96					96	
7	205		79	96	64	96					115	
8	115		260	230	64	79					115	
9	136	159	170	182	79	96					96	
10	115	96	136	115								115
11	64	79	136	96	230	380					115	
12		64			775	730					105	
13	64	51	290	260	1,960	1,400					115	
14	51	40	260	159	610	450					115	
15			115	136	380	320					136	
16	51	64	115	79	230	205					159	
17	40	30	115	96								290
18	40	30	96	115	230	182					320	
19	910	690			159	115					380	
20	450	350	96	136	115	96					415	
21	260		115	115	96	115			79		380	
22			96	96	96	96			87		290	
23	205	320	79	115	1,840	1,720			96		260	
24	230	182	79	96					79			115
25	182	136	64								136	
26	96	96			380	320			79		115	
27	79	79	79	96	320	260			64		79	
28	79	79	79	96	260	205			71		96	
29			182	450	182	136			79		450	
30	79	64		290	115	79					1,250	
31	64	79										865

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1911–12.												
1	1,100	820	145	145	1,230	734	17	34	17	54		34
2	570	490	127	127	390	335	17	17	2	43	25	43
3	380	350	110	94	335	447	5	43	3	34	66	66
4	290	260	110	110	335	258	10	5		17	43	66
5	182	380		79	234	187	10	34	25	43	34	54
6	910	1,150	110	362	165	145	3	43	34	54	30	43
7	1,780	3,540	234	165	210	165		2	25	43	34	43
8	3,540	1,480	155	127	145	127	3	17	25	43		25
9	700	632	118	110	145	94	1	1	17	43	30	43
10	447	666	110	110	79	94	1	1	25	17	25	34
11	335	447	94	94	54	110	1	34	25	25	25	43
12	447	700		79	43	66	1	43	25	43	25	54
13	506	700	79	94	54	79	1	1	34	43	25	34
14	536		309	187	54	79		2	34	43	25	34
15	536	878	145	127	43	66	3	25	34	66		145
16	878	2,180	94	145		66	1	34	34	54	390	234
17	1,400	954	568	536	66	54	2	54	17	17	94	127
18	700	878	476	335	43	66	3	54		17	43	66
19	700	770		234	43	54	17	43	17	25	309	258
20	568	447	165	234	34	54	2	3	10	25	258	187
21		476	1,530	1,070	34	43		10	5	25	187	145
22	447	418	666	447	34	43	43	43	17	25		127
23	1,270	806	666	418		34	34	54	5	17	54	79
24	476	390	335	283	25	34	34	54	10	17	43	66
25	362	335	309	335	25	43	25	43		17	43	66
26	335	283		210	17	38	10	43	17	43	34	60
27	283	335	165	145	10	43	5	10	187	145	34	66
28	283	234	127	110	17	54		17	54	43	48	66
29	210	127	110	234	17	17	5	34	25	66		34
30	145	127	916	842		17	3	43	25	43	94	110
31			1,070	1,030			3	54	25	43		

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—Continued.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1912–13.												
1	94	66	66	79	......	66	54	48	145	110	......	......
2	34	66	127	25	43	66	48	43	......	66	......	......
3	34	66	......	110	600	362	43	110	66	66	......	......
4	34	43	66	66	536	335	390	258	54	66	......	......
5	......	25	79	66	165	145	......	165	66	66	......	......
6	25	54	66	79	258	362	94	110	79	66	......	......
7	25	43	66	127	309	258	165	145	72	66	......	......
8	34	43	1,400	666	......	145	110	127	54	54	......	......
9	34	38	418	309	94	110	145	79	......	......	......	......
10	34	34	......	283	94	127	94	79	......	......	......	......
11	25	54	283	210	94	79	94	79	......	......	......	......
12	25	34	127	94	79	79	......	283	......	......	......	......
13	335	......	127	145	43	43	210	234	......	......	......	......
14	110	127	283	335	48	66	187	165	..•...	......	......	......
15	110	145	418	335	......	66	127	110	......	......	......	......
16	94	127	258	210	66	66	79	94	......	......	......	......
17	54	66	......	165	43	60	79	155	......	......	362	309
18	43	66	145	110	43	66	362	418	......	......	210	234
19	34	54	127	110	66	309	1,070	666	......	......	362	476
20	......	43	110	94	283	187	390	283	......	......	568	734
21	43	43	94	94	66	79	954	734	......	......	842	1,400
22	34	43	127	127	......	54	390	309	......	......	1,620	770
23	25	66	94	110	66	66	187	187	......	......	......	390
24	2,680	878	......	79	66	60	210	187	......	......	335	476
25	1,110	666	94	110	......	54	127	145	......	......	1,110	3,420
26	418	362	94	94	54	54	......	127	......	......	1,150	1,760
27	......	258	79	79	48	54	145	145	......	......	1,230	3,360
28	187	165	66	66	43	54	94	94	......	......	1,150	632
29	127	127	54	66	......	43	94	66	......	......	568	390
30	110	110	54	66	34	54	79	66	......	......	......	283
31	79	79	......	......	79	66	66	66	......	......	309	916

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1912–13.												
1	666	476	54	66	......	110	14	22	8	22	4	4
2	309	309	54	66	127	94	14	18	8	4	8	14
3	234	234	43	54	79	79	4	4	......	8	8	14
4	390	600	......	32	66	79	......	4	4	3	4	8
5	992	878	38	43	54	66	4	4	4	32	4	8
6	......	362	22	54	43	60	......	8	4	8	4	8
7	258	283	32	18	43	66	8	22	4	4	......	8
8	187	258	22	18	......	54	8	4	3	4	4	8
9	187	210	32	54	43	66	4	4	3	4	4	4
10	145	187	32	54	32	43	4	22	......	4	4	4
11	234	309	......	14	32	54	18	22	4	4	4	4
12	258	309	22	54	27	43	8	22	3	4	4	4
13	......	309	22	54	32	54	......	8	3	3	4	14
14	283	234	22	54	27	54	18	22	2	4	......	8
15	309	222	27	43	......	22	22	22	3	4	8	8
16	283	234	32	43	22	54	8	18	3	4	8	6
17	234	187	32	43	38	66	8	22	......	3	4	6
18	·127	145	......	32	32	43	8	14	3	4	4	4
19	187	418	38	43	22	32	54	22	4	14	4	4
20	......	234	27	54	22	32	......	8	8	8	4	4
21	165	187	22	54	14	27	4	8	4	4	......	4
22	145	127	32	127	......	14	8	8	4	4	4	22
23	127	145	234	283	14	22	8	8	8	4	8	66
24	145	127	390	335	14	22	4	4	......	4	8	48
25	127	127	......	234	14	32	4	4	4	14	8	32
26	110	110	110	110	4	43	18	43	4	8	4	11
27	......	86	79	79	14	22	......	14	4	14	8	8
28	79	94	127	187	14	22	14	43	4	14	......	4
29	79	79	916	842	......	8	43	66	4	14	4	14
30	54	79	283	234	8	14	27	54	8	14	6	14
31	......	......	187	165	......	......	14	8	......	4	......	......

Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—Continued.

Day.	October.		November.		December.		January.		February.		March.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913–14.												
1	4	22	32	54	22	66	43	66	......	......	......	......
2	4	4	......	22	43	79	48	66	......	......	......	......
3	4	8	32	32	66	127	43	72	......	......	......	......
4	4	8	22	54	94	94	......	48	......	......	......	......
5	......	8	22	43	79	79	43	79	......	.	......	......
6	14	22	22	38	54	66	54	32	......	......	......	......
7	4	22	22	32	......	43	43	72	......	......	......	......
8	4	14	22	38	187	210	38	66	......	......	......	......
9	4	14	22	43	94	102	38	79	......	......	......	......
10	4	14	110	127	54	94	43	79	......	......	......	......
11	4	8	43	66	48	79	......	54	......	......	......	......
12	......	8	43	66	43	66	......		......	......	......	......
13	22	32	32	66	43	72	......		......	......	......	......
14	22	54	27	54	......	54	......		......	......	......	......
15	27	38	22	54	54	66	......		......	......	......	......
16	14	22	22	22	43	66	......		......	......	......	......
17	14	32	22	43	32	43	......		......	......	......	......
18	8	14	22	32	32	66	......		......	......	......	......
19	......	4	.22	38	43	66	......		......	......	......	......
20	54	60	418	335	32	66	......		......	......	......	......
21	145	66	210	145	......	32	......		......	......	......	......
22	79	110	94	94	32	48	......		......	......	......	......
23	54	110	72	66	43	54	......		......	......	......	......
24	32	54	54	79	22	48	......		......	......	......	......
25	32	283	43	66	27	32	......		......	......	320	415
26	165	210	43	54	32	43	......		......	......	415	490
27	258	187	14	14	22	43	......		......	......	490	570
28	94	79	14	54	......	32	......		......	......	650	490
29	43	66	18	54	32	66	......		......	......	380	450
30	43	66	......	14	32	54	......		......	......	415	350
31	32	60	......	......	43	66	......		......	......	290	380

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913–14.												
1	290	415	650	530	8	62	25	41	35	4	87	78
2	570	490	490	450	16	62	48	170	......	6	96	70
3	320	380	......	490	16	35	106	115	6	8	35	55
4	205	320	650	490	16	70	55	62	3	16	55	70
5	182	230	690	570	41	87	55	41	4	35	70	8
6	136	205	530	490	35	16	41	25	4	25	......	48
7	136	136	450	320	......	8	20	48	4	25	78	115
8	205	350	320	290	8	62	16	62	30	4	115	170
9	1,500	1,000	290	230	16	35	25	70	......	4	78	87
10	730	610	......	205	16	35	35	70	4	25	55	70
11	415	530	182	136	8	41	35	30	3	20	55	70
12	......	775	136	159	3	62	......	20	4	16	70	41
13	380	490	136	126	4	20	16	62	4	8	......	35
14	415	490	115	126	......	4	16	70	6	25	35	70
15	380	570	78	115	8	4	8	35	25	4	25	35
16	570	490	96	62	3	16	4	35	......	4	16	30
17	380	610	......	55	4	16	4	41	4	20	8	30
18	530	1,000	62	106	8	4	62	4	4	25	6	25
19	1,450	2,920	48	78	3	1	......	4	6	25	70	6
20	4,480	4,540	35	70	4	3	4	30	4	25	......	4
21	3,700	1,720	35	62	......	3	6	41	4	25	4	20
22	1,840	690	35	62	4	16	4	25	30	20	4	25
23	650	610	25	55	3	1	4	30	......	25	6	30
24	610	490	......	35	3	70	4	25	25	30	4	41
25	650	450	41	78	4	16	41	4	8	30	4	30
26	490	490	35	62	4	70	......	4	12	25	55	25
27	610	690	35	62	3	4	4	25	4	25	......	41
28	955	910	25	48	......	4	4	20	6	25	48	70
29	1,150	1,400	25	62	4	60	3	48	25	78	55	70
30	1,200	1,350	16	16	4	48	25	30	......	162	30	48
31	......	......	......	8	......	......	4	20	205	11r	......	......

*Twice-daily discharge, in second-feet, of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—*Continued.

Day.	October.		November.		December.		Day.	October.		November.		December.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
1914.							**1914.**						
1...........	62	70	30	30	78	136	16...........	6	48	170	650	55	62
2...........	35	48	25	42	182	205	17...........	62	365	320	218	62	48
3...........	30	42	25	25	230	218	18...........	205	159	93	106	78	48
4...........	20	20	25	35	159	125	19...........	70	70	62	78	62	48
5...........	20	62	20	35	96	87	20...........	78	87	73	87	62	62
6...........	6	62	25	35	48	48	21...........	70	62	73	70	48	48
7...........	4	30	30	30	42	55	22...........	42	70	70	62	48	41
8...........	6	62	......	35	55	48	23...........	35	48	42	30	78	115
9...........	20	35	42	48	42	55	24...........	35	35	62	55	62	96
10...........	42	8	42	42	48	55	25...........	25	25	43	62	62	55
11...........	4	4	30	35	35	48	26...........	25	48	55	62	78	96
12...........	4	6	25	35	78	35	27...........	25	30	133	335	96	78
13...........	6	30	25	35	25	30	28...........	20	35	182	182	96	136
14...........	4	35	30	48	35	42	29...........	30	48	62	115	48	96
15...........	4	55	30	42	35	55	30...........	8	30	62	115	48	96
							31...........	20	25	......	......	41	115

NOTE.—Discharge given corresponds to gage readings at about 6.50 a. m. and 4.30 p m.; on Sundays usually one reading between 2 and 5 p. m. Determination of discharge above 600 second-feet uncertain.

Monthly discharge of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914.

[Drainage area, 78 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area.)	Accuracy.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area.)	Accuracy.
	Mean.	Per square mile.				Mean.	Per square mile.		
1909.					**1910–11.**				
May 15–31.......	270	3.46	2.19	B.	July.............	31.3	0.450	0.52	C.
June.............	56.9	.729	.81	B.	August..........	20.4	.262	.30	C.
July.............	25.8	.331	.38	C.	September......	51.4	.659	.74	C.
August..........	26.2	.336	.39	C.					
September.......	37.3	.478	.53	C.	The year..	125	1.60	21.78	
1909–10.					**1911–12.**				
October.........	37.0	.474	.55	C.	October........	161	2.06	2.38	C.
November.......	57.9	.743	.83	B.	November.......	129	1.65	1.84	B.
December.......	34.5	.442	.51	C.	December.......	349	4.47	5.15	D.
January.........	a 70	.866	1.00	D.	January.........	a 110	1.41	1.63	D.
February........	a 50	.641	.67	D.	February.... ...	a 60	.769	.83	D.
March..........	563	7.22	8.32	D.	March..........	230	2.95	3.40	D.
April...........	283	3.63	4.05	B.	April...........	710	9.10	10.15	D.
May............	203	2.60	3.00	B.	May............	295	3.78	4.36	C.
June............	143	1.83	2.04	B.	June............	127	1.63	1.82	B.
July............	37.4	.479	.55	C.	July............	18.9	.242	.28	C.
August..........	48.0	.615	.71	C.	August..........	32.9	.422	.40	C.
September.......	87.8	1.13	1.26	B.	September......	79.8	1.02	1.14	C.
The year...	136	1.74	23.49		The year..	192	2.46	33.47	
1910–11.					**1912–13.**				
October.........	94.6	1.21	1.40	B.	October........	171	2.19	2.52	C.
November.......	115	1.47	1.64	B.	November.......	168	2.15	2.40	C.
December.......	85.3	1.09	1.26	B.	December.......	120	1.54	1.78	B.
January.........	a 115	1.47	1.70	D.	January.........	200	2.56	2.95	B.
February........	a 40	.513	.53	D.	February........	a 75	.961	1.00	D.
March..........	a 80	1.03	1.19	D.	March..........	a 500	6.41	7.39	D.
April...........	687	8.81	9.83	C.	April...........	254	3.26	3.64	C.
May............	139	1.78	2.05	B.	May............	110	1.41	1.63	B.
June............	43.4	.556	.62	C.	June............	40.7	.522	.58	C.

a Discharge estimated by comparison with near-by drainage basins.

Monthly discharge of North Branch of Winooski River at Montpelier, Vt., for the years ending Sept. 30, 1909–1914—Continued.

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area.)	Accuracy.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area.)	Accuracy.
	Mean.	Per square mile.				Mean.	Per square mile.		
1912–13.					**1913–14.**				
July.............	15.2	0.195	0.22	D.	April.............	852	10.9	12.16	D.
August..........	6.1	.078	.09	D.	May.............	188	2.41	2.78	D.
September......	8.7	.112	.12	D.	June.............	20.2	.259	.29	C.
					July.............	32.4	.415	.48	C.
The year..	140	1.79	24.32		August..........	24.4	.313	.36	C.
					September......	46.8	.600	.67	C.
1913–14.									
October.........	47.0	.603	.70	C.	The year..	129	1.65	22.37	
November.......	58.0	.744	.83	B.					
December.......	58.6	.751	.87	B.	**1914.**				
January.........	a 35.0	.449	.52	C.	October.........	44.8	.571	.66	C.
February........	a 30.0	.385	.40	D.	November.......	79.2	1.02	1.14	B.
March..........	a 156	2.00	2.31	D.	December.......	75.7	.963	1.11	B.

a Discharge estimated by comparison with near-by drainage basins.

DOG RIVER AT NORTHFIELD, VT.

LOCATION.—At highway bridge near Norwich University campus in Northfield. Union Brook joins Dog River a short distance below the station.

DRAINAGE AREA.—47 square miles[1] (surveys of Norwich University students).

RECORDS AVAILABLE.—May 14, 1906, to September 30, 1916. Records from May 14, 1909, to August 22, 1910, at lower highway bridge. August 23, 1910, to date at the present site.

GAGES.—Gurley 7-day water-stage recorder installed October 8, 1914. Gage heights referred to gage datum by means of a hook gage inside well. An outside staff gage is used for auxiliary readings. Records prior to October 8, 1914, based on two readings a day of staff gage.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading.

CHANNEL AND CONTROL.—Channel is composed of gravel and alluvium; shifts slightly.

EXTREMES OF DISCHARGE.—1910–1916: Maximum stage recorded at present site, 8.5 feet March 25, 1913 (discharge, 3,400 second-feet); minimum stage, 0.60 foot September 10–11, 1913 (discharge, 3.0 second-feet). At the lower gage, 1909–10, there was practically zero flow at various times due to holding back of water by dam above gage.

WINTER FLOW.—Stage-discharge relation occasionally affected by ice; discharge determined from gage heights, discharge measurements, and weather records.

REGULATION.—A study of the discharge records indicates that a storage of 97,000,000 cubic feet might be required to insure a continuous flow 23.5 second-feet or 0.5 second-foot per square mile at Northfield for 90 per cent of the time during a year of extremely low flow; a storage of 45,000,000 cubic feet would probably insure this rate of flow for 90 per cent of the time during the average year. Operation of a small power plant above the station affects the distribution of flow throughout the day, but the range of fluctuation is not great.

ACCURACY.—Results good.

COOPERATION.—Water-stage recorder maintained and some discharge measurements made by students of Norwich University under the direction of the professor of civil engineering.

[1] At lower highway bridge, 57 square miles.

Discharge measurements of Dog River at Northfield, Vt., during the years ending Sept. 30, 1909–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1909.		*Feet.*	*Sec.-ft.*	**1914.**		*Feet.*	*Sec.-ft.*
May 14	D. M. Wood............	*a* 3. 28	133	Nov. 21	A. E. Winslow and student..............	1. 43	27. 7
19	Norwich University students..............	*a* 3. 58	180	Dec. 5	Norwich University students..............	1. 76	46. 7
19	.....do................	2. 53	164	5	.....do................	1. 74	46. 4
27	.....do................	1. 88	88. 6				
28	D. M. Wood............	*a* 3. 29	127	**1915.**			
June 24	.....do................	*a* 2. 76	41. 5	Jan. 16	Norwich University students..............	1. 53	38. 2
24	.....do................	1. 18	220	Feb. 6	.....do................	1. 50	35. 2
July 21	.....do................	*a* 2. 71	40. 1	13	.....do................	*c* 1. 72	50. 3
21	.....do................	*a* 2. 02	*b* 1±	20	.....do................	*c* 1. 98	65. 6
1910.				25	.....do................	6. 90	2, 590
Mar. 3	C. S. Carleton..........	3. 92	419	27	.....do................	4. 00	458
Aug. 9	G. M. Brett.............	1. 03	12. 9	Mar. 6	.....do................	2. 27	107
24	.....do................	1. 00	12. 0	May 4	R. S. Barnes............	1. 97	68. 3
1911.				June 8	C. H. Pierce............	1. 10	14. 6
June 19	G. H. Canfield.........	1. 00	12. 0	Oct. 16	Knowlton and George..	1. 40	28. 7
1912.				23	.....do................	1. 16	15. 9
Sept. 13	J. G. Mathers..........	1. 28	29. 0	Nov. 6	.....do................	1. 12	17. 1
1913.				15	G. F. Adams............	1. 20	18. 3
Mar. 27	R. S. Barnes............	7. 50	2, 520	15	.....do................	1. 35	21. 4
27	.....do................	7. 00	1, 960	15	R. C. Knowlton	1. 35	25. 3
Apr. 28	.....do................	1. 93	90	20	Knowlton and George..	1. 91	71
Sept. 14	G. H. Canfield.........	. 70	3. 7	20	.....do................	1. 86	64
1914.				Dec. 4	.....do................	1. 29	22. 2
Apr. 26	R. S. Barnes............	3. 62	364	**1916.**			
July 17	C. S. DeGolyer..........	1. 06	14. 5	Feb. 14	R. S. Barnes............	*c* 1. 75	34. 4
Oct. 9	C. H. Pierce............	0. 94	7. 6	Mar. 21	.....do................	1. 60	38
Nov. 21	C. S. DeGolyer..........	1. 46	26. 2	Apr. 6	.....do	3. 10	252

a Gage height referred to lower gage.
b Discharge estimated.   Zero flow at gage height 2. 0 feet.
c Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1909.						**1909.**					
1........	....	103	16	2	8	16........	260	84	14	24	5
2........	....	159	14	14	10	17........	218	56	24	23	6
3........	....	123	31	14	7	18........	220	61	13	39	5
4........	....	96	26	9	7	19........	190	40	19	16	4
5........	....	284	7	10	6	20........	226	18	18	6	5
6........	....	278	15	14	14	21........	204	24	15	3	5
7........	....	127	12	22	5	22........	156	23	10	4	5
8........	....	156	7	3	9	23........	160	60	15	3	7
9........	....	135	15	8	8	24........	148	18	14	9	22
10........	....	93	12	12	6	25........	129	18	3	22	10
11........	....	100	12	9	6	26........	98	22	16	12	2
12........	....	76	16	10	5	27........	74	31	11	13	4
13........	....	63	16	2	7	28........	156	18	13	12	71
14........	127	97	15	2	5	29........	156	16	15	4	52
15........	148	72	14	0	7	30........	148	14	14	16	32
						31........	141	....	10	8	....

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	16	11	29					100	224			11
2	10	18	6					100	146			10
3	4	23	4					94	150			8
4	5	26	4					254	2			13
5	6	32	23					186	1			11
6	6	25	25					116	214			82
7	6	32	32					114	285			62
8	7	20	18				150	89	214			24
9	6	18	17				152	112	194			19
10	6	16	29				158	105	175			17
11	16	12	32				136	82	127			17
12	40	8	15				127	65	163			18
13	16	4	25				109	50	146			12
14	17	10	20				100	44	103			21
15	13	10	20				93	60	59			15
16	8	9	20				84	44	59			18
17	4	11	20			71	69	48	127			17
18	16	18	20			43	65	46	133			15
19	5	13	15			66	101	45	86			12
20	8	18	25			127	81	34	73			12
21	8	12	15			150	63	33	35			12
22	11	19	20			175	57	50	45			15
23	15	13	20			274	74	33	29		9	15
24	23	23	20			260	66	34	45		9	20
25	16	23	25				55	31	25		8	20
26	14	32	25				55	325	18		8	40
27	11	28	25				333	190	20		11	60
28	11	48	20				190	170	22		10	94
29	11	43	25				116	150	23		9	48
30	14	16	10				105	150	14		7	40
31	18		15					125			8	
1910–11.												
1	33	30	56				87	203		9	9	12
2	51	33	55				68	183		8	7	10
3	33	65	57				51	163		10	6	12
4	32	52	48				43	170		8	6	11
5	30	192					44	136		9	5	8
6	28	80					78	123		8	5	25
7	25	59					553	94		12	8	12
8	25	50					231	90		7	5	12
9	25	46					194	88		7	5	25
10	33	45					156	70		6	5	24
11	30	44					177	.62		8	10	19
12	26	38					163	55		5	9	19
13	25	40					332	52		5	6	14
14	23	-43					312	50		5	6	12
15	23	33					647	46		6	6	16
16	25	31					353	48		5	6	37
17	23	30					239	45		7	4	36
18	22	30					192	44		14	6	22
19	20	30					146	41	13	8	9	9
20	18	30					99	38	16	7	7	15
21	18	30					239	35	18	6	6	9
22	17	28					215	31	12	6	5	28
23	28	28					207	28	11	5	5	22
24	31	28					256	24	12	7	4	15
25	24	26					239	28	10	13	5	13
26	26	26					256	25	13	10	8	20
27	35	25					274	25	14	10	5	19
28	44	25					256	24	12	8	18	19
29	35	25					240	24	11	48	67	18
30	31	28					223	20	12	16	23	30
31	30							15		11	12	

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	25	43	65	62	......	......	192	92	419	17	8	10
2	44	49	64	50	......	......	123	91	223	12	9	31
3	35	44	56	50	......	......	99	78	223	14	19	20
4	82	41	53	57	......	......	84	72	184	12	13	16
5	72	42	49	50	......	......	231	68	156	10	10	16
6	52	41	48	44	......	......	682	111	130	6	13	17
7	55	78	51	......	......	......	1,320	105	136	13	8	14
8	52	73	43	......	......	......	718	86	111	12	9	12
9	46	56	44	......	......	......	312	84	84	10	8	10
10	39	55	57	......	......	......	274	82	79	9	10	9
11	38	55	73	......	......	......	239	69	90	16	13	15
12	35	52	94	......	......	......	274	63	81	12	18	17
13	33	74	192	......	......	......	312	69	76	11	10	10
14	30	58	99	......	......	......	293	89	62	13	15	11
15	33	58	84	......	......	......	443	65	50	12	13	10
16	31	57	78	......	......	48	1,030	94	53	9	10	69
17	27	52	82	......	......	52	553	274	52	7	10	28
18	111	74	71	......	......	53	419	177	44	8	10	18
19	184	73	57	......	......	71	419	130	41	25	12	20
20	156	61	56	......	......	111	274	136	37	12	11	41
21	99	60	62	......	......	65	274	496	33	16	8	94
22	86	55	58	......	......	63	239	256	30	43	8	47
23	105	52	293	......	......	53	353	223	27	20	10	33
24	63	53	130	......	......	49	223	177	24	11	9	30
25	66	52	105	......	......	43	215	142	23	12	9	25
26	58	55	87	......	......	35	192	123	23	10	12	21
27	61	55	94	......	......	41	192	111	21	9	28	27
28	57	52	72	......	......	50	149	86	19	8	13	19
29	52	117	75	......	......	149	130	156	17	8	10	21
30	48	75	50	......	......	177	105	443	16	8	10	48
31	49	......	48	......	......	156	......	419	......	10	10	......
1912–13.												
1	25	82	71	59	99	18	215	88	99	10	7	4
2	30	94	67	52	35	24	177	81	88	9	7	4
3	23	79	223	130	39	15	149	77	82	10	6	4
4	20	69	136	130	46	18	312	68	94	8	8	5
5	23	73	105	77	46	18	443	73	79	10	8	4
6	18	68	163	30	33	13	293	62	70	8	9	4
7	18	90	136	123	35	15	215	52	67	8	6	4
8	16	332	111	24	31	15	177	52	61	15	5	4
9	14	184	82	31	30	50	142	57	57	23	5	4
10	18	142	86	35	30	239	177	50	48	28	5	3
11	17	123	79	44	25	77	177	49	35	19	5	3
12	21	111	55	312	25	117	163	46	24	10	4	4
13	20	149	57	94	25	65	156	43	35	15	4	4
14	16	149	55	77	25	1,390	163	49	34	12	6	4
15	23	156	59	77	25	647	163	41	24	10	5	4
16	21	111	59	72	20	256	130	57	33	8	5	4
17	20	99	52	184	20	57	136	52	35	8	4	4
18	17	99	50	256	20	88	170	48	41	6	7	4
19	16	88	111	223	20	256	.170	47	35	8	5	4
20	16	81	72	149	20	419	136	40	30	7	4	4
21	18	77	48	443	62	312	123	38	25	7	4	4
22	15	77	52	156	111	149	123	82	23	6	5	48
23	55	73	46	111	65	177	136	136	25	6	7	28
24	838	69	39	156	31	396	136	177	23	8	4	7
25	312	77	35	99	25	838	123	111	17	9	4	5
26	149	75	39	90	15	553	117	99	13	12	4	4
27	130	71	39	111	18	2,100	111	87	19	5	8	5
28	111	67	39	72	17	374	111	111	13	30	5	5
29	86	57	37	44	......	256	99	274	12	24	5	4
30	79	63	47	67	......	231	92	156	12	12	5	4
31	67	......	105	59	......	443	......	123	......	9	4	......

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	5	52	57	39	30	82	215	496	39	30	13	15
2	28	48	67	39	35	99	223	353	30	28	10	14
3	25	40	94	39	35	77	192	353	48	44	12	23
4	15	35	82	38	35	71	223	312	62	28	9.2	26
5	10	46	72	39	35	68	163	312	72	53	7.9	14
6	5	39	62	48	30	77	62	293	39	44	7.7	13
7	4	39	65	43	30	67	149	231	39	35	7.3	12
8	4	44	117	39	30	57	312	200	40	24	8.9	18
9	7	117	136	38	30	56	312	185	39	24	7.6	14
10	8	177	88	31	30	57	443	156	31	24	7.6	12
11	5	105	75	25	25	55	419	142	24	24	7.2	14
12	21	75	75	20	25	62	583	123	18	21	7 8	11
13	28	77	69	18	20	62	231	142	18	18	6.7	9.8
14	28	69	73	15	20	57	274	136	18	13	8.2	8.8
15	23	65	72	15	20	53	312	123	15	10	7.9	11
16	15	62	62	16	18	62	239	111	23	15	9.0	9.3
17	12	62	65	16	18	94	293	99	28	34	8.6	7.2
18	8	56	62	18	18	111	419	92	19	65	8.6	8.3
19	12	67	52	18	18	82	1,850	88	18	26	8.1	7.2
20	97	149	53	18	18	75	2,010	81	31	17	7.6	7.0
21	99	94	55	19	15	142	756	78	19	14	28	7.0
22	75	79	50	19	15	86	496	72	17	12	20	6.0
23	35	78	31	19	15	67	396	67	12	15	11	5.0
24	30	75	41	19	15	62	396	57	9	21	7.8	11
25	79	65	48	19	15	62	583	55	15	16	11	12
26	149	58	50	20	16	49	682	57	9	11	8.8	11
27	156	52	57	20	18	312	396	49	10	9.9	8.1	14
28	76	62	50	20	20	177	443	44	10	8.5	8.3	14
29	82	57	48	20	......	223	838	39	21	12	38	18
30	78	52	39	20	......	192	496	41	28	26	55	17
31	65	......	39	25	......	215	......	38	......	17	28	......
1914–15.												
1	12	12	42	22	26	178	75	71	22	53	48	22
2	14	13	74	25	27	149	80	90	20	80	125	20
3	9.6	13	64	25	29	112	69	78	19	58	61	20
4	8.1	13	45	30	32	110	72	69	19	67	48	18
5	9.1	14	35	40	37	103	91	62	17	58	66	18
6	8.1	14	26	30	42	96	93	58	14	49	51	17
7	8.6	14	27	70	45	86	100	54	14	35	45	18
8	31	15	30	225	38	81	206	83	16	190	45	20
9	8.8	20	27	125	34	78	213	71	14	265	78	18
10	9.3	17	26	75	34	70	505	58	12	118	56	18
11	9.1	16	23	50	33	70	695	51	16	79	44	16
12	13	17	18	35	42	58	630	47	36	61	38	12
13	14	17	23	35	38	58	308	59	26	82	41	12
14	12	26	23	30	31	58	215	56	21	115	36	13
15	9.3	22	20	30	141	51	185	46	18	81	33	13
16	14	149	23	29	110	51	166	42	25	59	30	12
17	23	75	20	26	78	47	146	45	· 62	54	45	12
18	23	30	19	83	56	42	128	48	53	58	34	11
19	23	26	19	182	53	38	121	44	38	54	29	12
20	19	27	18	141	51	41	106	40	47	64	25	14
21	17	26	20	72	45	47	87	37	31	48	22	23
22	15	25	22	47	45	44	81	37	25	51	34	25
23	14	20	22	48	45	51	75	34	21	51	78	17
24	14	18	20	53	110	74	80	31	20	43	42	16
25	14	24	18	49	1,450	99	74	29	20	41	53	14
26	15	35	18	47	490	125	78	36	16	39	40	15
27	15	90	18	43	286	81	69	42	18	36	31	20
28	15	52	19	41	204	80	62	35	24	30	25	15
29	14	38	18	33	......	70	61	30	17	42	24	14
30	15	37	25	28	......	53	64	26	16	31	25	13
31	12	......	25	26	......	62	......	24	......	27	26	......

Daily discharge, in second-feet, of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	13	19	32	58	308	149	505	125	69	48	26	13
2	16	19	27	54	168	133	505	107	53	43	24	15
3	22	17	27	51	136	125	286	102	56	55	21	15
4	18	16	24	47	102	110	224	107	124	64	21	12
5	23	17	24	53	88	90	206	84	88	65	19	13
6	29	18	25	159	76	78	217	76	92	46	21	14
7	22	17	25	103	56	67	215	71	69	39	19	14
8	21	16	22	72	53	62	183	72	60	37	19	13
9	16	17	18	57	55	58	178	71	116	39	32	12
10	13	17	17	58	48	58	167	60	144	44	30	11
11	13	15	18	47	45	58	190	60	173	37	22	11
12	13	16	14	38	46	53	217	50	133	47	20	10
13	13	16	15	38	44	50	217	48	93	60	20	9
14	14	15	16	33	43	49	208	49	72	50	18	9
15	47	22	18	33	44	38	215	45	62	36	17	27
16	27	29	18	34	44	35	245	73	78	31	15	24
17	20	20	17	31	44	34	276	405	149	29	14	18
18	18	18	23	27	38	32	255	368	138	26	15	14
19	19	20	45	29	33	34	217	195	118	23	15	14
20	20	55	36	33	31	34	194	154	170	22	14	13
21	18	39	30	52	31	37	187	133	119	23	13	12
22	17	33	27	93	30	36	215	127	99	57	13	12
23	16	27	27	190	29	31	355	118	84	93	14	16
24	16	25	27	116	27	33	297	102	75	45	14	16
25	16	22	27	96	45	36	245	83	75	39	13	14
26	16	22	141	217	392	44	211	72	72	34	12	12
27	18	22	115	445	226	76	180	62	74	49	17	12
28	17	25	97	650	190	152	160	57	121	42	18	11
29	14	28	76	265	165	245	144	53	72	32	22	14
30	17	44	60	195	....	392	141	72	58	30	14	42
31	20	....	44	197	....	430	....	104	....	28	14	....

NOTE.—Discharge May 14 to Dec. 31, 1909, determined from special computations by using an approximate rating curve when applicable, but taking account of conditions of regulation and records of precipitation. Discharge May 18, 27–30, June 9, Sept. 20–27, Oct. 6, 18, 29, and Nov. 10, 13, 20–29, 1910; Apr. 9, 19, 26, 29, and May 1, 2, 19–21, 30, 1911; and Apr. 16, May 29, July 25, 1915, estimated by interpolation and comparison. Discharge Dec. 12–25, 1909; Jan. 7 to Mar. 15, 1912; Feb. 9–20, 1913; Jan. 11 to Feb. 28, 1914; Dec. 20, 1914, to Jan. 15, 1915; Jan. 30 to Feb. 5, 1915; and Jan. 9–20, Feb. 5–25, and Mar. 2–20, 1916, during which periods stage-discharge relation was affected by ice, ascertained by means of gage heights, discharge measurements, and weather records.

Monthly discharge of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916.

[Drainage area, a 47 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
May 14–31	260	74	164	2.88	1.93	B.
June	284	14	82.2	1.44	1.61	B.
July	31	3	14.6	.256	.30	C.
August	39	0	11.1	.195	.22	D.
September	71	2	11.5	.202	.23	D.
1909–10.						
October	40	4	11.8	207	.24	C.
November	48	4	19.7	.346	.39	B.
December	32	4	20.0	.351	.40	C.
March 17–24	274	43	146	2.56	.76	B.
April 8–30	333	55	110	1.93	1.65	B.
May	325	31	99.3	1.74	2.01	B.
June	285	1	98.6	1.73	1.93	B.
August 23–31	11	7	8.8	.187	.06	C.
September	94	8	25.9	.55	.61	B.

a 57 square miles from May 14, 1909, to August 22, 1910.

Monthly discharge of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910–11.						
October	51	17	28.0	0.596	0.69	B.
November	192	25	42.3	.900	1.00	B.
April	647	43	219	4.66	5.20	B.
May	203	15	67.1	1.43	1.65	B.
June			a 23.5	.500	.56	C.
July	48	5.0	9.5	.202	.23	B.
August	67	4.0	9.3	.198	.23	B.
September	37	8.0	18.1	.385	.43	B.
1911–12.						
October	184	25	62.1	1.32	1.52	A.
November	117	41	58.7	1.25	1.40	A.
December	293	43	80.3	1.71	1.97	A.
January			a 45.0	.957	1.10	D.
February			a 37.5	.798	.86	D.
March	177		a 58.6	1.25	1.44	C.
April	1,320	84	345	7.34	8.19	A.
May	496	63	151	3.21	3.70	A.
June	419	16	85.5	1.82	2.03	A.
July	43	6.0	12.7	.270	.31	B.
August	28	8.0	11.5	.245	.28	B.
September	94	9.0	25.3	.538	.60	B.
The year	1,320	6.0	80.8	1.72	23.40	
1912–13.						
October	838	14	72.6	1.54	1.78	A.
November	332	57	103	2.19	2.44	A.
December	223	35	76.0	1.62	1.87	A.
January	443	24	116	2.47	2.85	A.
February	111	15	35.5	.755	.79	C.
March	2,100	13	311	6.62	7.63	A.
April	443	92	166	3.53	3.94	A.
May	274	38	81.5	1.73	1.99	A.
June	99	12	41.8	.889	.99	B.
July	30	5.0	11.6	.247	.28	C.
August	9	4.0	5.5	.117	.13	C.
September	48	3	6.4	.136	.15	C.
The year	2,100	3.0	86.0	1.83	24.84	
1913–14.						
October	156	4.0	41.4	.881	1.02	B.
November	177	35	69.9	1.49	1.66	A.
December	136	31	64.7	1.38	1.59	A.
January	48	15	25.5	.543	.63	D.
February	35	15	23.2	.489	.51	D.
March	312	49	97.1	2.06	2.38	A.
April	2,010	62	480	10.2	11.38	B.
May	496	38	149	3.17	3.66	A.
June	72	9.0	26.7	.568	.63	A.
July	65	8.5	23.8	.506	.58	A.
August	55	6.7	12.7	.270	.31	C.
September	26	5.0	12.3	.262	.29	C.
The year	2,010	4.0	85.4	1.82	24.64	
1914–15.						
October	31	8.1	14.1	.300	.35	C.
November	149	12	30.5	.649	.72	C.
December	74	18	26.7	.568	.65	C.
January	226	22	57.9	1.23	1.42	C.
February	1,450	26	130	2.77	2.88	B.
March	178	38	76.2	1.62	1.87	A.
April	695	61	164	3.49	3.89	A.
May	90	24	49.5	1.05	1.21	A.
June	62	12	23.9	.509	.57	A.
July	265	27	68.4	1.46	1.68	A.
August	125	22	44.5	.947	1.09	A.
September	25	11	16.3	.347	.39	A.
The year	1,450	8.1	58.0	1.23	16.72	

a Estimated by comparison with records of streams in near-by drainage basins. See also footnote to daily discharge table.

Monthly discharge of Dog River at Northfield, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1915–16.						
October	47	13	18.8	0.400	0.46	A.
November	55	15	22.9	.487	.54	A.
December	141	14	36.5	.777	.90	A.
January	650	27	115	2.45	2.82	B.
February	392	27	90.9	1.93	2.08	B.
March	430	31	92.2	1.96	2.26	B.
April	505	141	235	5.00	5.58	A.
May	405	45	107	2.28	2.63	C.
June	173	53	96.9	2.06	2.30	C.
July	93	22	42.4	.902	1.04	A.
August	32	12	18.3	.389	.45	B.
September	42	9	14.7	.313	.35	B.
The year	650	9	73.9	1.57	21.41	

Days of deficiency in discharge of Dog River at Northfield, Vt., during the years ending Sept. 30, 1913–1916.

Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.			
		1912-13	1913-14	1914-15	1915-16
4.0	0.46	3			
6.0	.68	48	6		
8.0	.91	61	22		
10	1.1	75	43	9	2
15	1.7	89	74	43	40
20	2.2	114	120	86	92
25	2.8	135	143	120	121
30	3.4	146	160	152	145
40	4.6	173	199	197	185
50	5.7	191	216	240	214
60	6.8	212	241	272	239
80	9.1	249	290	309	271
100	11.4	275	305	328	284
125	14.2	297	312	338	300
150	17.0	317	320	347	314
200	22.7	336	328	352	334
250	28.4	342	337	357	350
300	34.1	348	340	359	355
400	45.5	355	351	360	360
500	56.8	359	358	361	363
600	68.2	360	360	362	365
800	90.9	361	362	364	366
1,000	114	363	363	364	
1,500	171	364	364	365	
2,000	227	364	364		
2,500	284	365	365		

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

DOG RIVER NEAR MONTPELIER, VT.

LOCATION.—At covered wooden highway bridge about half a mile above mouth of river and 1 mile from Montpelier.

DRAINAGE AREA.—88 square miles.

RECORDS AVAILABLE.—July 6 to October 31, 1910.

GAGE.—Vertical staff on downstream end of right abutment; read twice daily by Katherine Berry.

DISCHARGE MEASUREMENTS.—Made by wading about 100 feet below gage.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvial deposits; control probably somewhat shifting.

EXTREMES OF STAGE.—Maximum stage recorded during the period, 3.50 feet at 6 a. m. July 8 and 10.25 a. m. September 29; minimum stage, 1.05 feet at 6.15 p. m. August 28.

REGULATION.—The operation of several power plants above the station seriously affects the distribution of flow during low-water periods.

ACCURACY.—Data insufficient for determination of daily discharge. Results of discharge measurements and morning and evening gage readings are given in the following tables.

Discharge measurements of Dog River near Montpelier, Vt., during 1910.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 6	G. M. Brett............	1.65	36.5	Aug. 10	G. M. Brett............	1.42	12.2
24	Brett and Butterfield..	1.42	14.7	11	.....do..................	1.59	28.2

Twice-daily gage height, in feet, of Dog River near Montpelier, Vt., for 1910.

Day.	July. A. M.	July. P. M.	August. A. M.	August. P. M.	September. A. M.	September. P. M.	October. A. M.	October. P. M.
1			1.35	1.3	1.2	1.2	1.75	1.75
2			1.45	1.45	1.45	1.55	1.75	1.75
3			1.45	1.45	1.3	1.2	1.85	1.8
4			1.45	1.75	1.15	1.15	1.9	1.85
5			2.1		1.25	1.45	1.75	1.75
6	1.65	1.6	2.0	1.7	1.65	1.65	1.75	1.7
7	1.65	1.7	1.7	1.5	1.65	1.65	1.7	1.65
8	a 1.65	2.65	1.4	1.5	1.45	1.45	1.65	1.65
9	1.55	1.5	1.4	1.45	1.5	1.5	1.65	1.65
10	1.45	1.55	1.7	1.55	1.45	1.5	1.8	1.85
11	b 2.6	2.0	1.4	1.4	1.5	1.5	2.0	2.0
12	1.65	1.6	1.4	1.4	1.5	1.5	1.75	1.75
13	1.55	1.5	1.4	1.4	1.45	1.5	1.85	1.85
14	1.45	1.45	1.4	1.4	1.65	1.65	2.0	2.0
15	1.65	1.6	1.4	1.4	1.5	1.5	2.0	2.0
16	1.7	1.6	1.4	1.4	1.5	1.5	2.1	2.0
17	1.45	1.4	1.4	1.4	1.5	1.5	1.85	1.8
18	1.45	1.45	1.4	1.4	1.5	1.5	1.75	1.7
19	1.5	1.65	1.6	1.6	2.0	2.0	1.7	1.75
20	1.75	1.7	1.4	1.4	1.65	1.65	1.8	1.75
21	1.65	1.65	1.15	1.15	1.5	1.5	1.65	1.65
22	1.45	1.5	1.1	1.15	1.6	1.6	1.65	1.8
23	1.55	1.5	1.1	1.1	1.75	1.6	1.7	1.65
24	1.4	1.45	1.1	1.1	1.5	1.5	1.65	1.5
25	1.35	1.3	1.05	1.25	2.0	1.75	1.55	1.5
26	1.5	1.45	1.45	1.45	1.6	1.6	1.5	1.45
27	1.65	1.6	1.15	1.15	1.6	1.5	1.45	1.45
28	1.7	1.65	1.1	1.05	1.5	1.5	1.5	1.5
29	1.55	1.5	1.2	1.2	3.5	2.8	1.5	1.5
30	1.6	1.5	1.15	1.1	2.0	2.2	1.65	1.7
31	1.55	1.45	1.05	1.15			1.75	1.75

a Gage height, 3.5 feet at 6 a. m.   b Gage height, 3.1 feet at 6 a. m.

NOTE.—Gage read at about 10 a. m. and 6 p. m.

MAD RIVER NEAR MORETOWN, VT.

LOCATION.—At covered wooden highway bridge known locally as Armstrong's Bridge, about 3 miles from Moretown on the road to Middlesex, and 4 miles above the mouth of the river.

DRAINAGE AREA.—153 square miles.

RECORDS AVAILABLE.—July 6 to November 6, 1910.

GAGE.—Vertical staff on downstream end of left abutment; read twice daily by Harvey Prescott.

DISCHARGE MEASUREMENTS.—Made by wading about 1,000 feet below the gage.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvium; control probably permanent throughout period covered by records.

EXTREMES OF DISCHARGE.—Maximum gage height recorded during the period, 5.6 feet at 11 a. m. November 5 (discharge not determined); minimum gage height, 1.48 feet at time of discharge measurement on August 28.

REGULATION.—Distribution of flow probably affected by operation of mills at Moretown.

ACCURACY.—Daily discharge not computed, as it is not known how nearly the average of two gage readings a day represents the mean daily stage, but as the time of gage reading varied considerably on different days it is thought that monthly discharge obtained from the twice-daily readings may be fairly good.

Discharge measurements of Mad River near Moretown, Vt., during 1910.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 6	G. M. Brett	1.75	49.7	Aug. 22	G. M. Brett	1.60	20.1
Aug. 8	....do....	1.92	63	28	A. D. Butterfield	1.48	13.6
8	....do....	1.92	69				

Twice-daily discharge, in second-feet, of Mad River near Moretown, Vt., for 1910.

Day.	July.		August.		September.		October.		November.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1			30	25	14	25	30	30	30	30
2			37	20	16	20	37	25	25	30
3			20	25	14	25	30	30	25	30
4			73	84	25	25	30	30	30	30
5			44	37	30	300	30	30		
6		30	37	30	300	370	25	25		
7	30	44	30	30	215	62	25	25		
8	30	44	30	30	37	37	30	30		
9	a 30	a 30	30	30	30	30	30	30		
10	20	62	37	30	20	25	30	30		
11	44	30	97	73	25	30	30	30		
12	20	44	73	53	16	20	20	25		
13	44	53	44	44	14	30	25	25		
14	44	53	44	37	14	44	25	30		
15	44	30	30	30	24	25	30	30		
16	62	30	30	30	16	30	30	30		
17	37	37	30	30	17	30	30	25		
18	30	30	25	37	20	30	610	610		
19	30	30	30	30	20	30	140	110		
20	37	37	25	30	20	37	62	44		
21	30	44	25	25	25	37	30	30		
22	25	44	25	22	25	37	30	30		
23	30	37	22	30	30	37	30	30		
24	30	20	17	30	25	30	25	30		
25	37	25	16	30	25	30	25	30		
26	30	30	14	30	30	30	30	30		
27	30	37	16	25	30	25	25	30		
28	140	110	17	25	30	25	25	30		
29	44	37	16	20	25	20	30	30		
30	44	30	17	22	25	20	25	30		
31	30	30	16	25			25	30		

a Discharge estimated.

NOTE.—Discharge determined from a rating curve fairly well defined between 10 and 75 second-feet. Time of gage reading irregular, varying from 3 a. m. to noon for morning readings, and from 2 p. m. to 8 p. m. for afternoon readings. Discharge Sept. 5 p. m. to Sept. 7 a. m. and Oct. 18 estimated from extension of rating curve. Gage heights Nov. 5-6 beyond range of rating curve; discharge not estimated.

Monthly discharge of Mad River near Moretown, Vt., for 1910.

[Drainage are, 153 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area)	Accuracy.
	Mean.	Per square mile.		
July 6–31	39.2	0.256	0 25	D.
August	32.5	.212	.24	D.
September	44.5	.291	.32	D.
October	51.2	.335	.39	D.

WATERBURY[1] RIVER NEAR WATERBURY, VT.

LOCATION.—Near the covered wooden highway bridge known locally as Barbers Bridge, about 3½ miles from Waterbury on the road to Stowe.

DRAINAGE AREA.—112 square miles.

RECORDS AVAILABLE.—July 7 to October 31, 1910.

GAGE.—Vertical staff on right bank about 75 feet below bridge.

DISCHARGE MEASUREMENTS.—Made by wading about 100 feet above bridge.

CHANNEL AND CONTROL.—Channel covered with gravel and alluvium; control probably permanent during period covered by records.

EXTREMES OF STAGE.—Maximum stage recorded, 6.5 feet at 7 a. m. August 6; minimum stage, 4.08 feet at 12 noon July 16.

REGULATION.—Flow affected by the operation of several mills above the gage.

ACCURACY.—Data insufficient for determination of discharge.

Discharge measurements of Waterbury River near Waterbury, Vt., during 1910.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 7	G. M. Brett............	4.32	52	Aug. 17	A. D. Butterfield......	4.42	64
15	.....do................	4.24	40				

Gage height, in feet, of Waterbury River near Waterbury, Vt., for 1910.

Day.	July. A.M.	July. M.	July. P.M.	August. A.M.	August. M.	August. P.M.	September. A.M.	September. M.	September. P.M.	October. A.M.	October. M.	October. P.M.
1.............	......	......	......	4.48	4.45	4.42	4.28	....	4.20	5.00	....	5.10
2.............	......	......	......	4.48	4.46	4.45	4.18	....	4.12	5.50	....	5.28
3.............	......	......	......	4.38	4.35	4.42	4.80	....	4.25	5.00	....	4.90
4.............	......	......	......	4.50	4.88	5.12	4.50	......	4.42	4.82	....	4.78
5.............	......	......	......	5.50	5.12	5.17	4.35	....	4.80	4.65	....	4.62
6.............	......	......	......	6.50	6.20	6.23	5.30	....	5.82	4.70	....	4.80
7.............	......	4.32	4.30	6.00	5.90	5.60	5.60	....	5.20	5.00	....	5.10
8.............	4.40	4.50	4.35	5.00	4.97	4.88	4.80	....	4.78	5.00	....	4.88
9.............	4.30	4.30	4.25	4.80	4.77	4.74	4.65	....	4.60	4.92	....	4.85
10.............	4.38	4.28	4.25	4.60	4.74	4.80	4.48	....	4.45	4.78	....	4.70
11.............	4.30	4.25	4.20	5.60	5.45	5.32	4.40	....	4.38	4.62	....	4.55
12.............	4.18	4.12	4.15	5.20	4.90	4.80	4.30	....	4.32	4.50	....	4.52
13.............	4.20	4.32	4.38	4.70	4.60	4.65	4.38	....	4.40	4.48	....	4.50
14.............	4.27	4.23	4.38	4.62	4.58	4.55	4.35	....	4.40	4.45	....	4.42
15.............	4.20	4.18	4.25	4.60	4.52	4.63	4.50	....	4.42	4.40	....	4.50
16.............	4.10	4.08	4.22	4.50	4.58	4.48	4.35	....	4.28	4.50	....	4.48
17.............	4.15	4.12	4.10	4.45	4.48	4.42	4.25	....	4.20	4.40	....	4.45
18.............	4.15	4.20	4.15	4.38	4.38	4.35	4.18	....	4.15	4.38	....	4.35
19.............	4.80	4.15	4.25	4.40	4.55	4.60	4.12	....	4.15	4.30	....	4.32
20.............	4.80	4.28	4.22	4.55	4.52	4.50	4.20	....	4.22	4.28	....	4.30
21.............	4.80	4.18	4.20	4.42	....	4.35	4.18	....	4.20	4.25	....	4.20
22.............	4.28	4.30	4.35	4.30	....	4.25	4.10	....	4.12	4.22	....	4.18
23.............	4.48	4.52	4.45	4.22	....	4.20	4.80	....	4.12	4.70	....	4.78
24.............	4.50	4.47	4.40	4.18	....	4.20	4.10	....	4.15	4.80	....	4.85
25.............	4.34	4.38	4.32	4.15	....	4.20	4.80	....	4.20	4.80	....	4.90
26.............	4.20	4.27	4.37	4.18	....	4.30	4.35	....	4.32	5.80	....	5.75
27.............	4.22	4.34	4.17	4.25	....	4.28	4.30	....	4.35	5.70	....	5.78
28.............	6.00	5.80	5.50	4.20	....	4.18	5.50	....	5.10	5.90	....	5.82
29.............	4.90	4.80	4.68	4.15	....	4.18	4.70	....	4.62	5.60	....	5.52
30.............	4.60	4.67	4.48	4.50	....	4.10	4.50	....	4.45	5.52	....	5.40
31.............	4.50	4.48	4.46	4.20	....	4.15	....	....	....	5.30	....	5.22

NOTE.—Readings usually taken at about 7 a. m., noon, and 6 p. m.

[1] Sometimes called Little River.

HUNTINGTON RIVER AT JONESVILLE, VT.

LOCATION.—At Palmer's mill, three-fourths mile from Jonesville railroad station and three-fourths mile above mouth of river.

DRAINAGE AREA.—55 square miles.

RECORDS AVAILABLE.—July 16 to September 3, 1910.

GAGE.—Vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading about three-fourths mile below gage.

CHANNEL AND CONTROL.—Gage just above and within the influence of the mill dam, but mill is used for power development only at extremely high water.

REGULATION.—Low-water flow regulated by operation of the Richmond electric-light plant 1½ miles above the gage.

ACCURACY.—Data inadequate for determination of discharge.

COOPERATION.—Gage-height readings furnished by Mr. G. W. Palmer.

Discharge measurements of Huntington River at Jonesville, Vt., during 1910.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 16	G. M. Brett	3.25	12.0
Aug. 29	.....do	3.15	6.7

Daily gage height, in feet, of Huntington River at Jonesville, Vt., for 1910.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1		3.42	3.5	11		3.5		21	3.4	3.5	
2		3.5	3.52	12		3.6		22	3.42	3.5	
3		3.6	3.55	13		3.6		23	3.42	3.5	
4		3.8		14		3.6		24	3.45	3.5	
5		3.7		15		3.55		25	3.5	3.5	
6		3.6		16	3.25	3.5		26	3.45	3.5	
7		3.6		17	3.3	3.5		27	3.45	3.5	
8		3.55		18	3.38	3.5		28	3.4	3.48	
9		3.5		19	3.4	3.5		29	3.4	3.4	
10		3.5		20	3.4	3.5		30	3.42	3.48	
								31	3.42	3.52	

LAMOILLE RIVER AT CADYS FALLS, VT.

LOCATION.—About one-fourth mile below power plant of Morrisville Electric Light & Power Co., at what was formerly known as Cadys Falls, 2 miles downstream from village of Morrisville. (See Pl. XI, p. 90.)

DRAINAGE AREA.—280 square miles (measured on post-route map of Vermont, edition of 1915).

RECORDS AVAILABLE.—September 4, 1913, to September 30, 1916, at present location. A station was maintained at the highway bridge near the power plant at Cadys Falls from July 28, 1909, to July 13, 1910.

GAGES.—Water-stage recorder on right bank one-fourth mile below highway bridge at Cadys Falls (Pl. X, B, p. 41). Gage heights are referred to gage datum by means of a hook gage inside the well. An outside staff gage is used for auxiliary readings. July 28, 1909, to July 13, 1910, chain gage on highway bridge at Cadys Falls.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel has smooth gravel bed with well-defined gravel control 500 feet downstream from gage.
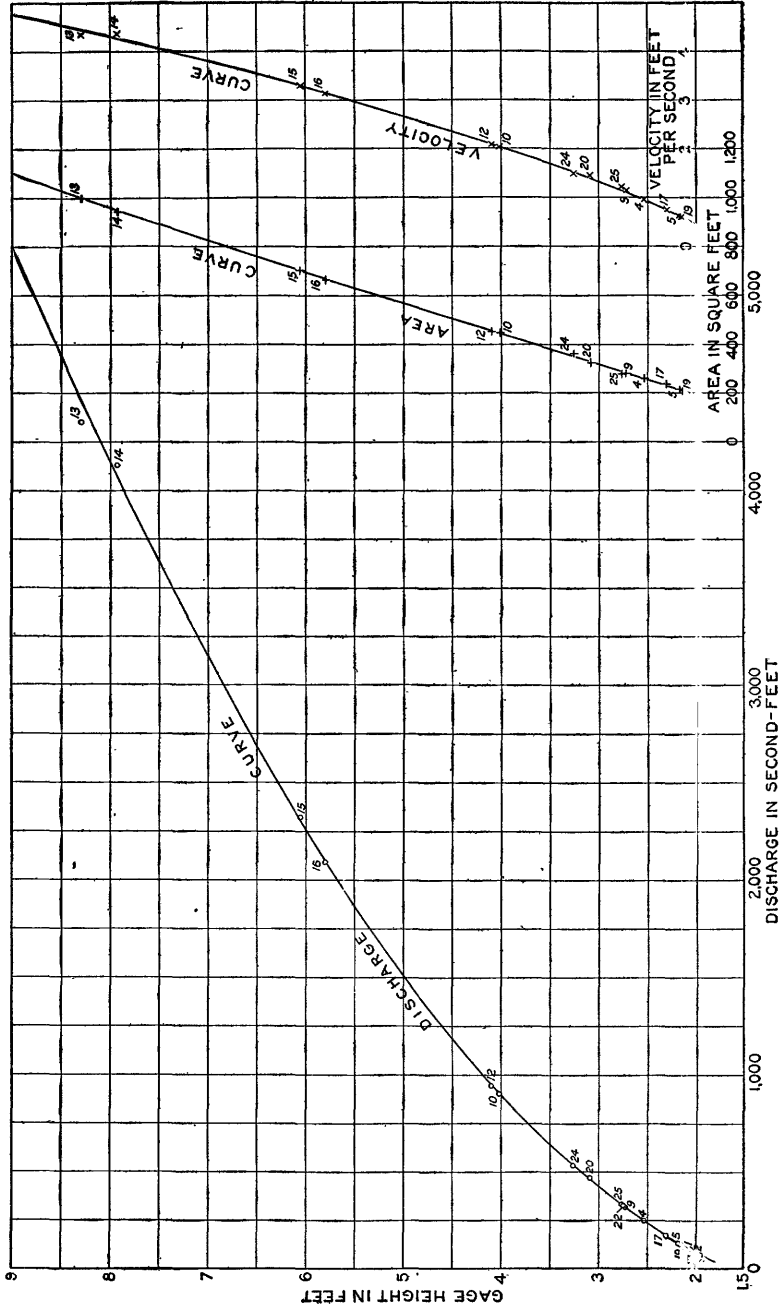
FIGURE 2.—Rating curve for Lamoille River at Cadys Falls, Vt.

EXTREMES OF DISCHARGE.—1913–1916: Maximum stage recorded, 10.53 feet April 20, 1914 (discharge, 7,250 second-feet); minimum stage, 1.82 feet August 17, 1914 (discharge, 50 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice for short period⁻ during extremely cold weather.

REGULATION.—The large amount of storage in the pond above the power plant at Cadys Falls, together with the fluctuations in discharge caused by the operation of the plant, affects the flow of the river at this point. A study of the discharge records indicates that an additional storage of 270,000,000 cubic feet might be needed to insure a continuous flow of 140 second-feet or 0.5 second-foot per square mile at Cadys Falls for 90 per cent of the time during a year of extremely low flow; a storage of 85,000,000 cubic feet would probably insure this rate of flow for 90 per cent of the time during the average year.

ACCURACY.—Results good except for periods during which water-stage recorder was not in operation.

The rating curve for this station is shown in figure 2.

Discharge measurements of Lamoille River at Cadys Falls, Vt., during 1909–10 and 1913–1916.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
1909.		*Feet.*	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 29	D. M. Wood	2.48	150	Mar. 20	W. S. Easterly	2.73	320
July 29	.....do	1.61	24.1	29	.....do	4.02	904
29	.....do	2.26	98	29	.....do	4.02	931
1910.				30	.....do	4.10	944
Jan. 6	.....do	2.40	146	Apr. 21	R. S. Barnes	8.30	4,350
Mar. 27	T. W. Norcross	5.71	1,680	21	.....do	7.93	4,130
Apr. 19	.....do	3.76	510	22	.....do	6.06	2,320
				22	.....do	5.80	2,090
1913.				May 28	C. S. DeGolyer	2.31	175
Sept. 4	G. H. Canfield	2.06	107	Oct. 10	C. H. Pierce	2.06	101
6	.....do	2.05	102	Dec. 21	C. S. DeGolyer	2.16	127
6	.....do	1.95	73				
Oct. 31	G. S. DeGolyer	2.54	251	**1915.**			
				Jan. 8	C. H. Pierce	3.09	472
1914.				Feb. 10	R. S. Barnes	a 2.36	151
Jan. 3	W. S. Easterly	2.18	135	Apr. 23	.....do	2.75	328
17	.....do	a 2.25	131	July 30	G. F. Adams	3.03	460
Feb. 2	.....do	a 2.37	180	Nov. 20	.....do	3.26	535
25	C. C. Covert	a 2.56	160				
				1916.			
				Feb. 10	R. S. Barnes	2.77	336

a Stage-discharge relation affected by ice.

NOTE.—Gage heights of measurements made during 1909–10 refer to chain gage at highway bridge.

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1913–1916.

Day.	Sept.	Day.	Sept.	Day.	Sept.
1913.		**1913.**		**1913.**	
1		11	84	21	60
2		12	92	22	87
3		13	75	23	179
4	105	14	64	24	140
5	102	15	73	25	132
6	92	16	78	26	110
7	73	17	78	27	107
8	84	18	80	28	89
9	84	19	78	29	89
10	97	20	78	30	102
				31	

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1913–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	99	237	211	105	190	130	770	1,590	125	190	112	158
2	80	164	302	121	175	190	920	1,380	125	290	80	137
3	84	230	383	102	160	330	720	1,420	145	390	94	129
4	112	237	428	123	160	470	582	1,380	140	250	94	137
5	92	220	305	143	170	410	484	1,280	120	140	89	121
6	87	182	262	158	185	345	416	1,520	100	140	89	102
7	82	167	185	115	145	255	383	950	90	160	84	254
8	89	188	462	129	135	220	475	695	90	290	102	230
9	80	149	367	158	150	190	1,620	770	90	270	75	230
10	82	240	294	129	125	205	1,120	650	90	240	84	185
11	89	234	244	129	100	190	1,030	580	90	220	115	164
12	99	195	176	129	50	205	1,160	535	90	205	129	143
13	123	161	220	100	50	175	950	475	90	175	102	112
14	146	167	195	75	65	250	870	462	90	140	102	110
15	115	149	195	90	65	145	950	395	90	130	97	112
16	94	132	211	100	100	190	1,060	324	100	130	78	110
17	87	110	201	115	90	345	920	224	115	100	78	99
18	78	135	207	100	80	470	1,590	200	115	140	97	110
19	60	140	161	115	100	365	3,920	200	100	130	143	110
20	164	578	167	100	115	325	6,650	200	100	115	110	92
21	347	403	158	105	100	313	5,020	200	90	115	102	92
22	217	298	161	105	65	298	2,510	200	90	107	158	99
23	192	217	140	100	100	258	2,020	200	90	102	110	112
24	200	244	126	115	75	207	1,660	200	90	102	94	161
25	235	248	149	115	100	240	1,730	200	100	123	94	176
26	400	237	152	115	100	265	1,800	200	100	115	82	140
27	750	188	123	160	100	672	1,870	200	100	115	82	167
28	500	161	99	130	90	950	2,260	176	100	137	97	251
29	400	176	85	175	......	1,000	2,860	164	100	161	188	214
30	367	143	110	190	......	922	2,600	140	150	161	309	188
31	279	......	135	205	......	770	......	121	......	123	204	......
1914–15.												
1	220	135	298	121	100	628	244	450	141	126	182	138
2	204	163	458	126	95	560	294	493	147	126	172	135
3	147	198	493	118	90	462	272	441	141	126	204	138
4	107	191	375	135	90	428	198	367	126	112	169	135
5	112	191	254	126	90	408	336	309	124	109	141	124
6	126	224	178	126	90	515	424	112	96	147	141	107
7	124	204	172	254	90	290	328	204	98	129	138	115
8	126	156	172	542	120	305	672	367	112	436	141	115
9	135	178	147	367	145	290	1,060	484	118	1,450	204	191
10	126	188	147	254	130	265	1,380	351	129	672	551	237
11	107	166	118	230	145	251	5,620	290	144	347	328	166
12	112	166	112	188	145	279	3,820	251	237	244	224	126
13	135	166	90	182	130	220	1,520	220	135	204	188	132
14	126	185	118	178	105	166	945	220	121	144	188	144
15	132	141	121	166	110	182	745	194	141	156	169	141
16	132	408	118	150	195	204	542	182	156	165	169	144
17	328	428	115	115	210	198	628	188	198	170	204	156
18	317	237	121	141	185	185	502	227	290	180	254	144
19	248	204	124	387	190	198	475	230	204	190	198	118
20	272	220	129	720	170	188	450	248	182	200	163	115
21	217	230	132	347	125	144	403	224	175	204	153	135
22	188	204	135	251	135	166	359	204	144	204	118	129
23	172	175	138	220	130	188	328	194	121	538	290	129
24	175	178	138	188	309	272	302	178	107	328	408	150
25	129	214	132	150	4,700	416	471	183	115	220	371	156
26	166	309	141	145	3,600	538	820	169	107	240	328	118
27	172	745	139	140	1,250	309	695	367	98	265	240	240
28	166	450	137	140	820	220	515	290	112	290	194	230
29	166	276	135	125	......	272	416	204	120	300	141	172
30	172	262	135	120	......	227	379	166	126	510	147	138
31	172	......	135	110	......	220	......	150	......	300	144	......

Daily discharge, in second-feet, of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1913–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	135	175	420	445	1,350	367	2,430	416	475	248	191	124
2	135	172	272	375	972	351	2,950	493	347	198	150	141
3	132	175	220	309	672	347	1,800	502	290	207	141	135
4	141	169	220	355	533	367	1,320	618	672	328	135	109
5	420	175	191	546	462	302	945	560	745	367	132	132
6	672	188	201	582	395	294	870	467	1,000	276	109	144
7	383	153	172	551	387	283	945	437	610	220	121	141
8	290	147	156	347	351	279	795	428	428	290	138	147
9	230	178	169	272	336	279	845	408	450	347	895	178
10	178	182	135	428	317	276	695	383	641	240	845	115
11	178	169	129	313	302	258	820	383	745	204	445	109
12	169	166	129	294	254	254	1,090	359	672	244	268	115
13	160	178	126	237	217	244	1,060	317	542	276	207	112
14	150	150	150	244	244	328	1,180	290	391	268	185	107
15	175	175	160	359	244	237	1,060	283	309	204	160	204
16	169	283	156	234	230	204	1,180	283	287	147	141	276
17	132	220	153	185	224	237	1,520	493	363	188	141	147
18	124	191	175	211	224	272	2,180	1,590	412	175	135	138
19	163	211	302	237	237	237	1,700	1,060	515	160	129	135
20	204	560	347	178	230	214	1,220	695	795	147	104	144
21	204	582	265	182	234	172	1,090	515	574	141	109	129
22	204	462	237	279	214	227	1,180	428	395	141	129	118
23	166	347	211	745	211	328	1,800	408	317	147	132	129
24	132	279	211	720	207	220	1,760	395	276	172	124	135
25	135	224	201	515	217	220	1,350	328	214	185	126	126
26	153	217	646	533	480	214	1,090	272	262	188	118	118
27	163	194	1,030	945	945	332	895	244	240	175	121	115
28	153	211	672	2,430	506	770	770	230	524	150	132	115
29	147	272	551	1,660	391	1,150	695	244	432	126	147	144
30	166	493	493	895	....	1,730	560	363	317	115	138	1,000
31	172	....	462	770	....	2,340	....	770	....	237	135	....

NOTE.—Discharge computed from a well-defined rating curve. Stage-discharge relation affected by ice Jan. 13 to Mar. 1, 1914; Jan. 25 to Feb. 23, 1915; Jan. 8–21, Feb. 11–18, Mar. 1–6, 16–21, 1916; discharge ascertained by means of gage heights, discharge measurements, and weather records. Daily discharge Oct. 24–29, 1913, to Jan. 12, 1914; Mar. 2–19, May 10–13, 18–27; June 1 to July 21, Dec. 27–28, 1914; Feb. 25–26, Apr. 11–12, 27–28, June 29 to July 2, July 13, 14, 16, 18–20, 26, 27, 29, 31, 1915; Jan. 1–3, 5, Feb. 26–28, Mar. 17–20, 29–30, and May 3–22, 1916, when automatic gage was out of order, estimated from readings by observer and comparisons with records of Winooski River at Montpelier and Missisquoi River near Richford.

Monthly discharge of Lamoille River at Cadys Falls, Vt., for the years ending Sept. 30, 1913–1916.

[Drainage area, 280 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913–14.						
October	750	60	188	0.671	0.77	B.
November	578	110	211	.754	.84	A.
December	462	99	213	.761	.88	A.
January	205	75	124	.443	.51	D.
February	190	50	112	.400	.42	D.
March	1,000	130	365	1.30	1.50	C.
April	6,650	383	1,700	6.07	6.77	A.
May	1,590	121	556	1.99	2.29	C.
June	145	90	104	.371	.41	D.
July	390	102	168	.600	.69	C.
August	309	75	112	.400	.46	B.
September	254	92	143	.511	.57	B.
The year	6,650	50	333	1.19	16.11	

Monthly discharge of Lamoille River at Cadys Falls, Vt., for the year ending Sept. 30, 1913–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accu-racy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914–15.						
October	328	107	169	0.604	0.70	A.
November	745	135	240	.857	.96	A.
December	493	90	173	.618	.71	A.
January	720	110	212	.757	.87	B.
February	4,700	90	489	1.75	1.82	C.
March	628	144	297	1.06	1.22	A.
April	5,620	198	838	2.99	3.34	A.
May	493	112	262	.936	1.08	A.
June	290	96	142	.507	.57	A.
July	1,450	109	285	1.02	1.18	C.
August	551	118	215	.768	.89	A.
September	240	107	147	.525	.59	A.
The year	5,620	90	287	1.02	13.93	
1915–16.						
October	672	124	198	.707	.82	A.
November	582	147	243	.868	.97	A.
December	1,030	126	289	1.03	1.19	A.
January	2,430	178	528	1.89	2.18	C.
February	1,350	207	400	1.43	1.54	C.
March	2,340	172	430	1.54	1.78	C.
April	2,950	560	1,260	4.50	5.02	B.
May	1,590	230	473	1.69	1.95	C.
June	1,000	214	475	1.70	1.90	A.
July	367	115	210	.750	.86	B.
August	845	104	183	.654	.75	A.
September	1,000	107	166	.593	.66	B.
The year	2,950	104	403	1.44	19.62	

Days of deficiency in discharge of Lamoille River at Cadys Falls, Vt., during the years ending Sept. 30, 1914–1916.

Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.		
		1913–14	1914–15	1915–16
65	7.4	3		
80	9.1	12		
100	11.4	62	10	
125	14.2	134	53	20
150	17.0	176	134	69
175	19.8	205	172	99
200	22.7	231	214	126
250	28.4	274	261	185
300	34.1	289	286	217
350	39.8	299	303	239
400	45.5	306	314	260
500	56.8	319	336	285
600	68.2	324	346	303
700	79.6	325	352	315
800	90.9	332	356	325
1,000	114	340	359	336
1,500	170	349	362	353
2,000	227	357	363	361
3,000	341	362	363	366
4,000	455	363	364	
6,000	682	364	365	
8,000	909	365		

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

LAMOILLE RIVER AT JOHNSON, VT.

LOCATION.—At the highway bridge in the village of Johnson, on the road from the railroad station to the post office, and about 400 feet above the mouth of Gihon River.

DRAINAGE AREA.—324 square miles.

RECORDS AVAILABLE.—July 14, 1910, to December 31, 1913.

GAGE.—Chain, fastened to handrail of bridge; read twice daily by F. M. Ward.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel covered with gravel and ledge rock; control for low stages formed by gravel bar about 350 feet below the bridge; at high stages control is probably below mouth of Gihon River.

EXTREMES OF DISCHARGE.—1910–1913: Maximum stage recorded, 16.0 feet at 7 a. m. April 8, 1912 (approximate discharge from extension of rating curve, 11,700 second-feet); minimum stage, 1.8 feet July 6, 13, and 16, 1911 (discharge, 50 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice.

REGULATION.—Distribution of flow affected by storage in several ponds and lakes above the station. Diurnal fluctuation in flow at this point probably not great.

ACCURACY.—Comparisons with records at Cadys Falls from September to December, 1913, indicate that computations based on gage readings twice daily may be considered reliable.

Discharge measurements of Lamoille River at Johnson, Vt., during 1909–1913.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1909.				1912.			
June 28	D. M. Wood............	2.51	128	Feb. 24	G. H. Canfield..........	*a* 3.70	155
				Aug. 29	J. G. Mathers...........	2.57	206
1910.				Oct. 19	C. S. DeGolyer	2.69	238
Mar. 27	T. W. Norcross.........	5.45	1,640				
Apr. 19	.....do...................	3.69	642	1913.			
July 14	G. M. Brett.............	2.38	193	Mar. 7	C. S. DeGolyer........	*a* 5.49	235
Aug. 20	.....do...................	2.68	226	29	R. S. Barnes.............	6.12	2,190
				Apr. 25	.....do...................	3.35	555
1911.				Aug. 20	G. H. Canfield..........	2.18	98
June 27	G. H. Canfield..........	2.12	104	20	.....do...................	2.37	136
Aug. 5	.....do...................	2.09	96				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Lamoille River at Johnson, Vt., for the years ending Sept. 30, 1910–1913.

Day	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1910.				1910.				1910.			
1..........	....	128	119	11..........	....	186	174	21..........	123	138	90
2..........	....	126	144	12..........	....	174	119	22..........	153	123-	90
3..........	....	124	123	13..........	....	129	123	23..........	227	117	90
4..........	....	123	151	14..........	140	90	136	24..........	123	117	109
5..........	....	115	138	15..........	258	109	140	25..........	109	115	99
6..........	....	425	600	16..........	123	162	119	26..........	111	99	81
7..........	....	405	600	17..........	117	167	123	27..........	109	121	109
8..........	....	310	385	18..........	90	192	119	28..........	242	123	487
9..........	....	123	227	19..........	127	217	109	29..........	328	109	310
10..........	....	90	212	20..........	127	242	99	30..........	129	121	199
								31..........	129	119	....

Daily discharge, in second-feet, of Lamoille River at Johnson, Vt., for the years ending Sept. 30, 1910–1913—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	199	212	227							99	129	109
2	445	555	227							103	103	81
3	532	700	258							73	99	73
4	292	1,200	174							57	99	81
5	174	1,140	242							62	103	95
6	151	555	227					129		50	103	186
7	227	445						125		57	73	258
8	199	365						129		90	103	151
9	199	258						129		73	92	121
10	212	227						125		65	85	129
11	186	292						119		103	103	119
12	186	275						147		81	95	140
13	151	258						186		50	73	115
14	174	292						169		73	73	115
15	140	275						186		68	78	162
16	140	258						186		57	95	328
17	129	258						227		81	107	212
18	140	227						212		186	103	136
19	129	227						140		151	186	123
20	123	199						151		129	174	115
21	129	242						140		103	115	99
22	119	227						134		109	115	109
23	174	242						147		90	107	123
24	186	292						119		73	78	103
25	310	258						109		85	73	158
26	327	227						81		119	81	212
27	555	174						95		90	81	186
28	532	227						115		85	78	186
29	328	212						103		90	109	174
30	227	227						103		99	95	199
31	212							103		123	73	
1911–12.												
1	181	328	555					880	3,820	140	135	151
2	167	258	425					615	2,970	140	140	140
3	151	292	425					570	1,600	125	216	145
4	174	227	242					425	1,260	120	175	162
5	910	199	310					510	1,430	109	186	162
6	510	158	365					480	910	82	168	242
7	275	258	385				7,500	625	940	73	145	227
8	199	151	310				9,150	500	910	100	145	151
9	181	405	328				3,290	465	615	82	151	130
10	162	310	555				2,230	490	455	100	162	130
11	151	292	750				1,880	425	490	114	140	255
12	129	275	1,330				2,020	425	465	114	216	285
13	140	750	3,650				2,120	490	510	114	174	199
14	119	555	2,090				2,410	1,140	425	82	162	163
15	115	365	1,020				3,930	725	345	120	174	151
16	99	405	650				6,280	990	345	110	145	470
17	95	292	800				6,350	1,640	465	114	140	285
18	140	365	600				3,690	1,570	385	120	130	290
19	1,400	445	510				3,450	1,080	293	109	100	800
20	650	425	405				2,730	700	260	125	145	940
21	425	405	425				2,770	2,690	227	130	125	775
22	328	405	365				1,810	1,640	242	120	128	510
23	532	365	3,490				5,160	1,640	213	130	130	328
24	600	385	1,810				2,480	1,110	162	110	145	328
25	405	292	1,140				1,640	1,200	186	120	199	250
26	292	328	750				1,560	910	186	104	213	212
27	258	310	600				1,250	675	212	109	400	199
28	242	258	532				855	465	174	120	320	180
29	199	1,810	510				880	525	156	120	186	202
30	186	965	465				650	880	140	162	174	350
31	227		365					3,090		135	156	

Daily discharge, in second-feet, of Lamoille River at Johnson, Vt., for the years ending Sept. 30, 1910–1913—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	292	405	405	405			2,730	365	675	151	199	119
2	328	510	258	385			1,640	310	465	130	174	109
3	258	485	1,500	365			1,200	328	465	151	174	130
4	250	405	880	1,170			1,880	258	310	130	151	130
5	235	365	700	880			3,970	275	328	109	151	109
6	186	350	780	750			2,020	292	292	151	146	99
7	151	365	990	675		235	1,540	292	278	151	151	130
8	199	3,770	655	650			1,020	266	328	146	140	109
9	205	1,640	405	775			980	292	365	130	119	120
10	199	1,300	385	625			910	258	310	218	130	109
11	227	625	405				940	227	130	292	151	115
12	244	760	405				1,140	206	130	186	146	110
13	328	445	345				1,050	199	187	151	151	222
14	405	1,100	375				1,060	199	109	151	151	90
15	284	1,400	350				990	199	120	151	140	100
16	292	1,110	365				1,040	180	176	130	130	90
17	258	1,020	430				830	199	555	130	130	100
18	258	825	405				750	199	328	151	120	110
19	242	465	600				1,350	284	227	328	130	100
20	212	485	830				1,540	266	214	174	135	90
21	157	740	580				775	227	151	130	130	110
22	222	227	700				725	258	109	130	125	438
23	227	308	480				675	368	146	120	140	244
24	6,100	385	530			1,700	580	328	163	151	130	187
25	3,730	405	580			5,740	580	468	174	187	120	151
26	2,300	530	365			6,170	530	650	174	174	130	146
27	2,050	435	405			6,400	555	328	244	140	151	135
28	650	405	385			4,550	465	512	140	254	151	151
29	625	284	425			2,260	445	2,200	151	405	146	110
30	334	365	365			1,610	405	1,820	146	328	151	109
31	405		445			2,360		970		258	130	

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1913.				1913.				1913.			
1	130	365	227	11	99	328		21	455	555	
2	90	292	310	12	140	244		22	199	468	
3	176	227	555	13	227	227		23	187	365	
4	151	186	578	14	212	199		24	212	328	
5	109	258	532	15	202	186		25	258	328	
6	90	227	405	16	151	174		26	428	310	
7	99	199	555	17	130	151		27	802	227	
8	90	292	650	18	205	199		28	578	186	
9	109	258	385	19	120	174		29	445	258	
10	99	365		20	151	1,060		30	328	328	
								31	405		

NOTE.—Discharge computed from a rating curve fairly well defined between 90 and 2,400 second-feet.

Monthly discharge of Lamoille River at Johnson, Vt., for the years endirg Sept. 30, 1910–1913.

[Drainage area, 324 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1910.						
July 14–30	328	90	154	0.475	0.32	B.
August	425	90	159	.491	.57	B.
September	600	81	187	.577	.64	B.
1910–11.						
October	555	119	233	.719	.83	B.
November	1,200	174	352	1.09	1.22	B.
June 6–30	227	81	140	.432	.40	B.
July	186	50	88.5	.273	.31	C.
August	186	73	99.4	.307	.35	C.
September	328	73	147	.454	.51	B.
1911–12.						
October	1,400	95	311	.960	1.11	B.
November	1,810	151	409	1.26	1.41	B.
December	3,650	242	844	2.60	3.00	B.
January			a 400	1.23	1.42	D.
February			a 150	.463	.50	C.
March			a 500	1.54	1.78	D.
April	9,150	650	2.800	8.64	9.64	C.
May	3,090	425	954	2.94	3.39	B.
June	3,820	140	693	2.14	2.39	B.
July	162	73	115	.355	.41	B.
August	400	100	172	.531	.61	B.
September	940	130	294	.907	1.01	B.
The year	9,150		634	1.96	26.67	
1912–13.						
October	6,100	151	705	2.18	2.51	B.
November	3,770	227	730	2.25	2.51	B.
December	1,500	258	540	1.67	1.92	B.
January			a 840	2.58	2.97	C.
February			a 485	1.50	1.56	D.
March			a 1,950	6.02	6.94	C.
April	3,970	405	1,140	3.52	3.93	B.
May	2.200	180	427	1.32	1.52	B.
June	675	109	253	.781	.87	B.
July	405	109	180	.556	.64	B.
August	199	119	143	.441	.51	B.
September	438	90	136	.420	.47	B.
The year			630	1.94	26.35	
1913.						
October	802	90	228	.704	.81	B.
November	1,060	151	299	.923	1.03	B.
December 1–9	650	227	466	1.44	.48	B.

a Stage-discharge relation affected by ice Jan. 1 to Apr. 6, 1912, and Jan. 11 to Mar. 23, 1913; determinations of discharge for these periods based on 2 discharge measurements and comparisons with near-by drainage basins.

LAMOILLE RIVER AT WEST MILTON, VT.

LOCATION.—At the steel highway bridge near West Milton post office, about 4 miles above mouth of river.

DRAINAGE AREA.—715 square miles.

RECORDS AVAILABLE.—March 28 to October 8, 1903.

GAGE.—Chain on highway bridge; read twice daily by Harry A. Granger.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel straight above and below gage; broken by one bridge pier. Control indefinite and affected by backwater from Lake Champlain.

EXTREMES OF STAGE.—Maximum stage recorded March 28 to October 4, 1903, 12.0 feet,
    March 28; minimum stage, 4.0 feet, September 25 to October 2, and October 8.
WINTER FLOW.—Observations discontinued during winter.
DIVERSIONS.—No diversions except from tributaries for municipal use.
REGULATION.—Distribution of flow at low stages affected by power development
    above the station.
ACCURACY.—Records only approximate, as stage-discharge relation was seriously
    affected by backwater from Lake Champlain.   Data insufficient for determina-
    tion of discharge subsequent to June 11.

Discharge measurements of Lamoille River at West Milton, Vt., during 1903.

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 28	H. K. Barrows	12.00	3,480	May 20	C. H. Pierce	6.72	195
Apr. 6	C. B. Brownell	11.55	2,760	27	.....do	6.10	245
23	A. D. Butterfield	9.60	795	June 8	.....do	5.45	220
29	H. K. Barrows	8.75	655	15	E. C. Murphy	5.79	775
May 6	C. H. Pierce	7.93	455	15	.....do	5.75	763
13	.....do	7.32	395	26	H. K. Barrows	5.72	450

Daily gage height, in feet, of Lamoille River at West Milton, Vt., for 1903.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1		11.58	8.55	5.72	5.5	5.92	4.8	4.0
2		11.5	8.4	5.68	5.5	5.55	4.8	4.0
3		11.4	8.25	5.6	5.52	5.35	4.8	4.2
4		12.2	8.05	5.58	5.58	5.3	4.8	4.3
5		11.9	8.0	5.5	5.55	5.22	4.8	4.2
6		11.55	7.92	5.48	5.5	5.2	4.75	4.15
7		11.45	7.82	5.4	5.5	5.15	4.65	4.05
8		11.5	7.7	5.4	5.45	5.1	4.6	4.0
9		11.45	7.6	5.32	5.42	5.1	4.58	....
10		11.35	7.5	5.3	5.4	5.0	4.5	....
11		11.25	7.45	5.28	5.55	5.0	4.5	....
12		11.1	7.35	5.4	5.6	5.8	4.5	....
13		10.92	7.28	5.7	5.35	5.4	4.5	....
14		10.8	7.18	5.95	....	5.18	4.4	....
15		10.65	7.1	5.75	5.3	5.1	4.4	....
16		10.55	7.0	5.6	5.22	5.02	4.4	....
17		10.45	6.88	5.6	5.35	5.0	4.4	....
18		10.32	6.8	5.6	5.25	4.9	4.35	....
19		10.2	6.75	5.55	5.18	4.95	4.32	....
20		10.05	6.62	5.52	5.15	6.7	4.3	....
21		9.85	6.55	5.58	5.15	6.25	4.3	....
22		9.7	6.52	5.9	5.85	5.6	4.3	....
23		9.58	6.38	6.2	5.8	5.25	4.2	....
24		9.45	6.32	5.9	6.35	5.08	4.2	....
25		9.35	6.25	5.72	5.72	5.0	4.0	....
26		9.2	6.2	5.72	5.6	5.0	4.0	....
27		9.05	6.18	5.7	6.05	5.0	4.0	....
28	12.0	8.88	6.08	5.65	5.62	5.0	4.0	....
29	11.85	8.75	5.95	5.6	5.45	4.9	4.0	....
30	11.62	8.7	5.88	5.58	5.55	4.85	4.0	....
31	11.58	....	5.8	....	6.42	4.8	....	....

Monthly discharge of Lamoille River at West Milton, Vt., for 1903.

Month.	Discharge in second-feet.			Month.	Discharge in second-feet.		
	Maximum.	Minimum.	Mean.		Maximum.	Minimum.	Mean.
March 28–31....	3,420	2,860	3,090	May............	577	237	354
April...........	3,720	613	1,820	June 1–11.......	231	214	221

GREEN RIVER AT GARFIELD, VT.

LOCATION.—At site of old dam just above highway bridge at Garfield, about 2 miles above junction of Green River with Lamoille River.

DRAINAGE AREA.—20 square miles (approximate).

RECORDS AVAILABLE.—January 3, 1915, to September 30, 1916.

GAGE.—Inclined staff on left bank in pool back of weir; read twice daily by P. M. Trescott.

DISCHARGE MEASUREMENTS.—Standard sharp-crested weir of compound section; length of crest at gage height 0.00 is 9.0 feet; at gage height 0.83 foot, 11.17 feet additional length of crest becomes available. Current-meter measurements made by wading about half a mile downstream from weir.

CHANNEL AND CONTROL.—A pool of considerable size is formed in the old mill pond back of the weir; at ordinary stages the velocity of approach to the weir is very small. Some leakage around the weir in the old tailrace on left bank.

EXTREMES OF DISCHARGE.—1915–16: Maximum stage recorded, 3.6 feet at 9 a. m. April 12, 1915 (discharge, 436 second-feet); minimum stage, 0.35 foot at 9 a. m. February 5, 1915 (discharge, 7.2 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice; there is a clear fall below the weir and weir crest is kept clear of ice.

REGULATION.—An old timber dam about 2 miles upstream affects flow to some extent. The dam leaks by an amount somewhat greater than the low-water flow. During prolonged stage of low water flow, surface of water in pond (103 acres) falls below crest of dam. Subsequent increased flow into pond is retained until water again flows over crest, when the increased flow is apparent at gaging station.

ACCURACY.—Except for some uncertainty in regard to leakage through old tailrace, results are considered very good for flow below 120 second-feet. At the higher stages the weir is flooded and results somewhat uncertain.

COOPERATION.—Gage-height records furnished by C. T. Middlebrook, consulting engineer, Albany, N. Y.

Discharge measurements of Green River at Garfield, Vt., during 1915–16.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Mar. 15	C. H. Pierce...........	0.88	31.0	Nov. 19b	G. F. Adams...........	.62	13.6
15	.....do.................	.80	23.9	19b	.....do.................	.62	12.2
Apr. 22	R. S. Barnes...........	.94	28.8	1916.			
22	.....do.................	.92	28.7	Apr. 4a	R. S. Barnes...........	1.76	109
July 30	G. F. Adams...........	.64	19.3	4a	.....do.................	1.76	111
Nov. 19a	.....do.................	.62	19.0	4b	.....do.................	1.77	97

a Measurement made about one-half mile below weir.
b Measurement made at highway bridge about one-half mile above weir.

Daily discharge, in second-feet, of Green River at Garfield, Vt., for the years ending Sept. 30, 1915–16.

[P. M. Trescott, observer.]

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915.												
1					10	68	16	31	13	11	15	15
2					10	53	16	32	13	10	19	14
3				8	10	43	17	30	13	10	14	13
4				8	9.6	34	16	27	13	10	13	13
5				8.3	7.2	32	20	24	11	10	12	12
6				8.8	9.8	34	19	22	11	10	11	12
7				10	9.8	28	21	20	11	9.8	12	11
8				14	9.6	24	38	32	11	23	12	11
9				11	9.1	26	51	36	10	81	13	14
10				10	9.1	21	116	28	11	60	13	12
11				10	9.6	21	301	24	15	29	13	11
12				10	9.6	22	394	20	17	23	13	11
13				10	9.8	18	178	18	16	18	13	11
14				10	9.1	19	114	17	15	15	14	11
15				10	9.1	20	86	15	15	14	14	10
16				11	13	20	76	14	17	13	13	10
17				11	11	18	70	16	18	43	17	11
18				12	8.8	18	53	18	17	159	16	10
19				14	8.8	20	45	21	16	70	15	9.8
20				16	9.3	19	41	25	16	35	15	9.8
21				13	12	15	32	23	15	25	15	18
22				12	12	13	29	23	13	22	14	12
23				12	15	13	25	21	13	19	19	11
24				19	14	15	25	19	12	18	17	11
25				15	61	17	41	16	11	19	24	11
26				14	134	20	66	21	11	18	23	15
27				12	105	17	55	29	10	15	21	13
28				12	81	19	39	25	9.8	13	19	12
29				9.6	......	19	33	21	9.8	26	17	11
30				9.6	......	21	31	17	9.6	17	16	11
31				10	......	17	......	15	......	15	15	......
1915–16.												
1	11	14	45	23	77	21	152	52	38	18	15	10
2	12	13	29	23	70	28	192	43	28	19	14	13
3	11	15	26	22	62	24	160	39	25	19	14	10
4	11	14	23	20	43	21	103	55	51	19	13	10
5	28	14	21	20	34	19	77	52	70	19	13	10
6	23	14	19	25	33	19	66	42	79	17	13	10
7	37	13	17	23	29	17	56	35	55	15	12	10
8	29	13	17	24	24	17	56	30	35	17	13	9.8
9	23	13	17	25	23	17	53	28	32	17	44	9.1
10	19	13	16	23	22	15	53	26	44	17	47	9.1
11	18	13	15	21	20	15	56	29	59	16	54	8.6
12	16	13	17	18	18	14	88	28	55	16	32	8.6
13	15	14	17	18	18	14	103	26	41	16	26	8.3
14	15	13	15	16	18	14	128	23	33	15	23	7.8
15	15	14	15	15	18	14	95	21	28	15	20	12
16	14	16	14	15	17	13	109	22	27	13	18	11
17	14	16	13	15	16	13	170	50	32	13	17	10
18	13	17	15	15	15	13	229	150	36	13	16	9.8
19	15	16	17	15	15	12	165	129	36	13	15	9.8
20	15	27	19	15	15	12	105	65	36	12	14	9.3
21	15	36	21	15	14	11	111	40	32	12	14	9.1
22	15	37	18	18	13	12	138	34	25	12	16	9.8
23	15	28	17	22	13	12	192	34	22	12	15	9.8
24	14	23	18	19	13	12	184	32	20	11	13	9.6
25	13	20	20	21	15	11	155	28	19	11	13	9.6
26	13	19	28	32	25	11	119	25	19	11	11	9.3
27	13	18	31	44	20	17	94	22	23	15	12	9.3
28	13	21	35	97	16	22	81	20	25	15	12	9.1
29	13	29	33	92	18	29	65	19	24	14	12	9.6
30	15	51	31	96	......	56	51	35	20	13	11	16
31	15	......	21	77	......	129	......	51	......	23	11	......

NOTE.—Discharge computed from weir formula: $Q = 3.33\,LH^{3/2}$ with logarithmic extension above gage height 1.90 feet, to which has been added 1.0 second-foot on account of leakage.

Monthly discharge of Green River at Garfield, Vt., for the years ending Sept. 30, 1915–16.

Month.	Discharge in second-feet.			Accu-racy.
	Maximum.	Minimum.	Mean.	
1915.				
January 3–31	19	8.0	11.4	A.
February	134	7.2	22.4	A.
March	68	13	24.0	A.
April	394	16	68.8	A.
May	36	14	22.6	A.
June	18	9.6	13.1	A.
July	159	9.8	27.8	A.
August	24	11	15.4	A.
September	15	9.8	11.9	A.
1915–16.				
October	37	11	16.4	A.
November	51	13	19.2	A.
December	45	13	21.3	A.
January	97	15	29.8	A.
February	77	13	25.3	A.
March	129	11	21.1	A.
April	229	51	114.	A.
May	150	19	41.5	A.
June	79	19	35.6	A.
July	23	11	15.1	A.
August	54	11	18.5	A.
September	16	7.8	9.91	A.
The year	229	7.8	30.5	

MISSISQUOI RIVER NEAR RICHFORD, VT.

LOCATIONS.—First established near highway bridge in Richford, May 22, 1909; relocated at a highway bridge 3 miles downstream from Richford, 3 miles below the mouth of North Branch and 2 miles above the mouth of Trout River, June 26, 1911.

DRAINAGE AREA.—342 square miles at first site in Richford; 445 square miles at new site 3 miles below Richford.

RECORDS AVAILABLE.—May 22, 1909, to December 3, 1910, and June 26, 1911, to September 30, 1916.

GAGES.—May 22, 1909, to December 3, 1910, a chain gage just below the mill of the Sweat-Comings Co. and two staff gages attached to rocks in the river just below the highway bridge in Richford; June 26, 1911, to July 31, 1915, a chain gage on downstream side of highway bridge just below the railroad bridge 3 miles downstream from Richford; August 1, 1915, to September 30, 1916, water-stage recorder in gage house on left bank about one-fourth mile above the highway bridge. (See Pl. XII, *A*.)

DISCHARGE MEASUREMENTS.—Made from highway bridge in Richford, at highway bridge 3 miles below Richford, and by wading.

CHANNEL AND CONTROL.—Channel at Richford rough and covered with ledge rock; control permanent. At highway bridge 3 miles below Richford, channel deep and covered with gravel, boulders, and ledge rock. Control a poorly defined riffle about half a mile below the bridge; at high stages control probably influenced by dam at Enosburg Falls. Control for low and medium stages at water-stage recorder station is sharply defined rock outcrop about 100 feet below gage, and for higher stages control is probably at the island just above the railroad bridge.

EXTREMES OF DISCHARGE.—1911–1916 (new site): Maximum stage recorded, 16.7 feet at 8.30 a. m. March 26, 1913 (approximate discharge determined from extension of rating curve, 10,200 second-feet); minimum stage, 4.15 feet by chain gage, July 14, 1911 (discharge, 8 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; discharge ascertained by means of gage heights, discharge measurements, observer's notes, and weather records.

REGULATION.—At low stages considerable daily fluctuation is caused by operation of power plants at Richford. The effect of this regulation is not so marked at the new site 3 miles below Richford as at Richford.

A. MUNICIPAL DAM.

B. ELECTRIC-LIGHT PLANT.

LAMOILLE RIVER AT MORRISVILLE, VT.

A. GAGE HOUSE ON MISSISQUOI RIVER NEAR RICHFORD, VT., FEBRUARY 12, 1916.

B. WHITE RIVER AT WEST HARTFORD, VT., FEBRUARY 15, 1916, LOOKING UPSTREAM.

Accuracy.—Results from water-stage recorder are good. Comparison of results obtained by reading chain gage twice a day, with results obtained by use of water-stage recorder indicates that the monthly means computed from readings twice daily are fairly good, though the determinations for individual days obtained from these readings may be seriously in error. The discharge corresponding to the readings twice daily and the monthly discharge computed therefrom are given in the following tables. Discharge determined from the chain gage readings twice daily for August and September, 1915, are given for purpose of comparison with the results obtained by the water-stage recorder for the same period.

Discharge measurements of Missisquoi River near Richford, Vt., during 1909–1916.

Date.	Made by—	Gage height.		Discharge.
		By hook gage at recording gage station.	By chain gage.	
1909.		*Feet.*	*Feet.*	*Sec.-ft.*
May 22	D. M. Wood a.		7.09	1,100
July 1	.....do.		5.36	198
1	.....do.		4.63	b 35
25	.....do.		4.91	77
26	.....do.		5.22	147
26	.....do.		5.21	100
Oct. 28	.....do.		5.93	254
1910.				
Jan. 3	D. M. Wood.		c 5.75	244
Mar. 24	T. W. Norcross a.		8.24	2,300
July 12	G. M. Brett.		5.25	137
Aug. 19	.....do.:		5.27	165
1911.				
June 26	G. H. Canfield.		5.10	188
Aug. 4	.....do.		4.74	82
1912.				
Feb. 26	G. H. Canfield.		c 6.42	190
Aug. 27	J. G. Mathers.		6.65	835
27	.....do.		6.58	790
Oct. 18	C. S. DeGolyer.		5.94	407
18	.....do.		5.81	360
1913.				
Mar. 3	C. S. DeGolyer.		c 7.34	281
Apr. 2	R. S. Barnes.		10.24	3,860
22	.....do.		7.10	1,170
Sept. 9	G. H. Canfield.		4.63	50
1914.				
May 27	C. S. DeGolyer.		5.46	244
Nov. 18	.....do.		d 6.63	768
18	.....do.		6.58	760
1915.				
Apr. 24	R. S. Barnes.		6.21	638
24	.....do.		6.17	605
July 11	C. H. Pierce.		5.88	487
Aug. 3	G. F. Adams.		4.94	114
4	.....do.	2.65	5.00	144
Sept. 20	.....do.	2.25	4.62	46.2
20	.....do.	2.44	4.76	81
Nov. 17	.....do.	4.36	6.78	957
17	.....do.	4.28	6.65	915
Dec. 19	R. S. Barnes.	c 5.20	c 7.90	863
1916.				
Jan. 13	R. S. Barnes.	c 4.79	c 7.25	544
Feb. 12	.....do.	c 5.69	c 9.05	1,210
Mar. 23	.....do.	c 4.04	c 7.00	182
Apr. 5	.....do.	5.81	8.58	2,370
Oct. 3	Hardin Thweatt.	3.80	6.28	644

a Measurement made at highway bridge 3 miles below Richford. Correction made for addit'onal drainage area.
b Estimated.
c Stage-discharge relation affected by ice.
d Slush ice in river may have affected stage-discharge relation.

Note.—Measurements made during 1909 and 1910 referred to gage at Richford village. Measurements during 1911 and subsequent years referred to gage 3 miles below Richford.

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915.

(Original location at Richford village.)

Day.	May A. M.	May P. M.	June A. M.	June P. M.	July A. M.	July P. M.	August A. M.	August P. M.	September A. M.	September P. M.
1909.										
1			565	465	160	175	....	120	66	108
2			515	465	120	85	....	120	....	120
3			465	415	120	160	....	120	160	160
4			415	370	....	392	....	75	145	160
5			370	370	415	305	....	66	....	145
6			....	465	325	285	....	66	325	228
7			465	370	285	245	....	66	285	265
8			370	285	245	192	....	40	192	245
9			370	285	210	192	....	40	95	175
10			285	210	175	132	....	40	160	108
11			370	210	....	....	....	30	50	16
12			285	210	160	285	....	30	....	192
13			....	....	285	160	....	40	175	175
14			245	210	108	58	....	30	115	192
15			245	160	145	132	....	20	132	175
16			245	245	75	108	....	40	95	192
17			285	175	108	66	....	50	75	85
18			370	415	....	....	....	50	160	108
19			730	675	175	175	....	40	....	175
20			....	620	145	210	16	175	145	108
21			565	515	210	175	228	228	50	26
22			465	370	175	192	....	193	16	108
23			415	285	145	120	132	108	26	66
24	790	790	325	210	108	132	95	132	26	85
25	730	675	245	228	....	285	66	108	175	145
26	675	620	245	210	175	145	66	85	....	160
27	620	565	....	....	108	108	175	160	160	192
28	565	620	....	....	120	145	160	132	620	1,240
29	850	910	160	210	....	55		210	1,520	1,520
30	....	790	6	210	95	160	175	85	1,040	790
31	730	675			175	145		80	....	

Day.	October A. M.	October P. M.	November A. M.	November P. M.	December A. M.	December P. M.	March A. M.	March P. M.
1909–10.								
1	730	675	325	285	1,040	850	3,300	....
2	910	1,310	415	415	730	790	3,220	....
3	....	1,590	515	465	730	730	3,140	....
4	1,240	1,170	515	465	675	565	2,680	2,760
5	1,040	910	515	465	....	565	3,220	1,960
6	790	675	465	415	565	465	....	....
7	515	415	....	415	515	465	2,360	2,440
8	370	370	370	415	565	565	2,840	2,600
9	370	285	675	675	415	415	2,520	2,280
10	....	....	620	620	....	395	1,740	1,520
11	325	325	565	565	....	420	1,310	1,310
12	325	325	465	415	....	440	1,170	1,100
13	370	285	465	515	....	392	1,100	1,040
14	285	192	....	450	....	400	1,040	1,040
15	325	245	465	370	....	400	325	790
16	285	245	415	325	....	410	790	730
17	....	285	370	415	....	400	850	675
18	415	245	465	370	....	375	790	560
19	465	285	415	370	....	350	675	620
20	285	285	415	370	....	345	790	675
21	370	285	565	....	....	245	975	850
22	325	325	730	790	....	230	1,660	1,740
23	620	675	1,040	1,450	....	230	1,820	1,820
24	....	565	1,590	1,380	....	295		
25	515	465	975	910	....	280	2,760	3,220
26	415	415	910	975	....	210	3,460	3,700
27	415	370	850	850	....	280	3,060	....
28	....	370	....	730	....	230	2,120	1,890
29	370	325	1,240	1,380		230	2,040	2,280
30	415	285	1,240	1,240		275	2,600	2,760
31	285	....	....	....		270	2,760	2,760

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1910.												
1	2,600	2,600	1,520	1,450	675	790	228	175	85	145	85	26
2	2,520	2,200	1,170	1,040	850	790	120	160	85	145	....	21
3	1,590	1,380	1,520	1,820	790	790	....	....	108	95	....	16
4	1,450	1,450	2,600	2,760	790	675	160	85	132	145	....	...
5	1,590	1,590	2,680	2,440	....	....	245	145	192	175	150	145
6	1,590	1,590	1,960	1,590	730	730	108	95	565	565	132	210
7	1,960	1,820	1,380	1,240	1,380	1,590	120	31	....	....	730	730
8	1,520	1,450	1,170	....	1,740	1,740	120	21	370	285	620	465
9	1,450	1,450	1,040	1,170	1,740	1,380	120	85	228	175	415	370
10	1,590	1,590	1,450	1,380	1,310	1,240	....	....	175	175	370	285
11	1,450	1,310	1,450	1,240	1,100	1,040	120	108	210	210	....	....
12	1,310	1,240	1,240	1,170	....	1,040	192	132	285	285	....	....
13	1,170	1,040	1,170	1,040	975	910	210	175	245	175	145	120
14	975	975	910	850	975	850	245	120	....	....	108	66
15	910	975	....	790	730	675	132	85	....	....	50	11
16	1,040	975	790	620	515	....	132	66	....	....	11	16
17	975	1,170	620	565	415	325	....	....	....	....	16	11
18	1,040	1,040	515	515	465	370	120	95	....	....	....	...
19	1,170	1,100	620	730	....	465	95	....	....	....	50	31
20	1,100	120	850	790	465	415	95	75	....	....	6	21
21	975	910	790	620	370	370	120	108	....	....	31	26
22	1,310	1,040	675	....	245	192	21	120	....	....	11	11
23	1,450	1,040	620	620	370	325	108	95	....	....	95	43
24	....	....	565	565	415	325	....	....	....	....	6	31
25	850	790	675	730	370	325	245	132	....	....	....	....
26	730	675	1,100	1,170	....	....	75	120	....	....	50	37
27	790	910	1,240	1,100	245	210	108	95	....	....	50	43
28	1,240	1,100	1,040	910	285	285	145	175	....	95	95	50
29	1,380	1,310	790	....	285	228	210	175	120	95	66	58
30	1,450	1,380	675	620	370	285	192	145	75	75	58	50
31	....	....	675	565	....	....	75	....	6	43	....	....

Day.	October.		November.		December.		Day.	October.		November.		December.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.		A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1910.							**1910.**						
1	50	66	565	565	465	790	16	....	....	....	....	....	....
2	675	....	515	465	370	325	17	285	285	....	....	....	....
3	1,040	730	620	620	285	285	18	285	245	....	....	....	....
4	565	565	1,040	1,040	....	....	19	228	245	....	....	....	....
5	565	515	1,170	1,170	....	....	20	285	370	....	....	....	....
6	515	565	1,170	....	....	....	21	228	6	370	370	....	....
7	850	790	1,170	1,040	....	....	22	228	228	325	325	....	....
8	730	790	910	850	....	....	23	....	....	285	465	....	....
9	....	....	850	790	....	....	24	245	245	465	515	....	....
10	465	415	675	675	....	....	25	370	465	465	465	....	....
11	515	415	620	620	....	....	26	790	285	515	465	....	....
12	370	325	675	565	....	....	27	910	910	....	565	....	....
13	370	370	....	....	....	....	28	910	975	415	465	....	....
14	370	325	....	....	....	....	29	975	975	415	465	....	....
15	325	325	....	....	....	....	30	....	....	465	465	....	....
							31	730	620	....	....	....	....

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	July. A. M.	July. P. M.	August. A. M.	August. P. M.	September. A. M.	September. P. M.	Day.	July. A. M.	July. P. M.	August. A. M.	August. P. M.	September. A. M.	September. P. M.
1911.							1911.						
1.....	188	188	86	......	154	154	16.....	......	10	12·	206	302	......
2.....	139	124	74	......	124	......	17.....	97	35	22·	224	620	680
3.....	124	110	......	86	124	124	18.....	110	224	18?	188	344	302
4.....	......	......	74	74	124	97	19.....	188	......	206		262	262
5.....	86	97	15	......	97	97	20.....	......	154	3·2	......	188	188
6.....	86	110	22	22	154	800	21.....	......	124	22·	262	154	64
7.....	154	188	97	53	960	960	22.....	154	......	154	124	124	154
8.....	124	......	35	53	534	......	23.....	......	86	12·	124	188	......
9.....	110	110	86	74	302	......	24.....	97	97	97	110	154	188
10.....	74	74	74	44	243	......	25.....	97	97	97	97	139	224
11.....	74	86	35	44	188	154	26.....	86	97	97	......	302	......
12.....	74	74	44	......	154	302	27.....	86	......	110	124	482	434
13.....	154	53	86	......	434	458	28.....	97	97	12·	......	344	388
14.....	8	53	28	74	388	366	29.....	86	......	110	224	323	344
15.....	......	74	53	74	262	366	30.....	97	97	344	302	344	......
							31.....	97	97	243	......	......	......

Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.	Day.	October. A. M.	October. P. M.	November. A. M.	November. P. M.	December. A. M.	December. P. M.
1911.							1911.						
1.....	482	482	534	590	2,110	1,800	16.....	206	206	890	......	1,590	......
2.....	388	434	710	......	1,520	......	17.....	188	188	650	650	......	1,660
3.....	323	323	534	482	......	......	18.....	188	262	830	......	1,800	1,950
4.....	388	434	388	......	1,030	1,030	19.....	650	1,310	1,450	......	1,950	......
5.....	534	960	344	388	1,100	......	20.....	1,380	1,240	1,660	1,380	1,800	1,800
6.....	1,380	1,030	344	434	1,100	1,100	21.....	890	......	1,170	1,100	1,800	......
7.....	830	......			1,100	......	22.....	590	482	960	890	1,660	1,660
8.....	482	434	590	710	1,100	......	23.....	830	1,030	800	770	4,190	......
9.....	388	344	890	830	1,380	......	24.....	1,100	1,030	770	770	3,870	......
10.....	344	......	710	710	......	1,950	25.....	770	710	740	......	......	......
11.....	302	262	650	......	2,030	......	26.....	590	590	710	......	2,910	2,670
12.....	262	302	590	......	2,350	2,750	27.....	482	482	650	650	2,350	......
13.....	224	224	1,450	1,660	4,350	......	28.....	434	......	650	960	......	1,870
14.....	206	......	1,730	1,730	2,910	2,750	29.....	388	344	4,590	4,510	1,730	......
15.....	124	188	1,380	1,240	1,800	1,590	30.....	388	......	2,830	2,590	......	......
							31.....	344	434	......	......	......	......

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	April A.M.	April P.M.	May A.M.	May P.M.	June A.M.	June P.M.	July A.M.	July P.M.	August A.M.	August P.M.	September A.M.	September P.M.
1912.												
1	......	......	1,090	......	......	......	108	84	45	54	......	......
2				880			18	9	45	45	234	264
3	1,090		815	815	4,580	4,010	30	45	63		193	
4			718		3,540		84		134		132	162
5	1,540		590		2,730		63	74	148	162		
6	2,460		560	685	1,700	1,160	63		148	121		560
7	9,500	8,900	750		2,030	1,860	84	63	96	84	78	
8	11,700	9,700	685		1,620		63	63	63			
9		6,500	620	620	1,160		45	45	54	54	815	685
10	4,960		750	815	950	880	45	45	63		500	500
11		3,820	815		1,160	1,090	54	84			1,700	2,200
12	3,450		560	560	950		108		121	264	1,900	
13	2,730			950	950		84		500	445	1,130	950
14		4,390	1,310	1,380	750	750			347	347	750	
15		5,800		1,020	620		63	54	284	264		
16	6,500	7,600	880		500		54	45	210	193	1,310	
17	8,200	8,400	1,240	1,540	500	445	45		193		890	750
18	7,300		3,180		420	370	38	24			620	950
19	5,650	5,150	1,620	1,460	326		30	30	108	84	2,280	2,460
20	4,580				304		45		84	84	4,290	3,180
21			2,120	1,860	284	284	38		84	63	2,910	
22	3,920	3,630		1,700	264		63	84	74	63		
23	7,500	8,100	1,540		210	162	63		63	54	1,540	1,380
24	7,300		1,380	1,310	162		45	45	45		1,240	1,090
25	4,680		2,550		193		38			1,780	850	
26	3,000	2,550			227	246	45	38	1,540	1,460	750	
27	2,120		1,160	1,020	227	210	45				530	472
28			815		210	193			815	680	445	
29	1,620		1,020	4,770	193		45	54	590			815
30		1,310	4,300	4,300			54	45		445	1,700	1,780
31			4,770	5,550			45		394			

Day.	October A.M.	October P.M.	November A.M.	November P.M.	December A.M.	December P.M.	January A.M.	January P.M.	February A.M.	February P.M.	March A.M.	March P.M.
1912–13.												
1	1,540	1,460	750									
2	1,380	1,310	950		1,360							
3	1,020				3,180							
4	750	815	620	620	2,820							
5	685		560		1,700							
6		500	500	445	1,380							
7	445	445	500	1,940	1,860							
8	500	472	5,550									
9	420	394	4,580									
10	420	420										
11	445	445	2,030									
12	500		1,540									
13			1,240									
14	815	685	2,030									
15	560	560	3,090									
16	*500	445	2,550									
17	445	445										
18	394		1,380									
19	347		1,160									
20			1,020									
21	472	445	1,240								7,940	
22	394	394	1,380								9,810	
23	347		1,160									
24	2,280	3,270									5,350	
25	4,200	4,390	880									9,530
26	3,360		985								11,700	
27			815								7,820	9,670
28	2,030	1,780	750								8,730	
29	1,540	1,240	590								6,580	
30	1,020	950	560									
31	815											

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913.												
1			395									
2			372		1,020							
3	2,460		350		950							
4	1,860				848							
5	3,360		292		685							
6			258		500							
7	2,730		240		445							
8	2,120		225									
9	1,780		225		880						50	47
10	1,380		225		590						24	35
11	1,200				420						54	61
12	1,380		182		372						47	41
13			196		275						47	
14	1,270		182		258						77	54
15	1,380		182								35	61
16	1,540		182		210						81	47
17	1,420		196		685						41	
18	1,310				685						95	61
19	1,200		292		372						61	61
20			590		258						77	
21	1,380		445		225						86	47
22	1,160		310								69	240
23	1,060		500		157						750	685
24	950		718		135						420	330
25	880				114						196	182
26	880				114						196	135
27			500		182						95	
28	620		530		310						114	157
29	530		2,730								114	95
30	445		3,500								77	54
31			2,030									

Day.	October.		November.		December.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1913.						
1	86	61	395		350	445
2	54	86	330	310	420	350
3	310	310	275	275	560	1,060
4	372		258	372	985	915
5	240	182	472	445	815	782
6	157	182	372	310	620	
7	114	114	292	240	445	590
8	114	69			1,160	1,240
9	104	135	240	182	848	985
10	114	135	146	157	1,090	1,350
11	95	104	135	210	1,160	1,460
12	114	157	275	225	1,780	2,160
13	114	86	240	258	2,280	
14	146	124	225	258		
15	135	157	240			
16	114	135	196	210		
17	104	86	170	135		
18	104		210	196		
19	114	104	210	275		
20	124	114	1,500	2,160		
21	445	590	1,940	1,500		
22	560	445	950			
23	350	240	718	1,270		
24	210	225	1,160	1,060		
25	210		880	815		
26	590	950	685	685		
27	1,120	1,160	530	560		
28	1,060	848	395	275		
29	782	685	350			
30	590	560	350	330		
31	500	500				

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	April. A.M.	April. P.M.	May. A.M.	May. P.M.	June. A.M.	June. P.M.	July. A.M.	July. P.M.	August. A.M.	August. P.M.	September. A.M.	September. P.M.
1914.												
1	......	......	2,730	2,370	104	95	135	146	......	......	305	310
2	......	......	1,940	......	77	95	170	182	95	77	500	445
3	2,370	2,030	1,780	1,940	135	114	210	257	77	77	445	500
4	1,700	......	1,940	1,940	114	114	240	......	61	61	620	560
5	1,460	1,460	2,030	2,120	114	95	182	170	61	77	560	500
6	1,240	1,240	2,120	2,120	104	......	135	135	47	61	500	500
7	1,090	950	1,940	1,780	86	95	114	135	61	61	560	620
8	815	1,020	1,540	1,380	104	95	350	420	95	......	620	620
9	2,910	2,820	1,160	......	95	95	395	330	61	61	652	590
10	2,640	2,640	1,090	1,020	95	86	240	196	77	77	500	445
11	2,730	......	880	815	86	86	146	......	77	95	395	350
12	3,270	3,000	750	685	77	77	114	114	95	95	275	......
13	2,120	2,120	650	560	77	......	95	86	77	69	2?0	210
14	1,780	1,620	472	472	69	61	86	77	61	61	157	157
15	1,380	1,700	445	420	77	69	77	69	61	......	182	157
16	1,780	1,940	372	......	61	61	69	61	47	41	157	135
17	2,200	2,640	350	310	77	77	61	61	35	47	135	......
18	3,000	......	292	275	95	104	95	......	54	54	135	114
19	4,680	5,850	257	257	86	95	135	135	69	77	95	......
20	8,550	9,750	257	240	86	......	114	95	77	86	61	61
21	9,050	7,750	225	240	86	77	95	77	77	95	47	47
22	6,650	5,850	225	225	61	61	69	69	135	......	47	41
23	4,000	3,450	225	......	77	61	47	47	95	95	41	35
24	2,640	2,910	225	225	104	95	61	69	86	77	35	61
25	2,730	......	210	196	86	77	61	......	61	77	95	104
26	2,460	2,550	170	157	77	77	47	54	54	54	95	......
27	2,820	3,000	135	135	77	......	54	61	35	47	135	182
28	2,910	3,360	114	114	69	61	54	69	35	35	2?0	275
29	3,540	4,000	135	114	86	86	61	61	35	......	2?7	240
30	4,280	3,540	124	......	104	114	47	54	310	560	2?0	196
31	......	......	......	......	......	......	47	61	950	685	......	......

Day.	October. A.M.	October. P.M.	November. A.M.	November. P.M.	December. A.M.	December. P.M.	January. A.M.	January. P.M.	February. A.M.	February. P.M.	March. A.M.	March. P.M.
1914-15.												
1	170	157	330	298	782	985					2,430	2,120
2	146	146	258	298	1,240	1,620					1,880	1,800
3	114	......	330	372	1,990	1,780					1,640	1,640
4	86	69	330	330	1,540	1,380					1,430	1,440
5	69	86	298	275	950	......					1,120	1,020
6	104	124	330	395	685	620					930	......
7	114	114	530	......	445	395					810	780
8	104	104	560	530	445	445					690	690
9	86	86	530	472	500	445					635	635
10	95	......	472	420	560	685					698	580
11	86	77	420	372	880	1,020					570	525
12	69	69	330	298	1,020	......					500	475
13	69	77	258	258	......	......					475	......
14	86	69	225	......	......						3?0	380
15	77	170	258	298							3?0	300
16	372	530	......	......							3?0	300
17	848	......									2?0	260
18	985	1,060	......	815							3?0	300
19	1,200	1,120	620	620							3?0	360
20	1,060	985	500	445							380	......
21	848	590	395	......							475	475
22	330	258	350	350							5?0	635
23	275	275	310	330							635	690
24	225	......	350	350							870	1,050
25	196	196	420	560							1,490	1,800
26	182	196	......	......							2,290	2,200
27	225	210	2,960	2,680							2,080	......
28	210	196	2,370	......							1,7??	1,480
29	196	182	1,090	1,020							1,050	870
30	210	258	880	685							635	525
31	372	......	......								425	380

Twice-daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for 1909–1915—Continued.

Day.	April.		May.		June.		July.		August.		September.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
1915.												
1	340	525	930	......	320	320	66	66	192	177	87	110
2	475	690	870	870	300	280	66	87	148	148	87	......
3	652	......	810	780	260	260	110	102	122	135	76	37
4	525	580	750	690	225	225	95	......	122	......	87	......
5	580	690	690	720	192	......	......	66	98	......	87	12
6	690	840	690	652	162	162	66	87	98	87	76	87
7	930	1,120	635	635	148	135	98	87	98	......	12	46
8	1,260	1,480	652	......	135	162	110	162	46	110	12	76
9	1,640	1,880	635	608	192	192	690	990	87	148	12	87
10	2,370	......	635	652	192	192	1,260	......	320	340	37	110
11	2,820	3,450	750	720	192	208	......	402	380	......	110	......
12	4,450	5,050	608	580	242	......	300	260	225	......	76	66
13	5,400	5,500	580	525	192	177	242	208	148	148	76	76
14	5,150	5,150	500	475	162	192	208	192	225	......	20	46
15	4,750	4,550	425	......	260	340	162	155	280	300	12	66
16	4,170	3,900	380	360	425	450	148	122	225	177	......	......
17	3,360	......	340	380	425	380	110	......	208	192	110	98
18	1,800	1,480	475	475	360	340	475	900	260	280	12	......
19	1,120	1,050	450	475	320	......	720	572	280	208	12	......
20	930	990	635	608	260	260	425	380	148	......	66	......
21	900	870	580	608	225	225	340	280	122	......	66	192
22	750	780	580	......	208	192	280	242	98	110	225	225
23	690	780	635	......	192	192	225	......	87	122	260	208
24	......	......	525	475	162	177	192	......	300	340	162	177
25	1,190	1,560	425	402	162	148	162	......	260	208	110	......
26	2,120	2,280	340	425	148	......	110	148	208	......	87	162
27	1,960	1,800	635	635	135	122	148	148	225	208	340	525
28	1,480	1,400	580	552	98	98	135	122	177	......	690	525
29	1,190	1,330	500	......	87	98	162	380	177	148	340	225
30	1,120	1,050	425	425	87	76	662	525	98	110	208	177
31	......	......	380	360	......	......	340	......	12	135	......	......

Daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1915–16.

[Automatic gage.]

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1915.			**1915.**			**1915.**		
1	226	98	11	379	101	21	136	79
2	176	70	12	246	88	22	101	262
3	126	70	13	148	81	23	112	266
4	132	70	14	254	51	24	398	193
5	115	54	15	331	58	25	292	132
6	101	72	16	226	44	26	279	120
7	84	49	17	219	66	27	246	403
8	64	51	18	336	51	28	223	700
9	118	56	19	296	36	29	142	429
10	350	62	20	179	62	30	139	274
						31	86	....

Daily discharge, in second-feet, of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1915–16—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1915–16.											
1	223	900	1,110	605	3,330	900	7,460	1,270	1,350	605	179
2	186	726	935	605	2,730	765	6,230	1,270	900	476	118
3	152	700	791	545	2,330	515	5,510	1,190	900	900	98
4	155	758	706	515	1,960	408	4,070	1,430	1,350	2,180	112
5	545	674	599	545	1,780	408	2,380	1,430	2,100	1,740	98
6	1,190	617	545	1,230	1,510	408	1,960	1,110	1,820	1,080	104
7	739	551	488	1,470	1,270	408	2,230	970	1,600	772	96
8	476	498	434	1,150	1,110	408	2,000	900	1,270	732	98
9	341	510	379	830	970	384	2,180	830	1,110	900	1,110
10	250	599	341	668	935	408	1,870	732	1,510	648	1,510
11	230	551	292	575	900	408	1,960	935	1,780	408	713
12	226	504	250	488	830	359	2,430	1,040	1,350	515	587
13	186	587	230	488	732	313	2,430	810	1,190	408	680
14	162	515	212	515	668	292	2,630	700	1,110	635	557
15	179	798	193	408	635	292	2,330	575	830	313	398
16	168	1,230	193	408	515	292	2,230	527	706	254	309
17	145	970	212	384	515	230	2,830	1,270	830	270	250
18	158	765	488	336	460	212	4,070	3,850	1,230	354	200
19	200	687	935	359	434	212	4,620	4,070	2,630	313	186
20	450	1,390	765	359	384	193	3,630	2,530	1,780	292	109
21	569	1,920	545	359	292	193	2,630	1,560	1,350	292	132
22	720	1,560	408	1,040	270	193	2,480	1,230	1,000	322	136
23	493	1,150	336	1,870	250	193	3,430	1,040	804	413	126
24	369	900	336	1,430	250	193	4,070	900	713	557	112
25	296	746	336	1,040	313	193	3,330	778	642	359	106
26	313	642	1,920	1,040	605	212	2,630	668	700	274	112
27	408	648	2,180	1,870	1,230	545	2,100	581	460	246	98
28	460	900	1,820	5,060	1,350	1,870	1.740	527	563	434	86
29	545	1,080	1,270	4,180	1,110	4,180	1,510	504	605	250	126
30	830	1,390	900	2,430	....	5,870	1,350	970	772	226	126
31	1,190	....	668	2,230	....	6,950	....	1,960	....	212	101

NOTE.—Discharge determined from fairly well-defined rating curves. Discharge given for July 29, Aug. 1–19, 31, Sept. 2, Nov. 7, 14, and Dec. 10–31, 1909, represents mean discharge for 24 hours determined from special computations based on knowledge of conditions of flow. Stage-discharge relation affected by ice at various times during the following periods: Jan. 1 to Feb. 28, 1910; Dec. 30, 1911, to Apr. 2, 1912; Dec. 8, 1912, to Mar. 20, 1913; Dec. 14, 1913, to Apr. 2, 1914; Dec. 13, 1914, to Feb. 28, 1915; Nov. 12–19, Dec. 1, 1915; Dec. 6, 1915, to Apr. 1, 1916. Determination of daily discharge during the winter of 1915–16 by means of gage heights, discharge measurements, observer's notes, and weather records.

Monthly discharge of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1909–1916.

[Drainage area, *a* 445 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Ac-cur-acy.	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Ac-cur-acy.
	Mean.	Per square mile.				Mean.	Per square mile.		
1909.					**1911–12.**				
May 22–31........	716	2.09	0.62	C.	June..............	1,310	2.94	3.28	B.
June..............	336	.982	1.10	C.	July..............	55.0	.124	.14	D.
July..............	170	.497	.57	D.	August...........	316	.710	.82	C.
August...........	86.4	.253	.29	D.	September........	1,090	2.45	2.73	C.
September.......	236	.690	.77	C.					
					The year...	1,140	2.56	34.97	
1909–10.									
October..........	493	1.44	1.66	C.	**1912–13.**				
November.......	640	1.87	2.09	C.	October..........	1,040	2.34	2.70	B.
December.......	423	1.24	1.43	C.	November.......	1,500	3.37	3.76	B.
January.........	*b* 500	1.46	1.68	D.	December.......	*b* 900	2.02	2.33	C.
February........	*b* 345	1.01	1.05	D.	January.........	*b*1,250	2.81	3.24	D.
March...........	1,950	5.70	6.57	C.	February........	*b* 560	1.26	1.31	D.
April.............	1,290	3.77	4.21	C.	March...........	*b*2,910	6.54	7.54	D.
May..............	1,080	3.16	3.64	C.	April.............	1,600	3.60	4.02	B.
June..............	685	2.00	2.23	C.	May..............	576	1.29	1.49	C.
July..............	126	.368	.42	D.	June..............	457	1.03	1.15	C.
August...........	192	.561	.65	D.	July..............	225	.506	.58	C.
September.......	125	.365	.41	D.	August...........	110	.247	.28	D.
					September.......	119	.267	.30	D.
The year ..	656	1.92	26.04						
					The year...	941	2.11	28.70	
1910–11.									
October..........	497	1.45	1.67	C.	**1913–14.**				
November.......	650	1.90	2.12	C.	October..........	300	.674	.78	C.
July..............	·106	.238	.27	D.	November.......	485	1.09	1.22	C.
August...........	121	.272	.31	D.	December.......	*b* 550	1.24	1.43	C.
September.......	301	.676	.75	C.	January.........	*b* 225	.506	.58	D.
					February........	*b* 180	.404	.42	D.
1911–12.					March...........	*b*1,000	2.25	2.59	D.
October..........	524	1.18	1.36	C.	April.............	3,000	6.74	7.52	C.
November.......	1,030	2.31	2.58	B.	May..............	787	1.77	2.04	C.
December.......	1,980	4.45	5.13	B.	June..............	86.6	.195	.22	D.
January.........	*b* 650	1.46	1.68	D.	July..............	123	.276	.32	D.
February........	*b* 250	.562	.61	D.	August...........	107	.240	.28	D.
March...........	*b* 750	1.69	1.95	D.	September.......	273	.613	.68	D.
April.............	4,320	9.71	10.83	C.					
May..............	1,490	3.35	3.86	B.	The year...	592	1.33	18.08	

a 342 square miles from May 22, 1909, to June 26, 1911.
b Estimated wholly or in part by comparison with records of streams in adjacent drainage basins.

Monthly discharge of Missisquoi River near Richford, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area)	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1914–15.						
October			293	0.658	0 76	C.
November			606	1.36	1.52	C.
December			a 450	1.01	1.16	D.
January			a 550	1.24	1.43	D.
February			a 700	1.57	1.64	D.
March			897	2.02	2.33	C.
April			1,890	4.25	4 74	C.
May			576	1.29	1.49	C.
June			213	.479	.53	C.
July			285	.640	.74	C.
August	398	64	202	.454	.52	A.
September	700	36	138	.310	.35	A.
The year			564	1.27	17.21	
1915–16.						
October	1,190	145	405	.910	1.05	A.
November	1,920	498	849	1.91	2.13	A.
December	2,180	193	672	1.51	1.74	C.
January	5,060	336	1,130	2.54	2.93	D.
February	3,330	250	1,020	2.29	2.47	D.
March	6,950	193	916	2.06	2.38	D.
April	7,460	1,350	3,010	6.76	7.54	C.
May	4,070	504	1,230	2.76	3 18	B.
June	2,630	460	1,170	2.63	2.93	B.
July	2,180	212	561	1.26	1.45	C.
August	1,510	86	283	.636	.73	D.
September			a 220	.494	.55	D.
The year	7,460		951	2.14	29 08	

a Estimated wholly or in part by comparison with records of streams in adjacent drainage basins.

MISSISQUOI RIVER AT SWANTON. VT.

LOCATION.—At the steel highway bridge on the road from Swanton to St. Albans, about three-eighths mile from East Swanton railway station and 9 miles above mouth of river.

DRAINAGE AREA.—850 square miles.

RECORDS AVAILABLE.—March 30 to September 30, 1903.

GAGE.—Chain on highway bridge; read twice daily by O. A. Skeels.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel of ledge rock partly covered with sand and alluvium. Control at the dam at Swanton.

EXTREMES OF STAGE.—Maximum stage recorded March 30 to September 30, 1903, 39.0 feet at 7.15 a. m. April 4; minimum stage, 28.0 feet at 5 p. m. September 26.

REGULATION.—The operation of power plants above the station affected the distribution of flow at low stages.

ACCURACY.—Stage-discharge relation affected by operation of gates at Swanton dam. Data insufficient for determination of daily discharge.

Discharge measurements of Missisquoi River at Swanton, Vt., during 1903.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 30	H. K. Barrows	35.00	3,240	May 7	H. K. Barrows	33.02	410
Apr. 11	A. D. Butterfield	34.90	3,400	14	.....do	32.05	400
22	.....do	33.85	1,220	28	.....do	29.00	270
May 1	H. K. Barrows	33.75	695				

Daily gage height, in feet, of Missisquoi River at Swanton, Vt., for 1903.

Day.	Mar.	Apr.	May.	June.	Jul?.	Aug.	Sept.
1		34.65	33.75	28.75	29.65	33.85	30.28
2		34.75	33.75	28.78	29.35	33.60	29.65
3		34.60	33.75	28.95	29.48	33.20	29.32
4		38.80	33.70	29.10	30.60	32.78	29.45
5		37.20	....	29.00	31.50	32.20	29.35
6		35.95	....	28.88	31.45	31.35	28.90
7		35.45	33.00	28.75	30.50	30.92	28.72
8		36.35	33.40	28.72	29.98	30.40	28.65
9		35.70	33.12	28.38	29.60	30.60	28.85
10		35.30	33.22	28.30	29.38	29.95	28.78
11		35.05	33.05	28.45	29.35	30.40	28.85
12		34.80	33.08	28.62	28.98	32.55	28.78
13		34.50	32.62	28.88	28.75	34.02	28.78
14		34.40	32.22	29.35	28.68	33.55	28.90
15		34.25	31.48	29.92	29.05	33.30	28.80
16		34.35	30.78	29.95	29.30	33.08	28.75
17		34.55	30.82	29.55	29.32	32.40	28.72
18		34.35	30.40	29.22	29.05	31.95	28.60
19		34.20	29.92	29.12	30.50	30.48	28.45
20		34.00	29.80	29.18	30.70	31.42	28.35
21		33.90	29.62	29.30	30 40	34.25	28.38
22		33.90	29.42	31.18	29.48	33.85	28.35
23		33.85	29.68	33.95	29 22	33.75	28.30
24		33.85	29.42	33.48	29 58	33.50	28.25
•25		33.75	29.35	32.62	32 25	33.00	28.18
23		33.80	28.95	31.82	34 85	32.82	28.10
27		33.70	28.90	30.62	34.70	32.78	28.40
28		33.65	29.02	30.10	34.00	32.65	28.60
29		33.75	28.92	29.65	33 60	32.15	28.45
30	35.00	33.75	28.82	29.85	33 50	31.88	28.42
31	34.65	....	29.30	....	34 38	31.55	....

ST. FRANCIS RIVER BASIN.

GENERAL FEATURES.

St. Francis River rises in Lake St. Francis, in the district of Beauce, in the southeastern part of the Province of Quebec, flows southwestward about 100 miles, then turns to the northwest at almost right angles in the district of Sherbrooke, and joins St. Lawrence River in Lake St. Peter. Lake Memphremagog, which crosses the international boundary into Vermont, is tributary to St. Francis River near the bend through Magog River. The principal tributaries of Lake Memphremagog in Vermont are Clyde, Barton, and Black rivers.

Clyde River rises in a lake region near Island Pond, in the northeastern part of Vermont, and flows in a general northwesterly direction to Newport, where it enters Lake Memphremagog. The basin is somewhat broken with hills and low mountains.

Although its drainage area is smaller than that of some other rivers in Vermont, it affords good opportunities for development. The area contains many natural ponds, and it is possible to create considerable additional storage which should make the flow of this river very uniform.

GAGING-STATION RECORDS.

CLYDE RIVER AT WEST DERBY, VT.

LOCATION.—Just below the plant of the Newport Electric Light Co., at West Derby; about a mile above mouth of river.

DRAINAGE AREA.—150 square miles (measured on post-route map of Vermont, edition of 1915).

RECORDS AVAILABLE.—May 25, 1909, to September 30, 1916.

GAGES.—Chain gage; read twice daily by E. C. Rogers. Barrett & Lawrence water-stage recorder installed September 21, 1915, in gage house on right bank (Pl. XIV, *A*, p. 111); referred to datum of chain gage.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from highway bridge half a mile downstream.

CHANNEL AND CONTROL.—Stream bed rough and irregular; covered with boulders and rock ledge. Fall of river rapid for some distance below the gage.

EXTREMES OF DISCHARGE.—1909–1916: High water of March 25–30, 1913, reached maximum stage of 5.8 feet, as determined by engineers of Geological Survey from high-water marks (discharge approximately 6,300 second-feet); minimum stage, 1.60 feet at 5.45 p. m. August 25, 1913, 7.30 p. m. July 30, and 4.50 p. m. August 17, 1914 (discharge, 17 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; discharge ascertained by means of gage heights, discharge measurements, observer's notes, weather records, and comparison with records obtained in nearby drainage basins.

REGULATION.—The flow at ordinary stages is very fully controlled by the two dams at West Derby, but the operation of the power plant is such that the fluctuations in stage are not great. The distribution of flow is also affected by several dams above West Derby. Seymour Lake and several smaller ponds in the basin afford a large amount of natural storage but there has been little if any artificial regulation at these ponds. A study of the discharge records indicates that an additional storage of 180,000,000 cubic feet might be required to insure a continuous flow of 75 second-feet or 0.5 second-foot per square mile at West Derby for 90 per cent of the time during a year of extremely low flow; a storage of 25,000,000 cubic feet would probably insure this rate of flow for 90 per cent of the time during the average year.

ACCURACY.—A comparative study of records obtained by the water-stage recorder and by the chain gage records subsequent to the installation of the recorder indicates that the results obtained by reading the chain gage twice daily are fairly good.

Discharge measurements of Clyde River at West Derby, Vt., during 1909–1916.

Date.	Made by—	Gage height.	Dis- charge.	Date.	Made by—	Gage height.	Dis- charge.
1909.		*Feet.*	*Sec.-ft.*	**1913.**		*Feet.*	*Sec.-ft.*
May 25	D. M. Wood	2.80	370	Mar. 4	C. S. DeGolyer	2.21	130
June 30	…..do	2.06	102	Apr. 1	R. S. Barnes	3.85	1,380
July 24	…..do	1.92	74	23	…..do	2.98	481
Oct. 29	…..do	2.12	102	Sept. 9	G. H. Canfield	1.83	47.4
				9	…..do	1.87	52
1910.				**1914.**			
Mar. 25	T. W. Norcross	2.95	479	Nov. 19	C. S. DeGolyer	2.02	83
Apr. 18	…..do	2.82	495	19	…..do	2.02	81
20	…..do	2.78	459	**1915.**			
July 12	G. M. Brett	2.01	114	Apr. 25	R. S. Barnes	2.74	342
Aug. 18	…..do	1.86	45.3	Sept. 21	G. F. Adams	1.95	76
1911.				22	…..do	1.94	80
June 24	G. H. Canfield	2.17	125	Nov. 18	…..do	2.27	158
25	…..do	2.13	117	Dec. 17	R. S. Barnes	*a* 2.12	90
Aug. 3	…..do	1.90	78	**1916.**			
3	C. C. Covert	1.92	82	Jan. 14	R. S. Barnes	*a* 2.44	178
3	…..do	1.88	72	Feb. 11	…..do	2 65	291
Oct. 27	…..do	2.26	165	Mar. 24	…..do	*a* 2.18	120
1912.				Oct. 4	Hardin Thweatt	2.53	254
Aug. 26	J. G. Mathers	2.20	134	4	…..do	2.53	247

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1909.						**1909.**					
1		275	102	39	52	16		146	86	26	66
2		267	115	44	49	17		170	86	21	66
3		255	120	44	56	18		170	80	23	56
4		235	115	52	52	19		176	70	49	56
5		228	102	39	49	20		176	80	44	61
6		218	110	36	49	21		176	70	49	52
7		200	128	23	49	22		185	80	49	56
8		185	128	33	44	23		176	74	44	61
9		185	120	36	49	24		164	80	36	66
10		194	110	30	56	25	375	155	70	36	66
11		176	102	23	56	26	364	128	61	49	66
12		155	86	44	61	27	320	128	49	52	80
13		155	90	36	61	28	320	115	39	52	115
14		164	80	30	61	29	311	102	44	52	155
15		155	70	33	66	30	284	95	44	52	200
						31	275		49	52	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	235	115	185	80	302	320	928	353	470	170	78	42
2	284	120	176	80	284	387	980	364	449	167	74	39
3	311	115	176	80	259	423	1,090	375	429	155	70	44
4	298	115	164	80	255	470	1,040	477	423	140	74	46
5	275	115	170	70	239	470	928	477	405	135	74	46
6	255	120	146	70	235	477	875	470	387	110	92	66
7	243	128	140	70	214	505	875	463	387	112	92	70
8	218	135	146	70	150	545	1,090	429	381	110	90	68
9	194	128	135	90	100	505	1,320	423	387	100	88	70
10	170	140	135	90	100	449	1,260	411	399	100	88	82
11	155	140	128	90	90	429	a 1,130	387	387	100	86	82
12	135	135	128	90	90	399	a 992	370	387	95	86	78
13	128	120	115	90	90	381	a 859	342	370	95	74	74
14	115	120	128	80	80	348	725	316	331	100	72	74
15	110	128	115	80	80	311	630	293	311	95	63	66
16	95	110	120	70	80	298	545	275	293	88	59	59
17	102	128	115	70	80	275	498	255	267	82	54	59
18	95	110	120	90	75	267	429	243	239	74	61	50
19	95	115	120	100	75	259	387	243	232	74	68	52
20	90	110	95	150	75	255	370	239	214	72	63	49
21	102	110	110	200	70	275	353	239	204	74	63	50
22	102	115	115	298	70	275	353	259	204	74	63	44
23	102	128	115	375	70	293	387	267	214	78	59	44
24	115	140	110	348	70	370	381	251	197	74	54	42
25	120	164	115	331	70	505	364	267	188	72	52	50
26	120	164	110	353	75	630	353	381	182	72	49	44
27	135	176	90	348	100	725	353	387	185	70	49	44
28	140	185	90	342	200	775	342	498	228	82	46	52
29	135	194	90	316		775	326	545	214	72	46	50
30	120	194	90	320		775	353	505	185	80	42	49
31	120		90	311		775		470		78	42	

a Discharge interpolated.

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	52	95	78	115	52	56	200	1,450	138	86	86	42
2	50	100	82	128	a46	a58	194	1,520	128	80	86	46
3	56	125	78	176	39	61	194	1,600	138	56	68	42
4	66	128	80	185	52	a58	194	1,450	138	74	59	39
5	82	164	88	311	61	56	197	1,200	135	68	59	39
6	90	170	82	267	66	52	207	1,040	128	78	56	49
7	88	176	95	235	a62	44	284	875	125	63	44	56
8	88	176	105	218	a58	49	320	775	105	59	39	54
9	86	173	82	204	a55	a52	405	725	100	59	39	63
10	72	167	155	200	a52	a54	429	675	105	56	32	50
11	63	155	182	170	49	a56	435	585	105	70	36	49
12	63	138	194	146	52	59	477	405	135	66	32	50
13	66	125	100	155	a48	72	545	477	115	59	30	50
14	66	128	54	128	44	63	725	423	120	44	35	50
15	63	118	63	110	36	66	928	411	128	56	44	56
16	59	112	57	100	a37	52	1,140	387	140	61	68	63
17	61	102	56	100	a38	52	1,200	348	143	66	59	52
18	59	90	56	100	39	61	1,090	311	143	78	52	54
19	56	82	55	90	46	63	980	280	155	56	49	47
20	56	86	54	90	a46	59	875	255	176	59	56	52
21	56	82	53	90	a45	63	825	239	155	56	54	54
22	56	80	52	80	a45	61	775	214	140	56	54	56
23	54	72	52	75	a44	66	775	207	135	56	52	56
24	54	70	61	75	44	61	775	207	128	52	42	56
25	59	80	70	75	49	61	725	197	125	44	50	66
26	86	74	79	60	59	63	775	185	120	52	56	63
27	88	74	88	60	66	80	875	185	115	54	49	66
28	86	74	97	52	49	120	980	176	95	57	52	66
29	90	78	106	56	....	152	1,200	176	92	66	49	90
30	86	78	115	61	....	182	1,320	164	90	72	50	130
31	88	....	a115	46	....	204	....	146	....	74	49	....
1911–12.												
1	128	120	232	....	....	....	235	725	775	146	72	170
2	120	118	255	....	....	....	259	675	875	135	74	173
3	118	110	251	....	....	....	275	545	875	130	78	164
4	125	100	235	....	....	....	284	505	825	120	88	138
5	115	90	298	....	....	....	280	505	775	112	86	128
6	110	90	200	....	....	....	331	491	725	118	78	118
7	130	100	182	....	....	....	675	449	725	110	86	128
8	146	110	194	....	....	....	1,140	429	585	102	95	130
9	158	105	182	....	....	....	1,260	423	545	102	100	128
10	170	125	191	....	....	....	1,200	423	498	95	92	130
11	135	120	194	....	....	....	1,040	387	463	100	90	164
12	132	118	185	....	....	....	928	375	423	95	130	164
13	115	158	320	....	....	....	875	370	381	100	128	130
14	110	158	375	....	....	....	825	387	364	88	140	158
15	92	182	429	....	....	....	928	411	331	82	130	138
16	82	185	470	....	....	....	1,090	442	331	80	140	158
17	90	170	498	....	....	....	1,520	498	311	76	135	143
18	92	182	399	....	....	....	1,910	442	280	63	125	164
19	112	185	353	....	....	....	1,830	442	271	66	100	200
20	115	197	302	....	....	....	1,520	423	259	61	90	229
21	118	176	255	....	....	....	1,260	449	251	70	100	275
22	128	176	235	....	....	....	1,090	429	221	82	84	275
23	176	176	405	....	....	....	1,140	435	218	74	90	280
24	164	155	423	....	....	....	1,320	411	197	70	78	298
25	164	164	429	....	....	....	1,320	429	185	74	143	280
26	170	140	463	....	....	....	1,200	405	194	74	152	259
27	170	135	491	....	....	....	1,040	364	176	65	167	239
28	146	130	423	....	....	....	980	331	176	74	173	221
29	140	218	353	....	....	....	875	353	158	80	188	200
30	125	218	348	....	....	....	775	435	146	66	185	214
31	128	....	311	....	....	....	....	585	....	82	176	....

a Discharge interpolated.

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	204	214	194	197	266	132	1,330	303	368	96	116	49
2	207	197	185	194	265	126	1,200	289	368	91	105	52
3	214	188	207	221	260	121	1,140	257	362	87	98	50
4	218	185	221	259	255	105	1,080	248	318	89	132	50
5	204	182	235	275	250	116	1,140	216	294	87	96	49
6	200	176	251	284	245	110	1,080	186	270	87	87	50
7	188	188	255	284	240	105	1,020	173	294	82	89	50
8	185	267	251	326	235	113	970	201	231	65	74	50
9	170	280	239	306	230	110	760	219	257	70	76	45
10	188	320	235	280	225	116	715	193	216	70	89	45
11	176	342	221	275	220	121	625	204	219	87	89	42
12	158	348	218	280	215	123	580	180	216	96	70	42
13	170	326	280	285	210	121	540	160	193	121	70	44
14	158	370	247	290	201	284	540	157	173	126	67	49
15	176	370	185	295	148	493	540	148	170	126	74	a 46
16	182	342	173	300	140	860	500	154	164	116	63	44
17	173	326	176	305	143	1,020	500	154	157	126	61	45
18	176	316	170	311	140	810	500	140	151	116	61	45
19	173	302	228	375	126	810	500	157	154	105	57	57
20	158	280	235	435	126	760	500	157	148	110	56	42
21	152	259	284	510	151	760	486	170	140	113	42	49
22	143	243	449	585	154	1,020	486	183	132	103	50	68
23	146	239	298	540	143	1,200	500	183	121	91	57	68
24	182	251	280	491	110	1,200	444	201	116	89	50	59
25	197	243	255	450	137	1,330	424	219	113	82	31	59
26	207	251	228	405	148	1,530	399	231	105	87	45	74
27	221	235	214	375	137	2,260	380	231	105	78	56	70
28	221	221	204	345	126	2,660	368	257	96	80	56	67
29	251	214	194	320	......	2,450	357	318	100	91	67	63
30	243	197	200	295	......	2,260	324	340	105	100	59	63
31	235	......	197	267	......	1,530	......	346	......	110	50	......
1913–14.												
1	61	227	123	100	103	78	313	1,200	154	89	45	61
2	68	216	121	100	105	89	346	1,080	148	98	52	56
3	63	193	126	100	116	89	340	970	148	98	74	68
4	63	183	129	100	105	103	303	860	154	96	74	63
5	57	167	132	100	96	105	289	860	148	96	67	67
6	59	157	137	100	105	113	257	915	143	96	63	68
7	63	157	140	100	113	121	231	970	143	96	50	76
8	57	148	154	100	103	132	231	915	132	98	56	82
9	36	140	151	91	100	118	335	915	121	96	56	74
10	63	140	154	96	91	121	357	810	116	89	50	78
11	57	129	157	100	90	116	418	760	113	89	63	78
12	63	132	186	91	90	105	540	670	96	82	45	74
13	63	137	154	78	90	100	540	625	100	91	45	70
14	59	132	143	78	91	100	540	580	82	89	56	67
15	68	121	140	87	91	105	540	500	91	110	63	63
16	82	110	129	89	74	113	580	465	89	96	52	59
17	91	121	126	91	90	113	580	424	89	82	36	52
18	91	98	126	78	91	126	625	357	89	98	59	36
19	91	113	123	87	87	151	860	275	82	78	68	50
20	110	132	121	82	74	140	1,260	275	100	68	41	45
21	132	143	121	89	91	143	1,910	248	96	70	59	49
22	180	154	103	100	78	148	2,080	219	96	65	78	49
23	208	180	100	82	74	140	1,750	362	96	63	59	50
24	248	180	100	105	78	126	1,330	405	91	56	56	52
25	248	183	100	98	80	129	1,080	313	89	56	56	59
26	240	170	100	82	76	137	1,020	244	89	50	42	56
27	244	151	100	89	74	170	1,020	227	82	49	49	68
28	257	137	100	96	68	208	970	204	76	52	45	67
29	248	132	100	98	......	248	1,080	201	91	57	63	63
30	265	123	100	87	......	265	1,200	190	87	39	57	74
31	261	......	100	100	......	289	......	180	......	50	59	......

a Discharge interpolated.

Daily discharge, in second-feet, of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.								*				
1	82	63	113	70	70	585	102	435	164	100	232	112
2	87	68	129	70	70	545	110	442	152	86	243	100
3	78	74	132	70	75	449	118	387	135	86	218	95
4	78	68	151	75	80	370	110	364	125	86	188	90
5	80	74	154	75	80	331	118	342	120	90	170	86
6	78	59	160	90	80	284	120	311	108	100	164	86
7	76	87	151	90	80	239	143	298	100	88	155	80
8	70	82	137	125	80	232	158	311	100	128	135	78
9	63	89	121	125	90	200	207	293	90	173	128	100
10	36	91	110	150	90	185	302	280	95	207	135	92
11	61	82	105	125	90	176	381	275	102	259	135	118
12	67	78	96	100	90	176	505	271	110	311	140	120
13	63	82	82	90	90	176	675	267	95	342	146	132
14	56	80	78	90	100	164	825	255	102	311	164	120
15	57	76	78	90	100	173	875	232	110	267	138	102
16	70	82	82	110	100	146	675	218	112	218	140	88
17	78	80	74	110	110	152	545	214	115	185	135	82
18	80	74	78	125	120	140	491	194	125	197	125	80
19	80	78	68	150	120	130	429	197	146	204	125	72
20	87	118	68	175	120	135	405	194	176	232	130	72
21	96	129	67	200	128	128	364	182	188	243	138	76
22	96	113	65	150	140	128	348	185	194	239	128	70
23	96	116	65	125	138	128	342	182	185	228	115	76
24	89	103	65	100	158	152	331	182	176	214	118	90
25	82	105	60	100	505	155	381	170	170	197	125	102
26	78	100	60	90	775	173	429	158	140	188	146	105
27	76	132	60	85	775	143	435	185	130	164	149	92
28	70	116	65	80	725	118	463	176	115	173	140	98
29	70	110	65	75	......	108	498	176	120	204	138	118
30	68	103	70	75	......	102	470	176	102	232	135	128
31	67	......	70	70	......	95	......	179	......	232	118	......
1915–16.												
1	149	110	161	348	470	221	545	630	320	218	132	80
2	140	108	167	375	442	221	725	585	320	218	128	98
3	130	118	173	336	405	207	775	585	320	210	125	108
4	122	122	170	298	387	194	725	585	399	221	122	102
5	115	120	164	251	336	176	630	545	470	224	118	112
6	112	122	149	218	311	176	585	545	491	221	115	110
7	102	122	132	194	288	164	545	505	505	228	*15	102
8	115	115	138	207	271	164	498	491	545	243	110	110
9	115	108	130	243	263	152	449	449	545	263	284	102
10	122	105	122	259	243	146	423	387	545	267	442	95
11	120	102	108	228	239	146	429	399	505	271	449	102
12	108	102	102	204	221	140	435	364	470	263	435	115
13	105	102	110	179	210	146	442	331	449	239	375	100
14	100	110	102	152	204	152	463	316	449	200	320	90
15	98	120	98	158	218	135	463	298	423	185	267	95
16	95	130	108	170	204	125	449	275	399	185	224	102
17	98	132	90	185	188	112	505	326	381	179	188	84
18	95	132	88	200	164	112	585	405	375	170	170	88
19	86	140	80	155	155	110	775	463	387	158	155	90
20	92	158	88	135	152	112	875	505	381	164	135	86
21	90	164	90	149	155	120	875	505	387	170	125	82
22	95	182	108	173	152	110	825	491	375	170	115	78
23	120	182	102	200	155	112	825	470	375	170	105	86
24	138	179	118	228	161	105	875	411	364	176	100	80
25	125	170	130	251	170	105	875	,364	342	173	92	74
26	118	155	176	271	176	102	875	331	326	164	95	74
27	112	140	200	311	188	115	875	302	302	152	90	70
28	102	132	224	405	200	140	775	275	275	140	86	70
29	98	161	259	545	210	210	775	267	235	135	90	80
30	98	155	320	545	......	302	675	284	218	135	86	158
31	105	......	364	463	......	442	......	320	......	135	88	......

NOTE.—Discharge determined from two rating curves fairly well defined for periods covered. Determinations based on readings of chain gage twice a day until Sept. 20, 1915. Beginning Sept. 21, 1915, waterstage recorder used. Stage-discharge relation affected by ice Dec. 28, 1909, to Jan. 21, 1910; Feb. 8–28, Dec. 18–29, 1910; Jan. 16–27, 1911; Jan. 12 to Feb. 13, 1913; Dec. 24, 1913, to Feb. 25, 1914; Dec. 20, 1914, to Feb. 20, 1915; Dec. 10–24, 1915; Jan. 7–24, Feb. 2–24, 27–29, and Mar. 16–28, 1916. No records obtained Jan. 1 to Mar. 31, 1912.

Monthly discharge of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916.

[Drainage area, 150 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
May 25–31	375	275	321	2.14	0.56	B.
June	275	95	177	1.18	1.32	B.
July	128	39	85.2	.568	.65	B.
August	52	21	39.6	.264	.30	B.
September	200	44	67.7	.451	.50	B.
1909–10.						
October	311	90	159	1.06	1.22	B.
November	194	110	134	.893	1.00	B.
December	185	90	125	.833	.96	C.
January	375	70	a 169	1.13	1.30	D.
February	302	70	a 131	.873	.91	D.
March	775	255	450	3.00	3.50	A.
April	1,320	326	684	4.56	5.09	A.
May	545	239	364	2.43	2.80	A.
June	470	182	305	2.03	2.26	A.
July	170	70	96.8	.645	.74	B.
August	92	42	66.8	.445	.51	B.
September	82	39	56.2	.375	.42	B.
The year	1,320	39	228	1.52	20.71	
1910–11.						
October	90	50	69.2	.461	.53	B.
November	176	70	113	.753	.84	B.
December	194	52	a 86.6	.577	.66	C.
January	311	46	a 128	.853	98	D.
February	66	36	49.2	.328	.34	C.
March	204	44	72.8	.485	.56	B.
April	1,320	194	668	4.45	4.97	A.
May	1,600	146	558	3.72	4.29	A.
June	176	90	126	.840	.94	B.
July	86	44	62.4	.416	.48	B.
August	86	30	51.2	.341	.39	B.
September	130	39	56.9	.379	.42	B.
The year	1,600	30	170	1.13	15.40	
1911–12.						
October	176	82	130	.867	1.00	B.
November	218	90	147	.980	1.09	B.
December	498	182	319	2.13	2.46	A.
January	....	....	a 195	1.30	1.50	D.
February	....	....	a 90	.600	.65	D.
March	....	....	a 210	1.40	1.61	D.
April	1,910	235	980	6.53	7.29	A.
May	725	331	451	3.01	3.47	A.
June	875	146	418	2.79	3.11	A.
July	146	61	90.1	.601	.69	B.
August	188	72	116	.773	.89	B.
September	298	118	187	1.25	1.40	B.
The year	....	....	278	1.85	25.16	
1912–13.						
October	251	143	190	1.27	1.46	B.
November	370	176	262	1.75	1.95	A.
December	449	170	233	1.55	1.79	A.
January	585	194	a 334	2.23	2.57	B.
February	266	126	a 188	1.25	1.30	C.
March	2,660	105	799	5.33	6.14	B.
April	1,330	324	664	4.43	4.94	A.
May	346	140	212	1.41	1.63	A.
June	368	96	195	1.30	1.45	A.
July	126	65	96.0	.640	.74	B.
August	132	31	70.7	.471	.54	B.
September	74	42	52.9	.353	.39	B.
The year	2,660	31	275	1.83	24.90	

a See note to daily discharge table; determinations of discharge based on observer's notes, weather records, and comparison with records obtained at gaging stations in near-by drainage basins.

Monthly discharge of Clyde River at West Derby, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1913–14.						
October	265	36	126	0.840	0.97	B.
November	227	98	150	1.00	1.12	B.
December	186	100	a 126	.840	.97	C.
January	105	78	a 92.7	.618	.71	D.
February	116	68	a 90.1	.607	.63	C.
March	289	78	137	.913	1.05	B.
April	2,080	231	764	5.09	5.68	B.
May	1,200	180	555	3.70	4.27	A.
June	154	76	108	.720	.80	B.
July	110	39	78.8	.525	.61	B.
August	78	36	56.1	.374	.43	B.
September	82	36	62.5	.417	.47	B.
The year	2,080	36	196	1.31	17.71	
1914–15.						
October	96	36	74.7	.498	.57	B.
November	132	59	90.4	.603	.67	B.
December	160	60	a 93.0	.620	.71	C.
January	200	70	a 105	.700	.81	D.
February	775	70	a 185	1.23	1.28	C.
March	585	95	207	1.38	1.59	A.
April	875	102	378	2.52	2.81	A.
May	442	158	249	1.66	1.91	A.
June	194	90	130	.867	.97	B.
July	342	86	193	1.29	1.49	B.
August	243	115	148	.987	1.14	B.
September	132	70	95.3	.635	.71	B.
The year	875	36	162	1.08	14.66	
1915–16.						
October	149	86	110	.733	.85	A.
November	182	102	134	.893	1.00	A.
December	364	80	b 147	.980	1.13	C.
January	545	135	b 259	1.73	1.99	C.
February	470	152	b 239	1.59	1 72	D.
March	442	102	b 160	1.07	1.23	C.
April	875	423	652	4.35	4.85	B.
May	630	267	420	2.80	3.23	B.
June	545	218	396	2.64	2.94	B.
July	271	135	195	1.30	1.50	B.
August	449	86	177	1.18	1.36	B.
September	158	70	94.1	.627	.70	B.
The year	875	70	248	1.65	22.50	

a See note to daily discharge table; determinations of discharge based on observer's note weather records, and comparison with records obtained at gaging stations in near-by drainage basins.

b See note to daily discharge table; determinations of discharge based on gage heights, discharge measurements, observer's notes, and weather records.

Days of deficiency in discharge of Clyde River at West Derby, Vt., during the years ending Sept. 30, 1910–11, and 1913–1916.

Discharge in second-feet.	Theoretical horsepower per foot of fall.	Days of deficiency in discharge.					
		1909–10	1910–11	1912–13	1913–14	1914–15	1915–16
35	4.0	....	3	1	....	....	....
40	4.6	1	14	1	4	1	....
45	5.2	10	25	7	6	1	....
50	5.7	18	44	17	15	1	....
60	6.8	31	128	35	48	4	....
70	7.9	40	169	46	77	24	....
80	9.1	79	192	56	101	64	·5
90	10.2	99	216	70	131	99	20
100	11.4	124	230	78	170	125	41
120	13.6	161	251	101	219	179	99
140	15.9	189	274	119	251	226	132
160	18.2	201	285	146	279	253	162
180	20.4	211	297	163	282	276	193
200	22.7	221	308	188	291	293	203
225	25.6	230	317	221	297	304	229
250	28.4	241	319	243	309	315	239
300	34.1	266	323	283	318	325	260
350	39.8	286	327	304	324	336	280
400	45.5	316	328	315	327	342	298
500	56.8	339	336	325	331	353	329
600	68.2	344	338	338	339	358	349
800	90.9	352	347	343	343	363	358
1,000	114	359	354	347	353	365	366
1,500	170	365	363	359	362	....	....
2,000	227	....	365	361	364	....	....
3,000	341	....	....	365	365	....	....

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

CONNECTICUT RIVER BASIN.

GENERAL FEATURES.

The Connecticut River system drains the eastern part of Vermont east of the Green Mountains, from Canada on the north to Massachusetts on the south. Connecticut River is considered as rising in the Connecticut lakes in northern New Hampshire, although the headwaters have their source in the mountains near the international boundary. The river flows in a southerly direction between New Hampshire and Vermont and across Massachusetts and Connecticut into Long Island Sound. The total area drained is 11,300 square miles, distributed as follows:

Square miles.

Province of Quebec... 105
New Hampshire... 3,120
Vermont... 3,970
Massachusetts.. 2,720
Connecticut.. 1,430

The principal tributaries of the Connecticut in Vermont are the Nulhegan, Passumpsic, Wells, Waits, Ompompanoosuc, White,
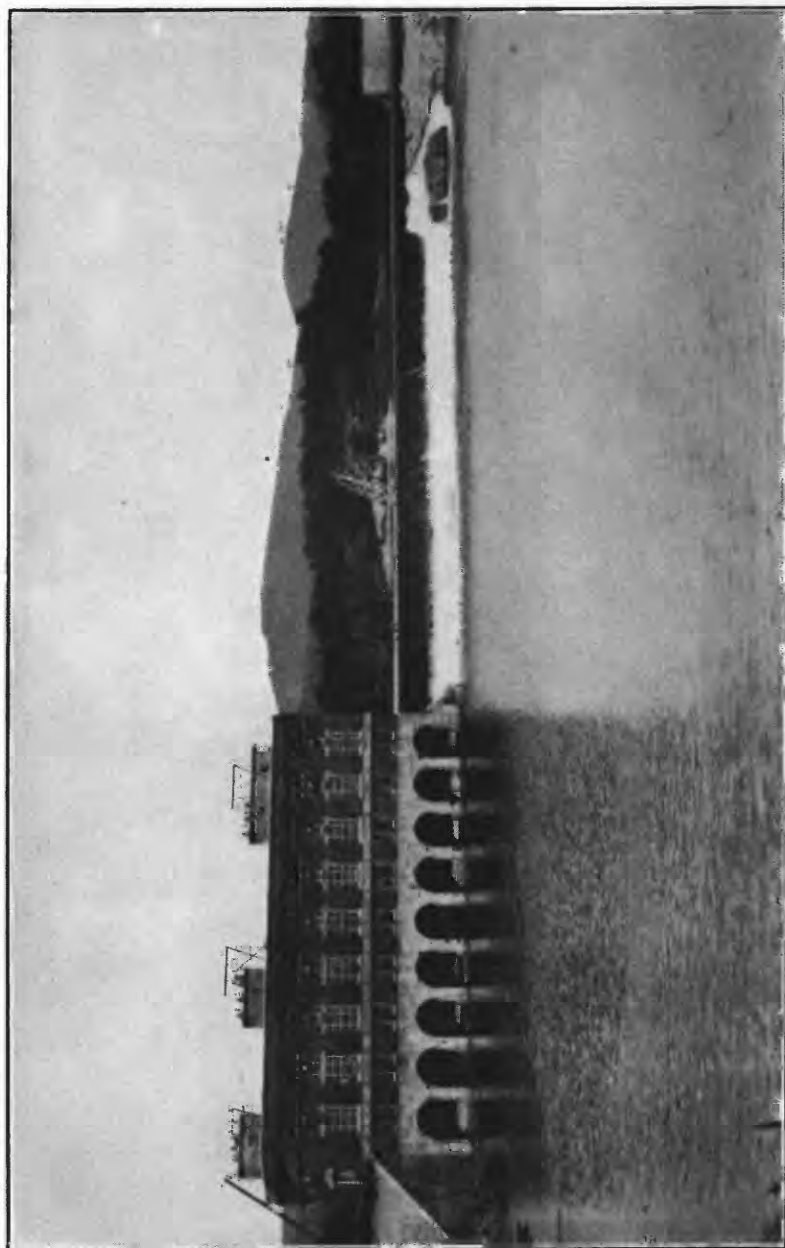
HYDROELECTRIC PLANT OF NEW ENGLAND POWER CO. AT VERNON, VT.

A. CLYDE RIVER AT WEST DERBY, VT., FEBRUARY 11, 1916, LOOKING UPSTREAM.

Gage house on right bank in foreground; dam and power house in background.
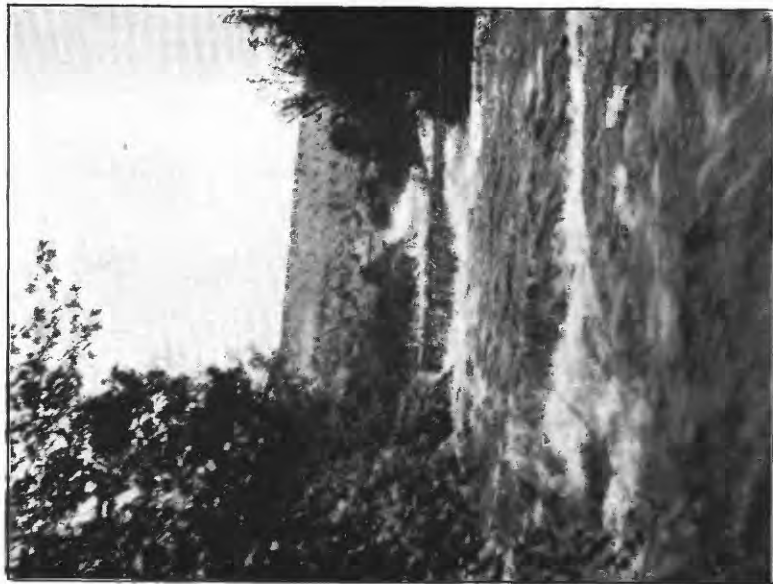
B. RESERVOIR EMBANKMENT AND MEASURING WEIR BELOW SOMERSET RESERVOIR, ON EAST BRANCH OF DEERFIELD RIVER AT SOMERSET, VT.

Ottaquechee, Black, Williams, Saxons, and West rivers. Deerfield River enters below the State line but drains an area of 316 square miles in Vermont which includes important storage and power developments.

The region east of the Green Mountains differs essentially from that west of the mountains in regard to natural storage, and the Connecticut River drainage basin in Vermont contains few natural ponds or lakes whereby the run-off may be equalized. Consequently the streams are somewhat flashy and a large percentage of the total run-off goes to waste during the early spring. The utilization of some storage sites has already been undertaken and the feasibility of others has been investigated. (See Pl. XIV, *B*.)

Records of flow of the Connecticut River at Orford, N. H. (Fairlee, Vt.), have been obtained since 1900. The driest year during the period covered by these records was 1910–11, and the wettest 1901–2, the total flow during these two years being about in the ratio of 1 to 1.73.

GAGING-STATION RECORDS.

CONNECTICUT RIVER AT ORFORD, N. H. (FAIRLEE, VT.).

LOCATION.—At covered highway bridge between Fairlee, Vt., and Orford, N. H., about 8 miles below the mouth of Waits River and 22 miles above the mouth of White River.

DRAINAGE AREA.—3,100 square miles.

RECORDS AVAILABLE.—August 6, 1900, to September 30, 1916.

GAGES.—Chain on upstream side of bridge and inclined staff on left bank 25 feet below bridge.

DISCHARGE MEASUREMENTS.—Open-water measurements made from the bridge or from cable 500 feet above the bridge.

CHANNEL AND CONTROL.—Channel wide and deep with gravelly bottom; control for low stages slightly shifting; at high stages the control is probably at the dam at Wilder.

EXTREMES OF DISCHARGE.—1900–1916: Maximum stage recorded, 33.4 feet at noon March 28, 1913 (approximate discharge from extension of rating curve, 57,300 second-feet); minimum discharge for 24 hours, 288 second-feet, September 28, 1908.

WINTER FLOW.—Stage-discharge relation seriously affected by ice, usually from December to March; records based on gage heights, current-meter measurements, observer's notes, and weather records.

REGULATION.—Distribution of flow not seriously affected by the operation of any power plants above the station. Some storage has been developed on reservoirs in the headwaters.

ACCURACY.—Several rating curves have been used, each fairly well defined for the period covered; results considered good. Precipitation records at St. Johnsbury, Vt., are given for purposes of comparison only, as it is not probable that records at St. Johnsbury indicate fairly the average rainfall in the upper Connecticut basin; the precipitation is probably considerably greater at places of higher altitude than along the river valley.

Monthly discharge of Connecticut River at Orford, N. H. (Fairlee, Vt.), for the years ending Sept. 30, 1900–1916.

[Drainage area, 3,100 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.	Precipitation in inches at St. Johnsbury, Vt.
	Maximum.	Minimum.	Mean.	Per square mile.			
1900.							
August 6–31	5,110	950	2,270	0.732	0.71	B.	3.25
September	2,520	815	1,300	.419	.47	B.	2.84
1900–1901.							
October	12,600	1,880	4,400	1.42	1.64	A.	2.70
November	16,300	1,600	7,560	2.44	2.72	A.	6.15
December	6,900	4,010	5,170	1.67	1.92	B.	.95
January	5,500	2,400	2,930	.945	1.09	D.	2.06
February	2,500	1,900	2,220	.716	.75	D.	.56
March	21,300	1,800	5,400	1.74	2.01	D.	3.31
April	32,600	11,000	23,200	7.48	8.34	B.	1.74
May	16,300	5,550	9,030	2.91	3.36	A.	3.40
June	7,600	2,610	5,240	1.69	1.89	A.	4.07
July	8,450	1,280	3,300	1.07	1.23	A.	4.96
August	6,640	1,100	3,690	1.19	1.37	A.	4.44
September	2,110	1,100	1,580	.510	.57	B.	2.64
The year	32,600	1,100	6,150	1.98	26.89	......	36.98
1901–2.							
October	5,220	1,340	2,250	.726	.84	A.	2.31
November	2,350	1,280	1,710	.552	.62	B.	1.60
December	30,400	1,460	6,600	2.13	2.46	D.	4.06
January	6,000	2,700	3,810	1.23	1.28	D.	.89
February	8,000	2,000	2,810	.906	1.04	D.	1.08
March	43,400	9,770	20,500	6.61	7.62	B.	4.16
April	23,200	8,600	13,000	4.19	4.68	A.	2.55
May	31,900	4,560	10,600	3.42	3.94	A.	5.14
June	17,000	4,890	9,590	3.09	3.45	A.	4.45
July	6,770	2,520	4,250	1.37	1.58	A.	4.48
August	8,300	2,190	4,390	1.42	1.64	A.	6.44
September	5,330	2,030	3,430	1.11	1.24	A.	3.75
The year	43,400	1,280	6,950	2.24	30.39	......	40.91
1902–3.							
October	19,700	2,350	4,420	1.43	1.65	A.	3.98
November	10,100	3,470	4,990	1.61	1.80	B.	1.44
December	3,560	2,580	2,930	.945	1.09	C.	2.49
January	3,560	2,260	2,840	.916	1.06	C.	3.24
February	4,170	2,720	3,320	1.07	1.11	C.	2.25
March	40,100	11,500	24,300	7.84	9.04	B.	5.13
April	22,900	5,110	11,100	3.58	3.99	A.	1.23
May	5,780	1,460	3,340	1.08	1.24	A.	.04
June	7,740	1,100	3,090	.997	1.11	A.	3.54
July	4,010	1,400	2,310	.745	.86	A.	5.91
August	3,470	1,280	2,120	.684	.79	A.	2.90
September	2,030	640	1,100	.355	.40	B.	1.08
The year	40,100	640	5,510	1.78	24.14	......	33.23
1903–4.							
October	2,030	860	1,300	.419	.48	B.	2.65
November	2,110	1,050	1,480	.477	.53	B.	1.00
December	2,800	1,040	1,540	.497	.57	C.	2.27
January	980	650	785	.253	.29	C.	1.81
February	1,220	700	830	.268	.29	C.	1.01
March	21,700	1,160	5,240	1.69	1.95	B.	1.26
April	22,100	6,640	12,800	4.13	4.61	A.	2.67
May	23,600	6,260	14,400	4.65	5.36	A.	3.64
June	6,260	1,400	3,010	.971	1.08	A.	2.40
July	2,350	815	1,420	.458	.53	B.	2.81
August	4,780	905	1,980	.639	.74	B.	4.39
September	7,460	1,280	3,690	1.19	1.33	A.	5.15
The year	23,600	650	4,050	1.31	17.76	......	31.06

Monthly discharge of Connecticut River at Orford, N. H. (Fairlee, Vt.), for the years ending Sept. 30, 1900–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.	Precipitation in inches at St. Johnsbury, Vt.
	Maximum.	Minimum.	Mean.	Per square mile.			
1904–5.							
October	10,800	3,270	5,550	1.79	2.06	A.	1.81
November	3,790	1,750	2,570	.829	.92	C.	1.09
December	2,110	900	1,210	.390	.45	C.	1.63
January	1,070	700	868	.280	.32	C.	1.30
February	760	600	681	.220	.23	C.	1.08
March	37,200	560	7,110	2.29	2.64	C.	2.10
April	33,200	7,040	13,400	4.32	4.82	A.	2.22
May	13,000	4,120	8,400	2.71	3.12	A.	2.68
June	7,460	2,610	4,180	1.35	1.51	A.	3.36
July	17,600	1,530	4,390	1.42	1.64	A.	4.35
August	7,320	1,460	3,430	1.11	1.28	A.	4.62
September	10,400	2,520	5,410	1.75	1.95	A.	4.79
The year	37,200	560	4,780	1.54	20.94	......	31.03
1905–6.							
October	3,270	1,880	2,620	.845	.97	A.	1.60
November	5,200	2,030	3,050	.984	1.10	B.	2.10
December	10,200	3,070	5,660	1.83	2.11	C.	2.92
January	27,100	2,000	7,060	2.28	2.63	C.	2.10
February	8,020	2,050	3,030	.977	1.02	C.	2.51
March	6,600	1,500	2,240	.723	.83	C.	1.82
April	30,200	3,000	11,800	3.81	4.25	C.	.54
May	27,600	7,320	14,200	4.58	5.28	A.	3.71
June	14,600	3,270	6,580	2.12	2.36	A.	4.35
July	4,010	1,670	2,630	.848	.98	A.	3.68
August	4,010	1,050	1,790	.577	.67	B.	4.71
September	3,570	950	1,600	.516	.58	B.	2.70
The year	30,200	950	5,200	1.68	22.78	......	32.74
1906–7.							
October	5,000	1,000	2,760	.890	1.03	A.	3.13
November	4,670	1,530	2,670	.861	.96	A.	1.74
December	3,070	1,500	1,960	.632	.73	B.	2.75
January	3,550	1,400	1,960	.632	.73	C.	1.58
February	1,440	980	1,190	.384	.40	C.	1.24
March	27,000	1,240	3,970	1.28	1.48	C.	2.62
April	32,600	7,320	14,400	4.65	5.19	B.	4.60
May	40,600	5,320	15,900	5.13	5.91	B.	2.58
June	10,100	2,520	4,690	1.51	1.68	A.	3.38
July	9,770	2,270	4,600	1.48	1.71	A.	4.46
August	6,230	1,050	2,600	.839	.97	A.	2.35
September	7,180	1,340	3,010	.971	1.08	A.	8.11
The year	40,600	980	4,990	1.61	21.87	......	38.54
1907–8.							
October	18,700	3,590	8,940	2.88	3.32	A.	5.06
November	15,900	3,480	7,810	2.52	2.81	A.	2.47
December	26,500	2,000	9,320	3.01	3.47	C.	3.90
January	9,320	2,350	4,410	1.42	1.64	C.	2.09
February	18,000	2,320	4,830	1.56	1.68	C.	3.94
March	30,600	2,200	7,580	2.45	2.82	C.	1.97
April	36,700	6,900	12,800	4.13	4.61	B.	2.27
May	35,400	5,200	12,700	4.10	4.73	B.	3.75
June	11,500	1,520	4,450	1.44	1.61	A.	4.78
July	2,310	980	1,530	.494	.57	B.	3.11
August	3,810	880	1,690	.545	.63	B.	5.21
September	980	288	627	.202	.23	B.	.68
The year	36,700	288	6,400	2.06	28.12	......	39.23

*Monthly discharge of Connecticut River at Orford, N. H. (Fairlee, Vt.), for the years
ending Sept. 30,1900–1916*—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.	Precipitation in inches at St. Johnsbury, Vt.
	Maximum.	Minimum.	Mean.	Per square mile.			
1908–9.							
October.....................	1,040	550	747	0.241	0.28	B.	1.66
November...................	2,780	640	1,040	.335	.37	B.	1.10
December...................	2,050	698	1,200	.387	.45	B.	2.67
January.....................	6,000	1,020	2,690	.868	1.00	C.	2.86
February....................	7,320	2,100	4,000	1.29	1.34	C.	1.93
March......................	6,300	2,320	3,620	1.17	1.35	C.	.72
April.......................	49,700	7,000	25,400	8.19	9.14	C.	3.51
May........................	23,200	6,770	14,400	4.65	5.36	B.	4.28
June........................	7,320	1,590	3,890	1.25	1.40	A.	3.33
July........................	2,400	930	1,490	.481	.55	B.	2.83
August.....................	1,090	640	836	.270	.31	B.	2.47
September..................	5,450	880	1,460	.471	.53	B.	1.06
The year...............	49,700	550	5,050	1.63·	22.08	......	28.42
1909–10.							
October.....................	6,360	1,320	2,360	.761	.88	A.	3.73
November...................	3,920	1,660	2,380	.768	.86	A.	1.97
December...................	4,030	1,020	2,070	.668	.77	B.	1.09
January.....................	12,000	900	3,130	1.01	1.16	C.	2.12
February....................	4,000	1,400	2,000	.645	.67	C.	4.55
March......................	21,500	5,320	12,800	4.13	4.76	B.	1.46
April.......................	24,500	6,640	14,500	4.68	5.22	B.	3.25
May........................	17,600	4,960	9,080	2.93	3.38	A.	4.25
June........................	14,800	2,520	6,050	1.95	2.18	A.	2.90
July........................	2,520	1,000	1,630	.526	.61	A.	2.92
August.....................	6,230	1,110	2,430	·.784	.90	A.	4.53
September..................	3,710	755	1,740	.561	.63	A.	4.55
The year...............	24,500	755	5,020	1.62	22.02	......	37.32
1910–11.							
October.....................	3,290	1,060	2,040	.658	.76	A.	1.44
November...................	4,150	1,550	2,510	.810	.90	A.	2.37
December...................	3,000	1,000	1,520	.490	.56	C.	2.12
January.....................	4,500	1,600	2,520	.813	.94	C.	1.74
February....................	1,600	1,000	1,360	.439	.46	C.	2.29
March......................	10,700	1,200	2,450	.790	.91	C.	3.50
April.......................	28,900	6,520	16,800	5.42	6.05	B.	1.01
May........................	34,500	2,900	11,300	3.65	4.21	A.	1.08
June........................	4,340	1,450	2,440	.787	.88	A.	2 54
July........................	2.530	680	1,180	.381	.44	B.	4.73
August.....................	4,780	770	1,620	.523	.60	B.	5.19
September..................	3,900	1,650	2,360	.761	.85	A.	4.32
The year...............	34,500	680	4,010	1.29	17.56	......	32.33
1911–12.							
October.....................	6,520	2,350	4,310	1.39	1.60	A.	3.58
November...................	7.050	3,180	4,340	1.40	1.56	A.	2.50
December...................	17,800	4,560	8,250	2.66	3.07	A.	3.05
January.....................	7,460	1,600	3,110	1.00	1.15	C.	2.13
February....................	1,600	1,200	1,420	.458	.49	C.	2.04
March......................	12,100	1,400	3,840	1.24	1.43	C.	2.76
April.......................	36,700	9,800	21,800	7.03	7.84	C.	3.14
May........................	20,900	6,900	10,800	3.48	4.01	A.	6.56
June........................	30,600	2,160	9,570	3.09	3.45	A.	2.04
July........................	2,080	850	1,390	.448	.52	B.	3.17
August.....................	5,330	950	2,220	.716	.83	A.	4.80
September..................	11,600	1,840	4,100	1.32	1.47	A.	5.56
The year...............	36,700	850	6,250	2.02	27.42	......	41.33

Monthly discharge of Connecticut River at Orford, N. H. (Fairlee, Vt.), for the years ending Sept. 30, 1900–1916—Continued.

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.	Precipitation in inches at St. Johnsbury, Vt.
	Maximum.	Minimum.	Mean.	Per square mile.			
1912–13.							
October....................	8,880	2,520	4,010	1.29	1.49	A.	2.15
November..................	12,600	3,500	5,640	1.82	2.03	A.	2.78
December..................	8,020	3,290	5,450	1.76	2.03	B.	2.97
January...................	15,500	5,330	8,740	2.82	3.25	B.	3.25
February..................	7,880	3,190	4.410	1.42	1.48	C.	1.32
March....................	56,000	1,420	18,900	6.10	7.03	C.	6.76
April.....................	25,200	9,470	13,300	4.29	4.79	B.	1.63
May......................	15,700	3,930	6,750	2.18	2.51	A.	3.36
June......................	12,800	1,870	4,340	1.40	1.56	A.	1.40
July......................	4,960	1,220	2,090	.674	.78	A.	7.56
August....................	2,650	595	1,390	.448	.52	B.	1.44
September.................	2,850	550	1,130	.365	.41	B.	1.45
The year................	56,000	550	6,370	2.05	27.88	......	36.07
1913–14.							
October....................	8,600	930	3,130	1.01	1.16	A.	5.94
November..................	7,040	2,850	4,170	1.35	1.51	A.	1.25
December..................	6,900	1,500	3,680	1.19	1.37	A.	2.78
January...................	1,950	1,100	1,390	.448	.52	B.	1.80
February..................	2,030	880	1,250	.403	.42	B.	2.00
March....................	11,800	1,100	4,580	1.48	1.71	C.	2.59
April.....................	44,300	6,500	18,300	5.90	6.58	C.	4.47
May......................	24,200	3,490	11,300	3.65	4.21	A.	.50
June......................	4,840	1,500	2,360	.761	.85	A.	3.09
July......................	3,050	1,100	1,940	.626	.72	A.	4.87
August....................	2,560	930	1,410	.455	.52	B.	4.98
September.................	2,650	980	1,550	.500	.56	B.	2.41
The year................	44,300	880	4,600	1.48	20.13	......	36.68
1914–15.							
October....................	3,600	1,040	1,910	.616	.71	C.	.89
November..................	4,960	1,500	3,230	1.04	1.16	B.	2.22
December..................	6,630	880	2,500	.806	.93	B.	1.24
January...................	5,580	730	2,160	.697	.80	B.	1.98
February..................	33,700	730	4,910	1.58	1.64	B.	3.47
March....................	18,200	2,110	5,560	1.79	2.06	A.	.30
April.....................	23,800	2,030	9,250	2.98	3.32	A.	1.98
May......................	12,000	2,470	5,110	1.65	1.90	A.	2.01
June......................	5,200	1,360	2,400	.774	.86	A.	2.79
July......................	21,900	2,470	7,000	2.26	2.61	A.	6.38
August....................	9,770	2,650	4,950	1.60	1.84	A.	4.67
September.................	5,840	1,360	2,540	.819	.91	A.	3.22
The year................	33.700	730	4,290	1.38	18.74	......	31.15
1915–16.							
October....................	4,260	1,870	3,000	.968	1.12	A.	1.48
November..................	5,580	3,490	4,510	1.45	1.62	A.	1.79
December..................	11,600	2,560	4,450	1.44	1.66	B.	3.03
January...................	13,200	1,950	4,420	1.43	1.65	B.	1.93
February..................	12,000	2,470	5,190	1.67	1.80	B.	2.59
March....................	18,500	2,030	3,540	1.14	1.31	B.	1.52
April.....................	31,700	9,470	17,200	5.55	6.19	B.	1.68
May......................	19,300	5,080	9,550	3.08	3.55	A.	3.48
June......................	13,800	4,840	8,640	2.79	3.11	A.	4.36
July......................	10,700	2,380	5,190	1.67	1.92	A.	2.02
August....................	13,000	1,500	3,330	1.07	1.23	A.	4.62
September.................	3,450	1,280	2,100	.677	.76	A.	5.55
The year................	31,700	1,280	5,910	1.91	25.92	......	34.05

NOTE.—Discharge determined from a well-defined rating curve, the low-water part of which has varied somewhat at different periods on account of changes in control section. Stage-discharge relation affected by ice: Dec. 30, 1900, to Mar. 24, 1901; Dec. 4–11, 1901; Dec. 24, 1901, to Feb. 26, 1902; Dec. 5, 1902, to Feb. 28, 1903; Dec. 15, 1903, to Mar. 28, 1904; Nov. 17, 1904, to Mar. 25, 1905; Nov. 30 to Dec. 5, 1905; Jan. 2-23 and Feb. 3 to Apr. 15, 1906; Dec. 12, 1906, to Mar. 30, 1907; Dec. 1–10, 1907; Jan. 4 to Mar. 27, 1908; Dec. 16, 1908, to Apr. 2, 1909; Dec. 15, 1909, to Mar. 1, 1910; Dec. 6, 1910, to Mar. 28, 1911; Dec. 31, 1911, to Apr. 7, 1912; Feb. 23 to Mar. 15, 1913; Dec. 21, 1913, to Apr. 4, 1914; Dec. 14, 1914, to Feb. 25, 1915; and Dec. 9, 1915, to Apr. 4, 1916. Discharge for these periods determined from gage heights, discharge measurements, observer's notes, and weather records.

Days of deficiency in discharge of Connecticut River at Orford, N. H. (Fairlee, Vt.), during the years ending Sept. 30, 1901–1916.

Discharge in second-feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge.							
		1900–1901	1901–2	1902–3	1903–4	1904–5	1905–6	1906–7	1907–8
500	56.8	....	....	....	....	....	....	....	4
1,000	114	....	....	17	72	85	2	1	34
1,500	170	19	18	40	158	104	35	80	61
2,000	227	55	47	69	233	121	71	135	86
2,500	284	100	88	104	252	141	131	164	126
3,000	341	144	121	183	259	171	178	197	144
3,500	398	166	140	233	265	202	213	215	159
4,000	455	180	163	250	273	220	233	236	175
4,500	512	210	177	268	280	241	260	258	191
5,000	568	216	206	277	284	251	267	276	199
6,000	682	255	235	298	293	273	278	291	221
7,000	796	280	254	306	302	289	289	298	243
8,000	909	291	263	309	309	304	295	304	258
9,000	1,020	301	272	313	317	307	305	319	271
10,000	1,140	310	283	313	329	317	313	324	285
15,000	1,700	330	318	331	345	352	341	340	334
20,000	2,270	341	348	346	361	357	350	350	352
25,000	2,840	355	355	350	366	359	359	354	359
30,000	3,410	361	360	356	....	359	364	356	361
35,000	3,980	365	362	361	....	362	365	361	365
40,000	4,550	....	364	364	....	365	....	364	366
45,000	5,120	....	365	365	....	....	....	365	....
50,000	5,680	....	....	....	....	....	....	....	....
60,000	6,820	....	....	....	....	....	....	....	....

Discharge in second-feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge.							
		1908–9	1909–10	1910–11	1911–12	1912–13	1913–14	1914–15	1915–16
500	56.8	....	....	....	....	....	....	....	....
1,000	114	94	12	15	2	30	22	20	....
1,500	170	158	75	110	58	47	83	57	4
2,000	227	192	132	179	99	74	166	102	33
2,500	284	209	188	236	103	96	197	137	77
3,000	341	228	207	270	146	114	217	171	120
3,500	398	253	218	287	159	134	248	210	150
4,000	455	268	233	304	186	168	256	236	180
4,500	512	277	239	308	206	194	268	259	205
5,000	568	283	243	312	216	209	282	277	227
6,000	682	295	256	314	245	238	295	298	251
7,000	796	304	276	319	267	271	310	319	270
8,000	909	307	289	322	278	284	316	324	281
9,000	1,020	311	303	324	285	293	318	334	293
10,000	1,140	313	314	326	302	308	320	338	303
15,000	1,700	328	334	338	332	339	336	354	345
20,000	2,270	343	353	350	344	348	354	358	357
25,000	2,840	353	365	357	352	352	360	363	362
30,000	3,410	356	....	360	359	359	361	363	365
35,000	3,980	357	....	365	363	360	362	365	366
40,000	4,550	360	....	....	366	362	362	....	....
45,000	5,120	362	....	....	....	362	365	....	....
50,000	5,680	365	....	....	....	364	....	....	....
60,000	6,820	....	....	....	....	365	....	....	....

PASSUMPSIC-RIVER AT PIERCE'S MILLS, NEAR ST. JOHNSBURY, V͞T,

LOCATION.—At suspension footbridge just below Pierce's Mills, about 2 miles below mouth of Sheldon Branch, 4 miles above mouth of Moose River, and 5 miles from St. Johnsbury.

DRAINAGE AREA.—237 square miles.

RECORDS AVAILABLE.—May 26, 1909, to September 30, 1916.

GAGE.—Staff, in two sections; low-water section a vertical staff bolted to ledge just above bridge; high-water section an inclined staff bolted to ledge below bridge.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading below the bridge.

CHANNEL AND CONTROL.—Channel composed of ledge rock partly covered with gravel and alluvium. At high stages the control is probably at the dam near Centervale.

EXTREMES OF DISCHARGE.—1909–1916: Maximum stage recorded, 14.8 feet during the night of March 27–28, 1913, determined by leveling from flood marks (discharge not computed); minimum stage, zero flow at various times due to water being held back by mills.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow determined from gage heights, corrected for backwater by means of current-meter measurements, observer's notes, and records of temperature and precipitation.

REGULATION.—A study of the discharge records indicates that a storage of 455,000,000 cubic feet might be required to insure a continuous flow of 0.5 second-foot per square mile at Pierce's Mills for 90 per cent of the time during a year of extremely low flow; a storage of 15,000,000 cubic feet would probably insure this rate of flow for 90 per cent of the time during the average year. There is a small diurnal fluctuation caused by the operation of Pierce's Mills, just above station, and by other mills farther upstream. (See Accuracy.)

ACCURACY.—A fairly well-defined rating curve has been developed, but individual discharge measurements frequently show a large percentage of error due to fluctuation in stage during the measurement. The effect of the diurnal fluctuation was studied by means of temporary installation of a water-stage recorder during August and September, 1914. Although the results obtained by means of gage heights read twice a day were found to be occasionally in error for individual days, the mean discharge for the period August 16 to September 11, as determined from such gage heights and that determined from hourly gage heights from water-stage recorder, were found to be identical.

Discharge measurements of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., during 1909–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1909.		*Feet.*	*Sec.-ft.*	**1912.**		*Feet.*	*Sec.-ft.*
May 26	D. M. Wood	2.50	359	Aug. 24	J. G. Mathers	1.69	162
June 29	....do....	1.68	172	Oct. 17	C. S. DeGolyer	1.90	219
29	....do....	1.45	118				
July 27	....do....	1.29	69	**1913.**			
Oct. 27	....do....	1.64	164	Mar. 5	C. S. DeGolyer	a 2.09	147
1910.				31	R. S. Barnes	5.33	1,650
Mar. 25	T. W. Norcross	5.16	1,580	Apr. 24	....do....	2.90	570
26	....do....	5.62	1,790	Sept. 10	G. H. Canfield	1.30	88
26	....do....	5.46	1,680	10	....do....	1.16	66
26	....do....	5.36	1,610				
26	....do....	5.31	1,620	**1914.**			
26	....do....	5.16	1,520	May 27	C. S. DeGolyer	1.98	261
26	....do....	5.05	1,480	Aug. 16	C. C. Covert	.98	40.8
28	....do....	3.71	938	Sept. 12	R. S. Barnes	1.45	145
Apr. 20	....do....	3.05	624				
July 13	G. M. Brett	1.31	77	**1915.**			
				Apr. 26	R. S. Barnes	4.34	1,140
1911.				Dec. 16	....do....	1.79	213
June 23	G. H. Canfield	1.60	164				
Aug. 1	....do....	1.42	119	**1916.**			
				Feb. 9	R. S. Barnes	a 2.90	326
1912.							
Feb. 23	G. H. Canfield	a 2.73	196				
Aug. 24	J. G. Mathers	1.75	177				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for the years ending Sept. 30, 1909–1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1909.						1909.					
1......	....	372	149	110	122	16......	....	230	80	78	100
2......	....	238	149	93	180	17......	....	202	80	89	98
3......	....	306	162	91	124	18......	....	558	80	82	96
4......	....	290	260	91	102	19......	....	408	180	98	78
5......	....	290	202	89	98	20......	....	275	140	124	87
6......	....	537	175	102	194	21......	....	245	120	372	89
7......	....	372	162	96	136	22......	....	216	1ⁿ0	159	91
8......	....	306	149	74	119	23......	....	202	80	119	87
9......	....	275	124	78	98	24......	....	175	80	107	89
10......	....	260	124	89	89	25......	....	175	80	96	134
11......	....	230	145	96	100	26.......	426	202	90	89	100
12......	....	230	200	80	107	27.......	390	149	96	154	152
13......	....	216	100	78	110	28.......	462	162	87	122	556
14......	....	426	90	114	98	29.......	700	162	87	91	777
15......	....	290	100	76	87	30.......	518	162	105	102	322
						31.......	426	....	165	96	....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1..............	230	149	219	120	577	2,320	2,000	780	906	216	134	96
2..............	197	149	180	120	616	2,100	1,600	577	697	178	119	100
3..............	397	162	186	120	596	1,470	1,290	558	596	126	144	82
4..............	266	167	178	110	....	1,210	1,080	519	538	248	298	154
5..............	191	178	149	100	....	992	1,250	992	444	216	306	139
6..............	175	159	172	100	....	906	1,470	738	656	227	208	290
7..............	154	144	172	80	....	1,430	1,960	558	697	144	208	355
8..............	139	154	170	80	....	1,560	1,510	500	616	154	170	208
9..............	124	202	152	70	....	992	1,120	463	577	159	134	154
10..............	122	178	144	70	....	697	1,120	656	444	134	124	154
11..............	129	152	154	70	....	656	906	538	444	197	165	136
12..............	119	162	144	60	....	656	738	426	444	139	199	114
13..............	126	154	162	60	....	463	616	372	463	134	144	110
14..............	119	149	172	60	....	463	577	355	355	144	124	134
15..............	129	149	180	60	....	390	558	355	290	136	197	122
16..............	124	154	178	70	....	372	577	372	290	126	444	122
17..............	165	144	162	70	....	322	500	322	290	105	205	91
18..............	199	180	144	100	....	306	519	290	463	91	146	78
19..............	175	159	139	150	....	322	. 656	616	500	98	227	105
20..............	144	152	149	200	....	338	616	482	322	100	197	98
21..............	159	149	146	180	....	463	596	408	290	100	139	98
22..............	239	180	124	1,960	....	390	558	390	227	162	126	91
23..............	260	245	139	2,540	....	519	906	355	338	233	110	96
24..............	197	224	139	1,560	....	738	616	322	254	186	114	91
25..............	186	213	149	1,290	....	1,600	500	500	216	159	119	91
26..............	172	362	136	1,080	....	1,650	558	3,080	224	114	114	124
27..............	149	236	136	864	....	992	1,210	1,290	178	119	105	105
28..............	165	197	149	780	1,960	992	738	1,040	500	180	96	949
29..............	165	316	136	697	....	1,560	558	697	355	172	112	338
30..............	149	230	136	616	....	2,000	780	538	233	139	91	199
31..............	139	....	136	616	....	1,960	....	596	....	162	80	....

Daily discharge, in second-feet, of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	172	186	175				500	2,280	307	116	134	139
2	306	170	152				400	2,500	322	116	128	128
3	245	355	146				200	1,560	232	114	121	161
4	180	355	152				300	1,040	200	99	112	151
5	172	390	162				300	864	176	108	108	128
6	175	355	144				550	822	168	106	85	292
7	159	275					1,560	780	161	106	99	338
8	152	242					1,820	780	153	116	99	186
9	129	216					1,380	738	149	79	99	166
10	139	162					1,080	657	139	112	97	206
11	134	180					906	580	153	108	75	168
12	126	180					1,210	543	249	87	95	158
13	119	180					1,470	472	270	75	79	179
14	124	197					1,920	437	220	83	97	134
15	124	175					2,460	403	246	95	85	141
16	126	172					2,100	437	354	166	149	338
17	134	170					1,290	386	370	91	144	200
18	122	165					992	354	249	130	125	173
19	114	162					1,040	370	189	139	525	141
20	124	136					1,340	338	184	116	232	137
21	110	149					1,290	307	240	139	166	130
22	119	154					1,290	276	184	130	134	217
23	159	152					1,049	243	166	116	116	203
24	172	162					1,210	249	151	99	114	151
25	154	172					1,870	292	141	307	91	184
26	245	170					2,050	370	128	151	103	420
27	245	126				150	2,230	292	112	116	97	240
28	355	162				600	2,410	246	130	114	118	240
29	322	149				900	2,500	232	137	338	599	214
30	233	162				900	2,360	189	130	322	217	338
31	205					600		168		179	168	
1911–12.												
1	264	307	420				1,430	777	2,180	141	111	129
2	246	270	338				863	735	1,164	136	92	141
3	200	229	307				651	651	1,290	129	176	136
4	307	217	255				550	610	1,040	117	247	139
5	580	211	270				384	550	1,120	131	161	122
6	420	195	276				1,040	735	777	139	136	154
7	307	232	270				2,360	777	992	141	139	146
8	243	370	270				3,800	610	693	106	111	203
9	223	292	270				1,470	570	570	108	106	136
10	200	249	338				1,040	550	493	103	99	127
11	186	270	403				992	512	570	100	146	550
12	184	258	738				1,120	456	456	100	192	550
13	173	580	1,820				1,160	531	531	96	174	203
14	161	354	992				1,210	1,160	456	117	115	129
15	151	322	657				1,740	693	384	122	115	141
16	156	307	543				3,940	531	420	117	108	531
17	141	229	490				3,620	1,040	493	103	90	235
18	173	354	472				2,280	906	384	85	68	169
19	738	490	354				2,180	590	315	90	111	820
20	420	354	276				1,740	493	282	106	96	949
21	292	307	386				1,470	1,380	282	85	96	777
22	276	307	354				1,560	906	250	203	90	420
23	472	252	2,000		196		3,130	820	223	156	81	298
24	507	307	1,250				1,870	651	209	106	166	282
25	338	270	822				1,380	693	182	92	298	238
26	292	246	562				1,340	512	282	85	282	198
27	270	276	543				1,470	456	223	81	315	171
28	270	279	507				1,290	384	187	72	195	166
29	243	864	307				949	384	171	106	146	195
30	240	543	507				820	2,410	144	119	139	550
31	234		472					2,500		111	115	

Daily discharge, in second-feet, of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	315	250	266				2,480	360	405	141	141	89
2	315	438	298				1,170	360	375	120	152	80
3	244	298	1,080				910	340	320	126	130	80
4	220	250	570				1,410	290	290	117	130	86
5	209	247	456				2,360	290	260	120	141	171
6	192	244	610				1,660	290	230	126	130	58
7	182	282	693				1,000	275	275	202	113	55
8	192	1,820	438				790	245	390	141	93	49
9	164	906	282				710	230	290	120	99	22
10	187	590	384				670	230	230	152	93	49
11	182	474	366				710	230	202	290	113	69
12	195	420	298				750	216	176	164	97	54
13	531	402	250				790	202	176	164	97	44
14	315	735	244				750	230	176	152	99	47
15	266	735	250				910	202	164	141	101	85
16	266	531	266				910	202	176	141	87	71
17	238	420	266				830	305	405	113	85	80
18	214	366	244				670	230	260	111	89	73
19	203	366	512				910	320	202	230	71	68
20	250	384	693				830	290	176	164	75	55
21	214	366	349				640	230	176	130	75	47
22	192	384	315				600	320	152	117	63	82
23	203	384	384				560	790	141	101	75	360
24	1,340	349	315				600	750	130	117	71	152
25	777	349	349				600	460	130	176	85	105
26	570	349	349				600	360	120	141	78	89
27	456	315	315				560	290	460	101	89	85
28	366	282	300			3,280	500	320	360	360	126	69
29	315	226	282			1,260	460	1,460	189	420	105	80
30	298	298	280			1,170	405	750	152	219	120	87
31	266		651			1,560		500		174	80	
1913–14.												
1	111	216	189				420	1,410	189	230	80	128
2	85	216	202				670	1,120	176	275	55	125
3	122	189	230				420	1,310	152	275	130	123
4	130	189	290				290	1,460	230	202	141	121
5	97	202	230				305	1,710	390	152	113	106
6	97	176	202				230	1,510	260	176	107	88
7	87	152	164				216	1,260	189	152	107	179
8	93	152	530				320	1,000	176	189	320	186
9	89	164	260				1,820	950	164	290	152	149
10	89	230	290				870	830	152	176	105	146
11	101	230	260				670	410	141	152	115	122
12	126	189	260				1,040	600	130	176	126	105
13	202	152	202				750	530	126	141	89	101
14	152	176	202				600	530	111	105	78	97
15	141	152	189				640	500	126	111	68	89
16	126	130	176				870	420	117	97	58	85
17	113	130	202				710	390	141	87	93	80
18	97	141	189				1,080	360	130	89	90	58
19	105	152	176				2,240	340	122	107	86	71
20	186	670	152				4,640	320	189	101	83	13
21	790	420	152				4,320	305	176	87	86	78
22	320	275	152				1,880	305	141	85	139	80
23	202	230	189				1,460	305	122	48	102	58
24	176	230	152				1,170	360	109	55	84	85
25	230	230	164				1,460	290	176	55	65	130
26	530	202	176				1,510	260	128	55	63	152
27	560	164	152			640	1,560	230	111	91	53	130
28	360	141	152			830	1,880	245	101	78	54	230
29	305	176	152			1,080	2,420	202	141	85	94	164
30	340	176	152			830	2,000	176	202	93	138	152
31	320		152			600		202		111	181	

Daily discharge, in second-feet, of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for the years ending Sept. 30, 1909–1916—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	141	69	164			750	189	600	164	107	375	230
2	130	111	260			600	230	600	152	164	640	202
3	111	128	405			530	230	500	152	141	420	176
4	97	120	305			420	202	420	130	141	290	176
5	91	126	164			405	290	390	122	189	275	152
6	97	126	189			390	340	340	101	202	230	152
7	97	122	176			340	245	305	113	130	202	152
8	93	97	141			340	460	530	113	320	530	710
9	91	122	130			305	710	500	120	2,540	750	600
10	71	128	111			290	870	405	117	750	1,310	305
11	68	109	113			260	1,820	340	120	405	600	202
12	97	73	130			245	4,000	290	320	260	360	176
13	82	105	89			245	1,360	275	176	216	320	176
14	80	117	105			230	910	230	152	176	460	189
15	82	97				230	750	230	128	176	320	176
16	78	260				189	670	216	152	152	320	152
17	78	340				176	670	216	405	670	390	164
18	202	152				176	600	260	530	910	360	152
19	152	202				202	560	230	260	405	260	130
20	141	141				202	530	260	375	360	202	152
21	141	130				176	460	216	260	260	176	420
22	130	141				164	390	230	176	230	202	640
23	113	189				189	375	216	152	560	1,170	290
24	97	164				290	360	189	130	275	710	216
25	105	141				340	1,000	176	141	202	670	189
26	101	141				530	1,000	202	152	245	530	202
27	111	202				260	750	460	113	1,310	375	600
28	97	202			950	260	530	275	108	460	290	360
29	99	176				152	500	216	105	1,660	260	260
30	101	152				189	530	189	93	830	230	216
31	82					176		176		500	275	
1915–16.												
1	189	216	305	460	1,410	670	2,360	830	530	320	245	152
2	202	216	202	530	1,120	600	2,360	750	390	275	176	245
3	260	202	260	530	910	560	1,220	670	320	830	164	230
4	202	216	202	460	750	460	950	1,000	1,310	750	164	176
5	260	216	202	460	670	460	750	670	910	640	164	216
6	500	202	189	500	600	390	710	600	750	405	189	202
7	290	202	176	600	530	360	790	530	560	320	152	176
8	230	202	176	500	360	290	750	500	460	710	164	176
9	230	189	189	390	360	290	710	500	420	500	1,560	460
10	202	202	164	360	290	290	600	460	600	340	1,660	230
11	189	189	176	290	290	290	710	500	910	420	670	176
12	176	176	176	290	260	320	910	420	670	360	500	152
13	176	189	216	230	260	290	830	375	530	500	360	152
14	176	189	176	275	260	290	1,000	340	670	320	290	141
15	245	230	202	202	260	230	790	320	460	245	230	152
16	216	320	176	202	202	202	910	420	390	230	202	530
17	176	230	176	152	176	176	1,170	1,220	460	290	189	245
18	176	189	260	202	176	152	2,060	2,480	460	260	176	189
19	202	164	560	176	176	176	1,760	1,170	460	230	141	202
20	460	530	360	176	176	152	1,080	790	1,000	202	152	152
21	305	405	290	164	176	130	670	600	600	176	141	164
22	290	320	230	202	152	130	1,220	530	460	202	152	141
23	230	275	202	750	130	130	2,240	500	375	830	152	164
24	202	230	230	640	152	130	1,510	460	320	360	176	176
25	202	189	230	530	152	130	1,310	420	305	260	164	176
26	189	176	1,660	600	560	152	1,170	390	360	216	164	152
27	230	189	1,410	790	950	260	950	360	275	390	152	152
28	216	230	870	2,060	910	600	910	320	640	230	202	130
29	202	230	530	1,760	750	1,760	830	340	420	202	230	152
30	216	460	530	1,220		2,660	830	500	500	189	189	2,060
31	260		405	1,170		3,140		870		275	202	

NOTE.—Discharge determined from a rating curve fairly well defined below 2,000 second-feet; above 2,000 second-feet the curve is based on logarithmic extension. Discharge, July 11-28, 1909, estimated by comparison with record of White River at Sharon. Stage-discharge relation affected by ice Dec. 28, 1909, to Jan. 21, 1910; Feb. 4-27, 1910; Dec. 7, 1910, to Mar. 26, 1911; Jan. 6 to Apr. 8, 1912; Jan. 1 to Mar. 28, 1913; Jan. 1 to Mar. 26, 1914; Dec. 15, 1914, to Feb. 27, 1915; Jan. 9-25, Feb. 4-27, and Mar. 3-28, 1916; discharge for these periods ascertained by means of gage heights, current-meter measurements, observer's notes, and weather records.

Monthly discharge of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for 1909–1916.

[Drainage area, 237 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1909.						
May 26–31	700	390	487	2.05	0.46	B.
June	556	149	272	1.15	1.28	B.
July	260	80	127	.536	.62	C
August	372	74	108	.456	.53	B.
September	777	87	154	.650	.73	B.
1909–10.						
October	397	119	174	.734	.85	B.
November	362	144	185	.781	.87	B.
December	219	124	156	.658	.76	B.
January	2,540	60	453	1.91	2.20	C.
February	1,960	....	a 275	1.16	1.21	D.
March	2,320	306	994	4.19	4.83	A.
April	2,000	500	923	3.89	4.34	A.
May	3,080	290	635	2.68	3.09	A.
June	906	178	428	1.81	2.02	A.
July	248	91	155	.654	.75	A.
August	444	80	162	.684	.79	A.
September	949	78	167	.705	.79	A.
The year	3,080	....	393	1.66	22.50	
1910–11.						
October	355	110	174	.734	.85	A.
November	390	126	199	.840	.94	A.
December	....	....	a 140	.591	.68	D.
January	....	....	a 190	.802	.92	D.
February	....	....	a 100	.422	.44	D.
March	....	....	a 185	.781	.90	D.
April	2,500	200	1,370	5.78	6.45	B.
May	2,500	168	620	2.62	3.02	A.
June	370	112	200	.844	.94	A.
July	338	75	135	.570	.66	A.
August	599	75	149	.629	.73	A.
September	420	128	200	.844	.94	A.
The year	....	....	305	1.29	17.47	
1911–12.						
October	580	141	287	1.21	1.40	A.
November	864	195	326	1.38	1.54	A.
December	2,000	255	564	2.38	2.74	A.
January	....	....	a 290	1.22	1.41	D.
February	....	....	a 120	.506	.55	D.
March	....	....	a 350	1.48	1.71	D.
April	3,940	384	1,630	6.88	7.68	A.
May	2,500	384	793	3.35	3.86	A.
June	2,180	144	559	2.36	2.63	A.
July	203	72	113	.477	.55	B.
August	315	68	146	.616	.71	B.
September	949	122	300	1.27	1.42	A.
The year	....	....	455	1.92	26.20	
1912–13.						
October	1,340	164	319	1.35	1.56	A.
November	1,820	226	449	1.89	2.11	A.
December	1,080	244	399	1.68	1.94	A.
January	....	....	a 600	2.53	2.92	D.
February	....	....	a 320	1.35	1.41	D.
March	....	....	a 1,360	5.74	6.62	D.
April	2,480	405	892	3.76	4.20	A.
May	1,460	202	373	1.57	1.81	A.
June	460	120	240	1.01	1.13	A.
July	420	101	164	.692	.80	A.
August	152	63	100	.422	.49	B.
September	360	22	84.1	.355	.40	B.
The year	....	....	443	1.87	25.39	

a Discharge estimated wholly or in part by comparison with records of streams in adjacent drainage basins.

Monthly discharge of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., for 1909–1916—Continued.

Month.	Discharge in second-feet.			Per square mile.	Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.			
1913–14.						
October	560	85	209	0.882	1.02	A.
November	670	130	208	.878	.98	A.
December	530	152	205	.865	1.00	A.
January			a 120	.506	.58	D.
February			a 115	.485	.50	D.
March	1,080		a 295	1.24	1.43	D.
April	4,640	216	1,280	5.40	6.02	B.
May	1,710	176	650	2.74	3.16	A.
June	390	101	161	.679	.76	A.
July	290	48	133	.561	.65	A.
August	320	53	105	.443	.51	B.
September	230	13	114	.481	.54	B.
The year	4,640	13	300	1.27	17.15	
1914–15.						
October	202	68	105	.443	.51	B.
November	340	69	146	.616	.69	B.
December			a 145	.612	.71	C.
January			a 170	.717	.83	D.
February	950		a 270	1.14	1.19	D.
March	750	164	298	1.26	1.45	A.
April	4,000	189	718	3.03	3.38	A.
May	600	176	313	1.32	1.52	A.
June	530	93	178	.751	.84	A.
July	2,540	107	482	2.03	2.34	A.
August	1,310	176	436	1.84	2.12	A.
September	710	130	264	1.11	1.24	A.
The year	4,000		294	1.24	16.82	
1915–16.						
October	500	176	235	.992	1.14	A.
November	530	164	239	1.01	1.13	A.
December	1,660	164	365	1.54	1.78	A.
January	2,060	152	544	2.30	2.65	C.
February	1,410	130	454	1.92	2.07	C.
March	3,140	130	512	2.16	2.49	C.
April	2,360	600	1,140	4.81	5.37	B.
May	2,480	320	640	2.70	3.11	A.
June	1,310	275	550	2.32	2.59	A.
July	830	176	370	1.56	1.80	A.
August	1,660	141	306	1.29	1.49	A.
September	2,060	130	261	1.10	1.23	A.
The year	3,140	130	466	1.97	26.85	

a Discharge estimated wholly or in part by comparison with records of streams in adjacent drainage basins.

Days of deficiency in discharge of Passumpsic River at Pierce's Mills, near St. Johnsbury, Vt., during the year ending Sept. 30, 1916.

Discharge in second-feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge, 1915–16.	Discharge in second-feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge. 1915–16.
140	15.9	7	400	45.5	225
150	17.0	11	500	56.8	250
160	18.2	31	600	68.2	278
170	19.3	42	700	79.6	299
180	20.4	75	800	90.9	315
200	22.7	92	1,000	114	333
220	25.0	133	1,500	170	350
250	28.4	159	2,000	227	357
300	34.1	191	2,500	284	363
350	39.8	207	3,000	341	365
			3,500	398	366

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

PASSUMPSIC RIVER AT ST. JOHNSBURY CENTER, VT.

LOCATION.—At steel highway bridge near railway station at St. Johnsbury Center, about 3½ miles below mouth of Sheldon Branch and 2½ miles above mouth of Moose River.

DRAINAGE AREA.—244 square miles.

RECORDS AVAILABLE.—June 29 to November 30, 1903.

GAGE.—Chain attached to downstream side of steel highway bridge; read twice daily by F. H. Wheeler.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Channel rocky, with gravel and alluvium; banks high and not subject to overflow. Control influenced by the dam at Paddocks Village, St. Johnsbury, 2 miles downstream.

EXTREMES OF STAGE.—Maximum stage recorded during the period, 5.40 feet at 8 a. m. July 26; minimum stage, 1.20 feet at 5.40 p. m. September 26.

REGULATION.—The operation of power plants above the station may have affected the distribution of flow at low stages.

ACCURACY.—Stage-discharge relation affected by dam below the station. Data insufficient for determination of daily discharge.

Discharge measurements of Passumpsic River at St. Johnsbury Center, Vt., during 1903.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 29	H. K. Barrows.........	2.57	160	Aug. 4	H. K. Barrows.........	2.64	179
July 16	N. C. Grover...........	2.98	249	Sept. 17	.....do.................	1.37	90

Daily gage height, in feet, of Passumpsic River at St. Johnsbury Center, Vt., for 1903.

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.
1........	....	2.70	3.32	2.58	2.12	3.00	16........	....	3.02	2.85	1.52	2.15	2.90
2........	....	3.10	3.18	2.55	2.10	2.85	17........	....	3.12	2.62	1.40	2.15	2.65
3........	....	3.00	2.98	2.48	2.62	2.75	18........	....	2.82	2.50	1.35	3.10	2.88
4........	....	2.95	2.85	2.48	2.88	2.58	19........	....	2.90	2.32	1.35	3.15	2.88
5........	....	2.88	2.98	2.70	2.60	2.65	20........	....	2.82	3.22	1.72	2.95	2.50
6........	....	3.02	2.90	2.82	2.95	3.20	21........	....	2.78	3.35	1.90	2.85	2.50
7........	....	3.08	2.90	2.50	2.65	3.02	22........	....	2.65	3.05	2.18	2.42	2.60
8........	....	2.65	2.80	2.15	2.48	3.05	23........	....	2.95	2.95	1.88	2.80	2.68
9........	....	2.40	2.82	1.80	2.45	2.88	24........	....	3.20	2.58	1.65	3.30	2.65
10........	....	3.02	2.60	1.78	2.50	2.80	25........	....	2.95	2.55	1.42	3.10	2.65
11........	....	3.10	1.92	1.52	2.88	2.82	26........	....	5.05	3.20	1.25	2.90	2.95
12........	....	2.90	2.00	1.40	2.30	2.80	27........	....	3.78	2.92	1.30	2.70	2.78
13........	....	2.32	1.90	1.30	2.22	2.80	28........	....	3.25	2.52	1.60	2.85	2.78
14........	....	2.30	1.85	1.35	2.20	2.68	29........	2.57	3.20	2.78	2.32	2.68	2.90
15........	....	2.45	2.45	1.40	2.20	2.95	30........	2.65	3.38	2.85	2.22	2.70	2.35
							31........	....	3.98	2.92	......	2.78	......

WHITE RIVER AT SHARON, VT.

LOCATION.—At steel highway bridge near railway station in Sharon village (1903 1904); about 1,500 feet below dam of Vermont Copper Co., 1 mile below Sharon village (1909–1912).

DRAINAGE AREA.—643 square miles at site first used in Sharon village; 654 square, miles at site 1 mile below Sharon.[1]

RECORDS AVAILABLE.—June 30, 1903, to November 12, 1904, and May 12, 1909, to December 31, 1912.

GAGES.—Chain gage on upstream side of highway bridge in Sharon village; read twice daily from June 30, 1903, to November 12, 1904; staff and chain gages on left bank 1,500 feet below dam of Vermont Copper Co., and staff gage at crest of dam, used from May 12, 1909, to December 31, 1912.

[1] Remeasured since publication of other reports.

DISCHARGE MEASUREMENTS.—Made from highway bridge in Sharon village; from suspension footbridge below dam of Vermont Copper Co., and by wading.

CHANNEL AND CONTROL.—Stream bed covered with gravel and alluvium; somewhat shifting. Control at first site was at a timber crib dam, but as dam was not used for power and all water except leakage passed over it, the conditions were fairly permanent until the erection of a new dam 1 mile downstream caused back-water at the gage. The control for the new site consisted of gravel and boulders and was somewhat shifting. A rating was also made of the crest of the dam.

EXTREMES OF STAGE.—Maximum stage recorded 1903–4 and 1909–1912: 9.5 feet April 7, 1911 (discharge 10,200 second-feet); minimum stage, 2.9 feet September 22, 1909 (discharge, 10 second-feet; water held back by dam).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; records at dam of Vermont Copper Co. used in making computations at various times during the winters from 1909 to 1912.

REGULATION.—Flow not seriously affected by regulation during 1903–4, but at the new site, 1 mile below Sharon, the distribution of flow was largely regulated by the dam of the Vermont Copper Co.

ACCURACY.—Records considered good.

Discharge measurements of White River at Sharon, Vt., during 1903–4 and 1909–1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1903.				1910.			
June 30	H. K. Barrows.........	5.03	440	Aug. 17	G. M. Brett............	3.90	286
Aug. 1	.....do...............	4.87	395				
Sept. 10	.....do...............	4.79	270	1911.			
				June 18	G. H. Canfield.........	3.80	306
1904.							
Apr. 7	N. C. Grover..........	6.63	3,110	1912.			
May 3	S. K. Clapp............	6.49	2,810	Feb. 17	G. H. Canfield.........	a 5.25	431
27	.....do...............	5.58	1,180	Sept. 2	J. G. Mathers..........	3.45	162
July 7	.....do...............	4.51	147				
7	.....do...............	4.49	128	1913.			
27	.....do...............	4.70	316	Sept. 12	G. H. Canfield.........	2.92	151
Sept. 26	T. W. Norcross.........	5.59	1,260	13	.....do...............	1.90	4
1909.				1914.			
May 12	D. M. Wood...........	5.85	2,640	Sept. 20	R. S. Barnes...........	2.70	141
29	.....do...............	5.30	1,830	Oct. 7	C. H. Pierce...........	b 2.32	69
June 24	.....do...............	4.07	496	7	.....do...............	b 2.32	67
July 20	.....do...............	3.70	255				
21	.....do...............	3.63	224				
Sept. 10	.....do...............	3.50	175				

a Stage-discharge relation affected by ice.
b Stage-discharge relation affected by gravel bar below the gage; conditions shifting.

Daily discharge, in second-feet, of White River at Sharon, Vt., for the years ending Sept. 30, 1903–4 and 1909–1912.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1903.				1903.				1903.			
1.........	619	375	418	11.........	298	375	335	21.........	513	849	263
2.........	790	335	418	12.........	263	1,970	263	22.........	619	535	263
3.........	513	298	335	13.........	298	849	263	23.........	1,700	418	263
4.........	513	335	335	14.........	263	619	298	24.........	849	418	230
5.........	418	418	513	15.........	263	418	263	25.........	565	418	230
6.........	418	418	464	16.........	335	418	263	26.........	513	675	230
7.........	375	513	418	17.........	298	418	335	27.........	619	513	230
8.........	375	335	375	18.........	335	418	335	28.........	513	454	263
9.........	335	335	335	19.........	298	375	335	29.........	418	418	298
10.........	298	335	335	20.........	375	732	263	30.........	513	375	263
								31.........	464	418	....

Daily discharge, in second-feet, of White River at Sharon, Vt., for the years ending Sept. 30, 1903–4 and 1909–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1	263	418	......	......	......	......	2,250	4,340	732	298	140	140
2	263	418	......	......	......	......	2,150	3,470	732	335	140	88
3	263	418	......	......	......	......	2,410	2,850	675	335	199	88
4	263	375	......	......	......	......	2,680	2,650	619	263	199	113
5	263	375	......	......	......	......	2,940	2,250	675	263	230	263
6	513	513	......	......	......	......	3,200	1,880	732	199	230	335
7	375	464	......	......	......	......	3,470	1,530	619	169	263	418
8	335	335	......	......	......	......	3,470	1,370	619	140	263	464
9	619	375	......	......	......	......	5,460	1,300	565	140	240	464
10	909	418	......	......	......	......	5,230	1,530	513	199	240	418
11	619	335	......	......	......	......	4,340	1,530	513	199	220	335
12	513	375	......	......	......	......	3,570	1,300	418	199	220	335
13	464	418	......	......	......	......	3,260	1,370	418	263	200	263
14	418	375	......	......	......	......	2,450	1,300	418	263	200	263
15	418	335	......	......	......	......	2,060	1,370	335	263	180	199
16	375	375	......	......	......	......	2,060	1,610	335	199	180	1,700
17	375	418	......	......	......	......	1,700	1,230	298	199	160	1,700
18	619	619	......	......	......	......	1,880	1,370	263	140	160	1,610
19	790	565	......	......	......	......	1,970	2,450	335	140	140	1,450
20	619	418	......	......	......	......	1,880	2,250	335	88	199	1,300
21	513	335	......	.	......	......	1,700	1,970	298	67	263	1,160
22	464	......	......	......	......	......	1,880	1,970	298	50	335	1,030
23	418	......	......	......	......	......	1,880	1,450	169	113	335	909
24	619	......	......	......	......	......	2,060	1,450	88	140	335	790
25	565	......	......	......	......	......	3,260	1,450	140	199	263	675
26	513	......	......	......	......	......	3,360	1,370	140	263	263	970
27	513	......	......	......	......	6,260	2,650	1,230	88	263	199	1,230
28	464	......	......	......	......	3,470	4,560	1,030	113	263	199	1,230
29	418	......	......	......	......	2,550	6.380	970	169	199	199	1,300
30	418	......	......	......	......	2,350	5.800	849	199	199	199	1,530
31	464	......	......	......	......	2,450	....	849	......	140	140	......

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1904.			**1904.**			**1904.**		
1	1,700	2,150	11	675	1,300	21	1,100	......
2	1,700	1,970	12	565	1,160	22	1,530	......
3	1,790	1,700	13	464	....	23	2,550	......
4	1,610	1,450	14	375	....	24	3,360	......
5	1,450	1,300	15	335	....	25	3,470	......
6	1,300	1,450	16	375	....	26	3,260	......
7	1,160	1,610	17	464	....	27	3,150	......
8	1,030	1,700	18	565	....	28	2,950	......
9	909	1,610	19	675	....	29	2,750	......
10	790	1,450	20	790	....	30	2,550	......
						31	2,350	......

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1909.						**1909.**					
1	....	1,020	315	86	135	16	1,510	875	175	100	143
2	....	885	288	266	135	17	2,780	725	175	135	155
3	....	846	271	175	155	18	2,840	1,050	179	345	135
4	....	752	408	155	143	19	2,350	836	288	271	72
5	....	865	288	163	260	20	2,260	351	238	315	72
6	....	2,590	408	238	224	21	2,000	752	263	260	135
7	....	1,560	315	246	143	22	1,700	579	195	233	10
8	....	1,180	288	199	139	23	1,700	500	175	345	72
9	....	986	271	203	159	24	1,510	440	167	195	135
10	....	885	238	175	143	25	1,210	440	100	135	139
11	....	1,130	260	155	110	26	1,120	375	195	155	47
12	2,640	986	315	163	64	27	1,050	455	179	175	89
13	1,870	743	195	155	104	28	1,130	440	179	107	169
14	1,750	1,290	183	163	135	29	1,670	345	155	100	820
15	1,630	1,180	195	67	139	30	1,510	260	151	195	459
						31	1,240	....	135	195	......

Daily discharge, in second-feet, of White River at Sharon, Vt., for the years endir 1 Sept. 30, 1903–4 and 1909–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	315	238	304			7,620	5,140	1,180	2,260	440	260	260
2	266	266	304			6,940	3,360	1,180	1,700	440	260	260
3	288	207	339			6,170	2,870	1,180	1,300	440	260	315
4	304	199	341			4,000	2,560	2,260	1,180	440	4,940	375
5	271	271	260			1,750	2,260	1,700	965	440	1,430	375
6	215	215	304			2,260	2,410	1,430	2,260	440	965	1,070
7	215	238	327			4,000	2,870	1,180	3,740	375	680	1,700
8	215	375	321			3,040	2,410	1,070	3,200	375	595	865
9	167	238	251			2,000	1,970	1,070	2,120	375	515	595
10	72	242	256			1,670	2,260	1,300	1,970	315	440	440
11	233	238	271			1,440	1,560	1,180	1,700	315	515	375
12	171	238	260			1,590	1,430	1,070	1,970	315	680	375
13	233	271				1,360	1,300	965	1,830	315	515	375
14	191	191				1,360	1,180	965	1,560	315	375	595
15	215	260				1,560	1,180	965	1,300	315	375	440
16	175	171				1,290	1,070	965	1,300	375	440	375
17	207	233				1,290	1,070	770	1,430	315	375	315
18	199	224				810	1,070	770	1,300	375	375	315
19	242	195				1,010	1,180	1,070	1,180	375	375	375
20	207	310		620		1,670	1,300	865	1,070	315	315	315
21	171	175		560		2,170	1,180	770	865	260	260	315
22	183	251		1,720		1,510	1,070	865	865	260	315	315
23	179	271		2,540		3,130	1,180	865	770	260	260	315
24	345	293		1,510		3,450	1,070	770	770	260	260	375
25	345	345		1,360		6,170	965	865	680	260	215	375
26	293	388		1,080		5,980	965	3,560	595	260	315	375
27	238	345		940		4,130	2,560	2,260	595	260	260	440
28	224	345		810	7,620	3,500	1,830	1,970	770	215	175	2,410
29	220	321		680		4,320	1,430	1,180	680	260	260	1,180
30	207	345		680		4,940	1,300	1,070	515	260	215	770
31	199			680		5,770		1,180		260	215	
1910–11.												
1	680	515	515	398		450	1,180	4,520	440	255	255	440
2	680	515	515	620		450	865	5,770	515	255	210	440
3	680	680	440	5,770		398	680	3,560	440	255	175	515
4	595	965	375	2,720		450	680	2,260	440	210	175	440
5	515	1,070	440	940		345	680	1,970	440	210	175	440
6	595	1,300	440	810		450	1,300	1,690	440	210	175	595
7	595	965	440	875		450	10,200	1,560	440	370	140	515
8	595	865	440	745		450	4,730	1,430	370	310	140	515
9	515	770	440	940		505	3,380	1,300	370	310	140	680
10	515	770	440	810		450	2,720	1,180	370	255	140	965
11	515	770	440	745		345	2,560	1,070	370	210	175	595
12	515	770	260	875		345	2,870	965	440	175	175	595
13	440	680	215	810		345	3,740	865	440	175	175	515
14	440	680	250	940		345	4,730	770	370	175	140	440
15	440	680	250	810		450	7,960	680	370	140	175	595
16	440	595	345	505		450	6,850	680	370	140	140	1,070
17	440	595	250	505		450	3,940	680	310	140	140	865
18	440	595		560		398	3,560	595	310	370	140	770
19	440	515		560		345	3,740	595	310	310	210	685
20	440	515		505		345	3,740	515	310	255	440	770
21	515	515		560		345	3,560	440	310	255	310	685
22	375	515		560		345	3,560	440	255	210	255	370
23	440	515		450		345	3,200	440	210	210	175	515
24	1,070	515		398		345	2,870	440	210	210	175	140
25	515	515		398		398	3,940	595	255	255	210	370
26	515	515		345		450	4,730	515	595	210	175	440
27	515	440		398		865	5,140	515	440	210	210	440
28	770	440		810		4,130	7,960	440	370	175	255	370
29	680	515		1,010		3,740	4,730	595	440	440	3,200	515
30	515	515		745		2,120	3,200	515	310	370	1,180	515
31	515			560		1,830		440		310	680	

Daily discharge, in second-feet, of White River at Sharon, Vt., for the years ending Sept. 30, 1903–4 and 1909–1912—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	770	1,180	1,430				6,420	1,970				
2	680	1,180	1,300				3,380	1,560				
3	770	1,070	1,070				2,410	1,560	3,200			
4	680	965	770					1,430	2,560			
5	1,700	865	595				1,700	1,560	2,260			
6	1,180	865	770				9,080		1,830			
7	1,070	1,430	770				11,200	1,430	1,830			
8	965	1,180	770					1,300				
9	965	1,070	865				8,180	1,180	1,300			
10	865	965	865						1,180			
11	770	965	1,070				3,380	965				
12	770	965	2,120				3,380	865	965			
13	680	1,430	2,410				3,740					
14	680	770	2,120					1,070	865			
15	565	1,070	1,560				4,130		770			
16	515	865	1,300				10,000	965	680			
17	515	865	1,430				9,540	4,320	680			
18	595	965	1,300						680			
19	7,960	1,560	965				10,500	1 970	595			
20	5,560	1,180	770						515			
21	2,870	1,070	770				4,130		515			
22	2,410	965	965				3,940	5,140	440			
23	2,120	965	5,980				6,850		370			
24	2,120	965	3,120					2,560	310			
25	1,700	865	2,120				3,560		255			
26	1,430	865	1,830				3,040		210			
27	1,300	865	1,560				3,040	1,430	255			
28	1,180	770	1,560				2,720		210			
29	1,070	2,120	1,070			2,870	2,410	1,070				
30	1,070	1,690	865			5,350		6,630	210			
31	1,430		770					7,960				

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1912.							**1912.**						
1			104	515			16						770
2	175	175			680	515	17	140		515			
3							18		140		370	1,180	
4	175	104	210	370	1,020		19	140			440		1,430
5	140						20		175				
6						1,560	21			1,300		865	865
7	175	140		310			22			770			
8	175		1,070		3,560	1,430	23	370	175				
9	140	140			1,830		24	255				770	595
10	122				1,830		25		104				
11		104		255			26			370	2,870		
12						770	27	140					
13	122						28	122				680	
14		140	175	680	1,830		29	104	175				595
15	175						30				1,070	515	
							31	74					1,830

NOTE.—Discharge for 1903–4 determined from a rating curve fairly well defined below 4,000 second-feet. Discharge for 1909 to 1912 determined from rating curve for staff and chain gages fairly well defined below 4,000 second-feet. A rating curve was also developed for gage at crest of dam, but computations based on this curve are uncertain on account of lack of information regarding use of water through wheels and operation of sluice gates. Stage-discharge relation affected by ice: Nov. 22, 1903, to Mar. 26, 1904; Dec. 10, 1909, to Mar. 25, 1910; Dec. 14–17, 1910; Jan. 1–2, and Jan. 5 to Mar. 26, 1911; and Jan. 12 to Mar. 28, 1912.

Monthly discharge of White River at Sharon, Vt., for the years ending Sept. 30, 1903–4 and 1909–1911.

[Drainage area,*a* 654 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1903.						
July	1,700	263	483	0.751	0.87	A.
August	1,970	298	510	.793	.91	A.
September	513	230	314	.488	.54	A.
1903–4.						
October	909	263	472	.734	.85	A.
November	619		364	.566	.63	B.
December			325	.505	.58	D.
January			225	.350	.40	D.
February			200	.311	.34	D.
March	6,260		1,160	1.80	2.08	C.
April	6,380	1,700	3,070	4.78	5.33	A.
May	4,340	849	1,730	2.69	3.10	A.
June	732	88	395	.614	.68	A.
July	335	50	200	.311	.36	A.
August	335	140	217	.337	.39	B.
September	1,700	88	759	1.18	1.32	A.
The year	6,380		758	1.18	1?.06	
1904.						
October	3,470	335	1,540	2.40	2.77	A.
November 1–12	2,150	1,160	1,570	2.44	1.09	A.
1909.						
May 12–31	2,840	1,050	1,780	2.72	2.02	A.
June	2,590	260	844	1.29	1.44	A.
July	408	100	230	.352	.41	A.
August	345	67	189	.289	.33	B.
September	865	10	163	.249	.28	B.
1909–10.						
October	345	72	226	.346	.40	A.
November	388	171	261	.399	.45	A.
December	341		237	.362	.42	C.
January	2,540		541	.827	.95	C.
February	7,620		700	1.07	1.11	D.
March	7,620	810	3,160	4.83	5.57	B.
April	5,140	965	1,810	2.77	3.09	A.
May	3,560	770	1,240	1.90	2.19	A.
June	3,740	515	1,420	2.17	2.42	A.
July	440	215	330	.505	.58	A.
August	4,940	175	562	.859	.99	B.
September	2,410	260	566	.865	.97	A.
The year	7,620	72	922	1.41	19.14	
1910–11.						
October	1,070	375	530	.810	.93	B.
November	1,300	440	660	1.01	1.13	A.
December			554	.847	.98	C.
January	5,770	345	893	1.37	1.58	B.
February			345	.528	.55	C.
March	4,130	345	746	1.14	1.31	B.
April	10,200	680	3,770	5.76	6.43	B.
May	5,770	440	1,230	1.88	2.17	A.
June	595	210	375	.573	.64	B.
July	440	140	245	.375	.43	B.
August	3,200	140	337	.515	.59	A.
September	1,070	140	560	.856	.96	A.
The year	10,200	140	853	1.30	17.70	
1911.						
October	7,960	515	1,520	2.32	2.68	A.
November	2,120	770	1,080	1.65	1.84	A.
December	5,980	595	1,450	2.22	2.56	A.

a 643 square miles from June 30, 1903, to Nov. 12, 1904.

NOTE.—Discharge for Nov. 22, 1903, to Mar. 26, 1904, estimated by comparison with record of flow of Connecticut River at Fairlee; mean discharge Dec. 13-31, 1909, estimated 201 second-feet; discharge for Jan. 1-19, and Feb. 1-27, estimated from weather records and comparison with records of streams in nearby drainage basins, mean discharge Feb. 1-27 estimated 444 second-feet. Discharge for February, 1911, estimated by comparison with records of streams in near-by drainage basins. Discharge for other periods during the winter months based on rating curve for crest of dam.

WHITE RIVER AT WEST HARTFORD, VT.

LOCATION.—About 500 feet above highway bridge in village of West Hartford, 7 miles above mouth of river.

DRAINAGE AREA.—687 square miles.

RECORDS AVAILABLE.—June 9, 1915, to September 30, 1916.

GAGE.—Inclined staff on left bank; read twice a day by F. P. Morse.

DISCHARGE MEASUREMENTS.—Made from cable 1,500 feet below the gage or by wading.

CHANNEL AND CONTROL.—Channel wide and of fairly uniform cross-section at measuring section; covered with gravel and alluvium. Control formed by rock ledge 100 feet below the gage; well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 10.7 feet at 7 a. m. April 2, 1916 (approximate discharge determined from extension of rating curve, 10,200 second-feet); minimum stage, 2.32 feet at 6 a. m. August 29, 1916 (approximate discharge determined from extension of rating curve, 40 second-feet).

The high water of March 27, 1913, reached a stage of 18.9 feet. as determined from reference mark on scale platform opposite gage (discharge not determined).

WINTER FLOW.—Stage-discharge relation somewhat affected by ice; discharge ascertained by means of gage heights, discharge measurements, observer's notes, and weather records. (See Pl. XII, B, p. 91.)

REGULATION.—There are several power plants on the main stream and tributaries above the station, the nearest being that of the Vermont Copper Co. at Sharon; when this plant is in operation it causes some diurnal fluctuation in discharge at low stages.

ACCURACY.—Results good.

Discharge measurements of White River at West Hartford, Vt., during 1915–16.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
June 9	C. H. Pierce............	3.11	230	Mar. 20	R. S. Barnes...........	2.98	617
Sept. 8	Thweatt and Adams...	3.30	260	21	.....do................	3.96	627
13	Hardin Thweatt.......	3.08	233	Apr. 7	.....do................	6.59	3,170
Nov. 22	G. F. Adams...........	4.17	715	8	.....do................	6.12	2,220
Dec. 5	C. H. Pierce...........	3.52	376	9	.....do................	6.22	2,310
21	R. S. Barnes...........	4.10	718	20	Hardin Thweatt.......	6.56	3,280
1916.				21	.....do................	6.45	3,090
Jan. 11	R. S. Barnes...........	a 4.35	748	25	R. S. Barnes...........	7.30	4,230
Feb. 7	.....do................	a 5.04	936	June 21	Hardin Thweatt.......	5.70	2,120
15	.....do................	4.08	668	Oct. 27	.....do................	3.37	286

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of White River at West Hartford, Vt., for the years ending Sept. 30, 1915–16.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1915.					**1915.**				
1	....	410	515	435	16	295	655	542	210
2	....	1,450	715	385	17	385	810	542	210
3	....	1,270	1,020	315	18	625	777	570	195
4	....	1,270	745	295	19	460	685	460	177
5	....	950	1,270	295	20	435	1,180	385	180
6	....	1,100	1,020	240	21	435	845	337	275
7	....	745	915	275	22	337	810	385	487
8	....	950	715	337	23	275	1,360	1,180	337
9	225	4,280	715	410	24	240	915	985	257
10	210	1,960	777	337	25	240	715	950	240
11	240	1.180	655	257	26	225	•715	777	180
12	410	915	542	225	27	180	880	597	295
13	410	777	570	225	28	240	685	487	295
14	295	845	597	240	29	225	915	435	257
15	275	845	487	225	30	195	810	460	210
					31	....	625	460	....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1915–16.												
1	210	337	625	715	4,130	1,360	6,080	2,960	1,180	845	315	165
2	225	315	460	950	2,960	1,270	8,900	2,560	950	745	275	142
3	275	295	515	950	2,070	1,180	4,760	1,960	915	1,640	257	177
4	337	295	487	915	1,450	1,180	3,830	2,070	1,640	1,360	275	174
5	295	295	360	810	985	1,100	2,960	1,850	1,450	1,540	257	156
6	410	295	385	1,180	985	1,020	3,240	1,640	1,360	1,270	240	142
7	410	295	360	1,540	985	915	3,380	1,540	1,180	950	195	156
8	315	275	295	1,100	810	1,100	2,690	1,540	1,020	845	295	165
9	275	275	257	950	810	950	2,690	1,540	1,270	715	225	174
10	240	275	295	777	810	810	2,430	1,360	1,740	655	257	128
11	240	295	315	745	810	715	2,690	1,180	1,960	655	275	159
12	225	257	410	745	625	810	3,240	1,020	1,960	597	240	120
13	210	257	360	745	685	810	3,240	950	1,740	745	225	94
14	195	275	275	715	625	745	3,240	915	1,740	625	225	108
15	257	315	275	745	715	625	2,960	880	1,360	570	225	108
16	410	597	275	515	745	597	3,240	845	1,270	435	210	295
17	315	487	295	542	777	625	3,830	2,820	1,960	515	159	240
18	295	337	300	542	745	570	4,440	5,910	2,310	410	210	240
19	275	460	597	515	715	597	3,680	3,100	1,960	435	195	225
20	275	880	950	487	625	625	3,380	2,310	2,690	360	168	148
21	315	880	715	542	542	625	2,960	1,960	1,960	315	180	195
22	315	745	542	715	597	570	3,100	1,640	1,640	487	195	130
23	275	597	460	2,310	655	542	5,570	1,740	1,360	1,100	295	122
24	225	515	487	2,310	625	542	6,080	1,740	1,180	810	295	171
25	225	435	542	1,640	845	570	4,440	1,450	1,180	597	156	177
26	257	385	2,960	1,540	1,180	685	3,980	1,270	1,270	542	148	168
27	257	410	2,310	3,680	3,380	845	3,380	1,180	1,020	515	142	174
28	295	385	1,740	7,820	1,740	1,360	2,960	1,020	1,549	655	142	171
29	275	487	1,270	4,130	1,450	2,190	2,690	1,100	1,180	460	90	145
30	275	685	1,100	2,430	....	3,680	2,960	1,020	1,020	385	195	1,020
31	275	....	915	2,690	....	5,080	....	1,850	....	360	180	....

NOTE.—Discharge determined from a rating curve fairly well defined between 150 and 5,000 second-feet. Stage-discharge relation affected by ice Jan. 10–21 and Feb. 4–14, 1916; discharge for these periods ascertained by means of gage heights, two discharge measurements, observer's notes, and weather records.

Monthly discharge of White River at West Hartford, Vt., for the year ending Sept. 30, 1915–16.

[Drainage area, 687 square miles.]

Month.	Discharge in second-feet.				Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.		
1915.						
June 9–30	625	180	312	0.454	0.37	B.
July	4,280	410	1,040	1.51	1.74	B.
August	1,270	337	671	.977	1.13	B.
September	487	177	277	.4C?	.45	B.
1915–16.						
October	410	195	280	.4C8	.47	B.
November	880	257	421	.613	.68	B.
December	2,9C0	257	684	.996	1.15	B.
January	7,820	487	1,480	2.15	2.48	C.
February	4,130	542	1,180	1.72	1.86	C.
March	5,080	542	1,110	1.62	1.87	B.
April	8,900	2,430	3,770	5.4C	6.12	B.
May	5,910	845	1,770	2.58	2.07	B.
June	2,690	915	1,500	2.1?	2.43	B.
July	1,640	315	714	1.04	1.20	B.
August	315	90	217	.31c	.36	C.
September	1,020	94	193	.281	.31	C.
The year	8,900	90	1,110	1.62	21.90	

Days of deficiency in discharge of White River at West Hartford, Vt., during the year ending Sept. 30, 1916.

Discharge in second-feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge, 1915–16.	Discharge in second feet.	Theoretical horse-power per foot of fall.	Days of deficiency in discharge, 1915–16.
100	11.4	2	700	79.6	186
120	13.6	4	800	90.9	206
140	15.9	8	900	102	223
160	18.2	20	1,000	114	239
180	20.4	31	1,250	142	264
200	22.7	39	1,500	170	282
225	25.6	43	2,000	227	311
250	28.4	58	3,000	341	337
275	31.2	67	5,000	568	359
300	34.1	101	10,000	1,140	366
350	39.8	113			
400	45.5	123			
450	51.1	131			
500	56.8	142			
600	68.2	169			

NOTE.—The above table gives the theoretical horsepower per foot of fall that may be developed at different rates of discharge, and shows the number of days on which the discharge and corresponding horsepower were respectively less than the amounts given in the columns for discharge and horsepower. In using this table, allowance should be made for the various losses, the principal ones being the wheel loss, which may be as large as 20 per cent, and the head loss, which may be as large as 5 per cent.

EAST BRANCH OF DEERFIELD RIVER AT SOMERSET RESERVOIR, VT.

LOCATION.—At the outlet of Somerset reservoir, about 11 miles (by river) northwest of Wilmington, Vt.

DRAINAGE AREA.—30 square miles, including 3 square miles of water surface when reservoir is full.

RECORDS AVAILABLE.—March 1, 1912, to September 30, 1916.

GAGES.—Vertical staff in arm of weir pool below outlet gates and vertical staff in reservoir near the spillway.

COMPUTATION OF RUN-OFF.—Water discharged through outlet gates is measured by 40-foot Cippoletti weir (Pl. XIV, *B*, p. 111) a few hundred feet below outlet; corrections are applied for gain or loss in water stored as determined from capacity curve of reservoir. During construction of reservoir, prior to June, 1914, the natural flow was ascertained by means of a weir just below the regulating works, with connections for pondage. Current-meter measurements have been made by suspending meter from cable across stream 100 feet below weir; section rough and unsatisfactory for current-meter measurements.

COOPERATION.—Records furnished by the New England Power Co.

The following discharge measurements were made by C. H. Pierce:

September 7, 1916: Gage height, 0.99 foot; discharge, 171 second-feet. Gage height, 2.17 feet; discharge, 573 second-feet.

Monthly discharge of East Branch of Deerfield River at Somerset reservoir, Vt., for the year ending Sept. 30, 1912–1916.

[Drainage area, 30 square miles.]

Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).	Month.	Discharge in second-feet.		Run-off (depth in inches on drainage area).
	Mean.	Per square mile.			Mean.	Per square mile.	
1912.				**1914–15.**			
March	70.0	2.33	2.69	October	12.6	0.42	0.49
April	234	7.80	8.70	November	32.4	1.07	1.21
May	88.5	2.95	3.40	December	26.7	.87	1.03
June	44.4	1.48	1.65	January	94.8	3.15	3.64
July	5.8	.19	.22	February	122	4.07	4.25
August	2.1	.07	.08	March	26.1	.87	1.00
September	17.7	.59	.66	April	175	5.84	6.52
1912–13.				May	48.0	1.60	1.85
October	140.8	4.69	5.41	June	10.2	.34	.38
November	60.7	2.02	2.25	July	139	4.63	5.34
December	96.0	3.20	3.69	August	99.3	3.31	3.82
January	145.7	4.86	5.60	September	33.0	1.10	1.23
February	25.4	.85	.89				
March	263	8.77	10.11	The year	68.1	2.27	30.76
April	96.0	3.20	3.57				
May	76.0	2.53	2.92	**1915–16.**			
June	10.1	.34	.38	October	34.5	1.15	1.33
July	9.2	.31	.36	November	36.6	1.22	1.36
August	6.0	.20	.23	December	77.7	2.59	2.99
September	18.2	.61	.68	January	112	3.73	4.32
				February	116	3.88	4.18
The year	79.8	2.66	36.09	March	31.8	1.06	1.22
				April	215	7.18	8.01
1913–14.				May	182	6.05	6.97
October	55.2	1.84	2.12	June	72.9	2.43	2.71
November	118	3.93	4.38	July	25.2	.84	.97
December	41.2	1.37	1.58	August	4.2	.14	.16
January	26.6	.89	1.03	September	16.5	.55	.62
February	7.5	.25	.26				
March	74.4	2.48	2.86	The year	76.8	2.57	34.84
April	326	10.88	12.14				
May	157	5.24	6.04				
June	9.0	.30	.33				
July	(*a*)	(*a*)	(*a*)				
August	24.0	.80	.92				
September	18.0	.60	.68				
The year	71.4	2.38	32.34				

a The apparent storage release during the month, as computed from capacity curve of the reservoir, exceeded total quantity passing the weir, as computed from weir table.

MISCELLANEOUS MEASUREMENTS.

. The results of measurements of flow of streams in Vermont at points other than gaging stations are given in the following table.

Miscellaneous measurements of streams in Vermont.

St. Lawrence River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1909.				*Feet.*	*Sec.-ft.*
June 28	Lamoille River..........	Lake Champlain..	Covered highway bridge at Johnson Vt.	(*a*)	128
May 19	Dog River...............	Winooski River...	Highway bridge one mile above Northfield, Vt.	*b* 10.25	164
27	.....do....................	.....do..........	.....do......................	*b* 10.90	88.6
June 24	.....do....................	.....do..........	.....do......................	*b* 11.60	22.0
May 20	.....do....................	.....do..........	Railroad bridge at mouth near Montpelier, Vt.	(*c*)	417
1910.					
Aug. 13	Winooski River.........	Lake Champlain..	500 feet below farm bridge or L. D. Nute's farm above Marshfield, Vt.	3.15	9.4
13	.....do....................	.....do..........	400 feet above iron bridge about 1 mile below Marshfield, Vt.	10.3	30.0
6	Mollys Brook	Winooski River...	Highway bridge on road 1 mile below pond between Marshfield and Danville, Vt.	....	1.3
5	Peachams Pond outlet..	.....do..........	At Bruce's Mill, Peacham, Vt.	....	4.0
13	.....do....................	.....do..........	50 feet above second highway bridge above dam of Molly Falls Power Co., Marshfield, Vt.	6.5	11.5
Sept. 2	Cranberry Meadow Pond outlet.	.....do..........	50 feet below first stone culvert under highway above Nelson Pond, near Marshfield, Vt.	2.70	.74
2	Kingsbury Branch......	.....do..........	At farm bridge 200 feet below junction with No. 10 Pond Brook, 2½ miles North Montpelier, Vt.	7.2	19.8
Aug. 12	.....do....................	.....do..........	At old bridge 500 feet below junction with No. 10 Pond Brook above Montpelier, Vt.	6.5	46.5
Sept. 2	Curtis Pond outlet	Kingsbury Branch	Calais Center, Vt.............	....	.26
Aug. 11	Stevens Branch.........	Winooski River...	25 feet above highway bridge below Central Vermont Ry. station, Williamstown, Vt.	3.10	3.17
23	.....do....................	.....do..........	20 feet below highway bridge below Central Vermont Ry. station, Williamstown, Vt.	3.40	1.18
11	.....do....................	.....do..........	At bridge, South Barre, Vt.	8.25	11.4
12	Jail Branch..............	Stevens Branch...	½ mile from East Barre, Vt., on road to Orange, Vt.	*d* 2.0	22.7
23	.....do....................	.....do..........	.....do....................	1.34	4.97
11	.....do....................	.....do..........	200 feet above railroad bridge, Barre, Vt.	*e* 1.75	33.0
23	.....do....................	.....do..........	At railroad bridge, Barre, Vt.	24.58	23.2
13	North Branch...........	Winooski River...	Just above old mill site above Worcester, Vt.	*f* 1.6	13.6
31	.....do....................	.....do..........	.....do....................	*f* 1.27	3.96
12	No. 10 Pond outlet	North Branch.....	Just above highway bridge 2½ miles above Montpelier, Vt.	8.4	23.0
Sept. 2	.....do....................	.....do..........	.....do....................	8.9	8.44

a Reference point is a U-shaped tack in top outer side of guard rail at station 50. Distance to water surface, 28.82 feet. Initial point is face of left abutment.

b Water surface to reference point. Reference point is under edge of zinc cover over the upstream truss at about station 5 from face of east abutment.

c Reference point, southwest corner of top of plate on middle floor beam, upstream side of bridge. Distance to water surface, 18.08 feet.

d Stake driven beside large rocks, with notch assumed at 2 feet.

e Gage at Marvin farm, 1.75.

f Stake driven on right bank.

Miscellaneous measurements of streams in Vermont—Continued.

St. Lawrence River basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1910.				*Feet.*	*Sec.-ft.*
Aug. 9	Dog River...............	Winooski River...	400 feet above Corks highway bridge near Northfield, Vt.	....	3.64
9	East Roxbury Branch of Dog River.	Dog River........	50 feet above mouth near Northfield, Vt.	....	2.50
24	Union Brook.............	....do............	Northfield, Vt.............	....	.09
9	Bull Run Brook..........	....do............	Under highway bridge, Northfield, Vt.	1.85	2.43
30	Mad River...............	Winooski River...	Warren, Vt.................	....	1.74
28	.....do.................	....do............	Waitsfield, Vt.............	....	7.72
28	Mill Stream Branch of Mad River.	Mad River........	Just above second mill, near Waitsfield, Vt.	....	2.47
20	Waterbury River........	Winooski River...	100 feet below junction of East and West Branches, Stowe, Vt.	23.9	36.9
30	.....do.................	....do............	.....do....................	24.15	17.1
20	West Branch of Waterbury River.	Waterbury River.	200 feet above junction of East and West Branches, Stowe, Vt.	23.9	23.6
30	.....do.................	.....do...........	100 feet above junction of East and West Branches, Stowe, Vt.	24.15	12.3
30	East Branch of Waterbury River.	.....do...........	Just below tailrace of mill at Moss Glen Falls, Stowe, Vt.	10.0	.40
1911.					
Aug. 8	Cold River...............	Otter Creek	Railroad bridge near Rutland, Vt.	....	*a* 7.8
1912.					
Oct. 16	Lamoille River *b*	Lake Champlain..	Hardwick, Vt...............	9.81	265
16	.....do.*c*	.....do...........	.....do....................	9.76	46.4
21	.....do.*d*	.....do...........	.....do....................	9.02	264
21	.....do.*e*	.....do...........	.....do....................	8.80	48.4

Connecticut River basin.

[Made by C. H. Pierce.]

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1913.					
June 28	Connecticut River.......	Atlantic Ocean....	Bellows Falls, Vt...........	46.656	3,030
28	.....do.................	.....do...........	.....do....................	46.653	3,020
July 20	.....do.*f*	.....do...........	Vernon, Vt.................	....	330

a Does not represent total discharge; a diversion through an old power canal about 1 mile above point of measurement. This condition ascertained from a local engineer after measurement was made.

b No. 1 gate at 0.5 opening; No. 2 gate at 3.3 feet; No. 3 gate at 0.7 opening; 32 feet of flashboards on spillway, with considerable leakage.

c No. 1 gate at 0.5 opening; No. 2 gate at 0.7 opening; No. 3 gate at 0.7 opening; 32 feet of flashboards on spillway.

d No. 1 gate at 0.5 opening; No. 2 gate at 3.75 feet; No. 3 gate at 0.7 opening.

e No. 1 gate at 0.5 opening; No. 2 gate at 1.0 opening; No. 3 gate at 0.7 opening; very little water leaking through flashboards.

f Measurement made 1,500 feet below Vernon dam. All wheel gates closed at powerhouse.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

Table for converting discharge in second-feet per square mile into run-off in depth in inches over the area.

Discharge (second-feet per square mile).	Run-off (depth in inches).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.03719	1.041	1.079	1.116	1.153
2	.07438	2.083	2.157	2.231	2.306
3	.11157	3.124	3.236	3.347	3.459
4	.14876	4.165	4.314	4.463	4.612
5	.18595	5.207	5.393	5.578	5.764
6	.22314	6.248	6.471	6.694	6.917
7	.26033	7.289	7.550	7.810	8.070
8	.29752	8.331	8.628	8.926	9.223
9	.33471	9.372	9.707	10.041	10.376

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in acre-feet.

Discharge (second-feet).	Run-off (acre-feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	1.983	55.54	57.52	59.50	61.49
2	3.967	111.1	115.0	119.0	123.0
3	5.950	166.6	172.6	178.5	184.5
4	7.934	222.1	230.1	238.0	246.0
5	9.917	277.7	287.6	297.5	307.4
6	11.90	333.2	345.1	357.0	368.9
7	13.88	388.8	402.6	416.5	430.4
8	15.87	444.3	460.2	476.0	491.9
9	17.85	499.8	517.7	535.5	553.4

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in millions of cubic feet.

Discharge (second-feet).	Run-off (millions of cubic feet).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1	0.0864	2.419	2.506	2.592	2.678
2	.1728	4.838	5.012	5.184	5.356
3	.2592	7.257	7.518	7.776	8.034
4	.3456	9.676	10.02	10.37	10.71
5	.4320	12.10	12.53	12.96	13.39
6	.5184	14.51	15.04	15.55	16.07
7	.6048	16.93	17.54	18.14	18.75
8	.6912	19.35	20.05	20.74	21.42
9	.7776	21.77	22.55	23.33	24.10

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting discharge in second-feet into run-off in millions of gallons.

Discharge (second-feet).	Run-off (millions of gallons).				
	1 day.	28 days.	29 days.	30 days.	31 days.
1.........	0.6463	18.10	18.74	19.39	20.04
2.........	1.293	36.20	37.48	38.78	40.08
3.........	1.939	54.30	56.22	58.17	60.12
4.........	2.585	72.40	74.96	77.56	80.16
5.........	3.232	90.50	93.70	96.95	100.2
6.........	3.878	108.6	112.4	116.3	120.2
7.........	4.524	126.7	131.2	135.7	140.3
8.........	5.171	144.8	149.9	155.1	160.3
9.........	5.817	162.9	168.7	174.5	180.4

NOTE.—For part of a month multiply the run-off for 1 day by the number of days.

Table for converting velocity in feet per second into velocity in miles per hour.

[1 foot per second=0.681818 mile per hour, or two-thirds mile per hour, very nearly; 1 mile per hour=1.4666 feet per second. In computing the table the figures 0.68182 and 1.4667 were used.]

Feet per second (units).	Miles per hour for tenths of foot per second.									
	0	1	2	3	4	5	6	7	8	9
0.............	0.000	0.068	0.136	0.205	0.273	0.341	0.409	0.477	0.545	0.614
1.............	.682	.750	.818	.886	.995	1.02	1.09	1.16	1.23	1.30
2.............	1.36	1.43	1.50	1.57	1.64	1.70	1.77	1.84	1.91	1.98
3.............	2.05	2.11	2.18	2.25	2.32	2.39	2.45	2.52	2.59	2.66
4.............	2.73	2.80	2.86	2.93	3.00	3.07	3.14	3.20	3.27	3.34
5.............	3.41	3.48	3.55	3.61	3.68	3.75	3.82	3.89	3.95	4.02
6.............	4.09	4.16	4.23	4.30	4.36	4.43	4.50	4.57	4.64	4.70
7.............	4.77	4.84	4.91	4.98	5.05	5.11	5.18	5.25	5.32	5.39
8.............	5.45	5.52	5.59	5.66	5.73	5.80	5.86	5.93	6.00	6.07
9.............	6.14	6.20	6.27	6.34	6.41	6.48	6.55	6.61	6.68	6.75

Table for converting discharge in second-feet into theoretical horsepower per foot of fall.

[1 second-foot=0.1136 theoretical horsepower per foot of fall. Weight of 1 cubic foot of water=62.5 pounds.]

Tens.	Units.									
	0	1	2	3	4	5	6	7	8	9
0.............	0.00	0.114	0.227	0.341	0.454	0.568	0.682	0.795	0.909	1.02
1.............	1.14	1.25	1.36	1.48	1.59	1.70	1.82	1.93	2.04	2.16
2.............	2.27	2.39	2.50	2.61	2.73	2.84	2.95	3.07	3.18	3.29
3.............	3.41	3.52	3.64	3.75	3.86	3.98	4.09	4.20	4.32	4.43
4.............	4.54	4.66	4.77	4.88	5.00	5.11	5.23	5.34	5.45	5.57
5.............	5.68	5.79	5.91	6.02	6.13	6.25	6.36	6.48	6.59	6.70
6.............	6.82	6.93	7.04	7.16	7.27	7.38	7.50	7.61	7.72	7.84
7.............	7.95	8.07	8.18	8.29	8.41	8.52	8.63	8.75	8.86	8.97
8.............	9.09	9.20	9.32	9.43	9.54	9.66	9.77	9.88	10.0	10.1
9.............	10.2	10.3	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).

1 second-foot equals 38.4 Colorado miner's inches.

1 second-foot equals 40 Arizona miner's inches.

1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.

1 second-foot for one year (365 days) covers 1 square mile 1.131 feet, or 13.572 inches deep.

1 second-foot for one year (365 days) equals 31,536,000 cubic feet.

1 second-foot equals about 1 acre-inch per hour.

1 second-foot for one year (365 days) equals 724 acre-feet.

1 second-foot for one day equals 86,400 cubic feet.

1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.

1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.

1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.

1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.

1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.

100 California miner's inches equals 18.7 United States gallons per second.

100 California miner's inches for one day equals 4.96 acre-feet.

100 Colorado miner's inches equals 2.60 second-feet.

100 Colorado miner's inches equals 19.5 United States gallons per second.

100 Colorado miner's inches for one day equals 5.17 acre-feet.

100 United States gallons per minute equals 0.223 second-foot.

100 United States gallons per minute for one day equals 0.442 acre-foot.

1,000,000 United States gallons per day equals 1.55 second-feet.

1,000,000 United States gallons equals 3.07 acre-feet.

1,000,000 cubic feet equals 22.95 acre-feet.

1 acre-foot equals 325,850 gallons.

1 inch deep on 1 square mile equals 2,323,200 cubic feet.

1 inch deep on 1 square mile equals 0.0737 second-foot per year.

1 foot equals 0.3048 meter.

1 mile equals 1.60935 kilometers.

1 mile equals 5,280 feet.

1 acre equals 0.4047 hectare.

1 acre equals 43,560 square feet.

1 acre equals 209 feet square, nearly.

1 square mile equals 2.59 square kilometers.

1 cubic foot equals 0.0283 cubic meter.

1 cubic foot of water weighs 62.5 pounds.

1 cubic meter per minute equals 0.5886 second-foot.

1 horsepower equals 550 foot-pounds per second.

1 horsepower equals 76.0 kilogram-meters per second.

1 horsepower equals 746 watts.

1 horsepower equals 1 second-foot falling 8.80 feet.

1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\dfrac{\text{Second-feet} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

GAZETTEER OF STREAMS.

The streams, lakes, and ponds described in the following pages include those named on topographic maps of Vermont surveyed and published by the United States Geological Survey in cooperation with the State and covering parts of western and southern Vermont, on the post-route map of Vermont, and on a map published by George H. Walker & Co. (Boston) in 1906. Colton's railroad and township map of Vermont, published in 1864, has been consulted, and use has also been made of private surveys and of maps compiled by engineering corporations.

Each stream is described as rising near the point at which the head of the upper tributary apparently draining the largest area is shown on the map, and the elevation of that point is given as the elevation of the source. This method does not give results of great precision, but it probably causes no greater errors in the determination of length and fall than would be caused by extending each stream to the head of the divide between its basin and that of the adjoining streams. It should be understood, however, that all statements of elevation, length, and fall are merely approximate.

Topographic sheets used in the preparation of the gazetteer are listed below. An index map showing the area covered by each sheet may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

Becket.	Fort Ann.	Pawlet.	Wallingford.
Bennington.	Greenfield.	Plattsburg.	Warwick.
Berlin.	Greylock.	Port Henry.	Whitefield.
Brandon.	Hanover.	Rochester.[1]	Whitehall.
Brattleboro.	Hawley.	Rouses Point.	Willsboro.
Burlington.	Hoosick.	Rutland.	Wilmington.
Cambridge.	Keene.	St. Albans.	Woodstock.
Castleton.	Londonderry.	Schuylerville.	
Cohoes.	Middlebury.	Strafford.	
Equinox.	Milton.	Ticonderoga.	

A.

ABBEY BROOK.—Chittenden County; a small stream that enters Browns River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence) from the east in the town of Essex. Milton sheet.

ABBOTT BROOK.—Orange County; rises in the northern part of the town of Strafford on McMaster Hill, at an altitude of 1,700 feet above sea level; flows southeastward 4½ miles and joins West Branch of Ompompanoosuc River (tributary

---

[1] Rochester sheet will be ready for distribution about August, 1917.

through Ompompanoosuc River to the Connecticut) at Campbell Corner in the southwestern part of Thetford; fall, 1,000 feet; principal tributary, a stream from Miller Pond.   Strafford sheet.

ACTON BROOK.—Windham County; a stream about 5 miles long, rising in the northwestern part of Townshend and flowing west of south into West River (tributary to the Connecticut).   Walker map.

ADAM POND.—Windham County; eastern part of the town of Jamaica; outlet, a stream about a mile long flowing south of west into West River (tributary to the Connecticut); altitude, about 840 feet; area, 10 acres.   Londonderry sheet.

ADAMS BROOK.—Lamoille County; rises in the eastern part of the town of Eden; flows southwestward and southward to Green River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 5 miles long.   Colton map and Walker map.

ADAMS BROOK.—Windham County; a stream about 3 miles long, rising in the northwestern part of the town of Marlboro and flowing southeastward into Marlboro Branch (tributary through West River to the Connecticut).   Wilmington and Brattleboro sheets.

ALDER BROOK.—Addison County; rises in northern part of Ripton; flows southwestward into North Branch of Middlebury River (tributary through Middlebury River and Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long.   Walker map; Middlebury sheet.

ALDER BROOK.—Caledonia County; rises in the northern part of Hardwick; flows southward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long.   Colton map and Walker map.

ALDER BROOK.—Chittenden County; rises in the southwestern part of Westford; flows southward to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southern part of Essex Township; about 6 miles long.   Walker map and Milton sheet.

ALDER BROOK.—Essex County; rises in the northern part of the town of Victory; flows southeastward 3 miles into Moose River (tributary through Passumpsic River to the Connecticut).   Walker map.

ALDER BROOK.—Orleans County; rises in the southern part of the town of Coventry; flows northeastward and eastward 3 miles into Barton River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence).   Walker map.

ALDER BROOK, NORTH.—Bennington County; rises in the eastern part of Sunderland, at an altitude of 2,880 feet above sea level; flows west and southwest to its junction with South Alder Brook to form Roaring Branch (tributary through Batten Kill to Hudson River); length, 1¾ miles; fall, 640 feet.   Equinox sheet.

ALDER BROOK, SOUTH.—Bennington County; rises in the southeastern part of Sunderland, at an altitude of 3,000 feet above sea level; flows northward and northwestward to its junction with North Alder Brook to form Roaring Branch (tributary to Batten Kill and thus to the Hudson); length, 1¾ miles; fall, 760 feet.   Equinox sheet.

ALDER MEADOW BROOK.—Addison County; rises in the northern part of the town of Granville; flows eastward 1 mile, then west of south 5 miles to a point near Granville post office, where it joins Patterson Brook to form the head of White River (tributary to the Connecticut).   Walker map and Rochester sheet.

ALDER MEADOW BROOK.—Windsor County; rises in the northwestern part of Hartland, at an altitude of 1,240 feet; flows southeastward into Lulls Brook (tributary to the Connecticut) at Hartland Four Corners; fall, 610 feet; length, 4 miles. Hanover sheet.

ALGER BROOK.—Orange County; a stream about 1½ miles long, draining a small area in the east-central part of the town of Strafford, flowing southwestward, and discharging into West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut) three-fourths of a mile southeast of the mouth of Patterson Brook. Strafford sheet.

ALLBEE BROOK.—Addison County; rises in the southern part of the town of Granville; flows north of east 2 miles into White River (tributary to the Connecticut). Walker map and Rochester sheet.

ALLEN BROOK.—Chittenden County; rises northwest of Cobble Hill in the southern part of the town of Milton; flows northward 1 mile, then turns abruptly and flows in general southwesterly 5 miles to its junction with Malletts Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); intermittent at head and marshy near mouth. Milton sheet.

ALLEN BROOK.—Chittenden County; rises in the south-central part of Williston; at an altitude of 750 feet above sea level; flows somewhat east of north about 3 miles to Williston, where it turns and flows irregularly northwestward to its junction with Muddy Brook, a short distance above the entrance of the latter into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length about 8 miles; total fall, 550 feet; course very crooked. Walker map and Burlington sheet.

ASCUTNEY POND.—Windsor County; very small; in the course of Mill River about 1½ miles west of its junction with Connecticut River. Walker map.

ATWOOD BROOK.—Windsor County; rises in the northern part of Bridgewater, at an altitude of 2,220 feet; flows southeastward into Gulf Stream (tributary through Barnard Brook to Ottauquechee River and thus to the Connecticut) in the western corner of Pomfret; fall, 1,320 feet; length, 3½ miles. Woodstock sheet.

AUSTIN BROOK.—Addison County; rises in the northern part of Granville; flows northward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); very short. Walker map.

AUSTIN POND.—Rutland County; central part of town of Hubbardton; inlets from Beebe Pond (tributary from Keeler Pond) and Roach Pond; outlet, a stream three-fourths mile long flowing southward into the north end of Bomoseen Lake (outlet through Castleton River to Poultney River and thus through Lake Champlain to Richelieu River and the St. Lawrence); elevation above sea, 468 feet; fall of outlet, 55 feet. Castleton sheet.

AVERILL BROOK.—Essex County; stream about 2 miles long, rising in the western part of the town of Averill and joining Black Branch (tributary to Nulhegan River and thus to the Connecticut) in the northern part of the town of Lewis. Walker map and private surveys.

AVERILL STREAM.—Essex County; rises in the southeastern part of the town of Norton as a small stream flowing into Little Averill Pond; flows northward to Great Averill Pond, from the northwestern corner of which it flows northwestward into Coaticook River (tributary through Massawippi River to St. Francis River and thus to the St. Lawrence). Walker map.

AVERY BROOK.—Windsor and Orange counties; rises in the northwestern part of the town of Norwich, Windsor County; flows southeastward 1 mile, then northeastward 2 miles to Union Village in the southern part of the town of Thetford, where it joins West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut). Strafford sheet.

AYERS BROOK.—Washington and Orange counties; rises in the southeastern part of the town of Roxbury, Washington County; flows southeastward across the western corner of Brookfield and the eastern corner of Braintree and joins the Third Branch of White River (tributary through White River to the Connecticut) in the western part of the town of Randolph, Orange County; length, about 10 miles. Post-route map and Walker map.

B.

BABCOCK BROOK.—Windsor County; rises in a swamp in the northwestern part of
Hartland, at an altitude of about 1,000 feet; flows northward into Ottau-
quechee River (tributary to the Connecticut); fall, 365 feet; length, 3 miles.
Hanover sheet.

BACHELOR BROOK.—Orleans County; a stream rising in the central part of the town
of Holland and flowing northwestward into Stanstead, where it joins Johns River
(tributary through Lake Memphremagog to Magog and St. Francis rivers and
thus to the St. Lawrence). Walker map and Carte Régionale No. 5 of Quebec.

BAILEY BROOK.—Windsor County; rises in the western part of Reading, at an altitude
of 1,960 feet; flows south of east 4 miles to Bailey Mills, where it joins Mill River
(tributary to the Connecticut); fall, 910 feet. Woodstock sheet.

BAKER BROOK.—Rutland County; rises on the southeastern slope of Dutch Hill,
north of Danby Pond, near the central part of the town of Danby, at an altitude
of 1,500 feet above sea level; flows northward about 2 miles, then turns abruptly
and flows east and southeast to its junction with Otter Creek (tributary to Lake
Champlain and thus through Richelieu River to the St. Lawrence), 2 miles
south of South Wallingford; length, 5½ miles; fall, 870 feet. Pawlet and
Wallingford sheets.

BAKER BROOK.—Windham County; rises in the southeastern part of the town of
Wardsboro, at an altitude of 1,640 feet above sea level; flows southeastward 8
miles to Williamsville in Newfane where it joins Marlboro Branch (tributary
through West River to the Connecticut); fall, 1,120 feet. Londonderry, Wil-
mington, and Brattleboro sheets.

BALD HILL POND.—Caledonia County; eastern part of the town of Westmore, at the
head of Passumpsic River (tributary to Connecticut River). Walker map.

BALDWIN CREEK.—Addison County; rises in the southeastern part of Starksboro;
flows westward into the northeastern part of Bristol Township, then southward
into New Haven River (tributary through Otter Creek to Lake Champlain and
thus through Richelieu River to the St. Lawrence) at Ackworth; length, about 6
miles; fall between South Starksboro and Ackworth (3½ miles), 500 feet, of
which about 400 feet occurs in the mile and a half just below South Starksboro;
tributary, Beaver Brook. Middlebury sheet and Walker map.

BALL MOUNTAIN BROOK.—Windham County; rises on the southeast slope of Stratton
Mountain in the town of Stratton, its headwaters including several streams starting
3,000 feet or more above sea level and flowing southeastward; from the eastern
part of the town of Stratton the brook flows northeastward to Jamaica, where it
joins West River (tributary to the Connecticut); length, about 12 miles; principal
tributary, North Branch. Londonderry sheet.

BALL MOUNTAIN BROOK, NORTH BRANCH.—Windham County; rises at an altitude
of 2,700 feet, on the north slope of Stratton Mountain in the town of Stratton;
flows northeastward 1 mile into Winhall, Bennington County, then southeast-
ward 6 miles into Jamaica, where it joins Ball Mountain Brook (tributary through
West River to the Connecticut); fall, 1,740 feet. Londonderry sheet.

BARBER POND.—Bennington County; central part of Pownal; area, 17 acres; alti-
tude, 1,100 feet; inlet and outlet, South Stream, a branch of Walloomsac River
(tributary through Hoosic River to the Hudson). Bennington sheet.

BARKER BROOK.—Orange County; rises in the northeastern part of the town of
Strafford; flows southeastward about 3 miles into Thetford, where it joins Ompom-
panoosuc River (tributary to the Connecticut). Strafford sheet.

BARNARD BROOK.—Windsor County; rises in the eastern part of Barnard, at an
altitude of 1,620 feet; flows southeastward through the southwestern corner of
Pomfret into the town of Woodstock, where it receives Gulf Stream, its largest
branch; continues southward a mile and joins Ottauquechee River (tributary

to the Connecticut) about a mile north of Woodstock; numerous unnamed branches; length, 9 miles; fall, 950 feet. Woodstock sheet.

BARTLETT BROOK.—Windsor County; rises in the southwestern part of the town of Stockbridge, at an altitude of 2,060 feet; flows northeastward to Tweed River half a mile above its confluence with White River (tributary to the Connecticut); length, 2½ miles; fall, 740 feet. Rochester and Milton sheets.

BARTON RIVER.—Orleans County; rises in Runaway Pond in the southern part of Glover; flows northward across Glover, Barton, and the eastern corner of Irasburg to its entrance into Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence) in Coventry; about 18 miles long; tributaries include Beaver Meadow, Roaring, Graves, Trout, and Alder brooks, Willoughby River (tributary from Willoughby Lake), and streams from Stones and Long ponds, Crystal Lake, and Brownington Pond. Geology of Vermont, 1861; Colton map, Walker map, and post-route map. See Runaway Pond.

BASHAN BROOK.—Windsor County; rises near the northern boundary of Windsor, at an altitude of 850 feet; flows southeast about 1½ miles, then northeast about one-third of a mile into Connecticut River; fall, 550 feet. Hanover sheet.

BASIN BROOK.—Bennington County; rises in the western part of Glastenbury, on the western slope of Green Mountains, at an altitude of 3,200 feet; flows southwestward about 3 miles into Furnace Brook, a branch of Walloomsac River (tributary through Hoosic River to the Hudson); fall, 1,960 feet. Bennington sheet.

BATCHELLOR BROOK.—Orange County; town of Braintree; a small eastward-flowing tributary of the Third Branch of White River (tributary through White River to the Connecticut). Rochester sheet.

BATTEN KILL.—Bennington County; rises, as Mad Tom Brook, on the southern slope of Mount Tabor, at an altitude of 2,900 feet above sea level; flows southward and southwestward to East Dorset, where it takes the name of Batten Kill, and thence in general southwestward about 15 miles, then turns more to the west and crosses Washington County, N. Y., to its junction with Hudson River. From source to mouth following the major windings it measures more than 50 miles; its drainage basin comprises about 460[1] square miles. The basin lies on the western slopes of the Green Mountains and in Washington County is crossed by three minor ranges running northeast and southwest. The ranges have steep slopes and are composed largely of slate rocks whose disintegration has given the highlands a very fertile soil.

The principal tributaries of Batten Kill are West Branch, Roaring Branch, Green River, Black Creek, and Whitaker Brook, the last-named being the outlet of Cossayuna Lake.

The elevation of the stream at East Dorset is about 800 feet above sea level; at its mouth it is somewhat less than 100 feet, making the total fall below East Dorset 700 feet. The stream is subject to heavy freshets and runs of ice, but the high water quickly subsides. It is fed largely by springs and the dry-season flow is well sustained. It is one of the best mill streams tributary to the Hudson and much of the available power is developed. See Tenth Census, vol. 16; also Wallingford, Londonderry, Pawlet, Equinox, Cambridge, and Schuylerville sheets.

BATTEN KILL, WEST BRANCH.—Bennington County; rises on the northern slope of Bear Mountain, in the southeastern part of the town of Rupert, 2½ miles southwest of Dorset, at an altitude of about 2,500 feet above sea level; flows eastward about 2 miles, then turns and flows southeastward to its junction with Batten Kill (tributary to Hudson River) near Manchester Center; length, about 9 miles; fall, 1,800 feet, of which 1,600 feet occurs in the first 2 miles of course. Equinox sheet.

BEAUTIFUL LAKE.—See Caspian Lake.

BEAVER BRANCH.—Addison County; rises in the eastern part of Cornwall, at an elevation of 440 feet above sea level; flows southward about 2 miles, westward half a mile, and then northward 2½ miles to its junction with Lemon Fair River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 5 miles; fall, 310 feet. Brandon sheet.

BEAVER BRANCH.—Addison County; rises in the southeastern part of Middlebury, at an altitude of 520 feet above sea level; flows southwestward into Middlebury River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); 1½ miles west of East Middlebury; length, 2½ miles; fall, 140 feet. Brandon sheet.

BEAVER BROOK.—Addison County; rises on the eastern slope of Hogback Mountains, in the western part of Starksboro, at an altitude of 1,000 feet above sea level; flows southward about 3½ miles to Baldwin Creek (tributary through New Haven River to Otter Creek and thus through Lake Champlain and Richelieu River to the St. Lawrence); fall, 360 feet. Middlebury sheet.

BEAVER BROOK.—Chittenden County; rises in the northwestern part of Jericho; flows northward into Lamoille River (tributary through Lake Champlain and Richelieu River to the St. Lawrence); about 4 miles long. Walker map.

BEAVER BROOK.—Windsor County; rises in the northern part of West Windsor, at an altitude of 1,260 feet; flows southward into Mill River (tributary to the Connecticut); length, 4½ miles. Hanover sheet and Walker map.

BEAVER MEADOW BROOK.—Franklin County; rises in the northern part of Fairfax; flows in a general southerly course to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 6 miles long; tributary, stream from Silver Lake. Colton map, Walker map, post-route map, and Milton sheet.

BEAVER MEADOW BROOK.—Orange County; rises in western part of the town of Vershire, at an altitude of 2,000 feet; flows southwest into Jenken Brook, tributary to East (First) Branch of White River (tributary through White River to the Connecticut); length, about 3 miles. Strafford sheet.

BEAVER MEADOW BROOK.—Orleans County; town of Glover; a small stream discharging into Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence) near Glover post office. Walker map.

BEAVER POND.—Orleans County; northeastern part of the town of Holland; connected by a short westward-flowing stream with Holland Pond, head of Holland Brook (tributary through Johns River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map and Carte Régionale No. 5 of Quebec.

BEEBE POND.—Bennington County; southeastern part of Sunderland; 1 inlet; outlet, a stream one-fourth mile long flowing westward to South Alder Brook (tributary through Roaring Branch to Batten Kill and thus to the Hudson); elevation above sea level, 2,330 feet; fall of outlet, 60 feet. Equinox sheet.

BEEBE POND.—Rutland County; north-central part of town of Hubbardton; inlet from Keeler Pond; outlet, a stream 1 mile long flowing southward into Austin Pond (outlet to Bomoseen Lake and thus through Castleton and Poultney rivers to Lake Champlain, Richelieu River, and the St. Lawrence) area, 76 acres; elevation above sea level, 622 feet; fall of outlet, 154 feet. Castleton sheet.

BEE BROOK.—Rutland County; a stream 1½ miles long rising northwest of Bloodroot Mountain and flowing southwestward into Furnace Brook (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence). Rochester sheet.

BEETLE BROOK.—Orleans County; rises in the eastern part of Troy; flows westward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Westfield; about 3 miles ong. Walker map.

BENEDICT HOLLOW BROOK.—Bennington County; a small stream draining the area between Big Spruce Mountain and The Ball, in the town of Arlington, and flowing northeastward into Batten Kill (tributary to the Hudson) between Arlington and West Arlington. Equinox sheet.

BERLIN POND.—Washington County; southern part of town of Berlin; one inflowing stream; natural outlet, a stream about 2 miles long flowing northeastward to Stevens Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 1½ miles long; a source of water supply for the city of Montpelier. Colton map, Walker map, and post-route map.

BICKFORD HOLLOW BROOK.—Bennington County; rises in the Green Mountains in the western part of Glastenbury, at an altitude of 2,800 feet; flows west of south into Walloomsac Brook (River), a branch of Hoosic River (tributary to the Hudson), in the northwestern part of Woodford; receives many small branches from the Green Mountains; fall, 1,500 feet; length, 5 miles. Bennington sheet.

BICKNELL BROOK.—Orange County; rises in the southeastern part of the town of Chelsea at an altitude of 1,800 feet; flows northwestward into East (First) Branch of White River (tributary to the Connecticut); length, about 3 miles. Strafford sheet.

BIG BRANCH.—Rutland County; rises in the eastern part of the town of Mount Tabor, at an altitude of 2,200 feet above sea level; flows westerly to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Mount Tabor; length, about 7 miles; fall, 1,500 feet, of which 800 feet occurs in about 3 miles just below Griffith; principal tributary, Roaring Brook, which flows from Buffum Pond. Wallingford sheet.

BIG FISH POND.—Orleans County; northern part of the town of Sutton; irlets from two small ponds; outlet, a short stream flowing westward into Blake Pond (outlet through Crystal Lake to Barton River and thus through Lake Memphremagog to Magog and St. Francis rivers to the St. Lawrence). Walker map.

BIG POND.—Bennington County; north-central part of Woodford; altitude, 2,263 feet; area, 29 acres; outlet, City Stream to Walloomsac Brook (River), a branch of the Hoosic River (tributary to the Hudson). Bennington sheet.

BILL BROOK.—Windham County; rises in Ray Pond in the eastern part of the town of Wilmington; flows northwestward 2½ miles into North Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 250 feet. Wilmington sheet.

BILLINGS POND.—Bennington County; a small pond in the northeastern part of Woodford; inlet and outlet, Rake Branch (tributary through Deerfield River to the Connecticut); altitude, 2,100 feet. Bennington sheet.

BINGHAM BROOK.—Chittenden County; rises 1½ miles southwest of East Charlotte, at an altitude of 330 feet above sea level; flows northward into Mud Hollow Brook (tributary through La Platte River to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 2 miles; fall, 60 feet. Burlington sheet.

BINNEY BROOK.—Windham County; rises in the northwestern part of Wilmington, on the southern slope of Haystack Mountain; flows southeasterly about 3½ miles into North Branch of Deerfield River (tributary through Deerfield River to the Connecticut) in the west central part of Wilmington. Wilmington sheet.

BLACK BRANCH.—Essex County; rises in the eastern part of the town of Lewis; flows in a southerly direction about 10 miles into Nulhegan River (tributary to the Connecticut) in the northern part of the town of Brunswick; called Logger Brook

between the mouth of Averill Brook and the West Branch; drainage area, approximately 25 square miles; principal tributary, West Branch, which drains Lewis Pond. Walker map and private surveys.

BLACK BROOK.—Bennington County; rises in the southwestern part of Sunderland, at an altitude of 2,120 feet above sea level; flows southward 1 mile to its junction with Fayville Branch (tributary through Roaring Branch to Batten Kill and thus to the Hudson); fall, 240 feet. Equinox sheet.

BLACK BROOK.—Bennington and Windham counties; rises in the eastern part of the town of Sunderland, at an altitude of 2,600 feet above sea level; flows southeastward 4 miles into East Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 440 feet. Equinox and Londonderry sheets.

BLACK CREEK.—Franklin County; rises in Metcalf Pond, in the northern part of Fletcher; flows southeastward into the northern part of Cambridge, where it turns abruptly and flows northward and northwestward, passing across Fletcher, the southwestern corner of Bakersfield, and the northeastern part of Fairfield to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Sheldon; about 20 miles long; principal tributaries, Fairfield River, Cedar Swamp Brook, and streams from Trout Lake and Fairfield Pond. Colton map, Walker map, and post-route map.

BLACK POND.—Essex County; town of Brighton; outlet, a short stream flowing southwestward into Island Pond, the head of Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

BLACK POND.—Windsor County; in the northwestern part of Plymouth; altitude, 1,370 feet; inlet, a stream from Plymouth Pond; outlet, Black River (tributary to the Connecticut); small. Rutland sheet.

BLACK RIVER.—Orleans County; rises in Eligo Pond, in the western part of the town of Greensboro; flows northwestward to North Craftsbury, where its course becomes first northerly and then northeasterly, in which direction it crosses Albany, Irasburg, and Coventry to Newport, where it enters Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); about 26 miles long; principal tributaries, Seaver, Lord, Mill, and Chamberlain brooks. Colton map, Walker map, and post-route map.

BLACK RIVER.—Rutland and Windsor counties; rises on Shrewsbury Peak, at an altitude of 3,200 feet above sea level, in the northeastern part of the town of Shrewsbury, Rutland County, and flows southeasterly, crossing Plymouth, Cavendish, and Weathersfield, and discharging into Connecticut River in the southern part of the town of Springfield. The river is remarkable for the number of natural ponds in its course, and it furnishes power for manufacturing in Ludlow, Proctorsville, Cavendish, Perkinsville, and Springfield. Among the ponds in the drainage basin are two bearing the name "Plymouth," one in the northwestern part of the town of Plymouth and the other in the southeastern; length, 35 miles; branches named on Walker map are Tinker, Great Roaring, Buffalo, Money, Little Roaring, and Sewell brooks, and Twenty-mile Stream; ponds, Black, Plymouth (2), Reading, Horton, and Patch's. Walker map and Rutland and Woodstock sheets.

BLAKE POND.—Orleans County; northwestern part of the town of Sutton, near the base of Mount Horr; the largest of a group of small ponds connected by short streams; outlet, a stream 4 miles long flowing northwestward into Crystal Lake (outlet to Barton River and thus through Lake Memphremagog and Magog and St. Francis rivers to the St. Lawrence). Walker map.

BLAKE POND.—See Silver Lake.

BLIND BROOK.—Bennington County; rises in the northeastern part of Glastenbury at an altitude of 2,960 feet; flows south of east into a headwater tributary of Deerfield River (tributary to the Connecticut); fall, 860 feet; length, 2½ miles. Bennington sheet.

BLISS POND.—Washington County; 1½ miles south of Curtis Pond, in western part of Calais; outlet, eastward to Kingsbury Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map.

BLOODY BROOK.—Orange County; rises in the eastern part of the town of West Fairlee; flows west of south about 3 miles into Fairlee Lake (outlet through Ompompanoosuc River to the Connecticut). Walker map.

BLOODY BROOK.—Windsor County; rises on Gile Mountain, at an altitude of 1,600 feet above sea level, in the northern part of the town of Norwich; flows southeasterly 8 miles to its junction with Connecticut River at Lewiston; fall, 1,280 feet, of which only 100 feet is below Norwich; principal tributaries, New Boston, Charles Brown, and Brag brooks. Strafford and Hanover sheets.

BLUE BROOK.—Windham County; rises in southeastern part of the town of Stratton at an altitude of 2,600 feet above sea level; flows southeasterly 5 miles into North Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 840 feet. Wilmington sheet.

BOG BROOK.—Essex County; formed by Umpire and Mill brooks which unite in the central part of the town of Victory; flows southeastward 1 mile into Moose River (tributary through Passumpsic River to the Connecticut). Walker map.

BOGUES BROOK.—Franklin County; rises in the eastern part of Bakersfield; flows northwestward to its junction with Tylers Branch (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near West Enosburg; about 6 miles long. Walker map.

BOLLES BROOK.—*See* Walloomsac River.

BOMOSEEN LAKE.—Rutland County; southern part of Hubbardton and western part of Castleton; inlets, Sucker Brook and streams from a number of small ponds and lakes; outlet, a stream one-fourth mile long flowing southwestward to Castleton River (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Hydeville; elevation above sea level, 413 feet; fall of outlet, about 35 feet; extreme length of lake, 7½ miles; maximum width, about 1½ miles; area, 2,450 acres; contains several islands; upper end swampy; receives overflow from Austin Pond (which drains Beebe, Keeler, and Roach ponds), Half Moon Pond, and Glen Lake. Brandon and Castleton sheets.

BORDEN BROOK.—Addison County; rises in the southwestern part of the town of Hancock, east of the source of Grindstone Brook, and flows north into West Branch of White River (tributary through White River to the Connecticut); length, about 2 miles. Walker map and Rochester sheet.

BOURN BROOK.—Bennington County; rises in Bourn Pond, in the northeastern part of the town of Sunderland, at an altitude of 2,500 feet above sea level; flows somewhat east of north 2 miles and then takes a northwesterly course to its junction with Batten Kill (tributary to the Hudson) half a mile south of Manchester Center; length, about 6 miles; fall, 1,800 feet, of which 1,300 feet occurs within 1½ miles in its middle course. Londonderry and Equinox sheets.

BOURN POND.—Bennington County; northeastern part of Sunderland; one inlet; outlet, Bourn Brook to Batten Kill (tributary to Hudson River); elevation above sea, 2,500 feet; fall of outlet, 1,800 feet. Equinox sheet.

BOWLEYS POND.—Orleans County; northern part of Coventry; outlet, a stream half a mile long flowing southward to Daggetts Pond (tributary through Black River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); very small. Walker map.

BRACKETT BROOK.—Addison and Orange counties; a small eastward-flowing stream tributary to the Third Branch of White River (tributary through White River to the Connecticut) in the town of Braintree. Rochester sheet.

BRADLEY BROOK.—Washington County; rises in the western part of Warren; flows eastward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

BRAG BROOK.—Windsor County; rises in the southern part of the town of Norwich; flows eastward 1 mile, then southeastward 1½ miles into Bloody Brook (tributary to the Connecticut) at the village of Norwich. Hanover sheet.

BRANCH POND.—Bennington County; eastern part of Sunderland; outlet, Branch Pond Brook to Roaring Branch (tributary through Batten Kill to the Hudson); area, 28 acres; elevation above sea level, 2,630 feet. Equinox sheet.

BRANCH POND BROOK.—Bennington County; rises in Branch Pond, in the eastern part of Sunderland; at an altitude of 2,630 feet above sea level; flows southwestward 2½ miles to its junction with Roaring Branch (tributary through Batten Kill to Hudson River); fall, 530 feet. Equinox sheet.

BRANCH POND STREAM.—Essex County; rises in the eastern part of the town of East Haven; flows southeastward 5 miles, then eastward and northeastward 2 miles to its junction with Paul Stream (tributary to Connecticut River) in the southeastern part of the town of Ferdinand. Walker map.

BRANDON BROOK.—Addison, Windsor, and Rutland counties; rises in the southern part of the town of Goshen at an altitude of about 2,700 feet; flows in a general northeasterly direction and joins West Branch of White River (tributary through White River to the Connecticut) at the village of Robinson; length, about 7 miles; fall, 1,700 feet; principal tributary, Smith Brook. Rochester sheet.

BRANDY BROOK.—Addison County; rises in the eastern part of Ripton; flows southwestward to Middlebury River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Colton map, Walker map, and Rochester sheet.

BREAKNECK BROOK.—Windsor County; rises in the western part of the town of Bethel, at an altitude of 1,800 feet; flows in a southwesterly direction 3½ miles to White River (tributary to the Connecticut); fall, 1,040 feet. Rochester sheet.

BRIDGEWATER BROOK.—Windsor County; rises in the northeastern part of Bridgewater, at an altitude of 1,920 feet; flows easterly into Gulf Stream (tributary through Barnard Brook to Ottauquechee River and thus to the Connecticut) in the northwestern corner of Woodstock; fall, 1,100 feet; length, 3½ miles. Woodstock sheet.

BRISTOL POND.—Addison County; northern part of Bristol; several small inflowing streams, two of which come from the western slopes of Hogback Mountains; outlet, Pond Brook to Lewis Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, about 470 feet; fall of outlet, 140 feet; pond is about half a mile wide by three-fourths mile long; area, 196 acres; swampy to the north, south, and west. Middlebury sheet.

BRITTAIN BROOK, NORTH.—Rutland County; rises in the southeastern part of the town of Hubbardton, at an elevation of 1,200 feet above sea level; takes a southerly and southwesterly course to its junction with Castleton River (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Castleton; length, about 7 miles; total fall, 790 feet, of which 300 feet occurs in a little more than a mile at the head of the stream. Castleton sheet.

BROAD BROOK.—Windham County; formed in the north-central part of the town of Guilford by two branches, one draining the southwestern corner of Brattleboro and the northwestern corner of Guilford, and the other the central part of Guilford; from the junction north of Guilford Center the brook flows southeastward 1½ miles, then northeastward 3 miles into Connecticut River in the northeastern part of Vernon; length, to head of longest tributary, 8 miles. Brattleboro sheet.

BROAD BROOK.—Windsor County; rises in the eastern part of the town of Barnard; flows northward, eastward, then northward into White River (tributary to the Connecticut) in the western part of the town of Sharon; length, 5 miles. Walker map and Woodstock and Strafford sheets.

BROAD BROOK.—*See* Hale Hollow Brook.

BROOK RIVER.—Orange County; town of Vershire. *See* Ompompanoosuc River.

BROOKS POND.—Essex County; central part of the town of Concord; outlet, Minks Brook (tributary to Connecticut River). Walker map.

BROUILLARD BROOK.—Essex County; a stream about 1½ miles long, rising in the western part of the town of Lemington; flows in a southwesterly direction across the southern corner of the town of Averill to the East Branch of Nulhegan River (tributary through Nulhegan River to the Connecticut). Walker map and private surveys.

BROWN BROOK.—Windsor County; town of Stockbridge; a stream about 1½ miles long, rising on the northeastern slope of South Hill, at an altitude of 1,600 feet, and flowing northeasterly to Tweed River (tributary through White River to the Connecticut); fall, 850 feet. Rochester sheet.

BROWNINGTON POND.—Orleans County; on line between Salem and Brownington; two small inflowing streams; outlet, a stream 3 miles long flowing westward into Barton River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

BROWNS RIVER.—Chittenden County; rises on the western slope of the Green Mountains, in the eastern part of Underhill; flows westward about 9 miles into the town of Essex, where it turns and flows northward to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence), in the town of Fairfax, Franklin County; about 20 miles long; principal tributaries, Clay, Mill, and Roaring brooks. Colton map, Walker map, and post-route map.

BRUCE POND.—Caledonia County; western part of the town of Sheffield; outlet, a stream about 3 miles long flowing southeasterly into Millers Run (tributary through Passumpsic River to the Connecticut). Walker map.

BUCK POND.—Washington County; northern part of Woodbury; outlet southward by Kingsbury Brook to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about three-fourths mile long. Walker map.

BUFFALO BROOK.—Windsor County; rises in Reading Pond, on the boundary line between Reading and Plymouth, and flows southwestward into Plymouth Pond, which discharges into Black River (tributary to the Connecticut). Walker map.

BUFFUM POND.—Rutland County; southern part of town of Mount Tabor; outlet by Roaring Brook to Big Branch (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 11 acres; elevation above sea level, 2,650 feet; fall of outlet, more than 1,000 feet in about 4 miles. Wallingford sheet.

BUGBEE BROOK.—Orleans County; rises in the southeastern part of the town of Jay; flows north of east into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Troy Township; 2½ miles long. Walker map.

BURLESON POND.—Franklin County; western part of Berkshire; inlet, Pike River; outlet, Pike River to Franklin Pond (outlet to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map.

BURNELL POND.—Rutland County; near Forestdale, in northeastern part of Brandon; one inlet; outlet, a stream one-eighth mile long flowing southward to Neshobe River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 480 feet; fall of outlet, about 10 feet. Brandon sheet.

BURNSIDE BROOK.—Essex County; rises between Hubbard Hill and Burnside Mountain in the northern part of the town of Guildhall; flows southeastward into Gaskill Brook (tributary to Connecticut River); about 3 miles long. Walker map.

BURR POND.—Rutland County; southeastern part of Pittsford; outlet, a stream nearly half a mile long flowing south of east into East Creek (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 1,170 feet; fall of outlet, 180 feet. Rutland sheet.

BURR POND.—Rutland County; southwestern part of town of Sudbury; inlets, from from Huff and Hinkum ponds; outlet, a stream 1 mile long flowing southwestward to Horton Pond (tributary through Hubbardton and Poultney rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 512 feet; area, 73 acres; fall of outlet, 28 feet. Brandon sheet.

BUSH POND.—Windsor County; in the northeastern part of Sharon; small; swampy; inlets, two small streams; outlet, a stream about three-fourths of a mile long, flowing into Quation Brook, a branch of White River (tributary to the Connecticut). Strafford sheet.

BUTLER POND.—Rutland County; location, southwestern part of Pittsford; outlet, a stream 1 mile long flowing southward to Castleton River (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 650 feet; very small. Castleton sheet.

BUTTON BROOK.—Windsor County; rises in the northeastern part of Springfield; flows south into Connecticut River in the southeastern part of Springfield just north of the junction of Black River with the Connecticut; length, about 4 miles. Walker map.

C.

CALENDAR BROOK.—Caledonia County; rises in the northern part of the town of Sheffield; flows southeastward 12 miles into West Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut). Post-route map.

CAMDEN VALLEY CREEK.—Bennington County; rises in the western part of Sandgate, at an altitude of about 1,500 feet above sea level; takes a general southwesterly course to its junction with Batten Kill (tributary to the Hudson) in Salem, Washington County, N. Y.; length, about 7 miles; fall, about 1,000 feet, of which 700 feet occurs within 2½ miles at the head of the creek; principal tributary, West Camden Creek. Equinox and Cambridge sheets.

CAMP BROOK.—Windsor County; rises in the western part of the town of Bethel; flows southeastward to its junction with Third Branch of White River (tributary to White River and thus to the Connecticut); length, about 5 miles. Walker map.

CANEE BROOK.—Orange County; town of Braintree; a small eastward-flowing tributary of Third Branch of White River (tributary through White River to the Connecticut). Rochester sheet.

CANOE BROOK.—Windham County; rises in the southwestern part of Putney, at an altitude of 1,200 feet; flows southeastward through Putney and the northeastern part of Dummerston, where it turns abruptly and flows north about one-third of a mile into Connecticut River; fall, 970 feet; length, about 6½ miles. Brattleboro sheet.

CARMAN BROOK.—Franklin County; rises in the south-central part of the town of Highgate; flows northward into Lake Champlain (outlet through Richelieu River to the St. Lawrence) at Rock River Bay; about 3 miles long. St. Albans sheet.

CARYL BROOK.—Rutland County; rises on the eastern slope of Mount Carmel at an altitude of 2,500 feet; flows in an easterly direction 4 miles to its junction with West Branch of Tweed River (tributary through White River to the Connecticut) at Bayonne Camp; fall, 1,400 feet. Rochester sheet.

CASPIAN (OR BEAUTIFUL) LAKE.—Orleans County; southern part of Greensboro; several small inflowing streams; outlet, Greensboro Brook to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 1½ miles long by 1 mile wide. Colton map, Walker map, and post-route map.

CASTLE BROOK.—Bennington and Windham counties; rises in the southeastern part of Glastenbury, at an altitude of 2,600 feet; flows eastward about a mile, then northeastward about 2 miles into Deerfield River (tributary to the Connecticut); fall, 660 feet. Bennington and Wilmington sheets.

CASTLETON RIVER.—Rutland County; rises in the southwestern part of the town of Pittsford, at an altitude of 630 feet above sea level; flows 7 miles east of south, then turns abruptly and flows westward to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) a mile west of Fair Haven; total length, about 20 miles; fall, 340 feet; tributaries, Gully Brook, North Brittain Brook, and outlet stream from Bomoseen Lake, which is the largest lake in the drainage basin.

Of this river Hitchcock says:[1] "It seems remarkable that this small stream should rise east of a range of mountains 1,000 feet high, and, after flowing to the south for 7 miles, suddenly bend its course at right angles and cut through the mountain; especially when an obstruction of a few feet in the gorge would divert the stream southeast to Otter Creek at Rutland. As this gorge runs east and west, contrary to the most usual direction of excavated valleys in the State, and as it is in the region of curious and gigantic disturbances of the underlying strata, we can but suspect that this valley through [West Rutland and] Ira has been formed in some other way than by erosion. Perhaps it originated in a fault among the metamorphic schists." Brandon, Castleton, and Whitehall sheets.

CATSBOW BROOK.—Essex County; rises in the southeastern part of the town of Granby; flows east of south 6 miles into Connecticut River in the northeastern part of the town of Lunenburg. Walker map and Whitefield sheet.

CEDAR SWAMP BROOK.—Franklin County; rises in the southwestern part of Fairfield; flows somewhat east of north about 6 miles, then turns and flows northeast, then east to its junction with Black Creek (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) at St. Rocks; about 9 miles long; tributary from Fairfield Pond. Colton map, Walker map, and post-route map.

CENTER POND.—Caledonia County; the central part of the town of Newark; outlet, a stream 1 mile long flowing southward into Passumpsic River (tributary to Connecticut River). Walker map.

CHALMERS BROOK.—Orange County; rises in the western part of town of Newbury; flows southeastward 10 miles into Connecticut River. Walker map. On Colton map, 1864, called "Hall's Brook" above mouth of Whiting Brook, the name "Whiting Brook" being applied to the stream flowing into the Connecticut.

---

[1] Hitchcock, Edward, Hager, A. D., Hitchcock, Edward, jr., and Hitchcock, C. H., Report on the geology of Vermont: Descriptive, theoretical, economical, and scenographical, vol. 1, p. 129, 1861.

CHAMBERLAIN BROOK.—Orleans County; rises in the southeastern part of Newport; flows southeastward, then northeastward into Black River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence) in Irasburg; about 4 miles long. Colton map and Walker map.

CHAMPLAIN, LAKE.—In northeastern New York and northwestern Vermont (the boundary between the two States passing through the center of the lake) and a very small part in southern Quebec; outlet, Richelieu River, which flows northward from Rouses Point, on the international boundary, to the St. Lawrence; elevation of water surface above sea level at ordinary stage, 95 feet; area of water surface, 436 square miles; drainage area at mouth of lake, including water surface, 8,130 square miles; drainage area in Vermont, except islands, 4,428 square miles.

The lake occupies a valley lying between the Green Mountain range on the east and the Adirondacks on the west. The valley is irregular in form, being about 75 miles wide from a point opposite Middlebury, Vt., northward to Rouses Point, and having an average width of about 35 miles south of Middlebury. The lake itself is somewhat more than 100 miles long and is narrow. For 40 miles above Whitehall, N. Y., it is nowhere more than a mile wide and in most places not more than a quarter of a mile, forming virtually a drowned river. Opposite Port Henry, at the point on which stands the pre-Revolutionary Fort Frederick, it offsets sharply to the west and then resumes with increasing width its northerly course. In the widest part, which is just north of Burlington, Vt., 10 miles of clear water intervenes between shore and shore. The northern end contains many islands, both large and small. The depth in the northern part of the lake is in general 200 to 300 feet, but south of Fort Frederick it is much less.

The region tributary to Lake Champlain is very rugged and the soil is shallow except in the stream valleys. On the west the foothills of the Adirondacks extend in one or two places down to the water, but in most places the main ridges lie 10 to 25 miles back from the shore. On the Vermont side the slopes are less rugged than those on the New York side, and the surface ascends gradually from the lake shore to the summits of the Green Mountains, 20 miles or more away. The entire region is picturesque and beautiful in the highest degree.

The drainage to the lake is principally through large tributaries, including Big Chazy, Saranac, Au Sable, and Bouquet rivers and the Lake George Outlet from the New York side; principal tributaries from the Vermont side (head of lake to foot—that is, south to north), Mettawee River (headwaters only in Vermont), Poultney River, Otter Creek, Little Otter Creek, Lewis Creek, Thorpe Brook, Home Creek, La Platte River, Monroe Brook, Potash Brook, Winooski (Onion) River, Indian Brook, Dry Brook, Malletts Brook, Lamoille River, Stone Bridge Brook, Mill River, Stevens Brook, Charcoal Creek, Missisquoi River, Sucker Brook, Mud Creek, Eel Brook, and Rock River.

The entire surface of the lake freezes over nearly every winter, though the wider portions are usually not closed by ice until late in January and in some years not until February and then for only a few days.

Gages have been maintained on the lake at Burlington and on Richelieu River at Fort Montgomery. At the latter place records of gage heights have been kept by the United States Engineer Corps since 1875.

Surveys and data: Report on the Geology of Vermont: Descriptive, theoretical, economical, and scenographical, by Edward Hitchcock, Albert D. Hager, Edward Hitchcock, jr., and Charles H. Hitchcock, 2 vols., 1861; Report of the Board of Engineers on Deep Waterways between the Great Lakes and the Atlantic tide waters, 1900; U. S. Geol. Survey Water-Supply Papers 36, 65, 82, 97, 129, 170, 206, 244, 264, 284, 304, 324, 354, 384, 404, and 434; topographic map of the United States, U. S. Geol. Survey atlas sheets, as follows: Rouses Point, Plattsburg,

Willsboro, Port Henry, Ticonderoga, Whitehall, Castleton, Brandon, Middlebury, Burlington, Milton, and St. Albans.

CHANDLER POND.—Caledonia County; southern part of the town of Wheelock; outlet, a stream less than a mile long, flowing northeastward into West Brook (tributary through Passumpsic River to the Connecticut). Walker map.

CHARCOAL CREEK.—Franklin County; town of Highgate; a sloughlike channel in the marsh on Hog Island, west of Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). St. Albans sheet.

CHARLES BROWN BROOK.—Windsor County; rises in the western part of the town of Norwich; flows southward 5 miles into Bloody Brook (tributary to to Connecticut). Strafford and Hanover sheets.

CHASE BROOK.—Caledonia County; a stream about 2 miles long, rising in the western part of the town of Danville and flowing westward into Joes Brook (tributary through Passumpsic River to the Connecticut) in the southern part of the town of Walden. Walker map.

CHASES POND.—Windham County; eastern part of the town of Somerset; three inflowing streams, one of which, the East Branch of Deerfield River (tributary through Deerfield River to the Connecticut), is also the outlet; now known as Somerset reservoir of the New England Power Co.; a dam 110 feet high, completed in 1913, gives a storage capacity of 2,500,000,000 cubic feet at crest of spillway; elevation, 2,143 feet; drainage area above the dam, 30 square miles, including 3 square miles of water surface when reservoir is full. Walker map; shown but not named on Wilmington sheet.

CHITTENDEN BROOK.—Rutland and Windsor counties; rises in the northern part of the town of Chittenden at an altitude of 3,000 feet; flows in a general northeasterly direction to its junction with Brandon Brook (tributary to White River and thus to the Connecticut); length, 4½ miles; fall, 1,800 feet. Rochester sheet.

CHOATE POND.—Addison County; southeastern part of town of Orwell; outlet, a stream about 2 miles long flowing southward to Little Pond (outlet through Hubbardton and Poultney rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 825 feet; fall of outlet, 323 feet. Ticonderoga sheet.

CITY STREAM.—Bennington County; rises in Big Pond, north of Prospect Mountain, at an altitude of 2,263 feet; flows south, west, and northwest through central Woodford into Walloomsac Brook (tributary through Walloomsac River to Hoosic River and thus to the Hudson) in the northwestern part of Woodford; chief branch, Stamford Stream; fall, 1,093 feet; length, 5½ miles. Bennington sheet.

CLARENDON RIVER.—Rutland County; rises in the northern part of the town of Danby, at an altitude of 1,220 feet above sea level; flows northward through the towns of Tinmouth and Clarendon to a point near West Rutland, where it turns and flows northeastward to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Center Rutland; length, about 15 miles; fall, 720 feet; principal tributary, Ira Brook. In Tinmouth, where much of its course is bordered by swamp, it is called Tinmouth Channel, and in Hitchcock's report on the geology of Vermont (1861) it is referred to as Tinmouth River. Pawlet and Castleton sheets.

CLARK BROOK.—Addison County; town of Granville: a small stream entering White River (tributary to the Connecticut) from the north near West Hill School. Rochester sheet.

CLARK BROOK.—Addison County; town of Granville; a stream 1½ miles long flowing southwestward into White River (tributary to the Connecticut) north of Lower Granville. Rochester sheet.

CLARK HOLLOW BROOK.—Rutland County; rises on the western slope of Spruce Knob, in the eastern part of the town of Poultney, at an altitude of 1,700 feet above sea level; flows southwestward to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 2¾ miles; total fall, 1,120 feet; tributary, Hampshire Hollow Brook. Castleton sheet.

CLARK POND.—Caledonia County; western part of the town of Newark; connected with West Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut) by a southwestward-flowing stream 1½ miles long. Walker map.

CLARKS POND.—Orleans County; southeastern part of Glover; inlet, Barton River from Runaway Pond; outlet, Barton River to Lake Memphremagog (outlet, Magog River to St. Francis River and thus to the St. Lawrence); about half a mile long. Walker map and Colton map. See Runaway Pond.

CLAY BROOK.—Chittenden County; rises in the southern part of Underhill; flows northwestward in to Browns River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

CLAY BROOK.—Washington County; rises in the western part of Warren; flows eastward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long; tributary Sterling Brook. Colton map and Walker map.

CLEAR POND.—Lamoille County; eastern part of Hyde Park; outlet, a stream about 2 miles long flowing southward to Green River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

CLOUGH BROOK.—Essex County; rises in the western part of the town of Lemington; flows southeastward 6 miles and enters Connecticut River in the eastern part of Bloomfield. Walker map.

CLYDE RIVER.—Essex and Orleans counties; rises in Island Pond in the town of Brighton; flows northwestward 20 miles to Newport, where it enters Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); many natural ponds; several artificial ponds could be created; principal tributary, Mill River, the outlet of Seymour Lake, in Morgan, and Echo Pond, Charleston; fed also by many small brooks. The river affords excellent power sites, and many power plants are already in place. Gaging station at West Derby, 1909–1916. Walker map and U. S. Geol. Survey Water-Supply Paper 264, p. 121, 1910.

COATICOOK RIVER.—Orleans County, Vt., and Stanstead County, Quebec; rises in a small pond in the western part of the town of Norton, Vt.; flows southeastward 6 miles to the head of Norton Pond, from the northern end of which it takes a general northerly course to its junction with Massawippi River (tributary through St. Francis River to the St. Lawrence) in Sherbrooke County, Quebec; about 35 miles long, of which 10 miles is in Vermont; principal tributary from Vermont, Averill Stream. Walker map and Carte Régionale No. 5 of Quebec.

COBB BROOK.—Orleans County; rises in a small pond in the northern part of the town of Salem; flows southwestward into Lake Memphremagog (tributary through Magog and St. Francis rivers to the St. Lawrence); about 5 miles long. Walker map.

COBB BROOK.—Windham County; rises in the southwestern part of the town of Windham; flows southward into West River (tributary to the Connecticut) in the northeastern part of the town of Jamaica; length, 3½ miles. Londonderry sheet.

COBURN POND.—Caledonia County, northeastern part of the town of Ryegate; very small. Walker map.

COGGMAN CREEK.—Rutland County; rises near the west-central part of the town of Benson, at an altitude of 480 feet above sea level; flows in a general south westerly course to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of West Haven; length, about 7 miles; fall, 360 feet; tributary from Root Pond. Whitehall sheet.

COGGMAN PONDS (3).—Rutland County; east of Bald Mountain, in southern part of West Haven; two of the ponds connected by short channels with East Bay, through which Poultney River flows to Lake Champlain (outlet through Richelieu River to the St. Lawrence); the third and most southerly is a continuation of the swampy area on the west side of East Bay. Elevation above sea level, somewhat more than 100 feet, the 120-foot contour being above all three ponds. Whitehall sheet.

COITS POND.—Washington County; northern part of Cabot; outlet, a stream about 2 miles long flowing southward to West Hill Pond on Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Possibly this pond might be considered the head of the Winooski. Walker map and Colton map.

COLCHESTER POND.—Chittenden County; eastern part of Colchester; outlet from south end by Pond Brook to Malletts Brook (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map, Walker map, and Milton sheet.

COLD BROOK.—Essex County; a stream about a mile long, rising on the north slope of Miles Mountain (called "Niles" on Colton map, 1864); flows northwestward into Moose River (tributary through Passumpsic River to the Connecticut) in the southern part of the town of Victory. Walker map.

COLD BROOK.—Orange County; a stream about 2 miles long, flowing eastward into Ayers Brook (tributary through Third Branch of White River to White River and thus to the Connecticut) in the western part of the town of Brookfield. Walker map.

COLD BROOK.—Windham County; rises in the western part of the town of Dover at an altitude 2,800 feet above sea level; flows southeasterly 5 miles into North Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 1,220 feet; principal tributary, Haystack Brook. Wilmington sheet.

COLD BROOK.—Windsor County; rises in the southwestern part of the town of Bethel at an altitude of 2,200 feet; flows in a southwesterly direction and joins White River (tributary to the Connecticut) 1 mile below the mouth of Breakneck Brook; length, 3 miles; fall, 1,450 feet. Rochester sheet.

COLD HOLLOW BROOK.—Franklin County; rises in the northwestern part of Averys Gore; flows northwestward into Tylers Branch (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southeastern part of the town of Enosburg; about 3 miles long. Walker map.

COLD RIVER.—Rutland County; rises near North Shrewsbury, at an altitude of 2,200 feet above sea level; flows southwestward about 2 miles, then turns abruptly and takes a general northwesterly and westerly course to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) 2 miles south of Rutland; length, about 12 miles; fall, 1,670 feet, of which 600 feet occur in the first 2 miles; lower course lies through a broad, open valley; many small tributaries, but only one—Mendon Brook—is named on map. Rutland sheet.

COLES BROOK.—Orleans County; a small stream rising in the northwestern part of Morgan and flowing westward into Salem Pond (tributary through Clyde River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

COLES POND.—Caledonia County; northern part of the town of Walden; inlet, from Stannard Pond; outlet, Joes Brook to Passumpsic River (tributary to the Connecticut). Walker map.

COLLINS POND.—Lamoille County; eastern part of Hyde Park; no outlet shown on map. Walker map.

COLTS POND.—Orange County; west-central part of the town of Brookfield; inlets, from Lampson, North, and South ponds; outlet, to Ayers Brook (tributary through Third Branch of White River to White River and thus to the Connecticut). Colton map.

CONNECTICUT RIVER.—Rises in Connecticut lakes in northern New Hampshire; flows southward between New Hampshire and Vermont, and across Massachusetts and Connecticut, into Long Island Sound; length, about 345 miles; drainage area, 11,300 square miles, of which 3,970 square miles is in Vermont; principal tributaries from Vermont are the Nulhegan, Passumpsic, Wells, Waits Ompompanoosuc, White, Ottauquechee, Black, Williams, Saxtons, and West rivers. Deerfield River enters below the State line but drains an area of 316 square miles in Vermont. Fall from Connecticut lakes to the Vermont-Massachusetts State line, about 1,710 feet. Large power developments at Wilder and Vernon. Gaging station at Orford, N. H. (Fairlee, Vt.), 1900-1916. The following topographic maps are available, covering a portion of the area drained by the Connecticut River in Vermont: Greylock, Hawley, Greenfield, Warwick, Wilmington, Brattleboro, Keene, Londonderry, Wallingford, Rutland, Woodstock, Hanover, Rochester, Strafford, and Whitefield sheets. *See* Report on water power of the United States, Tenth Census, vol. 16, pp. 46-135, 1885; *also* pp. 111-116 of this report.

COOKS POND.—Windsor County; very small; eastern part of Weathersfield, discharging by a stream about 3 miles long flowing southeastward into the Connecticut. Walker map.

COPPERAS BROOK.—Orange County; a stream about 1 mile long draining a small area in the southeastern part of the town of Strafford, flowing northeastward and discharging into West Branch of the Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut) near Copper Flat. Strafford sheet.

CORBETT HOLLOW BROOK.—Bennington County; a small stream draining a part of the northwestern slope of Equinox Mountain and flowing northwestward into Green River (tributary through Batten Kill to the Hudson) at the village of Beartown. Equinox sheet.

COREY POND.—Lamoille and Orleans counties; on line between Eden, Lamoille County, and Lowell, Orleans County; outlet by West Brook to Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); very small. Walker map.

CORPORATION BROOK.—Rutland and Windsor counties; rises in the northeastern part of the town of Chittenden at an altitude of 2,500 feet; flows east 1 mile and then northeast 3 miles to West Branch of White River (tributary to the Connecticut); fall, 1,570 feet. Rochester sheet.

COW MOUNTAIN POND.—Essex County; southern part of the town of Granby; outlet, Pond Brook to Granby Stream (tributary through Moose River to Passumpsic River and thus to the Connecticut). Walker map.

COX BROOK.—Washington County; rises in south-central part of Moretown; flows southeastward into Dog River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Gouldsville, in the town of Northfield; about 5 miles long. Colton map and Walker map.

COY BROOK.—Rutland County; rises on the southern slopes of The Pinnacle, in the town of Wells, at an altitude of 1,440 feet above sea level; flows northward to its junction with South Brook (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 3 miles; total fall, 640 feet. Pawlet sheet.

CRAMS BROOK.—Orange County; rises in the northwestern part of the town of Chelsea; flows southeasterly into East (First) Branch of White River (tribu⁺ary to the Connecticut); length, about 5½ miles. Strafford sheet.

CRANBERRY MEADOW POND.—Washington County; northern part of Calais; about 1½ miles northwest of Wheelock Pond; no outlet shown on Walker map.

CRANBERRY POND.—Essex County; western part of the town of Brunswick; outlet, a stream 1½ miles long flowing west and north into Nulhegan River (tributary to the Connecticut) opposite the mouth of the Yellow Branch. Walker map.

CROLYS POND.—*See* Proper Pond.

CRYSTAL BROOK.—Addison County; town of Hancock; a stream about a mile long flowing southwestward into South Branch of Middlebury River (tributary through Middlebury River to Otter Creek and thus through Lake Champlain to Richelieu River and the St. Lawrence) in the eastern part of the town of Ripton. Rochester sheet.

CRYSTAL LAKE.—Orleans County; town of Barton; two inflowing streams, one of which drains May Pond and the other a group of small ponds in the northwestern part of the town of Sutton; outlet, a short stream flowing westward into Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); about 3 miles long and three-quarters of a mile wide. Walker map.

CURTIS HOLLOW BROOK.—Windsor County; rises in the northwestern part of Reading, at an altitude of 2,020 feet; flows northward about 3½ miles into Ottauquechee River (tributary to the Connecticut); fall, 1,220 feet. Woodstock heet.

CURTIS POND.—Washington County; western part of Calais; outlet southeastward to the stream connecting Wheelocks Pond with Kingsbury Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

CUTLER POND.—Franklin County; northern part of Highgate; outlet eastward to Rock River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map and St. Albans sheet.

CUTTER POND.—Orange County; a small pond in the southern part of Williamstown, discharging by a stream flowing northward to Stevens Branch of Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map.

D.

DAGGETTS POND.—Orleans County; northwestern part of Coventry; inlets, from Bowleys and Kinneys ponds; outlet, a stream about 4 miles long flowing east and then south to Black River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); very small. Colton map.

DANBY POND.—Rutland County; near central part of town of Danby; outlet, a stream 1½ miles long flowing southward to Mill Brook (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 1,390 feet; fall of outlet, 150 fee⁺; pond is somewhat less than half a mile in maximum length and about three-eighths of a mile wide. Pawlet sheet.

DANIELS POND.—Orleans County; town of Glover; 1½ miles north of west from Stones Pond; one inlet; outlet through Stones Pond to Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis river⁻ to the St. Lawrence). Walker map.

DAY BROOK.—Chittenden County; rises in the eastern part of Colchester; flows northwestward into Malletts Bay, Lake Champlain (outlet by Richelie⁻ River to the St. Lawrence); about 2 miles long. Walker map.

DEAD CREEK.—Addison County; formed in the southern part of Addison by the union of its East and West branches; East Branch, which drains the larger area, and is therefore considered the main stream, rises in the southern part of Bridport, at an altitude of 240 feet, and flows northward to the point at which it joins West Branch; beyond this junction Dead Creek continues to flow northward until it joins Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) about 3½ miles northwest of Vergennes; length to head of East Branch, about 20 miles; fall, very small, as the 120-foot contour closely borders the swamp through which it flows below the junction of the branches. Port Henry and Ticonderoga sheets.

DEAD CREEK, EAST BRANCH.—Addison County; rises in the southern part of Bridport, at an altitude of 240 feet above sea level; flows irregularly northward about 10 miles to its junction with the West Branch to form Dead Creek (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Addison; total fall, about 120 feet; flows through swamp except for about 2 miles in middle course. Ticonderoga and Port Henry sheets.

DEAD CREEK, WEST BRANCH.—Addison County; rises in the southern part of Bridport, at an altitude of 240 feet above sea level, about 1½ miles northwest of the head of the East Branch; flows northward very irregularly about 9 miles into the southern part of the town of Addison, where it unites with the East Branch to form Dead Creek (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); fall, 120 feet, of which 60 feet occurs in a little more than a mile near the head of the stream. Ticonderoga and Port Henry sheets.

DEAD CREEK.—Franklin County; a stream rising in the northwestern part of the town of Fairfax, flowing northeastward through a swamp in western Fairfield, and joining the creek connecting Fairfield Pond with Black River (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence). St. Albans sheet.

DEAD CREEK.—Franklin County; town of Highgate; a sloughlike channel in the marsh north of Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). St. Albans sheet.

DEAD POND.—Lamoille County; western part of the town of Eden; no outlet shown on Walker map.

DEER CABIN BROOK.—Bennington and Windham counties; rises in the southeastern part of Glastenbury, at an altitude of 2,600 feet; flows northeastward about 2 miles and southeastward less than a mile into one of the headwater tributaries of Deerfield River (tributary to the Connecticut); fall, 570 feet; several small branches. Bennington sheet.

DEERFIELD RIVER.—Windham and Bennington counties, Vt., and Berkshire and Franklin counties, Mass.; rises in the southeastern part of the town of Sunderland, Vt.; follows a general southeasterly course to its junction with the Connecticut near Greenfield, Mass.; length, above the Massachusetts State line, about 30 miles; below the Massachusetts line, 42 miles. Gaging stations: At Hoosac Tunnel, 1909–1913; at Charlemont, 1913–1916; at Shelburne Falls, 1907–1916; at Deerfield, 1904–5. The most important tributaries in Vermont are the East Branch, which enters at Searsburg; the North Branch, which comes in at Wilmington, and the West Branch, which joins at Readsboro.

The basin is in large part wooded, and little land is under cultivation except along the lower stretches. Most of the slopes are steep, and elevations in the upper part of the basin exceed 3,800 feet above sea level. Mean annual precipitation at the headwaters, probably about 48 inches; in the lower part of the basin it is several inches less; average depth of snowfall in January and February at Jacksonville, Vt., about 25 inches; mean temperature for these months,

about 18°. Equinox, Londonderry, Bennington, Wilmington, Hawley, and Greenfield sheets.

DEERFIELD RIVER, EAST BRANCH.—Windham and Bennington counties; rises on the southwest slope of Stratton Mountain, at an altitude of 2,660 feet above sea level; flows southward through Somerset into the northeastern part of Searsburg, where it joins Deerfield River (tributary to the Connecticut); length, 15 miles; fall, 860 feet; principal tributaries, Black and Pond brooks. Londonderry and Wilmington sheets.

DEERFIELD RIVER, NORTH BRANCH.—Windham and Bennington counties; rises in the northwestern part of the town of Dover, at an altitude of 2,860 feet above sea level; flows southeastward to the northern part of the town of Wilmington, thence southward, southwestward, and westward to its junction with Deerfield River (tributary to the Connecticut); length, 14 miles; fall, 1,340 feet; principal tributaries, Blue, Ellis, Bill, and Cole brooks. Wilmington sheet.

DEERFIELD RIVER, WEST BRANCH.—Bennington County; rises in the east-central part of Woodford on the eastern slope of Prospect Mountain, at an altitude of 2,380 feet above sea level; flows southwestward about a mile, then southeastward through Woodford and northern Readsboro, and joins Deerfield River (tributary to the Connecticut) at Readsboro; receives several unnamed tributaries; chief branch, Yaw Pond Brook; length, 11 miles; fall, 1,220 feet. Bennington and Wilmington sheets.

DEER LICK BROOK.—Bennington County; rises in the eastern part of Glastenbury, on the eastern slope of Glastenbury Mountain, at an altitude of 3,000 feet; flows southeastward about 2½ miles into a headwater tributary of Deerfield River (tributary to the Connecticut); fall, 940 feet; receives one southern branch. Bennington sheet.

DENNIS POND.—Essex County; central part of the town of Brunswick; inlet, Wheeler Stream; outlet, Wheeler Stream (tributary to the Connecticut); area, about 135 acres. Walker map and private surveys. Called North Pond on Walker map.

DERBY POND.—Orleans County; central part of Derby; outlet, a stream a mile long flowing southeastward into Salem Pond (tributary through Clyde River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

DEWEY BROOK.—*See* Farnham Brook.

DIMICK BROOK.—Windsor County; rises in the eastern part of Pomfret, at an altitude of 1,600 feet; flows northeastward into the northwestern part of Hartford and joins White River (tributary to the Connecticut); fall, 1,240 feet; length, about 3½ miles. Hanover sheet.

DOG POND.—Washington County; western part of Woodbury; near head of Kingsburg Branch (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); no outlet shown on Walker map.

DOG RIVER.—Washington County; rises in the central part of Roxbury; flows northeastward across the towns of Northfield and Berlin to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Montpelier Junction; length, about 15 miles; principal tributaries, Rocky, Jones, and Cox brooks. Gaging stations: At Northfield, 1909–1916; near Montpelier, 1910. Colton map, Walker map, post-route map, and U. S. Geol. Survey Water-Supply Paper 264, pp. 118–119, 1910.

DORSET POND.—Bennington County; northeastern part of town of Dorset; two small inlets; outlet northward by Otter Creek to Lake Champlain (outlet through Richelieu River to the St. Lawrence); elevation above sea level, approximately 700 feet; pond is about half a mile long and a quarter of a mile (maximum) wide; area, 34 acres. It lies in a valley remarkable for its narrowness and depth. Pawlet sheet. *See* Otter Creek.

DOTHAN BROOK.—Windsor County; rises on Griggs Mountain in the southwestern part of the town of Norwich; flows southeastward 5 miles into Connecticut River near Wilder, in the northeastern part of the town of Hartford. Hanover sheet.

DOUGHTY POND.—Rutland County; northeastern part of town of Benson; outlet, a stream one-eighth mile long flowing northward to the outlet of Spruce Pond to Sunset Lake (outlet through Little Pond to Hubbardton River and thus through Poultney River and Lake Champlain to Richelieu River and the St. Lawrence); elevation above sea level, 670 feet; above Sunset Lake, 167 feet. Ticonderoga sheet.

DOWNEYS BROOK.—Orleans County; a small stream in the northern part of Salem, flowing eastward into Salem Pond (tributary through Clyde River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

DOW POND.—Addison County; 3½ miles east of Middlebury; 2 inflowing streams; outlet, Muddy Branch to New Haven River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 14 acres; elevation above sea, 420 feet; fall of outlet, 160 feet; dammed. Middlebury sheet.

DRY BROOK.—Bennington County; rises on Grass Mountain, in the southwestern part of Arlington, at an altitude of 2,400 feet above sea level; flows southeastward to its junction with Warm Brook (tributary through Fayville Branch to Roaring Branch and thus through Batten Kill to the Hudson); length, 3½ miles; fall, 1,640 feet. Equinox sheet.

DRY CREEK.—Bennington County; rises on the northern slope of Egg Mountain, in the northwestern part of Sandgate; at an altitude of 1,800 feet above sea level; flows southwestward to its junction with White Creek (tributary to Batten Kill, a branch of the Hudson) 2½ miles northeast of Salem, Washington County, N. Y.; length, about 5 miles; fall, 1,280 feet, of which 900 feet occurs in the first mile of its course. Equinox and Cambridge sheets.

DUCK BROOK.—Chittenden County; rises in the western part of Bolton; flows southward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Colton map and Walker map.

DUCK POND.—Caledonia County; a very small pond on the line between Marshfield and Peacham, discharging by a stream 3 miles long flowing southeastward into Groton Pond (outlet, Wells River to the Connecticut). Walker map.

DUCK POND.—Caledonia County; northern part of the town of Sheffield; outlet, Millers Run to Passumpsic River (tributary to the Connecticut); very small. Walker map.

DUCK POND.—Orleans County; east of Little Hosmer Pond, in northeastern part of Craftsbury; small. Walker map.

DUCK POND.—Orleans County; a small pond in the northern part of the town of Sutton, discharging by a stream flowing to Big Fish Pond (outlet to Blake Pond, and thus through Crystal Lake to Barton River, Lake Memphremagog, and Magog and St. Francis rivers to the St. Lawrence). Walker map.

DUNHAM BROOK.—Addison and Orange counties; a small eastward-flowing stream tributary to Third Branch of White River (tributary through White River to the Connecticut) in the town of Braintree. Rochester sheet.

DUNHAMS POND.—See Pleiad Lake.

DUNMORE, LAKE.—Addison County; crossed by boundary line between Salisbury and Leicester; about half in each town; several inflowing streams, of which Sucker Brook is the largest; outlet, Leicester River to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 3½ miles; maximum width, 1 mile; area, 990 acres; elevation above sea level, 571 feet. Brandon sheet.

DUTTON BROOK.—Addison County; rises in the western part of Goshen, at an elevation of about 1,800 feet above sea level; flows west and northwest into Sucker Brook (tributary through Lake Dunmore to Leicester River, Otter Creek, and Lake Champlain, and thus through Richelieu River to the St. Lawrence); length, about 3 miles; fall, about 500 feet. Brandon sheet.

DUTTON POND.—Essex County; central part of town of Maidstone; outlet Gaskill Brook (tributary to Connecticut River). Colton map and Walker map.

E.

EAST BROOK.—Essex County; rises in the western part of the town of Lurenburg; flows southwestward 3 miles and southeastward 1 mile into Miles Brook (tributary to Connecticut River). Walker map.

EAST BROOK.—Lamoille County; rises in the southern part of Elmore; flows northward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 7 miles long. Colton map, Walker map, and post-route map.

EAST CREEK.—Rutland County; rises in a marsh in the northeastern part of the town of Benson, at an elevation of 450 feet above sea level; flows eastward for a mile or more, then northward about 5 miles to a point near Orwell in Addison County, then turns again and flows northwestward until it enters Lake Champlain (outlet through Richelieu River to Lake Champlain) nearly opposite Ticonderoga; length, about 10 miles; fall, 349 feet; swampy through much of its lower course; two ponds are mapped in this basin—Perch Pond, near Sunset Lake, and an unnamed pond lying west of the creek. Whitehall and Ticonderoga sheets.

EAST CREEK.—Rutland County; rises in the extreme northeastern part of Mendon, at an altitude of 2,200 feet above sea level; flows northwestward about 5 miles into the southern part of Chittenden Township, then with many abrupt bends passes to the west, south, and southwest, crossing the southeastern corner of Pittsford Township into Rutland, where it joins Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). In a straight line the distance between source and mouth is about 10 miles, but the course is so tortuous that map measurement shows the stream to be about 18 miles long; with its largest tributary it almost encircles Blue Ridge Mountain. Fall, 1,670 feet, of which 400 feet occurs in the first mile. Gaging station near Rutland, 1911–1913. The basin contains 3 small ponds—North and Burr ponds and one which is not named. Rutland sheet.

ECHO POND.—Orleans County; town of Charleston; inlet, Mill River, the outlet of Seymour Lake; outlet, Mill River to Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence); about a mile long and wide. Walker map.

EDDY BROOK.—Bennington and Windham counties; rises in the southern part of Peru, at an altitude of 2,240 feet; flows southeastward across the northeastern corner of Winhall, southward less than a mile along the western boundary of Londonderry, then southwestward into Winhall, where it joins Mill Brook, a branch of Winhall River (tributary through West River to the Connecticut); fall, 940 feet; length, about 5½ miles. Londonderry sheet.

ELIGO POND.—Orleans County; western part of Greensboro; one inlet; outlet, northward by Black River to Lake Memphremagog (outlet by Magog River to St. Francis River and thus to the St. Lawrence); about 2 miles long by a quarter of a mile wide. Colton map and Walker map.

ELLIS BROOK.—Windham County; rises in the northeastern part of the town of Dover, at an altitude of 2,200 feet above sea level; flows east of south 5 miles to its junction with North Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 580 feet. Wilmington sheet.

ELMORE BROOK.—Lamoille County; rises in Elmore Pond, in the northern part of Elmore; flows northward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the western part of the town of Wolcott; about 2 miles long. Colton map and Walker map.

ELMORE POND.—Lamoille County; northern part of Elmore; inlet, from Little Pond; outlet by Elmore Brook to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about a mile long and nearly half a mile wide. Colton map and Walker map.

ENDLESS BROOK.—Rutland County; rises in the eastern part of the town of Wells, on the slopes of Coy and Northeast mountains, the extreme headwaters starting at an altitude of 2,000 feet above sea level; takes a general northwesterly course and enters St. Catharine Lake (tributary through Mill and Wells brooks and Mettawee River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near its northern end; length, about 5 miles; fall, 1,523 feet, of which 800 feet occurs in the first mile. Pawlet sheet.

EQUINOX POND.—Bennington County; about 1 mile southwest of Manchester; east of Equinox Mountain; outlet, a stream about 2 miles long flowing east and then south to its junction with Batten Kill (tributary to Hudson River); area, 6 acres; elevation, 1,090 feet above sea level; fall of outlet, 440 feet. Equinox sheet.

ESTABROOK POND.—Windham County; southwestern part of the town of Jamaica, south of Sage Hill; outlet, a stream flowing eastward into Ball Mountain Brook (tributary through West River to the Connecticut). Walker map; not shown on the Londonderry sheet.

EWELL POND.—Caledonia County; northern part of town of Peacham; outlet, Stevens Brook (tributary to Connecticut River). Walker map.

F.

FAIRFIELD POND.—Franklin County; southwestern part of Fairfield; outlet by stream about 1 mile long flowing southeastward to Cedar Swamp Brook (tributary through Black Creek and Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about a mile and a half long by three-fourths of a mile wide. Colton map, Walker map (outlet not shown on this map), post-route map, and St. Albans sheet.

FAIRFIELD RIVER.—Franklin County; rises in the northwestern part of Fletcher; flows somewhat east of north to its junction with Black Creek (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Fairfield Township; about 6 miles long. Walker map and post-route map.

FAIRLEE LAKE.—Orange County; on boundary lines between the towns of Fairlee, West Fairlee, and Thetford; principal inlets, Middle and Bloody brooks; outlet, a stream about 1 mile long, flowing westward into Ompompanoosuc River (tributary to the Connecticut). Walker map.

FALL BROOK.—Caledonia County; rises in the central part of the town of Wheelock; flows eastward about 4 miles into Millers Run (tributary through Passumpsic River to the Connecticut). Walker map.

FARNHAM BROOK.—Orange County; rises in the western part of the town of Strafford, at an altitude of 1,800 feet; flows west into East (First) Branch of White River (tributary through White River to the Connecticut); length, about 4 miles; called Dewey Brook on Walker map. Strafford sheet.

FAY BROOK (MILL BROOK).—Orange and Windsor counties; rises in the southwestern part of the town of Strafford, at an altitude of 1,840 feet; flows southwestward into White River (tributary to the Connecticut) in the western part of the town of Sharon; receives stream from Standing Pond and several other small streams in the southwestern part of Strafford; fall, 1,380 feet, of which 500 feet is in the first mile; length, 7 miles. Strafford sheet.

FAYVILLE BRANCH.—Bennington County; rises in the northwestern part of Glastenbury, at an elevation of 2,440 feet above sea level; flows southwestward about 2 miles, then takes a general northwesterly course to its junction with Roaring Branch (tributary to Batten Kill, a branch of the Hudson) 1 mile northeast of Arlington; length, about 9 miles; fall, 1,800 feet, of which 1,300 feet occurs in 3½ miles at the head of the stream; principal tributary, Warm Brook. Equinox sheet.

FENNELL HOLLOW BROOK.—Rutland County; rises on the western slope of Herrick Mountain, in town of Ira, at an altitude of 2,300 feet above sea level; flows westward about 3 miles, then southwestward and southward 2½ miles to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near East Poultney; total fall in 5½ miles, 1,750 feet, of which 1,300 feet occurs in the first mile and a half of its course. Castleton sheet.

FERN LAKE.—Addison County; south of Lake Dunmore, in Leicester; elevation above sea level, 571 feet, the same as that of Lake Dunmore; outlet northward to Lake Dunmore (outlet through Leicester River to Otter Creek and Lake Champlain and thus through Richelieu River to the St. Lawrence); the distance between the two lakes is about one-fourth of a mile; area, 73 acres. Brandon sheet.

FETTERS RIVER.—Essex and Orleans counties; rises in Warner Grant in the northwestern part of Essex County; flows southward, passing across the southeastern corner of Morgan, in Orleans County, into Brighton, where it joins Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence) a short distance below the outlet of Island Pond; length, about 10 miles. Walker map.

FINNO BROOK.—Orleans County; rises on Westmore Mountain; flows northeastward 2 miles into Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

FIRST BRANCH, WHITE RIVER.—*See* White River, East Branch.

FIRST BROOK.—Essex County; a stream about 2 miles long, flowing southward into Miles Brook (tributary to Connecticut River) in the southern part of the town of Lunenburg. Walker map.

FISHER BROOK.—Essex County; a stream about a mile long, rising in the southern part of the town of Averill and flowing southwestward to East Branch of Nulhegan River (tributary through Nulhegan River to the Connecticut). Walker map and private surveys.

FLETCHER BROOK.—Rutland and Windsor counties; rises in the northern part of the town of Sherburne; flows northeastward, then northward to the eastern part of Stockbridge into White River (tributary to the Connecticut); length, 7 miles. Walker map and Rutland sheet.

FLETCHER POND.—Lamoille County; south-central part of town of Eden; directly east of South Pond; no outlet shown on maps. Colton map and Walker map.

FLOOD BROOK.—Bennington and Windham counties; rises in the west-central part of Peru, at an altitude of 2,500 feet; flows eastward and southeastward across Peru and Landgrove and joins West River (tributary to the Connecticut) in the western part of Londonderry; fall, 1,460 feet; length, about 8 miles. Wallingford and Londonderry sheets.

FLOWER BROOK.—Rutland County; rises on the southern slope of Tinmouth Mountain, in the southwestern part of the town of Tinmouth, at an altitude of 2,100 feet above sea level; flows southward about 3 miles, then southwestward 5 miles, uniting with Mettawee River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Pawlet; fall, 1,450 feet, of which 1,000 feet occurs in 3 miles at the head of the stream; receives several small tributaries draining Dutch Hill, Mount Hoag, Walnut Hill, and The Oxbow. Pawlet sheet.

FOREST LAKE.—Essex County; northwestern part of town of Canaan and southwestern part of Hereford, Compton County, Quebec; outlet, Leach Stream to Connecticut River. Name changed to Forest Lake by vote of Vermont State Legislature, 1917; also known as Wallace Pond and Leach Pond. Walker map and Carte Régionale No. 5 of Quebec.

FOSTER POND.—Caledonia County; central part of town of Peacham; outlet, a stream 6 miles long, flowing southeastward through the northern part of Harvey Lake into Stevens River (tributary to the Connecticut). Walker map.

FOX POND.—Rutland County; near Wallingford; elevation above sea level, about 590 feet; a narrow pond lying half a mile west of Otter Creek; area, 15 acres; no outflowing stream is shown on the map, but the contours indicate that natural outflow would be by a stream about a mile long flowing south and then east to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Wallingford sheet.

FRANKLIN POND.—Franklin County; eastern part of Franklin; several inflowing streams, including Pike River and stream from Little Pond; outlet by Pike River through Canada to Missisquoi Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence). Carte Régionale No. 5 of Quebec, Colton map, Walker map, and post-route map.

FREEMAN BROOK.—Washington County; rises in the eastern part of Warren; flows westward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Walker map.

FROST HOLLOW BROOK.—Bennington County; a small stream draining the southeastern slope of Bear Mountain in the town of Sandgate and flowing southeastward to Green River (tributary through Batten Kill to the Hudson). Equinox sheet.

FRYINGPAN BROOK.—Lamoille County; rises in the northern part of the town of Eden; flows southward into Gihon River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map; not named on Walker map.

FULLER POND.—Orleans County; town of Barton; outlet, a stream 1 mile long flowing northward into Graves Brook (tributary through Barton River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

FULTON BROOK.—Orange County; a stream 1½ miles long draining a small area in the western part of the town of Thetford and flowing southward into West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut). Strafford sheet.

FURNACE BROOK.—Bennington County; rises in the northeastern part of Shaftsbury, south of Maple Hill, at an altitude of 1,520 feet; flows south into Bennington, then irregularly westward into Walloomsac River (tributary through Hoosic River to the Hudson); chief branches, Basin and Stratton brooks; fall, 940 feet; length, 10 miles. Bennington sheet.

FURNACE BROOK (OR RIVER).—Rutland County; rises in the northwestern part of Chittenden, east of Lookout Mountain; flows in a general southwesterly direction to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) about 1½ miles southwest of Pittsford Mills; length, about 10 miles; fall from North Chittenden (elevation, 1,000 feet above sea level) to Otter Creek, 600 feet; principal tributaries, North Branch and Sugar Hollow Brook. Walker map and Rutland, Castleton, and Rochester sheets.

FURNACE BROOK, NORTH BRANCH.—Rutland County; rises west of Lookout Mountain in the town of Chittenden; flows southeastward 2½ miles to its junction with Furnace Brook (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence). Rochester sheet.

G.

GAGE BROOK.—Caledonia County; rises in the central part of the town of Kirby; a short stream flowing southeastward along the boundary between the towns of Kirby and St. Johnsbury and uniting with Moose River (tributary through Passumpsic River to the Connecticut) near the southeastern corner of St. Johnsbury. Walker map.

GASKILL BROOK.—Essex County; rises in Dutton Pond in the central part of the town of Maidstone; flows southeastward 4 miles and west of south 3 miles to its junction with Connecticut River near Guildhall station; principal tributaries, Mill Brook and Burnside Brook. Colton map and Walker map.

GEORGE BROOK.—Addison County; town of Ripton; a stream about 1½ miles long flowing southeastward into Texas Brook (tributary through Hancock Branch to White River and thus to the Connecticut). Rochester sheet.

GIHON RIVER.—Lamoille County; rises in North Pond, in the eastern part of the town of Eden; flows in a general southwesterly course to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Johnson; about 12 miles long; principal tributaries, Fryingpan and Wild brooks and stream from South Pond. Colton map, Walker map, and post-route map.

GILLETTS POND.—Chittenden County; southeastern corner of town of Richmond; one inlet; outlet, a stream about a mile long flowing northward to Huntington River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

GILMORE POND.—Addison County; on South Mountain, in the southeastern part of Bristol; 3 small inflowing streams; outlet, a stream 4½ miles long flowing southwest to Little Notch Road, then northwest into New Haven River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) at New Haven Mills; elevation above sea level, 2,010 feet; fall of outlet, 1,710 feet. Middlebury sheet.

GLEN LAKE.—Rutland County; on line between Benson, Fair Haven, and Castleton; two small inflowing streams; outlet, a stream half a mile long flowing southeastward to Bomoseen Lake (outlet through Castleton and Poultney rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 480 feet; fall of outlet, 67 feet; maximum width and length each about three-fourths of a mile; constricted near center to about one-eighth of a mile; area, 194 acres. Castleton sheet.

GOCHEY BROOK.—Orleans County; rises in Little Mud Pond in the northwestern part of Morgan; flows westward into Salem Pond; outlet, Clyde River to Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); 3 miles long. Walker map.

GOLD BROOK.—Lamoille County; rises in the southeastern part of Stowe; flows westward into Waterbury River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Moscow post office; about 3 miles long. Walker map.

GOODSELLS BROOK.—Franklin County; rises in the southeastern part of Sheldon; flows northward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Colton map and Walker map.

GOSHEN BROOK.—Addison County; rises in the northeastern part of the town of Goshen; flows northeastward 2 miles into South Branch of Middlebury River (tributary through Middlebury River and Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence). Rochester sheet.

GRANBY STREAM.—Essex County; rises in the east-central part of the town of Granby; flows southwestward about 6 miles into Moose River (tributary through Passumpsic River to the Connecticut); passes through Mud and Lees ronds; principal tributary, a stream from Cow Mountain Pond.   Walker map.

GRASS POND.—Windsor County; small; northwestern part of Plymouth; altitude, 1,570 feet; discharges by a short southward-flowing stream into Black River (tributary to the Connecticut).   Woodstock sheet.

GRASSY BROOK.—Windham County; rises in the southern part of the town of Athens in Lily Pond; flows southwestward 8 miles into West River (tributary to the Connecticut).   Walker map.

GRAVEL BROOK.—Windsor County; rises in the southern part of Springfield; flows eastward into Connecticut River south of Springfield station; about 3 miles long. Walker map.

GRAVES BROOK.—Orleans County; rises in the western part of the town of Barton; flows northeastward 3 miles into Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence).   Walker map.

GRAVES POND.—Windham County; southwestern part of the town of Jamaica; a small pond discharging by stream flowing westward into Ball Mountain Brook (tributary through West River to the Connecticut).   Walker map; not shown on Londonderry sheet.

GREAT AVERILL POND.—Essex County; northern part of the town of Averill on the eastern border of Norton; inlet from Little Averill Pond; outlet, Averill Stream to Coaticook River (tributary through Massawippi River to St. Francis River and thus to the St. Lawrence); 2½ miles long and 1 mile wide.   Walker map.

GREAT HOSMER POND.—Orleans County; on line between towns of Albany and Craftsbury; outlet to Little Hosmer Pond (outlet through Seaver Brook to Black River and thus through Lake Memphremagog and Magog and St. Francis rivers to the St. Lawrence); about 1½ miles long.   Walker map.

GREAT POND.—Lamoille County; east-central part of the town of Eden; two ponds with the same name; connected by westward-flowing stream with Gihon River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence).   Colton map and Walker map.

GREAT ROARING BROOK.—Rutland and Windsor counties; rises in the eastern part of Shrewsbury, at an altitude of 2,100 feet; flows northeastward into Plymouth, and passes into Black River (tributary to the Connecticut) just above Plymouth Notch; fall, 840 feet; length, 4 miles.   Rutland and Woodstock sheets.

GREEN RIVER.—Bennington County; rises in many forking branches on the western slopes of Bear Mountain in the towns of Sandgate and Manchester, at an altitude of nearly 3,000 feet above sea level; flows southwestward to Sandgate, then takes a more southerly course to its junction with Batten Kill (tributary to the Hudson) at West Arlington; length, about 10 miles; total fall from source of highest tributary to mouth, 2,400 feet, of which 1,800 feet occurs in about 3 miles at the head of the river.   Equinox sheet.

GREEN RIVER.—Lamoille County; rises in the eastern part of the town of Eden; flows southwestward and southward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 10 miles long; tributaries, Adams Brook and streams from Pettengill, Half Pound, Mud, and Clear ponds; gaging station at Garfield, 1915–16.   Colton map, Walker map, and post-route map.

GREEN RIVER.—Windham County, Vt.; Franklin County, Mass.; rises on Hogback Mountain in the town of Marlboro; flows in general southeastward to its junction with Deerfield River (tributary to the Connecticut) at Greenfield; length, 27 miles, of which 13 miles is below the Massachusetts line; principal tributaries,

West Hollow, Hibbard, Workman, Glen, Hinsdale, and Mill brooks, all in Massachusetts. Wilmington, Brattleboro, and Greenfield sheets.

GREENSBORO BROOK.—Orleans County; rises in Caspian Lake, in the southern part of Greensboro; flows southward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the eastern part of the town of Hardwick; 3 miles long. Walker map.

GRINDSTONE BROOK.—Addison County; rises in the southwestern part of the town of Hancock and flows northward into Robbins Branch (tributary through White River to the Connecticut); length, about 2½ miles. Walker map and Rochester sheet.

GROTON POND.—Caledonia County; northern part of the town of Groton; several inlets, including streams from Owls Head, Little Hosmer, Duck, and Kettle ponds; outlet, a short stream into Lunds Pond, which discharges into Wells River (tributary to the Connecticut); about 3 miles long and 1 mile wide. Called also Wells River Pond. Walker map.

GROUT POND.—Windham County; southeastern part of the town of Stratton; inlet and outlet, Pond Brook (tributary through East Branch of Deerfield River to Deerfield River and thus to the Connecticut); altitude, 2,225 feet above sea level; area, 115 acres. Londonderry sheet.

GUERNSEY BROOK.—Rutland County; rises in the town of Pittsfield on the southeastern slope of Little Wilcox Peak, at an altitude of 1,900 feet; flows in a southeasterly direction 4 miles to Tweed River (tributary through White River to the Connecticut); fall, 1,100 feet. Rochester sheet.

GULF BROOK.—Addison County; town of Granville; a stream 1½ miles long flowing northeastward into White River (tributary to the Connecticut). Rochester sheet.

GULF BROOK.—Windham County; a stream 2½ miles long, draining the northeastern part of the town of Marlboro, flowing southward 1 mile and northwestward 1½ miles into Marlboro Branch (tributary through West River to the Connecticut). Brattleboro sheet.

GULF STREAM.—Windsor County; rises in the southeastern part of the town of Barnard, at an altitude of 1,740 feet; flows southeastward, crossing the southwestern corner of Pomfret into the northern part of Woodstock, where it joins Barnard Brook, a branch of the Ottauquechee (tributary to the Connecticut); chief branches, Richmond, Atwood, and Bridgewater brooks; fall, 1,040 feet; length, 8 miles. Woodstock sheet.

GULLY BROOK.—Rutland County; rises on the northwestern slopes of Herrick Mountain in the town of Ira, at an altitude of 2,400 feet above sea level; takes a general northerly course to its junction with Castleton River (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 4 miles; total fall, 1,950 feet; receives small tributaries from western slope of Bird Mountain. Castleton sheet.

GUNNERS BROOK.—Caledonia County; rises in the southwestern part of Groton; flows westward 3 miles then northward 4 miles into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northern part of the town of Plainfield, Washington County. Colton map and Walker map.

. H. .

HALE HOLLOW BROOK.—Windsor County; formed by many small streams, some of which rise at altitudes of more than 2,100 feet in the northeastern part of Plymouth; flows in general northward into the southeastern part of Bridgewater where it joins Ottauquechee River (tributary to the Connecticut); only named branch, Pinney Hollow Brook; fall, 1,250 feet; length, about 7 miles; called Broad Brook on Walker map. Woodstock sheet.

HALF MOON POND.—Franklin County; central part of Fletcher; one inlet; outlet, a
stream about a mile long flowing southward to Stones Brook (tributary through
Lamoille River to Lake Champlain and thus through Richelieu F 'ver to the St.
Lawrence). Colton map and Walker map.

HALF MOON POND.—Rutland County; southwestern corner of town of Hubbardton;
outlet, a stream 1½ miles long flowing southeastward into an arm of Bomoseen
Lake (tributary through Castleton River to Poultney River and Lake Cham-
plain and thus through Richelieu River to the St. Lawrence); elevation above
sea level, 586 feet; fall of outlet, 173 feet. Castleton sheet.

HALF POUND POND.—Lamoille County; eastern part of Hyde Park; outlet eastward
to Green River (tributary through Lamoille River to Lake Champlain and thus
through Richelieu River to the St. Lawrence). Walker map.

HALLS POND.—Essex County; southwestern part of the town of Concord; outlet, a
stream 4 miles long flowing east or south into Connecticut River. Walker map.

HALLS POND.—Orange County; south-central part of the town of Newbury; outlet,
Whiting Brook (tributary through Chalmers Brook to the Connecticut). Walker
map.

HAMPSHIRE HOLLOW BROOK.—Rutland County; rises in the east-central part of the
town of Poultney, at an altitude of 900 feet above sea level; flows southward to
Clark Hollow Brook (tributary through Poultney River to Lake Champlain and
thus through Richelieu River to St. the Lawrence); length, 2 miles; fall, 280 feet.
Castleton sheet.

HANCOCK BRANCH.—Addison County; town of Ripton; rises on the south slope of
Battell Mountain, at an altitude of 3,200 feet above sea level; flows southeastward
to its junction with White River (tributary to the Connecticut) in the eastern
part of the town of Hancock; length, about 7 miles; principal tributaries, Texas
Brook and Robins Branch; fall, 2,280 feet. Rochester sheet.

HAPPY VALLEY BROOK.—Windsor County; rises in the northwestern part of Hart-
land, at an altitude of 1,280 feet; flows in general northward into Ottauquechee
River (tributary to the Connecticut); fall, 650 feet; length, about 3 miles. Han-
over sheet.

HARLOW BROOK.—Windsor County; rises in the northern part of Hartland, at an
altitude of 1,160 feet; flows northeastward about 3½ miles into Ottauquechee
River (tributary to the Connecticut); fall, 760 feet. Hanover sheet.

HARRIMANS POND.—Orange County; eastern part of town of Newbury; outlet, a
stream 4 miles long flowing southeastward into Connecticut River. Walker map.

HARVEY LAKE.—Caledonia County; southwestern part of the town of Barnet; princi-
pal inlet, a stream carrying the overflow from Foster and Martins ponds; outlet, a
stream 1 mile long, flowing eastward into Stevens River (tributary to the Con-
necticut). The lake receives, also, a stream draining a small area in the northern
part of Ryegate and the southwestern part of Barnet. Walker map; called Jewel
Brook on post-route map.

HAYES BROOK.—Rutland County; rises in the western part of the town of Pittsfield,
at an altitude of 2,500 feet; flows in a southwesterly direction to West Branch of
Tweed River (tributary through Tweed River to White River and thus to the
Connecticut) at Michigan Camp; length, 2½ miles; fall, 1,100 feet. Rochester sheet.

HAYSTACK BROOK.—Windham County; rises in Haystack Pond in the northwestern
part of the town of Wilmington; flows eastward 2 miles into Cold Brook (tributary
through North Branch of Deerfield River to Deerfield River and thus to the Con-
necticut); fall, 1,000 feet. Wilmington sheet.

HAYSTACK POND.—Windham County; in the northwestern corner of Wilmington;
about half a mile long; area, 54 acres; altitude, 2,800 feet; outlet, Haystack
Brook to Cold Brook, a branch of North Branch of Deerfield River (tributary
though Deerfield River to the Connecticut). Wilmington sheet.

HERRICK BROOK.—Rutland County; rises in the southeastern part of the town of Pawlet, at an altitude of 990 feet above sea level; flows southward 1¼ miles, then turns abruptly and flows northwestward to its junction with Mettawee River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near the line between Rutland and Bennington counties; fall, 300 feet. Pawlet sheet.

HEWETT BROOK.—Rutland County; town of Chittenden; a stream about 4 miles long flowing southeastward into East Creek (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) about 2 miles northeast of the village of Chittenden. Rochester and Rutland sheets.

HIGH POND.—Rutland County; southwestern part of town of Hubbardton; elevation above sea level, about 800 feet. Castleton sheet.

HIGH POND.—Rutland County; southeastern part of Sudbury; outlet, a stream 3½ miles long flowing northward and northeastward to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) 2 miles west of Brandon; elevation above sea level, 1,028 feet; fall of outlet, 680 feet, of which 530 feet occurs in the first 1½ miles of its course. Brandon sheet.

HINESBURGH BROOK.—Windham County; rises in the southeastern part of the town of Marlboro; flows southeastward across the northeastern corner of Halifax into Guilford, where it joins Green River (tributary through Deerfield River to the Connecticut); length, about 4 miles. Walker map; not named on Brattleboro sheet.

HINESBURG POND.—Chittenden County; at intersection of boundary lines between Williston, Richmond, Hinesburg, and Shelburne; one inlet from the north; outlet southward by Pond Brook to La Platte River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 684 feet; somewhat more than a mile long; half a mile wide; area, 250 acres; an expansion of the outlet, beginning one-fourth mile below the main pond and extending within half a mile of Mechanicsville, is 661 feet above sea level. Burlington sheet.

HINKUM POND.—Rutland County; southern part of town of Sudbury; outlet, a stream three-fourths mile long flowing westward to Burr Pond (outlet through Horton Pond to Hubbardton and Poultney rivers and Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 49 acres; elevation above sea level, 717 feet; fall of outlet, 205 feet. Brandon sheet.

HOLLAND BROOK.—Orleans County; rises in Holland Pond in the northeastern part of the town of Holland; flows northwestward into Stanstead, Province of Quebec, where it joins Johns River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map and Carte Régionale No. 5 of Quebec.

HOLLAND POND.—Orleans County; northeastern part of the town of Holland; outlet, Holland Brook to Johns River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map and Carte Régionale No. 5 of Quebec.

HOLLOW BROOK.—Addison County; rises in the southeastern part of Hinesburg, at an altitude of 1,300 feet above sea level; course exceedingly crooked, passing from southeast to southwest, then to the northwest and finally to the south; it joins Lewis Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northeastern corner of the town of Monkton; the distance between source and mouth in a straight line is little more than 3 miles, but following the course of the brook it is about 7 miles; fall, 930 feet, of which 600 feet occurs in the first 2 miles. Burlington sheet.

HOME CREEK.—Chittenden County; rises in the northwestern part of Charlotte, at an altitude of about 180 feet above sea level; flows southwest, west, and northwest into Lake Champlain (outlet through Richelieu River to the St. Lawrence); length, about 2 miles; fall, 80 feet; tributary, Pringle Brook. Willsboro sheet.

HOOSIC RIVER.—Rises about 2 miles northwest of Dalton, in Berkshire County, Mass., at an altitude of 1,500 feet above sea level. Its general course lies first somewhat east of north to North Adams, where it receives its North Branch, thence northwestward passing across the extreme southwestern corner of Vermont into Rensselaer County, N. Y.; at the northern border of that county it turns and flows irregularly westward, joining the Hudson opposite Stillwater. The total length of the river to the head of the South Branch or main stream is about 56 miles; its fall is 1,420 feet. Area of drainage basin, about 730 square miles (Rafter); principal tributaries, Little Hoosic and Walloomsac rivers and Tomhannock Creek, all of which enter in the State of New York. The principal tributaries in Massachusetts are North Branch of the Hoosic and Green rivers. Most of the other tributaries are short and unimportant.

The country drained is to a great extent rugged and mountainous, the summits of the Taghkanick and Petersburg ranges attaining elevations of 1,000 to 2,000 feet above sea level, and the Ragged Mountains, south of North Adams, culminating in Mount Greylock at 3,505 feet above sea level. The immediate valley of the Hoosic comprises a moderately hilly, open country, which is good farming land, even to the tops of the hills, and is well cultivated.

The stream is one of the largest tributaries of the Hudson and, excepting perhaps the Mohawk, is the most important in point of manufacturing. A large share of the fall has been improved. Tenth Census Rept., vol. 16; Rafter, Hydrology of the State of New York; New York State Mus. Bull. 85. Becket, Greylock, Berlin, Hoosic, and Cohoes sheets.

HOOSIC RIVER, NORTH BRANCH.—Bennington County, Vt., Berkshire County, Mass.; rises in the town of Stamford, near Heartwellville, Vt., flows southwestward to the city of North Adams, where it joins Hoosic River (tributary to the Hudson); length, 11 miles; principal tributary in Vermont, Roaring Brook. Bennington and Greylock sheets.

HORRID BROOK.—Windsor County; a small stream about 1½ miles long; rises in the western part of the town of Rochester; flows in a northeasterly direction to its junction with Smith Brook (tributary to Brandon Brook and thus through White River to the Connecticut). Rochester sheet.

HORSE POND.—Caledonia and Orleans counties; on line between Wheelock, Caledonia County, and Greensboro, Orleans County; outlet to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

HORTON POND.—Rutland County; in the northern part of Mount Holly; flows northward to a branch of Black River (tributary to the Connecticut); small. Walker map.

HORTON POND.—Rutland County; on line between Sudbury and Hubbardton; inlet from Burr Pond, which receives the overflow from Hinkum and Huff ponds; outlet, Hubbardton River to Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 484 feet; about 2 miles long; maximum width, three-fourths mile; area, 373 acres. Brandon and Castleton sheets.

HOSPITAL CREEK.—Addison County; rises in the northwestern part of the town of Bridport, at an altitude of 180 feet above sea level; flows north and northwest and enters Lake Champlain (outlet through Richelieu River to the St. Lawrence) at Crane Point; length, about 5 miles; fall, 79 feet; a number of small branching tributaries drain the southwestern part of the town of Addison. Port Henry sheet.

HOWARD BROOK.—Windham County; formed in the northeastern part of the town of Jamaica by the junction of Mill and Sharp brooks, which drain the southern part of the town of Windham; flows southward 4 miles into West River (tributary to the Connecticut). Walker map.

HOWE BROOK.—Windsor and Addison counties; rises in the northeastern part of the town of Rochester, at an altitude of 2,100 feet; flows in a southwesterly direction and joins White River (tributary to the Connecticut) half a mile below the village of Hancock; length, 4 miles; fall, 1,220 feet. Rochester sheet.

HUBBARD BROOK.—Windsor County; rises in the northwestern part of Windsor, at an altitude of 1,230 feet; flows northward about half a mile, then southeastward about 3½ miles into Connecticut River. Walker map and Hanover sheet.

HUBBARDTON RIVER.—Rutland County; rises in Horton Pond (which receives the overflow from Burr, Hinkum, and Huff ponds) in the northwestern part of the town of Hubbardton, at an altitude of 484 feet above sea level; flows in a winding but general southwesterly course to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southern part of the town of West Haven; length, about 13 miles; fall, about 350 feet. Castleton and Whitehall sheets.

HUFF POND.—Rutland County; central part of town of Sudbury; outlet, a stream 1¼ miles long flowing southward to Burr Pond (outlet through Horton Pond to Hubbardton and Poultney rivers and Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 30 acres: elevation above sea level, 772 feet; fall of outlet, 260 feet. Brandon sheet.

HUNGERFORD BROOK.—Franklin County; rises, at altitude of 560 feet, on Aldis Hill east of the city of St. Albans; flows northward across Swanton and the northwestern corner of Sheldon into Highgate, where it joins Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 9 miles; fall, 440 feet. St. Albans sheet.

HUNT BROOK.—Caledonia County; a stream about 4 miles long draining a small area in eastern Ryegate and flowing southeastward into Connecticut River. Walker map.

HUNTINGTON RIVER.—Chittenden County; rises in the southern part of the town of Huntington; flows in a general northerly course to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence), which it enters at Jonesville in the town of Richmond; about 10 miles long; tributary from Gilletts Pond; other tributaries unnamed on maps; gaging station at Jonesville, 1910. Colton map, Walker map, and post-route map.

I.

INDIAN BROOK.—Chittenden County; rises in the southeastern part of Colchester; flows northwestward into Lake Champlain (outlet through Richelieu River to the St. Lawrence) at Malletts Bay; about 5 miles long. Walker map and Milton sheet.

INMAN POND.—Rutland County; northwestern part of town of Fair Haven; outlet by a stream about 5 miles long winding southward through an unnamed pond to Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) half a mile below the mouth of Castleton River; elevation above sea level, about 660 feet; fall of outlet, 360 feet, of which 230 feet takes place within a quarter of a mile as the stream leaves the lower of the two ponds; upper pond is about half a mile in maximum width; area, 63 acres; lower is about a mile long and an eighth of a mile in maximum width. Whitehall sheet.

IRA BROOK.—Rutland County; rises in the southern part of the town of Ira, at an altitude of 1,170 feet above sea level; flows northeastward into Clarendon River

(tributary through Otter Creek to Lake Champlain and thus throu:h Richelieu River to the St. Lawrence) near Clarendon Springs; length, about 5 miles; fall, 590 feet. Pawlet and Castleton sheets.

ISLAND POND.—Essex County; town of Brighton; several inflowing streams; outlet, Clyde River to Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); 2 miles long and about 1 mile wide. Walker map.

J.

JACKSON BROOK.—Orange County; rises in the western part of the town of Thetford; flows west of south 1½ miles to Rices Mills, where it joins West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut); principal tributary, a stream somewhat more than 2 miles long rising between Davidson and Center Hills and flowing southeastward. Strafford sheet.

JACKSON POND.—Rutland County; at Mechanicsville, town of Mount Holly; outlet, a stream about 1 mile long flowing southwestward into Mill River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Tarbellville; area, 50 acres; elevation above sea level, about 1,810 feet; fall of outlet, 300 feet; pond is about three-eighths of a mile long and wide. Wallingford sheet.

JACKSONVILLE POND.—Windham County; northeastern part of Whitingham in the course of East Branch of North River (tributary through Deerfield River to the Connecticut); altitude, 1,500 feet; area, 26 acres; Walker map; unnamed on the Wilmington sheet.

JAIL BROOK.—Orange County; rises near the northwestern boundary of Vershire; flows westward into East (First) Branch of White River (tributary to the Connecticut); about 4 miles long. Strafford sheet.

JAIL BROOK.—Orange County; rises in the eastern part of Williamstown; flows southeastward into the town of Washington; then northward and northwestward to its junction with Stevens Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Barre, Washington County. Colton map and Walker map.

JAY BROOK.—Orleans County; rises in the central part of the town of Jay; flows southeastward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Troy; tributary, South Brook; length, about 5 miles. Colton map and Walker map.

JENKEN BROOK.—Orange County; rises in the western part of the town of Vershire; flows northwestward in East (First) Branch of White River (tributary to the Connecticut through White River); only branch named on map, Beaver Meadow Brook; length, about 5 miles. Strafford sheet.

JERICHO BROOK.—Windsor County; rises in the southern part of Norwich at an altitude of about 1,360 feet; flows southwestward into White River (tributary to the Connecticut) in the northern part of Hartford; fall, 1,000 feet; length, about 3 miles. Hanover sheet.

JEWEL BROOK.—Caledonia County; rises in the northwestern part of the town of Ryegate; flows southeastward 1 mile, then northeastward 3 miles into Harvey Lake (outlet through Stevens River to the Connecticut). Post-route map.

JEWETT BROOK.—Bennington County; rises in the west-central part of Pownal, north of Mann Hill, at an altitude of 1,150 feet; flows east of north and northeastward into South Stream, a branch of Walloomsac River (tributary through Hoosic River to the Hudson); fall, 420 feet; length, 6 miles. Bennington sheet.

JEWETT BROOK.—Franklin County; rises in the southwestern part of Swanton; flows southward into Stevens Brook (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of St. Albans; about 6 miles long. Walker map and St. Albans sheet.

JOES BROOK.—Caledonia County; rises in Stannard Pond in the eastern part of the town of Stannard; flows westward to Coles Pond, west of south through upper Joes Pond to Joes Pond, thence southeastward across the southern part of the town of Danville and the northern part of Barnet to its junction with Passumpsic River (tributary to the Connecticut); length, about 20 miles. Colton map and Walker map.

JOES BROOK.—Lamoille County; rises in Joes Pond, in the southern part of Morristown; flows northward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Morrisville; about 4 miles long. Colton map and Walker map.

JOES POND.—Caledonia County; eastern part of the town of Cabot and southwestern part of Danville; inlets, a stream from Lyford Pond and upper Joes Brook; outlet, Joes Brook (tributary to Passumpsic River and thus to the Connecticut); the pond is about 3 miles long and nearly a mile wide; a small arm at the north end is called Upper Joes Pond. Walker map.

JOES POND.—Lamoille County; southern part of Morristown; outlet, Joes Brook to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); very small. Colton map and Walker map.

JOHNSON POND.—Addison and Rutland counties; on line between Orwell, Addison County, and Sudbury, Rutland County; outlet, Lemon Fair River to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 445 feet. Brandon sheet.

JOHNSONS BROOK.—Orleans County; rises in the southern part of Lowell; flows northward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

JOHNS RIVER.—Province of Quebec and Orleans County, Vt.; rises in Stanstead, Quebec, and flows very irregularly southwestward into the northwestern part of the town of Derby, Orleans County, Vt., where it enters Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); position indicated only by name on Walker map; shown but not named on the map to accompany Part J, Annual Report Geological Survey, Canada, '1886. Carte Régionale No. 5, of Quebec.

JOINER BROOK.—Chittenden County; rises in the eastern part of Bolton; flows southward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) about 1½ miles below the mouth of Prince Brook; about 4 miles long. Colton map and Walker map.

JONES BROOK.—Washington County; rises in the southeastern part of Moretown; flows irregularly northeastward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) 3 miles west of Montpelier; about 4 miles long. Colton map and Walker map.

JONES BROOK.—Washington County; rises in the northern part of Northfield; flows southeastward into Dog River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Northfield Falls; about 4 miles long. Colton map and Walker map.

JOY BROOK.—Windham County; a short stream rising in the west-central part of Townshend and flowing southeastward into West River (tributary to the Connecticut). Walker map.

K.

KEELER POND.—Rutland County; on line between Sudbury and Hubbardton; one small inflowing stream; outlet, a stream one-eighth mile long flowing southward to Beebe Pond (outlet through Austin Pond to Bomoseen Lake and thus through Castleton and Poultney rivers and Lake Champlain to Richelieu River and the St. Lawrence); area, 52 acres; elevation above sea level, 622 feet, same as that of Beebe Pond. Brandon and Castleton sheets.

KELLY BROOK.—Franklin County; rises in the southern part of the town of Highgate; flows southeastward 1½ miles, then southwestward 1 mile into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). St. Albans sheet.

KENDALL BROOK.—Addison County; rises in the northern part of the town of Granville; flows west of south 3 miles into White River (tributary to the Connecticut). Walker map and Rochester sheet.

KETCHUM BROOK.—Washington County; rises in the eastern part of the town of Barre; flows northwestward, then southwestward to its junction with Stevens Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Barre city; about 4 miles long. Colton map and Walker map.

KETTLE POND.—Caledonia County; small pond in the northwestern part of town of Groton, discharging by a stream flowing southeastward into Groton Pond (outlet, Wells River to the Connecticut). Walker map.

KIDDER POND.—Orleans County; northern part of Irasburg; no outlet is shown on the map, but the discharge is possibly to Chamberlain Brook (tributary through Black River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

KILBURN BROOK.—Windsor County; rises at an altitude of 1,100 feet in the southeastern part of Hartford; flows irregularly southeast, northeast, and east into the Connecticut; several small branches; fall, 800 feet; length, about 4 miles. Hanover sheet.

KILBY BROOK.—Essex County; rises southeast of Haystack Mountain; flows northeastward and northward 4 miles into Clyde River (tributary through Lake Memphremagog to Magog and St. Francis Rivers and thus to the St. Lawrence). Walker map.

KILN BROOK.—Rutland County; town of Chittenden; rises west of Westmore Gap; flows southwestward 2½ miles into Furnace Brook (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence). Rochester sheet.

KINGSBURY BRANCH.—Washington County; rises in Buck Pond in the northern part of Woodbury; flows southward to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the eastern part of East Montpelier; length, about 12 miles; passes through Sabine Pond and receives small tributaries from West Long, Wheelocks, Nelsons, Curtis, and Bliss ponds. Colton map, Walker map, and post-route map.

KINNEYS POND.—Orleans County; eastern part of Newport; outlet, a stream about half a mile long flowing eastward to Daggetts Pond (tributary through Black River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); very small. Walker map.

KIRBY HOLLOW BROOK.—Bennington County; rises on the southwestern slope of Dorset Mountain in the northwestern part of the town of Dorset, at an altitude of 2,800 feet above sea level; flows southward about 2 miles to its junction with Mettawee River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); fall, 1,920 feet. Pawlet sheet.

KNOB HILL POND.—Washington County; northern part of Marshfield; outlet, a stream about a mile long flowing southeastward to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

L.

LAKE.—*See significant name.*

LAKOTA LAKE.—Windsor County; southern part of Barnard; about one-third of a mile long; area, 21 acres; altitude, 1,885 feet; inlet, short streams from a swamp; outlet, Richmond Brook to Gulf Stream, a branch of Barnard Brook (tributary to Ottauquechee River and thus to the Connecticut). Woodstock sheet.

LAMOILLE RIVER.—Orleans County; rises in the eastern part of the town of Greensboro, where it is formed by the union of several small streams; flows southward to Hardwick, then turns to the northwest, passes through the middle of Lamoille County, crosses the southern part of Franklin County, and joins Lake Champlain (outlet through Richelieu River to the St. Lawrence), in the northwestern corner of Chittenden County, in the town of Milton. Like the Winooski, it cuts through the Green Mountains, but it is not so large as the Winooski nor quite so long, map measurement including the larger bends indicating about 50 miles; drainage area, 725 square miles; considerable areas in the upper part of the basin are forested. Lakes are numerous and some storage has already been developed, but opportunities for improvement are many. Important tributaries are Greensboro Brook (flowing from Caspian Lake), Pond Brook (from Wolcott Pond), Green River, Joes Brook, Gihon River, North Branch, Mill River, and Browns River.

Gaging stations: At Cadys Falls, 1909–10 and 1913–1916; at Johnson, 1911–1913; at West Milton, 1903.

Surveys and data: Geology of Vermont, 1861, vols. 1 and 2; Colton map, Walker map, post-route map, and U. S. Geol. Survey Water-Supply Paper 264, pp. 110–112, 1910.

LAMOILLE RIVER, NORTH BRANCH.—Lamoille County; rises in Long Pond in the northern part of the town of Eden; flows westward and southwestward to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northeastern part of the town of Cambridge; about 12 miles long. Colton map, Walker map, and post-route map.

LAMPSON POND.—Orange County; a small pond in the northern part of the town of Brookfield, discharging by a southward-flowing stream to Colts Pond (outlet through a stream discharging to Ayers Brook (tributary through Third Branch of White River to White River and thus to the Connecticut). Walker map.

LA PAWAC BROOK.—Essex and Caledonia counties; rises in the northern part of the town of East Haven, west of Mount Seneca; flows north of west 3 miles into the East Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut). The stream to which La Pawac Brook is tributary is called East Branch of Passumpsic River on Colton map of Vermont, but is unnamed on Walker map. Walker map and Colton map.

LA PLATTE RIVER.—Chittenden County; rises in the southeastern part of Hinesburg, at an altitude of 1,200 feet above sea level; takes a general northwesterly course to Lake Champlain (outlet through Richelieu River to the St. Lawrence), which it enters at Shelburne Bay; length, about 14 miles; fall from highest source, 1,100 feet, of which 700 feet occurs in the first mile; principal tributaries, Pond Brook (from Hinesburg Pond) and Mud Hollow Brook. Called La Plop River on Colton map and Laplop River in Hitchcock's Report on geology of Vermont, 1861. Burlington and Willsboro sheets.

LEACH POND.—*See* Forest Lake.

LEACH STREAM.—Essex County; rises in Little Leach Pond in the northern part of the town of Averill and flows northeastward into Forest Lake (Leach Pond); from Forest Lake it flows across a small area in southern Quebec; again crossing the State line it flows southward to Connecticut River a short distance below Canaan; length between Forest Lake and Little Leach Pond, about 3 miles; drainage area, 53 square miles. Walker map and Carte Régionale No. 5 of Quebec.

LEDGE CREEK.—Addison County; rises in the eastern part of Weybridge, at an elevation of 460 feet above sea level; flows southward, westward, and northwestward to its junction with Lemon Fair River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 5 miles; fall, approximately 330 feet. Middlebury sheet.

LEES POND.—Essex County; eastern part of the town of Victory, or Granby Stream (tributary through Moose River to Passumpsic River and thus to the Connecticut); small. Walker map.

LEICESTER RIVER.—Addison County; rises in Lake Dunmore, in the southern part of Salisbury, at an altitude of 571 feet above sea level; flows southwestward into Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence), three-fourths of a mile north of Leicester Junction; length, about 4½ miles; fall, 220 feet, of which 190 feet occurs within 1¼ miles just below the lake. Brandon sheet.

LEMON FAIR RIVER.—Addison County; rises in Johnson Pond, on the line between Orwell, Addison County, and Sudbury, Rutland County, at an altitude of 445 feet above sea level; takes a general northerly course across the towns of Orwell, Shoreham, Bridport, and the northwestern corner of Cornwell to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Weybridge; length, about 26 miles, including major turns; fall, approximately 300 feet; principal tributaries, Beaver Branch and Ledge Creek. Brandon, Ticonderoga, Middlebury, and Port Henry sheets.

LEVI POND.—Caledonia County; a very small pond in the northeastern part of the town of Groton, discharging eastward to Red Brook (tributary through Wells River to the Connecticut). Walker map.

LEWIS BROOK.—Rutland County; rises in the northeastern part of the town of Poultney, being formed by the union of several tiny streams starting at altitudes of 1,200 to 1,300 feet above sea level; flows westward and southwestward to its union with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southeastern part of the town of Fair Haven; length, about 6 miles; fall, about 900 feet, of which 700 feet takes place in the first 2½ miles of its course. Castleton sheet.

LEWIS CREEK.—Addison County; rises near the central part of Starksboro, the tiny streams that form its headwaters starting at altitudes ranging from 1,200 to 1,900 feet or even more above sea level; it flows for 2 or 3 miles southwestward to the southwestern part of Starksboro, where it turns abruptly and flows northward into Hinesburg; here its course becomes in general westward to Charlotte, and it finally takes a southwesterly and westerly direction to Lake Champlain (outlet by Richelieu River to the St. Lawrence), which it enters just north of the mouth of Little Otter Creek; length, about 22 miles; fall, from highest source to Lake Champlain, about 1,800 feet, but 1,200 feet of this fall occurs in the first 4 miles of the stream's course; principal tributaries, Hollow Brook, Pond Brook (tributary from Bristol Pond), and stream from Monkton Pond. Middlebury, Burlington, and Port Henry sheets.

LEWIS POND.—Essex County; northern part of town of Lewis; outlet, West Branch (tributary through Black Branch to Nulhegan River and thus to the Connecticut). Walker map.

LILY POND.—Rutland County; town of Poultney; two small inlets; outlet, a channel one-eighth of a mile long, southward to St. Catharine Lake (tributary through Wells Brook and Mettawee River to Lake Champlain, and thus through Richelieu River to the St. Lawrence); elevation above sea level, 477 feet, the same as that of St. Catharine Lake, of which it forms the northern arm. Pawlet sheet.

LILY POND.—Windham County; southern part of the town of Athens; a very small pond at the head of Grassy Brook (tributary through West River to the Connecticut). Walker map.

LILY POND.—Windham County; town of Londonderry; altitude, 1,450 feet; outlet, by a short stream to Lowell Lake, which discharges by Pond Brook into West River (tributary to the Connecticut); area, 37 acres. Londonderry sheet and Walker map.

LILY POND.—Windsor County; a small pond in the eastern part of the town of Norwich, discharging by a stream flowing southwestward into Connecticut River. Hanover sheet.

LIME POND.—Caledonia County; in the northern part of the town of Sutton; outlet to Rocky Pond on one of the headwater tributaries to West Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut); very small. Walker map.

LINCOLN BROOK.—Washington County; rises in the southwestern part of Warren; flows eastward into Mad River (tributary through Winooski River to Lake Champlain, and thus through Richelieu River to the St. Lawrence) near the center of the township; about 3 miles long. Walker map.

LINE POND.—Windsor County; eastern part of the town of Barnard; a small pond at the head of one of the upper tributaries of Barnard Brook (tributary through Ottauquechee River to the Connecticut). Woodstock sheet.

LITTLE AVERILL POND.—Essex County; northwestern part of the town of Averill; one inlet, considered the head of Averill Stream; connected by a northward-flowing stream a mile long with Great Averill Pond; outlet, Averill Stream to Coaticook River, a branch of the Massawippi (tributary through St. Francis River to the St. Lawrence). Walker map.

LITTLE CLEAR POND.—Lamoille County; eastern part of Hyde Park; no outlet shown on Walker map.

LITTLE FISH POND.—Orleans County; northwestern part of the town of Sutton; outlet, a short stream flowing southward into Blake Pond (outlet through Crystal Lake to Barton River and thus through Lake Memphremagog and Magog and St. Francis rivers to the St. Lawrence); very small. Walker map.

LITTLE HOSMER POND.—Caledonia County; southwestern part of town of Peacham; outlet, a stream 3 miles long flowing southward into Groton Pond; (outlet, Wells River to the Connecticut). Walker map.

LITTLE HOSMER POND.—Orleans County; northern part of Craftsbury; inlet from Great Hosmer Pond; outlet, a stream 1 mile long flowing southeastward to Seaver Brook (tributary through Black River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map; called Osmore Pond on Colton map.

LITTLE LEACH POND.—Essex County; northern part of town of Averill; outlet, a stream 3 miles long flowing northeastward to Forest Lake (outlet to Connecticut River). Walker map.

LITTLE MUD POND.—Orleans County; northwestern part of the town of Morgan; a very small pond at the head of Gochey Brook, tributary through Salem Pond to Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

LITTLE OTTER CREEK.—Addison County; rises near Bristol, at an altitude of about 500 feet above sea level; flows irregularly northwestward and enters Lake Champlain (outlet through Richelieu River to the St. Lawrence) in the northwestern part of Ferrisburg; length, including major windings, about 16 miles; fall, 400 feet; swampy in lower course; principal tributary, Mud Creek. Middlebury and Port Henry sheets.

LITTLE POND.—Bennington County; southern part of town of Winhall; altitude, 2,390 feet; two inlets; outlet, a stream less than a mile long flowing southwestward into Winhall River, a branch of West River (tributary to the Connecticut). Londonderry sheet.

LITTLE POND.—Franklin County; eastern part of Franklin; outlet, a stream about 2 miles long flowing westward into Franklin Pond (outlet through Pike River, Canada, to Missisquoi Bay in Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map.

LITTLE POND.—Lamoille County; southeast of Elmore Mountain in the town of Elmore; outlet, a stream 1½ miles long flowing northward to Elmore Pond (outlet through Elmore Brook and Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about one-fourth mile long. Colton map and Walker map.

LITTLE POND.—Rutland County; northeastern part of town of Benson; inlet from Choate Pond, and possibly also from Sunset Lake, though no connecting stream is shown; outlet, a stream 2 miles long flowing southward to Hubbardton River (tributary through Poultney River to Lake Champlain and thus through Richelieu River so the St. Lawrence); area, 72 acres; elevation above sea level, 502 feet; fall of outlet, 132 feet. Ticonderoga sheet.

LITTLE POND.—Rutland County; southern part of town of Wallingford; outlet, a stream about 2 miles long flowing in a general westerly direction into Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near South Wallingford; area, 12 acres; elevation above sea level, 1,810 feet; fall of outlet, 1,200 feet. Wallingford sheet.

LITTLE POND.—Rutland County; southern part of town of Wells; inlet, from St. Catharine Lake, of which it is the southern arm; outlet, Mill Brook to Wells Brook (tributary through Mettawee River to Lake Champlain, and thus through Richelieu River to the St. Lawrence); elevation above sea level, the same as that of St. Catharine Lake—477 feet; fall of outlet, 60 feet. Pawlet sheet.

LITTLE ROARING BROOK.—Windsor County; rises in the southwestern part of Plymouth; flows eastward into Black River (tributary to the Connecticut) about a mile south of Money Brook. Walker map.

LITTLE WHITE CREEK.—Bennington County, Vt., and Rensselaer County, N. Y.; rises in the southwestern part of Arlington, south of Grass Mountain, at an altitude of 2,450 feet; flows southward and southwestward across the northwestern part of Shaftsbury and southeastern White Creek, N. Y., and joins Walloomsac River, a branch of Hoosic River (tributary to the Hudson) at North Hoosick; passes through Briggs Corners, Vt., and Martindale Corners and White Creek, N. Y., receives several small branches; fall, 2,050 feet, of which about 1,500 feet occurs in the 3½ miles of the stream above the New York-Vermont State line; length, 13 miles. Bennington, Hoosick, and Equinox sheets. Called White Creek on Equinox sheet.

LOCUST CREEK.—Windsor County; rises in the northwestern part of the town of Bridgewater; flows through Barnard into White River (tributary to the Connecticut) in the southeastern part of the town of Bethel; principal tributary, a stream from Silver Lake; length, 7 miles. Walker map and Woodstock sheet.

LOGGER BROOK.—Essex County. *See* Black Branch.

LONG POND.—Caledonia County; northern part of the town of Sheffield; inlet, from Round Pond; outlet, a stream 2 miles long flowing westward into Barton River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

LONG POND.—Chittenden County; northwestern part of Milton; outlet, a stream about 1½ miles long flowing southward into Trout Brook (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence).. Colton map, Walker map, and Milton sheet.

LONG POND.—Lamoille County; northern part of the town of Eden; outlet westward by North Branch of Lamoille River to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about a mile long. Colton map, Walker map, and post-route map.

LONG POND.—Orange County; western part of town of Newbury; outlet, a stream 4 miles long flowing southeastward into Chalmers Brook (tributary to the Connecticut). Walker map.

LONG POND.—Orleans County; northeastern part of Greensboro; 2 inlets; outlet, Lamoille River to Lake Champlain (outlet through Richelieu River to the St-Lawrence) 1½ miles long by three-fourths of a mile wide. Colton map, Walker map, and post-route map.

LONG POND.—Orleans County; town of Westmore; outlet, Mill Brook to Willoughby Lake (tributary through Willoughby River to Barton River and Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

LONG POND, EAST.—Washington County; eastern part of Woodbury; inlet, from Mud Pond; outlet, a stream half a mile long, flowing northeastward to Nichols Pond (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

LONG POND, WEST.—Washington County; northern part of Woodbury; outlet, southward to Kingsbury Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

LORD BROOK.—Windsor and Orange counties; rises in the northeastern part of the town of Sharon at an altitude of 1,640 feet above sea level; flows northeastward to Rices Mills in the southwestern part of the town of Thetford, where it joins West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut); length, about 5 miles. Strafford sheet.

LORD CREEK.—Orleans County; rises in the southwestern part of Albany; flows northeastward to its junction with Black River (tributary to Lake Memphremagog, and thus through Magog and St. Francis rivers to the St. Lawrence) in Irasburg; length, about 8 miles. Colton map, Walker map, and post-route map.

LOST LAKE.—Franklin County; northeastern part of Georgia; outlet, Mill River to Lake Champlain (outlet through Richelieu River to the St. Lawrence); very small. Walker map and St. Albans sheet.

LOST POND.—Bennington County; southeastern part of Sunderland; 1 inlet; outlet, a stream half a mile long flowing northward to South Alder Brook (tributary to Roaring Branch of Batten Kill and thus to the Hudson); elevation above sea level, 2,630 feet; fall of outlet, 250 feet. Equinox sheet.

LOVELAND BROOK.—Franklin County; rises in the east-central part of Richford; flows northwestward to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near the town of Berkshire line; about 5 miles long. Colton map and Walker map.

LOWELL LAKE.—Windham County; in the northeastern part of Londonderry; altitude, 1,290 feet; chief inlet, a stream from Lily Pond; outlet, Pond Brook to West River (tributary to the Connecticut); area, 122 acres. Walker map and Londonderry sheet.

LUCAS BROOK.—Franklin County; rises in the northeastern part of Richford; flows northwestward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near East Richford; about 2 miles long. Walker map.

LULLS BROOK.—Windsor County; rises in the northwest corner of West Windsor, at an altitude of 1,520 feet; flows in general eastward into the Connecticut about two-thirds of a mile north of the town of Windsor line; chief branch, Alder Meadow Brook; fall, 1,220 feet; length, 9 miles. Hanover and Woodstock sheets.

LUNDS POND.—Caledonia County; north-central part of town of Groton, on Wells River (tributary to Connecticut River). Walker map.

LYE BROOK.—Bennington County; rises in Lye Brook Meadows, in the northeastern part of Sunderland, at an elevation of 2,640 feet above sea level; flows in a general northerly direction about 5 miles, then turns abruptly and flows southwestward to its junction with Batten Kill (tributary to the Hudson); length, 6½ miles; fall, 1,990 feet, of which 1,890 feet occurs in the northward-flowing stretch. Equinox sheet.

LYE BROOK.—Caledonia County; rises in Pigeon Pond, in the western part of Groton; flows northwestward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Marshfield, Washington County; length, about 5 miles. Colton map and Walker map.

LYFORD POND.—Caledonia County; southern part of the town of Walden; outlet, a stream 2 miles long flowing southeastward into Joes Pond (tributary through Joes Brook to Connecticut River). Walker map.

LYMAN BRANCH OF WILLIAMS RIVER.—*See* Williams River.

LYMAN BROOK.—Bennington County; rises in the central part of Sunderland, at an altitude of 2,460 feet above sea level; flows southwestward about 1¼ miles to its junction with Roaring Branch (tributary to Batten Kill, a branch of the Hudson); fall, 500 feet. Equinox sheet.

M.

MAD BROOK.—Orleans County; a small stream in the southeastern part of Charleston, flowing northward into Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

MAD RIVER.—Addison County; rises in the northern part of Granville; flows northward and northeastward across the towns of Warren, Waitsfield, and Moretown, Washington County, to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence), 6 miles northwest of Montpelier; length, about 18 miles; many small tributaries; the maps show no ponds or lakes in this basin; gaging station near Moretown, 1910. Colton map, Walker map, and post-route map.

MAD TOM BROOK.—Bennington County; rises on the southern slope of Mount Tabor, in the northwestern part of the town of Peru, at an altitude of 2,900 feet above sea level; flows southward and southwestward to East Dorset, where it joins a small stream from the north and takes the name of Batten Kill (tributary to the Hudson); length, about 5½ miles; fall, 2,100 feet; several tributaries, two of which rise on the northwestern slope of Bromley Mountain at altitudes exceeding 2,800 feet. Wallingford, Londonderry, and Equinox sheets. *See* Batten Kill.

MAIDSTONE LAKE.—Essex County; west-central part of the town of Maidstone; outlet, a stream less than 1 mile long flowing northwestward into Paul Stream (tributary to the Connecticut River); about 3 miles long and nearly 1 mile in maximum width. Walker map.

MALLETTS CREEK.—Chittenden County; rises in Milton Pond, in the eastern part of Milton; flows in a general southwesterly course into Malletts Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence); about 10 miles long; tributary from Colchester Pond. Colton map, Walker map, post-route map, and Milton sheet.

MANCHESTER BROOK.—Caledonia County; rises in the northern part of the town of Ryegate; flows southeastward through Syms Pond into Connecticut River near East Ryegate post office; about 6 miles long. Walker map.

MAQUAM CREEK.—Franklin County; a channnel in the marsh between Maquam Bay and Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). St. Albans sheet.

MARLBORO BRANCH.—Windham County; rises in the western part of the town of Marlboro, at an altitude of 2,200 feet above sea level; flows northeastward across Marlboro and the southeastern part of Newfane and joins West River (tributary to the Connecticut) in the northwestern part of the town of Dummerstor; length, about 12 miles; fall, 1,820 feet, of which 1,000 feet occurs in 2 miles at the head; principal tributaries, Rock River and Baker Brook. Wilmington and Brattleboro sheets.

MARLE POND.—Caledonia County; eastern part of town of Sutton; a small pond between two of the headwater branches of West Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut). Walker map.

MARSH BROOK.—Windsor County; rises in the northeastern part of the town of Rochester, at an altitude of 2,100 feet; flows in a southwesterly direction and joins White River (tributary to the Connecticut) about 2 miles above the village of Rochester; length, 4 miles; fall, 1,250 feet. Rochester sheet.

MARTINS BROOK.—Washington County; rises in the northern part of Middlesex; flows southeastward into North Branch Winooski River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 4 miles long. Colton map and Walker map.

MARTINS POND.—Caledonia County; southern part of the town of Peacham; outlet, a stream flowing northeastward to the stream connecting Foster Pond with Harvey Lake and Stevens River (tributary to the Connecticut). Walker map.

MAY POND.—Orleans County; eastern part of the town of Barton: outlet, a stream 2 miles long flowing northwestward half a mile and southwestward 1½ miles into Crystal Lake (outlet through Barton River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

McCONNELL POND.—Essex County; town of Brighton; a small pond on the headwater stream of Nulhegan River (tributary to Connecticut River). Walker map.

MEADOW BROOK.—Orange County; rises in the northern part of the town of Topsham; flows southeastward 1 mile, then northeastward 2 miles into Wells River (tributary to the Connecticut). Walker map.

MEADOW BROOK.—Rutland County; rises in southeastern part of Wallingford, at an altitude of 2,180 feet above sea level; flows somewhat north of east about 2 miles to its junction with Mill River (tributary through Otter Creek to Lake Champlain, and thus through Richelieu River to the St. Lawrence) in the town of Mount Holly; fall, 720 feet. Wallingford sheet.

MEARS HOLLOW BROOK.—Bennington County; a small stream draining a part of the northwestern slope of Equinox Mountain and flowing northwestward into Green River (tributary through Batten Kill to the Hudson) at the village of Beartown. Equinox sheet.

MECAWEE POND.—Windsor County; northwestern corner of Reading; altitude, 1,420 feet; discharges by a stream about 1 mile long flowing southwestward into Hale Hollow Brook, a branch of Ottauquechee River (tributary to the Connecticut); small. Woodstock sheet.

MEMPHREMAGOG, LAKE.—Partly in Canada and partly in Orleans County, Vt., between the towns of Derby and Newport; principal tributaries in Vermont, Black, Barton, and Clyde rivers; outlet northward by Magog River to St. Francis River and thence to the St. Lawrence; about 33 miles long, 2 to 3 miles wide, and covers an area of 75 square miles, of which 15 square miles (approximately) is in Vermont. The tributary basin contains many lakes. Geology of Vermont, 2 vols., 1861; Colton map, Walker map, and post-route map.

MENDON BROOK.—Rutland County; rises on Mendon Peak, in the southeastern
part of Mendon, at an altitude of 3,000 feet above sea level; flows southwestward
into Northern Branch of Cold River (tributary through Otter Creek to Lake
Champlain and thus through Richelieu River to the St. Lawrence) in the
northwestern part of the town of Shrewsbury; length, about 4 miles; fall, 1,850
feet, of which 1,000 feet occurs in the first 1½ miles of its course.   Rutland sheet.

METCALF POND.—Franklin County; northern part of Fletcher; outlet, Black Creek
to Missisquoi River (tributary to Lake Champlain and thus through Richelieu
River to the St. Lawrence); about 1 mile long by one-fourth mile wide.   Colton
map, Walker map, and post-route map.

METTAWEE RIVER.—Bennington County; rises on the slopes of the Mettawee in the
northern part of the town of Dorset, the tiny streams that make the headwaters
starting at altitudes of 3,200 feet above sea level; from the foot of the Mettawee
(1,400 feet above sea level) the stream flows southward about 2 miles, then turns
abruptly to the west and northwest, passes through the towns of Rupert and Paw-
let, Vt., and Granville, Washington County, N. Y., and continues its northwesterly
course, though with many bends and sharp turns, to its junction with East
Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence), at
Whitehall, N. Y.   Including the major bends its length is about 40 miles;
total fall in the 38 miles below the foot of the Mettawee, about 1,300 feet.   Drain-
age area, 208 square miles, of which 152 square miles is in Vermont.   The coun-
try drained is exceedingly rugged and the river has many short tributaries
draining steep mountain slopes.   In Vermont the principal tributaries are
Flower and Wells brooks, the last-named carrying the overflow from St. Cath-
arine Lake, which reaches it through Little Pond and Mill Brook.   The princi-
pal tributaries of the Mettawee in New York are Indian River, which comes
in just below Granville, and Wood Creek, which enters above Whitehall.   Paw-
let, Fort Ann, and Whitehall sheets.

MIDDLE BROOK.—Orange County; rises in the northern part of the town of West
Fairlee; flows west of south about 6 miles into Fairlee Lake (outlet through
Ompompanoosuc River to the Connecticut).   Walker map.

MIDDLEBURY RIVER.—Addison County; formed near Ripton by union of South and
Middle branches; the South Branch, or continuation of the main stream, rises in
Pleiad Lake in the western part of Hancock and takes a general northwesterly
course; below the mouth of Middle Branch the river flows westerly to its junc-
tion with Otter Creek (tributary to Lake Champlain and thus through Riche-
lieu River to the St. Lawrence), about a mile northwest of Farmingdale, in the
town of Middlebury; length, including major windings, about 10 miles; fall from
Ripton (elevation, 1,100 feet) to Farmingdale, 740 feet, of which 600 feet occurs
in the 3 miles between East Middlebury and Ripton.   Rochester and Brandon
sheets and Walker map.

MIDDLEBURY RIVER, MIDDLE BRANCH.—Addison County; rises in the eastern part
of the town of Ripton; flows southward to the village of Ripton, where it unites
with the South Branch to form Middlebury River (tributary through Otter Creek
to Lake Champlain and thus through Richelieu River to the St. Lawrence),
Rochester sheet.

MIDDLEBURY RIVER, NORTH BRANCH.—Addison County; formed by two streams
that drain the mountain slopes in southwestern Lincoln and northwestern Ripton
and unite at an altitude of 1,500 feet; flows southward and southwestward to its
junction with Middlebury River (tributary through Otter Creek to Lake Cham-
plain and thus through Richelieu River to the St. Lawrence) in the southeastern
part of Middlebury Township; length, about 7 miles.   Fall, below junction of
principal headwater streams, 630 feet; tributary, Alder Brook.   Middlebury and
Brandon sheets.

MIDDLEBURY RIVER, SOUTH BRANCH.—See Middlebury River.

MILES POND.—Essex County; north-central part of the town of Concord; outlet, Miles Brook (tributary to Connecticut River); about 1½ miles long and more than half a mile wide. Walker map.

MILES STREAM.—Essex county; rises in the northern part of Concord; flows southward to Miles Pond, then southeastward through the pond and discharges into Connecticut River; principal tributaries, East Brook and First Brook. Walker map.

MILL BROOK.—Bennington County; rises near the center of Sunderland, at an altitude of 2,550 feet above sea level; flows southwestward, westward, and northwestward to its junction with Batten Kill (tributary to the Hudson) at Sunderland; length, 4½ miles; fall, about 1,920 feet, of which about 1,600 feet occurs within 2½ miles at the head of the stream. Equinox sheet.

MILL BROOK.—Bennington County; formed in the northeastern part of Winhall by two branches rising at altitudes of about 1,880 feet in the towns of Peru and Winhall; flows southeastward, northeastward about 1 mile, then southeastward across the southwestern corner of Londonderry and joins Winhall River, a branch of West River (tributary to the Connecticut) in the northwest corner of Jamaica; one small pond near the head of its course; chief branch, Eddy Brook; fall, 830 feet; length, about 8 miles. Londonderry sheet.

MILL BROOK.—Chittenden County; rises in the northeastern part of Bolton; flows westward to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southwestern part of the town of Jericho; length, about 8 miles. Colton map and Walker map.

MILL BROOK.—Chittenden County; rises in the southern part of Underhill; flows northwestward into Browns River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

MILL BROOK.—Essex County; rises in the central part of the town of Bloomfield; flows southeastward 3 miles into Connecticut River, 1½ miles northeast of Bloomfield post office. Walker map.

MILL BROOK.—Essex County; rises in eastern part of Granby; flows southeastward into Gaskill Brook (tributary to Connecticut River); about 4 miles long. Walker map.

MILL BROOK.—Essex County; rises in the central part of the town of Lemington; flows southeastward 3 miles into Connecticut River. Walker map.

MILL BROOK.—Essex County; a stream about 4 miles long, rising in the western part of the town of Victory and flowing very irregularly eastward to its junction with Umpire Brook, with which it forms Bog Brook (tributary through Moose River to Passumpsic River and thus to the Connecticut). Walker map.

MILL BROOK.—Franklin County; rises in the northeastern part of Fairfax; flows southward and southwestward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 6 miles long. Colton map, Walker map, and Milton sheet.

MILL BROOK.—Franklin County; rises in the southeastern part of Richford; flows southwestward into Trout River (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northwestern part of the town of Montgomery; 6 miles long. Walker map; called East Brook on Colton map.

MILL BROOK.—Franklin County; rises near the center of Richford; flows westward and then southwestward into Trout River (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) which it enters in the northwest corner of the town of Montgomery about 2 miles northwest of the mouth of another Mill Brook; 4½ miles long. Colton map, Walker map.

MILL BROOK.—Orange County; rises in the north-central part of Braintree; flows southeastward 4 miles into Ayers Brook (tributary through Third Branch of White River to White River and thus to the Connecticut) in the western part of Randolph; passes through Mud Pond near the head of the stream. Walker map.

MILL BROOK.—Orleans County; rises in the southeastern part of Lowell, on Lowell Mountains; flows southeastward into Black River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence), in the town of Albany; about 2 miles long. Walker map.

MILL BROOK.—Orleans County; rises in the north-central part of Westfield; flows southeastward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3½ miles long. Walker map.

MILL BROOK.—Orleans County; rises in Long Pond in Westmore; flows northwestward and westward 3 miles into Willoughby Lake; outlet through Willoughby River to Barton River (tributary to Lake Memphromagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

MILL BROOK.—Rutland County; rises in the southwestern part of the town of Danby, at an altitude of 2,100 feet above sea level; flows in a general northeasterly course to Otter Creek (tributary through Lake Champlain and thus through Richelieu River to the St. Lawrence), which it joins near Mount Tabor in the town of Mount Tabor; length, about 7 miles; fall, 1,450 feet; receives the overflow from Danby Pond and has a number of small tributaries which drain the eastern slopes of Woodlawn Mountain and the northern slopes of Dorset Mountain and start at altitudes of 2,500 to 3,300 feet above sea level. Pawlet and Wallingford sheets.

MILL BROOK.—Rutland County; rises in Little Pond, the southern arm of St. Catharine Lake, in Wells, at an altitude of 477 feet above sea level; flows southwestward about 1½ miles to Wells Brook (tributary through Mettawee River to Lake Champlain and thus through Richelieu River to the St. Lawrence); fall, about 50 feet. Pawlet sheet.

MILL BROOK.—Washington County; rises in the western part of Faystown; flows southeastward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the western part of the town of Waitsford; length, about 4 miles. Walker map.

MILL BROOK.—Windham County; rises in the central part of the town of Windham; flows southward to the northeastern part of the town of Jamaica, where it joins Sharp Brook to form Howard Brook (tributary through West River to the Connecticut). Walker map.

MILL BROOK.—Windsor County; rises in the north-central part of Pomfret, at an altitude of 1,340 feet; flows northward and eastward into White River (tributary to the Connecticut) at the boundary line between Pomfret and Hartford; length, including major windings, about 7½ miles; fall, 950 feet. Woodstock and Hanover sheets.

MILL BROOK.—*See also* Fay Brook.

MILLER BROOK.—Lamoille County; rises in the western part of Stowe; flows southeastward into Waterbury River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence), 1½ miles west of Moscow post office; about 3 miles long. Walker map.

MILLER POND.—Orange County; northeastern part of the town of Strafford; one inflowing stream; outlet, a stream 3 miles long flowing southwestward into Abbott Brook (tributary through West Branch of Ompompanoosuc River to Ompompanoosuc River and thus to the Connecticut); altitude, about 1,340 feet. Strafford sheet.

MILLERS RUN.—Caledonia County; rises in Duck Pond in the northern part of the town of Sheffield; flows southward to Sheffield post office, thence southeastward across the northeastern corner of Wheelock to the central part of the town of Lyndon, where it joins Passumpsic River (tributary to Connecticut River); length, about 15 miles. Walker map.

MILLIGAN POND.—Orange County; town of Topsham; a small pond discharging by a stream flowing northeastward into Wells River (tributary to the Connecticut), in the southern part of the town of Groton. Walker map.

MILL RIVER.—Chittenden County; rises in the northeastern part of Underhill; flows northwestward about 3 miles, then northeastward and northward to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Cambridge, Lamoille County; about 6 miles long. Walker map.

MILL RIVER.—Franklin County; rises in Lost Lake, in the northeastern part of the town of Georgia; flows southwestward, westward, east of north, and finally northwestward into Lake Champlain (outlet through Richelieu River to the St. Lawrence); between source and mouth the distance in a straight line is about 3 miles; following the course of the stream it is 6 miles. Colton map, Walker map, and St. Albans sheet.

MILL RIVER.—Orleans County; rises in Seymour Lake; flows southwestward to Echo Pond, thence southward to Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

MILL RIVER.—Rutland County; rises in the southwestern part of the town of Mount Holly, at an altitude of 2,300 feet above sea level; takes a general northwesterly course to East Clarendon, where it turns abruptly and flows southwestward to Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) half a mile southwest of Clarendon; length, about 16 miles; fall, 1,750 feet, of which 600 feet is in the first mile of its course; principal tributaries, Meadow and Russell brooks and streams from Jackson, Wallingford, and Shrewsbury ponds. Wallingford and Rutland sheets.

MILL RIVER.—Windsor County; rises in the northwestern part of Reading; flows southeastward through Reading, eastward through West Windsor, eastward and northeastward through Windsor into the Connecticut River near Windsor post office; branches, Beaver, Reading Hill, and Bailey brooks; length, 15 miles. Walker map and Woodstock and Hanover sheets.

MILLS BROOK.—Washington County; rises in the southeastern part of Warren; flows westward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

MILTON POND.—Chittenden County; northeastern part of town of Milton; outlet, Malletts Creek to Lake Champlain (outlet through Richelieu River to the St. Lawrence); altitude, 834 feet. Milton sheet.

MINISTER BROOK.—Washington County; rises in the western part of Worcester; flows southeastward into North Branch Winooski River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Worcester postoffice; about 4½ miles long. Walker map.

MINK BROOK.—Essex County; a stream 1½ miles long rising in the northern part of the town of Bloomfield; flows southwestward to East Branch of Nulhegan River (tributary through Nulhegan River to the Connecticut). Walker map and private surveys.

MINKS BROOK.—Essex County; rises in Brooks Pond in the central part of the town of Concord; flows southeastward 3 miles into Connecticut River. Walker map.

MINOT BROOK.—Windham County; rises in the western part of Westminster; flows east of south across Westminster and the northeastern part of Putney into Connecticut River; length, about 9 miles; unnamed on the Walker map. Postroute map.

MINTON BROOK.—Essex County; rises in the central part of the town of Lunenburg, northwest of Baldwin Mountain, at an altitude of 1,600 feet above sea level; flows southeastward 5 miles into Connecticut River; fall, 760 feet. Whitefield sheet.

MISSISQUOI RIVER.—Orleans County; formed by the junction of two branches, one rising in the mountainous region near Lowell, in the southwestern part of Orleans County, Vt., and flowing in a general northerly direction, the other rising near Bolton, in Brome, Quebec, and taking a southerly course; the two unite at Mansonville, in Brome, and the river takes a general westerly course to Lake Champlain (outlet through Richelieu River to the St. Lawrence), which it enters at Missisquoi Bay; from Troy to Richford its course lies in Canada. The river has many tributaries, the largest being North Branch, Trout River, Tylers Branch, and Black Creek. Throughout its course the Missisquoi flows alternately through long stretches having gentle slope and shorter sections having much greater fall. Power sites along the river are fairly numerous, but storage is not well developed. Gaging stations: Near Richford, 1909–1916; at Swanton, 1903. Report on the geology of Vermont, by Edward Hitchcock et al., 2 vols., 1861; Colton map, Walker map, post-route map; U. S. Geol. Survey Water-Supply Paper 264, pp. 108–110, 1910; St. Albans sheet; and Carte Régionale No. 5 of Quebec.

MITCHELL BROOK.—Windsor County; rises in the northeastern part of Sharon, at an altitude of about 1,640 feet; flows southwestward, crossing and recrossing the boundary between Sharon and Norwich, through Mitchell Pond, and enters White River (tributary to the Connecticut) in the southern part of Sharon; fall, about 1,240 feet; length, about 7 miles. Strafford and Hanover sheets.

MITCHELL POND.—Windsor County; in the southeastern part of Sharon; altitude, 900 feet; two inlets, one of which is Mitchell Brook; outlet, Mitchell Brook to White River (tributary to the Connecticut); about half a mile long. Hanover sheet.

MOLLYS BROOK.—Washington County; rises in Mollys Pond, in the eastern part of Cabot; flows southwest and west into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northeastern part of the town of Marshfield; tributary from Onion (Winooski) River Pond. Colton map and Walker map.

MOLLYS POND.—Washington County; eastern part of Cabot; two small inflowing streams; outlet, Mollys Brook to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about three-fourths mile long. Colton map and Walker map.

MONEY BROOK.—Windsor County; rises in the southwestern part of Plymouth; flows east into Black River (tributary to the Connecticut); about 2 miles long. Walker map.

MONKTON POND.—Addison County; northern part of Monkton; 2 small inlets; outlet, a stream 2½ miles long flowing northward to Lewis Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southwestern part of Hinesburg; area, 118 acres; elevation, above sea level, 491 feet; fall of outlet, 180 feet; pond is about half a mile long and nearly as wide. Middlebury and Burlington sheets.

MOON BROOK.—Rutland County; rises on the western slope of East Mountain in Mendon, at an altitude of 850 feet above sea level; flows southwestward into Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Rutland; length, about 4 miles; fall, 320 feet. Rutland sheet.

MOORES POND.—Caledonia County; central part of Barnet; inlet, from Warden Pond; outlet, a stream 3 miles long, flowing eastward into Connecticut River. Walker map.

MOORES PONDS.—Windsor County; two small ponds at the eastern base of Mount Tom, near the source and in the course of Pinney Hollow Brook, branch of Hale Hollow Brook (tributary through Ottauquechee River to the Connecticut); in the central part of Plymouth; altitude, about 1,400 feet. Woodstock sheet.

MOOSE RIVER.—Essex and Caledonia counties; rises in the central part of the town of East Haven 3 miles southwest of Mount Seneca; flows southeastward into the western part of the town of Granby, southwestward across the town of Victory to West Concord, northwestward into the eastern part of St. Johnsbury, then again southwestward across the southern part of St. Johnsbury to its junction with Passumpsic River (tributary to the Connecticut); length, including the major windings, about 28 miles; principal tributaries, Granby Stream and Bog and Putnam brooks. Walker map.

MOREY LAKE.—Orange County; eastern part of town of Fairlee; outlet, a stream 2 miles long flowing west of south into Connecticut River. On this pond Samuel Morey plied his steamboat in 1793. Walker map; called Fairlee Pond on Colton map.

MORGAN BROOK.—Chittenden County; a stream tributary to Browns River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Westford. Milton sheet.

MORRILL BROOK.—Rutland County; rises in the northern part of the town of Chittenden at an altitude of 2,400 feet; flows in a southeasterly direction $2\frac{1}{2}$ miles and joins West Branch of Tweed River (tributary through White River to the Connecticut) at Michigan Camp; fall, 950 feet. Rochester sheet.

MORRILLS BROOK.—Caledonia County; rises in the western part of the town of Danville; flows eastward to North Danville post office, then southeastward into the town of St. Johnsbury, where it joins Sleepers River (tributary through Passumpsic River to the Connecticut); length, about 6 miles. Colton map and Walker map.

MOSS HOLLOW BROOK.—Rutland County; rises in the extreme northern part of the town of Middletown, at an altitude of 1,800 feet above sea level; fows southwestward about 4 miles to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southeastern part of the town of Poultney; fall, about 1,200 feet. Castleton sheet.

MOUNTAIN BROOK.—Franklin County; rises in the northeastern part of Richford; flows westward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Colton map and Walker map.

MUD CREEK.—Addison County; rises on Buck Mountain in the eastern part of Waltham, at an altitude of 400 feet above sea level; flows southeastward about $1\frac{1}{2}$ miles, then turns abruptly and flows northward to its junction with Little Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southeastern part of Ferrisburg Township; length, about 8 miles; fall, 230 feet. Middlebury sheet.

MUD CREEK.—Grand Isle County; flows southward through a swamp in the northeastern part of Alburg, discharging into Ransom Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence); about 4 miles long. Rouses Point sheet.

MUD CREEK.—Orleans County; rises in the southeastern part of Newport; flows northeastward and then northwestward to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in Brome, Canada; about 13 miles long. Colton map and Walker map.

MUDDY BRANCH.—Addison County; rises in Dow Pond, in the eastern part of the town of Middlebury, at an altitude of 420 feet above sea level; flows in a general northwesterly course into New Haven River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) about a mile west of Brooksville; length, about 5 miles; fall, 160 feet. Middlebury sheet.

MUDDY BROOK.—Chittenden County; rises in Shelburne Pond, in the eastern part of Shelburne, at an altitude of 329 feet above sea level; flows in a general course somewhat east of north to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); forms boundary between the towns of South Burlington and Williston; length, about 6 miles; fall, 130 feet; principal tributaries, Sucker and Allen Brooks. Walker map, post-route map, and Burlington sheet; called Allen Brook on Colton map.

MUD HOLLOW BROOK.—Chittenden County; rises on the southeastern slope of Pease Mountain in Charlotte, at an altitude of 320 feet above sea level; flows somewhat east of north to its junction with La Platte River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 4 miles; fall, 100 feet; tributary, Bingham Brook. Burlington sheet.

MUD POND.—Addison County; one-fourth mile west of Lake Dunmore, in northern part of Leicester, at east foot of Mount Pleasant; outlet, a stream about 1 mile long flowing northwestward and westward to Leicester River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Salisbury; area, 26 acres; elevation above sea level, 585 feet; fall of outlet, 190 feet. Brandon sheet.

MUD POND.—Addison County; southern part of town of Orwell; outlet, a stream one-half mile long flowing southward to Sunset Lake (outlet through Little Pond to Hubbardton and Poultney rivers and thus through Lake Champlain to Richelieu River and the St. Lawrence); elevation above sea level, 650 feet; above Sunset Lake, 147 feet. Ticonderoga sheet.

MUD POND.—Bennington County; a small pond in the southeastern part of Peru, discharging by a stream into Winhall Brook and thus to Winhall River, a branch of West River (tributary to the Connecticut); altitude, 1,400 feet; Walker map and Londonderry sheet.

MUD POND.—Bennington County; northeastern part of Stamford; altitude, 2,260 feet; outlet, a short stream flowing northerly into the stream between Stamford Pond and West Branch of Deerfield River (tributary to the Connecticut); very small. Bennington sheet.

MUD POND.—Caledonia County; central part of town of Peacham; a very small pond discharging eastward to the stream connecting Foster Pond with Harvey Lake and Stevens River (tributary to the Connecticut). Walker map.

MUD POND.—Essex County; south-central part of the town of Granby, on Granby Stream (tributary through Moose River to Passumpsic River and thus to the Connecticut). Walker map.

MUD POND.—Essex County; a small pond on Catsbow Brook (tributary to Connecticut River) just north of the Guildhall-Lunenburg township line. Walker map.

MUD POND.—Lamoille County; northwestern part of town of Eden; outlet, a stream about 1½ miles long flowing southeastward through Ritterbush Pond to Fryingpan Brook (tributary through Gihon River to Lamoille River, and thus through Lake Champlain to Richelieu River and the St. Lawrence); very small. Walker map.

MUD POND.—Lamoille County; eastern part of Hyde Park; outlet, a stream about 2 miles long flowing west and then south to Green River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); very small. Walker map.

MUD POND.—Orange County; town of Braintree; a small pond drained by Mill Brook, a tributary of Ayers Brook (tributary through Third Branch of White River to White River and thus to the Connecticut). Walker map.

MUD POND.—Orange County; central part of the town of Thetford; one small inflowing stream; outlet, a stream less then 1 mile long flowing westward into Vershire Brook (tributary through Ompompanoosuc River to the Connecticut); small. Walker map.

MUD POND.—Orleans County; near central part of Craftsbury; inlet, Black River; outlet, Black River to Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence); about half a mile long. Walker map.

MUD POND.—Orleans County; northeastern part of Greensboro; outlet, a stream about 2 miles long flowing southward to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

MUD POND.—Orleans County; a small pond in the northern part of the town of Morgan, discharging by a stream flowing southeastward into Seymour Lake (outlet by Mill River to Clyde River, which is tributary through Lake Memphremagog to Magog and St. Francis rivers to the St. Lawrence). Walker map.

MUD POND.—Washington County; northern part of Marshfield; one inlet; outlet, a stream about a mile long flowing southeastward to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

MUD POND.—Washington County; eastern part of Woodbury; outlet to East Long Pond (outlet through Nichols Pond and Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence) by very short channel. Walker map.

MUD POND.—Windham County; in the northern part of Jamaica; altitude, 1,170 feet; discharges by a short stream into West River (tributary to the Connecticut). Walker map and Londonderry sheet. Called Jamaica Pond on Walker map.

MUD POND.—Windsor County; in the eastern part of Sharon; two inflowing streams; outlet, a stream about 1 mile long flowing south of west into White River (tributary to Connecticut River); small. Strafford sheet.

MUNROE BROOK.—Chittenden County; rises 1 mile west of Shelburne Pond in the town of Shelburne, at an altitutde of about 380 feet above sea level; flows very irregularly northwestward into Shelburne Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence), three-fourths of a mile northeast of the mouth of La Platte River; length, including windings, 4 miles; fall, 180 feet. Burlington sheet.

MURPHY BROOK.—Essex County; a stream 1½ miles long, rising in the northeastern part of the town of Lewis; flows southeastward to East Branch of Nulhegan River (tributary to the Connecticut). Walker map and private surveys.

N.

NASON BROOK.—Windsor County; rises on the western slope of Rochester Mountain, at an altitude of 2,300 feet; flows westerly 4 miles and joins White River (tributary to the Connecticut) 1 mile below the village of Rochester; fall, 1,520 feet. Rochester sheet.

NEALS BROOK.—Essex County; rises in Neals Pond in the central part of the town of Lunenburg; flows east of south 3½ miles into Connecticut River; fall, 365 feet. Whitefield sheet.

NEALS POND.—Essex County; central part of town of Lunenburg; outlet, Neals Brook to Connecticut River; pond is about 1½ miles long and nearly 1 mile wide; altitude, 1,195 feet. Whitefield sheet.

NEGRO BROOK.—Windham County; a short stream rising in southwestern Townshend and flowing northeastward into West River (tributary to the Connecticut). Walker map.

NELSONS POND.—Washington County; on line between Woodbury and Calais; outlet, by a short stream flowing southward into Wheelock Pond (outlet through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

NESHOBE RIVER.—Addison County; rises on Hogback Mountain ir Goshen, at an altitude of 1,760 feet above sea level; takes a general southwesterly course to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Brandon, through which it passes; length, about 9 miles; fall, 1,420 feet, of which 900 feet occurs in the first 3 miles of its course. Called Mill River on some maps: Brandon sheet.

NEW BOSTON BROOK.—Windsor County; rises near the village of New Boston in the town of Norwich; flows southwestward 3½ miles to its junction with Bloody Brook (tributary to Connecticut River). Strafford and Hanover sheets.

NEW HAVEN RIVER.—Addison County; rises in the northeastern part of Ripton or southern part of Lincoln; flows northwestward to Bristol, where it turns very abruptly and flows in a general southwesterly direction to its junction with Otter Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Brooksville, in the town of New Haven; length, about 21 miles; in the 12 miles below West Lincoln the river falls about 700 feet, of which 400 feet occur in 3 miles between West Lincoln and Bristol. Just above Bristol the river flows in a deep, narrow valley between Hogback Mountains and South Mountain; below Bristol the valley is more open. Principal tributaries of New Haven River are Baldwin Creek and Muddy Branch. Walker map and Middlebury sheet.

NICHOLS POND.—Washington County; eastern part of Woodbury; inlet, from East Long Pond; outlet, a stream about 3 miles long flowing irregularly northward to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

NIGGERHEAD BROOK.—Washington County; rises in Niggerhead Pond, in the eastern part of Marshfield; flows northward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Marshfield; about 2 miles long. Walker map.

NIGGERHEAD POND.—Washington County; eastern part of Marshfield; one inlet; outlet, by Niggerhead Brook to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about three-fourths mile long. Walker map.

NORTH BROOK.—Rutland County; rises in the northern part of the town of Middletown about a mile west of the head of Train Brook, at an altitude of 1,480 feet above sea level; flows southward to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Middletown Springs; length, 2¼ miles; fall, 630 feet. Castleton and Pawlet sheets.

NORTH POND.—Addison County; on South Mountain in southeastern part of Bristol; outlet, a stream 2 miles long flowing northward to New Haven River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) 2 miles above Bristol; elevation above sea level, 2,100 feet; fall of outlet, 1,400 feet; about one-fourth mile long. Middlebury sheet.

NORTH POND.—Lamoille County; eastern part of the town of Eden; several small inflowing streams; outlet, Gihon River to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 1½ miles long; maximum width, about half a mile. Colton map, Walker map, and post-route map.

NORTH POND.—Orange County; a small pond in the western part of the town of Brookfield, drained by a stream flowing eastward into Colts Pond (outlet, a stream flowing to Ayers Brook and thus through Third Branch of White River to White River and to the Connecticut). Walker map.

NORTH POND.—Rutland County; southeastern part of Chittenden; outlet by stream
1½ miles long flowing westward to East Creek (tributary through Otter Creek to
Lake Champlain and thus through Richelieu River to the St. Lawrence); area,
10 acres; elevation above sea level, 2,265 feet; fall of outlet, 780 feet. Rutland
sheet.

NORTH POND.—Windham County; northeastern part of the town of Marlboro; outlet,
a stream flowing southeastward 3 miles and northeastward 2 miles into West
River (tributary to the Connecticut); altitude, 1,440 feet; area, 83 acres Brat-
tleboro sheet.

NORTH RIVER, EAST BRANCH.—Windham County, Vt., Franklin County, Mass.;
formed near Lyonsville in the town of Colrain by the union of its East and West
branches. East Branch, which drains the larger area and is therefore considered
the continuation of the main stream, rises 1½ miles south of East Wilmington, Vt.,
and takes a general southeasterly course to a point near Colrain, Mass., where it
turns southwestward, westward, and southward, to receive the West Branch;
below this junction North River winds southward and southwestward to the
point at which it enters Deerfield River (tributary to the Connecticut) 1½ miles
north of Shelburne Falls; length to head of East Branch, about 20 miles. Wil-
mington, Hawley, and Greenfield sheets.

NORTH RIVER, WEST BRANCH.—Windham County, Vt., and Franklin County, Mass.;
rises in the town of Whittington, Vt.; flows southward 3 miles, then southeast-
ward 9 miles to its junction with East Branch (tributary through North River
to the Deerfield and thus to the Connecticut) near Lyonsville in the town of
Colrain, Mass. Wilmington, Hawley, and Greenfield sheets.

NORTON POND.—Essex County; Warren Grant and town of Norton; inlet, the head
of Coaticook River; outlet, Coaticook River to Massawippi River (tributary to
St. Francis River and thus to the St. Lawrence); about 3 miles long and a quarter
of a mile wide. Walker map.

NOTCH POND.—Essex County; eastern part of town of Ferdinand; inlet, a stream
from the south about a mile long; outlet, Wheeler Stream (tributary to the Con-
necticut); area, about 26 acres. Walker map and private surveys.

NULHEGAN POND.—Essex County; eastern part of town of Brighton; inlet, a stream
about 2 miles long draining the east-central part of the town; outlet to Nulhegan
River (tributary to Connecticut River). Walker map.

NULHEGAN RIVER.—Essex County; rises in the southwestern part of Averys Gore;
flows southeastward across the eastern corner of Brighton and the northern parts
of Ferdinand and Brunswick and enters Connecticut River at Bloomfield post
office, in the southern part of the town of Bloomfield; drainage area, 124 square
miles; principal tributaries, North, Yellow, Black, and East branches, all of
which enter from the north. In the headwaters, both on the main stream and on
the branches, the valleys are relatively wide and flat with occasional quick
stretches in the rivers. From Bloomfield to the mouth of the East Branch the river
slope is gentle, with bordering flat meadows and cultivated land. Immediately
above the East Branch, for 3¾ miles, the river is quick falling; above this
stretch of quick water the basin is flat for some distance, then another stretch of
quick water reaches to the so-called Sherman Eddy Dam. Above Sherman
Eddy Dam the basin broadens out and is generally flat. Walker map and
private surveys.

NULHEGAN RIVER, EAST BRANCH.—Essex County; rises in the central part of the
town of Averill; flows southward 12 miles to the southern part of Bloomfield,
where it joins Nulhegan River (tributary to the Connecticut); drainage area,
approximately 36 square miles; principal tributaries, Spaulding, Brouillard,
Murphy, Fisher, and Mink brooks. Walker map and private surveys.

NULHEGAN RIVER, NORTH BRANCH.—Essex County; rises in a small pond west of Black Mountain, in Averys Gore; flows southeastward across the western corner of the town of Lewis, and unites with Nulhegan River (tributary to the Connecticut) in the northern part of the town of Ferdinand; principal tributary, a stream draining a small pond in the western part of Averys Gore and uniting with the North Branch in the western part of the town of Lewis. Several dams on the stream are used for logging operations, but none of them have any considerable storage; drainage area, 25 square miles. Walker map and private surveys.

NUNGE BROOK.—Bennington County; rises in the northwestern part of Stamford on the southern slope of the Green Mountains, at an altitude of 2,800 feet; flows southeastward about 1½ miles into Roaring Brook, a branch of North Branch of Hoosic River (tributary through Hoosic River to the Hudson); fall, 840 feet. Bennington sheet.

σ

OLD CITY BROOK.—Orange County; rises on the southeast slope of Colton Hill in the southwestern part of the town of Vershire, at an altitude of 2,200 feet above sea level; flows southeastward about 1 mile, then southwestward 5 miles to its junction with West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut) half a mile north of Strafford. Strafford sheet.

OMPOMPANOOSUC RIVER.—Orange and Windsor counties; rises in the northwestern part of the town of Vershire; flows southeastward, passing across the southwest corner of West Fairlee and through Thetford, and enters Connecticut River in the northeastern part of Norwich, Windsor County; in Thetford it receives a stream from Fairlee Lake, but its other tributaries, except the West Branch, are short; length, about 20 miles; called Brook River above Lower Village in Vershire. Walker map, post-route map, and Strafford sheet.

OMPOMPANOOSUC RIVER, WEST BRANCH.—Orange County; rises on the west slope of Colton Hill in the southwestern part of Vershire, at an altitude of about 2,220 feet above sea level; flows irregularly southward to South Strafford, then southeastward across the southwest corner of Thetford into Ompompanoosuc River (tributary to the Connecticut); length, about 16 miles; fall, 1,760 feet, of which 440 feet occurs in the 6 miles below South Strafford; principal tributaries, Old City, Abbott, Lord, and Jackson brooks; many small tributaries draining steep slopes in Strafford. Strafford sheet.

ONION RIVER.—*See* Winooski River.

ONION RIVER POND.—Caledonia County; western part of Peacham; outlet, a stream about 2 miles long flowing northwestward to Mollys Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

OSWEGATCHIE RIVER.—Essex County; rises in the southwestern part of the town of Brighton; flows northward 4 miles into Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

OTTAUQUECHEE RIVER.—Rutland and Windsor counties; rises in the town of Sherburne, high on the slopes of the Green Mountains, one of its tributaries flowing from Pico Pond, more than 2,200 feet above sea level, and another rising north of Killington Peak (4,241 feet), at an altitude of 3,400 feet. From a point near North Sherburne the Ottauquechee flows southeastward to West Bridgewater, eastward to Bridgewater, northeastward across Woodstock into Hartford, then southeastward to the northeastern part of Hartland, where it joins Connecticut River; length, including major windings, about 38 miles; principal tributaries, North Branch, which joins it in Bridgewater, and South Branch, which joins it in Woodstock; fall, about 2,000 feet. To Sherburne the descent is very rapid, and

the stream from Killington Peak, which enters the main stream at Sherburne, falls more than 2,000 feet in 5 miles.

The stream furnishes power for mills at Bridgewater, West Woodstock, Woodstock, Queechee, and Deweys Mills, and the dam at Taftsville supplies electricity for light and power to this village (Woodstock), West Woodstock, Taftsville, and Queechee. A writer in Industrial Vermont (1914) says that the river has power to spare at all seasons, and that probably not one-half or one-quarter of this energy is utilized. Rutland, Woodstock, and Hanover sheets.

OTTAUQUECHEE RIVER, NORTH BRANCH.—Rutland and Windsor counties; formed at Chatauguay, in the northwestern part of Bridgewater, by the union of two streams, one rising in the northeastern part of Sherburne, at an altitude of 2,120 feet, the other in the northwestern part of Bridgewater, at an altitude of 2,040 feet; flows southeastward, eastward, and irregularly southward through Bridgewater, joining Ottauquechee River (tributary to the Connecticut) near Bridgewater Corners; length, 9 miles. Woodstock sheet.

OTTER CREEK.—Bennington County; rises in Dorset Pond, in the northeastern part of the town of Dorset, at an altitude of about 700 feet above sea level; flows northward across Rutland and Addison counties to Lake Champlain (outlet through Richelieu River to the St. Lawrence) at North Ferrisburgh, about 6 miles northwest of Vergennes; length, about 75 miles (map measurement, including the larger windings); total fall, 600 feet; drainage area, 935 square miles, all in Vermont, and of this 615 square miles is above Middlebury. Large tracts on the headwaters of the river are in forest. The slope of the river between Rutland and Middlebury is very small, but between Middlebury and the mouth it is greater. The slopes of the tributary streams are generally steep. Principal tributaries: Mill River, Cold River, East Creek, Clarendon River, Furnace Brook, and Neshobe, Leicester, Middlebury, New Haven, and Lemon Fair rivers. Gaging station at Middlebury, 1903–1907; 1910–1916.

Concerning Otter Creek Hitchcock [1] says: "The valley in which Dorset Pond is situated is remarkable for its narrowness and depth. One would hardly imagine that upon such a low level would be found the watershed of waters flowing to Long Island Sound in one direction and to the Gulf of St. Lawrence in another * * *. The very serpentine course of Otter Creek, both above and below Rutland, is due to the loamy character of the meadow. All sluggish streams passing through fine materials are characterized by a meandering course."

Surveys and data: Topographic maps of the United States Geological Survey as follows: Pawlet, Wallingford, Castleton, Rutland, Ticonderoga, Brandon, Port Henry, and Middlebury sheets; post-route map; Walker map; Report on the geology of Vermont, vol. 1, 1861; U. S. Geol. Survey Water-Supply Papers 97 (pp. 353–354), 129 (pp. 139–141), 170 (pp. 106–107), 206 (pp. 87–89), 244 (pp. 143–144).

OWLS HEAD POND.—Caledonia County; a small pond in the southwestern part of the town of Peacham, discharging by a stream flowing southeastward into the stream connecting Little Hosmer Pond with Groton Pond (outlet, Wells River to the Connecticut). Walker map.

P.

PAGE POND.—Orleans County; western part of Albany; outlet, a stream about a mile long flowing northward to Black River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); very small. Walker map.

---

[1] Hitchcock, Edward, et al., Report on the geology of Vermont, vol. 1, pp. 129, 130, 1861.

PARAN CREEK.—Bennington County; rises in the northeastern part of Shaftsbury, east of Trumbull Mountain, at an altitude of 1,380 feet; flows southwestward through Shaftsbury and west and south to north Bennington, where it joins Walloomsac River, a branch of the Hoosic (tributary to the Hudson); receives a large branch from the west rising on West Mountain; fall, 860 feet; length, 8 miles. Bennington sheet.

PARKER POND.—Orleans County; town of Glover; inlet (head of Roaring Brook) from Sweeney Pond; outlet, Roaring Brook to Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); nearly a mile long and about half a mile wide. Walker map.

PASSUMPSIC RIVER.—Caledonia County; rises in Bald Hill Pond in the eastern part of the town of Westmore; flows southeastward 9 miles across the town of Newark into the western part of East Haven, Essex County, southwestward 10 miles to the central part of the town of Lyndon, Caledonia County, then in general southward 15 miles across the towns of St. Johnsbury, Waterford, and Barnet to its junction with Connecticut River at East Barnet; principal tributaries, Millers River, Moose River, and Joes Brook. Gaging stations: Near St. Johnsbury, 1909–1916; at St. Johnsbury Center, 1903.

The river is in general quick-falling and there are many power plants along the main stream and on the tributaries. The upper parts of the basin are fairly well forested, the whole area is hilly, and much of it is rocky. Mean annual precipitation, about 40 inches. The river is generally frozen through out the winter. The run-off in the freshet season is usually large. Walker map and U. S. Geol. Survey Water-Supply Paper 261, pp. 143–144, 1911.

PASSUMPSIC RIVER, WEST BRANCH.—Orleans County; rises near the base of Mount Pisgah in the town of Westmore; flows southward to the central part of the town of Lyndon, where it joins the main stream (tributary to Connecticut River). Walker map.

PATCH'S POND.—Rutland County; in the northeastern part of Mount Holly; discharges by a short stream flowing north into branch of Black River (tributary to the Connecticut); small. Walker map.

PATTERSON BROOK.—Addison County; rises in the northwestern part of the town of Granville; flows southeastward 5 miles and unites with Alder Meadow Brook to form the head of White River (tributary to the Connecticut). Walker map and Rochester sheet.

PATTERSON BROOK.—Orange County; a stream about a mile long draining a small area in the central part of the town of Strafford and flowing southwestward into West Branch of Ompompanoosuc River (tributary through Ompompanoosuc River to the Connecticut). Strafford sheet.

PAUL STREAM.—Essex County; rises in the central part of the town of Ferdinand, flows southeastward about 5 miles, then turns abruptly and flows northeastward 5 miles across the northwest corner of Maidstone and the southeast corner of Brunswick into Connecticut River; principal tributaries, Branch Pond Stream and outlet of Maidstone Lake; drainage area, approximately 50 square miles. Walker map.

PEACHAM HOLLOW BROOK.—See Stevens River.

PEACH POND.—Lamoille County; northern part of Wolcott; no outlet shown on map. Walker map.

PECKS POND.—Washington County; western part of the town of Barre; outlet southeastward to Stevens Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); very small. Walker map.

PENSIONER POND.—Orleans County; town of Charleston; in the course of Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

PERCH POND.—Rutland County; northern part of the town of Benson; outlet, a stream about 1½ miles long flowing westward to East Creek (tributary to Lake Champlain; outlet through Richelieu River to the St. Lawrence); area, 37 acres; elevation above sea level, about 550 feet; fall of outlet, 220 feet, of which 110 feet occur in the first half mile of the outlet and 100 feet within a fourth of a mile near the mouth. Ticonderoga and Whitehall sheets.

PERKINS BROOK.—Rutland and Windsor counties; rises in the northern part of the town of Pittsfield, at an altitude of 2,020 feet; flows in a northeasterly direction to Corporation Brook (tributary through White River to the Connecticut); fall, 1,000 feet. Rochester sheet.

PETTINGILL POND.—Lamoille County; northeastern part of Hyde Park; outlet, a stream about 1 mile long flowing southeastward to Green River (tributary through Lamoille River to Lake Champlain; outlet through Richelieu River to the St. Lawrence). Walker map.

PHILLIPS POND.—Orleans County; northeastern part of Westfield; outlet, a stream about 2 miles long flowing southeastward into Missisquoi River (tributary to Lake Champlain; outlet through Richelieu River to the St. Lawrence). Colton map and Walker map.

PICO POND.—Rutland County; west-central part of Sherburne; inlet and outlet, Thundering Brook, a branch of Ottauquechee River (tributary to the Connecticut); altitude, about 2,200 feet; small. Rutland sheet.

PIERCE POND.—Washington County; northern part of town of Brookfield; inlet from Rood Pond; outlet to Second Branch of White River (tributary through White River to the Connecticut). Walker map.

PIGEON POND.—Caledonia County; western part of Groton; outlet, Lye Brook to Winooski River (tributary to Lake Champlain; outlet through Richelieu River to the St. Lawrence). Walker map.

PIKE RIVER.—Franklin County; rises in the northern part of Berkshire; flows very irregularly southwestward into the northeastern part of Franklin Pond and from the outlet of Franklin Pond through Canada to Missisquoi Bay, Lake Champlain (outlet through Richelieu River to the St. Lawrence). Carte Régionale No. 5 of Quebec and Walker map.

PINE BROOK.—Addison and Windsor Counties; rises in the southern part of the town of Hancock; flows southward 1½ miles into West Branch of White River (tributary through White River to the Connecticut). Rochester sheet.

PINNEY HOLLOW BROOK.—Windsor County; rises in the west-central part of Plymouth on the slopes of Blueberry Hill, at an altitude of 1,700 feet; flows northeastward, passing through Moores Ponds and the northern part of Plymouth, and joins Hale Hollow Brook, a branch of Ottauquechee River (tributary to the Connecticut) in the southeastern part of Bridgewater; fall, 800 feet; length, 6 miles. Woodstock sheet.

PIPER BROOK.—Addison County; rises in the south-central part of the town of Hancock; flows in a northerly direction into West Branch of White River (tributary to the Connecticut); length, about 2 miles. Walker map and Rochester sheet.

PLEIAD LAKE.—*See* Dunhams Pond.

PLYMOUTH POND.—Windsor County; in the northwestern part of Plymouth; altitude, 1,395 feet; discharges southward by a stream which passes through Black Pond into Black River (tributary to the Connecticut); length, 1½ miles. Rutland sheet.

PLYMOUTH POND.—Windsor County; southeastern part of town of Plymouth; inlet Buffalo Brook; outlet, Black River (tributary to the Connecticut); small. Walker map.

PODUNK BROOK.—Windsor County; rises in the southwestern part of Norwich south of the source of Tigerstown Brook, at an altitude of 1,400 feet; flows southwestward and is joined by Tigerstown Brook about a quarter mile northeast of its junction with White River (tributary to the Connecticut); fall, about 1,040 feet; length, 3½ miles. Hanover sheet.

POGUE, THE.—Windsor County; northern part of Woodstock; outlet, a stream about 1 mile long passing into Barnard Brook just above its junction with Ottauquechee River (tributary to the Connecticut); altitude, 1,170 feet; small. Woodstock sheet.

POND BROOK.—Addison County; rises in Bristol Pond in the northern part of Bristol, at an altitude of 470 feet above sea level (approximate); takes a general northerly course to Lewis Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southern part of Hinesburg; length, about 8 miles; fall, 140 feet; swampy about Bristol Pond and in middle course. Middlebury and Burlington sheets.

POND BROOK.—Chittenden County; rises in Colchester Pond in the eastern part of the town of Colchester; flows southwestward 1 mile, then in general northwestward 4 miles to its junction with Malletts Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Milton sheet.

POND BROOK.—Chittenden County; rises in Hinesburg Pond in the northern part of Hinesburg, at an altitude of 684 feet above sea level; takes a general southwesterly course to its junction with La Platte River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Hinesburg; length, about 3 miles; fall, 355 feet, of which 200 feet occurs in half a mile at Mechanicsville. Burlington sheet.

POND BROOK.—Chittenden County; rises in Westford Pond in the southwestern part of Westford; flows southeastward 1 mile, then east of north 1 mile into Rogers Brook (tributary through Browns River to Lamoille River and Lake Champlain and thus through Richelieu River to the St. Lawrence); intermittent. Milton sheet.

POND BROOK.—Essex County; rises in Cow Mountain Pond in the southern part of the town of Granby; flows north of west 2 miles into Granby Stream (tributary through Moose River to Passumpsic River and thus to the Connecticut). Walker map.

POND BROOK.—Lamoille County; rises in Wolcott Pond, in the eastern part of Wolcott; flows northwestward, then southwestward, then southward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Colton map and Walker map.

POND BROOK.—Windham County; rises in Lowell Lake, in the northeastern part of Londonderry, at an altitude of 1,290 feet above sea level; flows southward and southwestward into West River (tributary to Connecticut River) in the south-central part of Londonderry; fall, 310 feet; length, about 4 miles. Walker map and Londonderry sheet.

POND BROOK.—Windham County; rises on the southwestern slope of Stratton Mountain at an altitude 2,390 feet above sea level; flows southeastward 2½ miles to Grout Pond, then west of south 2½ miles to the northern part of the town of Somerset, where it joins East Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall below Grout Pond, 140 feet. Londonderry sheet.

POTASH BROOK.—Chittenden County; rises in the eastern part of South Burlington, at an altitude of 350 feet above sea level (approximate); flows northward about 1 mile, then turns and flows south of west to Lake Champlain (outlet through Richelieu River to the St. Lawrence), which it enters at Queen City Park; length, about 5 miles; fall, 250 feet. Burlington sheet.

POTASH BROOK.—Orange County; a stream draining a small area in the central part of the town of Corinth and flowing southeastward into South Branch of Waits River (tributary through Waits River to the Connecticut). Walker map.

POULTNEY RIVER.—Rutland County; rises in the northwestern part of the town of Tinmouth, at an altitude of 1,800 feet above sea level; takes a tortuous but in general northwesterly course to a point about 3 miles northwest of Fair Haven, then turns and flows westward 4 miles to the mouth of Coggman Creek, where it makes another abrupt turn and flows west of south through East Bay to its junction with Lake Champlain (outlet through Richelieu River to the St. Lawrence) near Whitehall, N. Y.; length, including major windings, about 35 miles; fall, approximately 1,600 feet, of which 500 feet occurs in the first 2 miles of its course and 126 feet at Carvers Falls near Fair Haven; principal tributaries. Castleton and Hubbardton rivers. The basin contains a number of large lakes. Below the village of Poultney the river forms the boundary between Rutland County, Vt., and Washington County, N. Y. Gaging station at Fair Haven, 1908. Surveys and data from Pawlet, Castleton, and Whitehall sheets and Walker map.

PRESTON BROOK.—Chittenden County; rises in the southern part of Bolton; flows northward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

PRETTY POND.—Caledonia County; western part of the town of Lyndon; connected with West Brook (tributary through Passumpsic River to the Connecticut) by a very short southward-flowing stream. Walker map.

PRINCE BROOK.—Chittenden County; rises in the eastern part of Bolton; flows southward into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Walker map.

PRINGLE BROOK.—Chittenden County; rises near the village of Charlotte, at an elevation of 240 feet above sea level; flows southwestward half a mile, then northwestward into Home Creek (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 1½ miles; fall, 100 feet. Villsboro sheet.

PROPER POND.—Franklin County; northern part of the town of Highgate; discharges by a stream flowing southwestward and westward toward the marsh along Rock River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); altitude, 212 feet. St. Albans sheet.

PRUDDY BROOK.—Bennington County; a small stream tributary to Green River (tributary through Batten Kill to the Hudson); drains the south slope of Moffitt Mountain in the town of Sandgate. Equinox sheet.

PUTNAM BROOK.—Caledonia and Essex counties; rises in the eastern part of the town of Kirby; flows southeastward 4 miles and joins Moose River (tributary through Passumpsic River to the Connecticut) near West Concord. Walker map.

Q.

QUATION BROOK.—Windsor and Orange counties; rises at an altitude of 1,560 feet near the boundary between the towns of Strafford and Sharon; flows southwestward into White River (tributary to the Connecticut); several small branches, one being a stream from Bush Pond, in the northern part of Sharon; fall, 1,080 feet; length, 5 miles. Walker map and Strafford sheet.

R.

RAKE BRANCH.—Bennington and Windham counties; rises in the central part of Woodford, Bennington County, on the northern slope of Prospect Mountain, at an altitude of 2,440 feet; flows northeastward through several ponds, the largest being Billings Pond in the northeastern part of Woodford, across the northwest corner of Searsburg, and joins Deerfield River (tributary to the Connecticut) in the southwest part of Somerset; chief branch, Redfield Brook; fall, 490 feet; length, 7 miles. Bennington and Wilmington sheets.

RAPONDA LAKE.—*See* Ray Pond.

RAY POND.—Windham County; eastern part of the town of Wilmington; outlet, Bill
Brook to North Branch ot Deerfield River (tributary through Deerfield River to
the Connecticut); altitude 1,850 feet above sea level; area, 166 acres; fall of out-
let, 250 feet; also known as Lake Raponda. Wilmington sheet.

READING HILL BROOK.—Windsor County; rises in the northeastern part of Reading,
at an altitude of 1,500 feet; flows southward to its junction with Mill River
(tributary to the Connecticut); length, about 3½ miles. Woodstock sheet.

READING. POND.—Windsor County; a small pond on the boundary line between
Reading and Plymouth, discharging by Buffalo Brook into Plymouth Pond and
thus into Black River (tributary to the Connecticut). Walker map.

READSBORO POND.—Bennington County; western part of Readsboro; outlet, a stream
about 1 mile long flowing southeastward into West Branch of Deerfield River
(tributary to the Connecticut) about 1 mile above Readsboro; about half a mile
long; area, 54 acres; altitude, 1,970 feet. Walker map and Wilmington sheet on
which it is unnamed.

RED BROOK.—Caledonia County; rises in the southern part of the town of Peacham;
flows southeastward 4 miles and southwestward 3 miles into Wells River (tributary
to the Connecticut). Walker map.

REDFIELD BROOK.—Bennington County; rises in the northeastern part of Wood-
ford, at an altitude of 2,340 feet; flows northeastward about 3½ miles into Rake
Branch (tributary through Deerfield River to the Connecticut); receives branches
from Hagar Hill and Little Pond in the northern part of Woodford; fall, 450 feet.
Bennington sheet.

RESERVOIR POND.—Windham County; east-central part of the town of Marlboro;
two outlets, one being a stream passing northwestward to Marlboro Branch (tribu-
tary through West River to the Connecticut) and the other by way of Whet-
stone Brook (tributary to the Connecticut) at Brattleboro. Walker map; not
named on Brattleboro sheet.

RICHMOND BROOK.—Windsor County; rises in Lakota Lake in the southern part
of Barnard, at an altitude of 1,885 feet; flows south of east to its junction with Gulf
Stream (tributary through Barnard Brook to Ottauquechee River, a branch of
the Connecticut) in the eastern part of Barnard; fall, 875 feet; length, 3½ miles.
Woodstock sheet.

RICHMOND POND.—Chittenden County; northeastern part of Richmond; outlet,
southward to Winooski River (tributary to Lake Champlain and thus through
Richelieu River to the St. Lawrence) by a stream about 2 miles long; this stream
carries also the overflow from Sanborn Pond. Colton map and Walker map.

RIFORD BROOK.—Orange County; town of Braintree; a small eastward-flowing tribu-
tary of Third Branch of White River (tributary through White River to the
Connecticut). Rochester sheet.

RITTERBUSH POND.—Lamoille County; northwestern part of the town of Eden; inlet
from Mud Pond; outlet, a stream about a mile long flowing eastward to Fryingpan
Brook (tributary through Gihon River to Lamoille River and Lake Champlain
and thus through Richelieu River to the St. Lawrence); very small. Walker map.

ROACH POND.—Rutland County; west-central part of town of Hubbardton; outlet, a
stream one-fourth mile long flowing eastward to Austin Pond (outlet to Bomo-
seen Lake and thus through Castleton and Poultney rivers and Lake Champlain
to Richelieu River and the St. Lawrence), area, 17 acres; elevation above sea
level, 537 feet; fall of outlet, 69 feet. Castleton sheet.

ROARING BRANCH.—Bennington County; rises in the western part of Stamford on a
southern slope of the Green Mountains, at an altitude of 2,780 feet; flows north-
westward into Pownal, where it joins South Stream (tributary through Walloomsac
River to Hoosic River and thus to the Hudson) near the Bennington boundary
line; fall, 1,770 feet; length, 4 miles. Bennington sheet.

ROARING BRANCH.—Bennington County; formed in the southeastern part of Sunder-
land, at an altitude of 2,240 feet above sea level, by the union of North Alder
and South Alder brooks; takes a very irregular course west and northwest about 9
miles to its junction with Batten Kill (tributary to the Hudson), 1 mile north-
east of Arlington; total fall, 1,600 feet; principal tributaries, South Fork and
Fayville Branch. Equinox sheet.

ROARING BROOK.—Bennington County; rises in the northern part of Stamford on the
southern slope of the Green Mountains, at an altitude of 2,580 feet; flows south-
ward and southeastward into North Branch of Hoosic River (tributary through
Hoosic River to the Hudson) in the southern part of Stamford; chief branch,
Nunge Brook; fall, 1,480 feet; length, 6 miles. Bennington sheet.

ROARING BROOK.—Chittenden County; rises in the west-central part of Underhill;
flows southwestward to its junction with Browns River (tributary through La-
moille River to Lake Champlain and thus through Richelieu River to the St.
Lawrence) in the northern part of the town of Jericho; about 5 miles long.
Colton map and Walker map.

ROARING BROOK.—Essex County; rises in the northeastern part of the town of Averill;
flows northeastward across the town of Canaan into Connecticut River near
Canaan post office; length, about 6 miles. Walker map.

ROARING BROOK.—Orange County; a stream about 6 miles long flowing southeast-
ward in the town of Bradford near the boundary between that town and Newbury
and discharging into Connecticut River. Walker map.

ROARING BROOK.—Orleans County; rises in Sweeney Pond in the western part of
the town of Glover; flows eastward into Parker Pond, thence northeastward
and eastward into Barton River (tributary to Lake Memphremagog and thus
through Magog and St. Francis rivers to the St. Lawrence); length, about 7
miles. Walker map.

ROARING BROOK.—Rutland County; rises in Buffum Pond in the southern part
of the town of Mount Tabor, at an altitude of 2,650 feet above sea level; flows
northward into Big Branch (tributary through Otter Creek to Lake Champlain
and thus through Richelieu River to the St. Lawrence) at Griffith; length, about
4 miles; fall, 1,000 feet; several small tributaries, one of which carries the over-
flow from three small ponds. Wallingford sheet.

ROARING BROOK.—Rutland County; rises in the northeastern part of Wallingford,
at an altitude of 1,700 feet above sea level; flows in a course somewhat south of
west for 2½ miles, then northwestward for 2 miles to Otter Creek (tributary to Lake
Champlain and thus through Richelieu River to the St. Lawrence) at Walling-
ford; fall, about 1,170 feet. Wallingford sheet.

ROBINS BRANCH.—Addison County; rises in the western part of the town of Hancock;
flows eastward to Hancock post office, where it joins White River (tributary to
the Connecticut); length, 5 miles. Walker map and Rochester sheet.

ROCK RIVER.—Franklin County; rises in the southwestern part of Franklin; flows
southwestward into the town of Highgate, then northward into St. Arnold, Canada,
where it turns and flows back into Highgate to its entrance into Missisquoi Bay,
Lake Champlain (outlet through Richelieu River to the St. Lawrence); about
13 miles long; principal tributary in Vermont, Saxe Brook. Colton map, Walker
map, post-route map, and St. Albans sheet.

ROCK RIVER.—Windham County; rises in the northern part of the town of Dover,
at altitude of 2,300 feet above sea level; flows southeastward 8 miles to south New-
fane, where it joins Marlboro Branch (tributary through West River to the Con-
necticut); fall, 1,660 feet, of which 800 feet occurs in 2 miles at the head. Wil-
mington and Brattleboro sheets.

ROCKY BROOK.—Washington County; rises in the western part of Northfield; flows southeastward into Dog River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 4 miles. Colton map; unnamed on Walker map.

ROCKY POND.—Caledonia County; northern part of town of Sutton; two small inflowing streams; outlet to West Branch of Passumpsic River (tributary through Passumpsic River to the Connecticut); small. Walker map.

RODMAN BROOK.—Lamoille County; rises near the central part of Hyde Park; flows southward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the eastern part of Morristown Township; about 5 miles long. Walker map.

ROGERS BROOK.—Chittenden County; rises in the western part of the town of Westford; flows southeastward 3 miles, northeastward 1 mile, then southeastward again half a mile into Browns River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Milton sheet.

ROGERS BROOK.—Windsor County; rises on the southwestern slope of Rochester Mountain at an altitude of 2,000 feet; flows westerly 3 miles and joins White River (tributary to the Connecticut) 2 miles below the village of Rochester; fall, 1,230 feet. Rochester sheet.

ROOD POND.—Washington County; southwestern part of Williamstown; very small; outlet, Second Branch of White River (tributary to the Connecticut). Walker map.

ROODS POND.—Chittenden County; western part of Milton; outlet, a stream about 3 miles long flowing northward 2½ miles then southwestward one-half mile to its junction with Stone Bridge Brook (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); altitude, 374 feet. Milton sheet.

ROOT POND.—Rutland County; at northeast base of Shaw Mountain, in the southwestern part of the town of Benson; one inlet, flowing through a swampy area lying northwest of the lake; outlet, a stream three-fourths mile long flowing southeastward to Coggman Creek (tributary through Poultney River to Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 40 acres; elevation above sea level, 370 feet; fall of outlet, 160 feet. Whitehall sheet.

ROUND POND.—Caledonia County; town of Sheffield; a very small pond connected with a short stream flowing northwestward into Long Pond (outlet through Barton River to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

ROUND POND.—Essex County; in Warren Grant; an expansion of the southern end of Norton Pond; outlet, Coaticook River to Massawippi River (tributary to St. Francis River and thus to the St. Lawrence). Walker map.

ROUND POND.—Orange County; west-central part of town of Newbury; a small pond within the area drained by Chalmers Brook (tributary to the Connecticut); no outlet mapped. Walker map.

RUGG BROOK.—Franklin County; rises in the south-central part of St. Albans; flows in general southwestward into Mill River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. St. Albans sheet.

RUNAWAY POND.—Orleans County; southern part of the town of Glover; at the head of Barton River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). In the early part of the nineteenth century a pond called Long Pond lay across the line between Greensboro and Glover and was the head of Lamoille River. A short distance north lay a small pond from which Barton River flowed. In order to increase the supply for a mill on Barton River, an attempt was made on June 6, 1810, to open a channel through the bank between

the two ponds. This bank proved to consist chiefly of loose sand, and as soon as the water began flowing northward it immediately cut an immense channel by which all the waters of Long Pond were discharged in a few minutes. The flood destroyed the mills and other property along Barton River and the bed of Long Pond was left bare. This bed is now known by the name "Runaway Pond," but a small stream flowing from its north end forms the head branch of Barton River. Walker map; Geography and geology of Vermont, by Zadock Thompson, pp. 194–195, Burlington, 1848; Report on the geology of Vermont, by Edward Hitchcock and others, vol. 2, pp. 729–730.

RUSH POND.—Lamoille County; southern part of the town of Eden; outlet, a stream 1¼ miles long flowing northeastward to South Pond (tributary through Gihon River to Lamoille River and thus through Lake Champlain and Richelieu River to the St. Lawrence); about half a mile long. Colton map and Walker map.

RUSSELL BROOK.—Rutland County; rises in the southeastern part of Shrewsbury, at an altitude of 2,040 feet above sea level; flows southwest and then west to its junction with Mill River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northeastern part of the town of Wallingford; length, about 5½ miles; fall, about 1,000 feet; several unnamed tributaries. Wallingford sheet.

S.

SABINE POND.—Washington County; southern part of Woodbury; inlet, Kingsbury Brook; outlet by Kingsbury Brook to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

SACKETTS BROOK.—Windham County; rises in the southwestern part of Westminster; flows south across Putney and the northeast corner of Dummerston into Connecticut River just south of Putney Station; length, about 5 miles. Walker map.

SADAWGA POND.—Windham County; west-central part of Whitingham; about 1 mile long; area, 137 acres; altitude, 1,670 feet; several inlets; outlet, a stream about 2 miles long flowing northwestward into Deerfield River (tributary to the Connecticut). Wilmington sheet.

ST. CATHARINE LAKE.—Rutland County; on line between the towns of Poultney and Wells; inlets, Endless Brook and stream from Lily Pond; outlet through Little Pond to Wells Brook (tributary through Mettawee River to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 477 feet; length, including Lily Pond and Little Pond, about 5 miles; maximum width, 1 mile; area, 930 acres; steamboat route. Pawlet sheet.

SALEM POND.—Orleans County; on the line between Derby and Salem, the greater part of the pond being in Salem; inlet, Clyde River; outlet, Clyde River to Lake Memphremagog (outlet through Magog and St. Francis rivers to the St. Lawrence). Walker map.

SANBORN POND.—Chittenden County; western part of Bolton; near head of Duck Brook; outlet, a stream 3½ miles long flowing west then south to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); very small. Colton map and Walker map.

SARGENT POND.—Rutland County; southwestern part of Pittsford; inlet, Castleton River; outlet, Castleton River to Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 600 feet; very small. Castleton sheet.

SAXE BROOK.—Franklin County; rises north of Carter Hill, in Highgate; flows northward into Rock River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 4 miles long. Walker map and St. Albans sheet.

SAXTONS RIVER.—Windham County; rises in the north-central part of Windham; flows southeastward across Grafton and Rockingham and into the northeast corner of Westminster, where it makes an abrupt turn toward the north and flows into Connecticut River about 1 mile below Bellows Falls: receives one large branch from the southwest, and several small branches; length, about 19 miles. Walker map.

SCOTTS BROOK.—Orange County; a stream about 5 miles long rising in the western part of Newbury and flowing northeastward into Wells River (tributary to the Connecticut). Walker map.

SEAVER BROOK.—Orleans County; rises in a small pond in the southeastern part of Albany; flows in a general southwesterly direction to its junction with Black River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); about 6 miles long; several small tributaries, including stream from Little Hosmer Pond. Walker map.

SEWELL BROOK.—Windsor County; rises in the southwestern part of Ludlow; flows northward into Black River (tributary to the Connecticut) near Ludlow post office; 5 miles long. Walker map.

SEYMOUR LAKE.—Orleans County; central part of Morgan; several inflowing streams draining small lakes; outlet, Mill River to Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence; 3 miles long and nearly 1 mile in average width. An arm extending westward from the north end is about 2 miles wide. Walker map.

SHARP BROOK.—Windham County; rises in the south-central part of the town of Windham; flows southward into northeastern Jamaica, where it joins Mill Brook to form Howard Brook (tributary through West River to the Connecticut). Walker map.

SHEFFIELD BROOK.—Orleans County; a small stream in Westmore flowing eastward into Willoughby Lake (outlet, Willowby River to Barton River, which is tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

SHELBURNE POND.—Chittenden County; eastern part of Shelburne; 2 inflowing streams shown; outlet northward by Muddy Creek to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, ·329 feet; about 1½ miles long by half a mile wide; marshy areas to south, west, and north. Colton map, Walker map, post-route map, and Burlington sheet.

SHELDON BROOK.—Caledonia County; rises in the northwestern part of the town of Danville; flows southeastward 4 miles into Morrills Brook (tributary through Sleepers River to Passumpsic River and thus to the Connecticut). Colton map and Walker map.

SHEPARD BROOK.—Washington County; rises in the northwestern part of Faystown; flows southeastward into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northern part of the town of Waitsfield; about 6 miles long. Walker map.

SHEPHERD BROOK.—Windsor County; rises in the eastern part of Hartland, at an altitude of 880 feet; flows southeastward and northeastward about 2 miles into Connecticut River; fall, 560 feet. Hanover sheet.

SHREWSBURY POND.—Rutland County; southwestern part of Shrewsbury; outlet, a stream 1 mile long flowing northward to Mill River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence); area, 63 acres; elevation above sea level, 1,457 feet; fall of outlet, 580 feet; pond is about half a mile long by one-fourth mile wide. Wallingford and Rutland sheets.

SILVER LAKE.—Addison County; northeast corner of Leicester; outlet, a stream about 1 mile long flowing northward to Sucker Brook (tributary through Lake Dunmore to Leicester River, Otter Creek, and Lake Champlain and thus through Richelieu River to the St. Lawrence); elevation above sea level, 1,241 feet; fall of outlet, 340 feet; lake is about three-fourths mile long by one-fourth of a mile wide; area, 70 acres. Brandon sheet.

SILVER LAKE.—Franklin County; on line between the towns of Fairfax and Georgia; outlet, a stream 2 miles long flowing southward to Beaver Meadow Brook (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence); altitude, 783 feet. Milton sheet.

SILVER LAKE.—Windsor County; north-central part of the town of Barnard; several small inflowing streams; outlet, a short stream flowing northwestward to a tributary of Locust Creek (tributary to the Connecticut); altitude, 1,305 feet; lake is about half a mile wide (north-south) and nearly three-fourths of a mile long; area, 96 acres. Woodstock sheet.

SIMPSON BROOK.—Windham County; rises in the northern part of Townshend; flows southward into West River (tributary to Connecticut River); 7 miles long. Walker map.

SLABBRIDGE BROOK.—Rutland County; a stream 2 miles long; rises in the northeastern part of the town of Chittenden, at an altitude of 2,500 feet; flows in a southwesterly direction to Morrill Brook (tributary through White River to the Connecticut) a quarter of a mile above Michigan Camp; fall, 1,050 feet. Rochester sheet.

SLEEPERS RIVER.—Caledonia County; rises in the southern part of the town of Wheelock; flows southeastward 12 miles into Passumpsic River (tributary to the Connecticut) near city of St. Johnsbury; several tributaries, all short, the largest being Morrills Brook. Colton map, Walker map, and post-route map.

SMITH BROOK.—Addison and Windsor counties; rises in the eastern part of the town of Goshen, at an altitude of about 2,600 feet; flows southeastward a distance of 3½ miles to its junction with Brandon Brook (tributary to White River and thus to the Connecticut); fall, 1,130 feet. Rochester sheet.

SMITH BROOK.—Windham County; rises in the northwestern part of the town of Newfane; flows southeasteard into West River (tributary to the Connecticut); about 6 miles long. Walker map.

SNOW BROOK.—Rutland County; rises on the western slope of Pond Mountain, in the town of Wells, at an altitude of 1,100 feet above sea level; flows southward 1½ miles to Wells Brook (tributary through Mettawee River to Lake Champlain and thus through Richelieu River to the St. Lawrence); fall, 540 feet. Pawlet sheet.

SOMERSET RESERVOIR.—*See* Chases Pond.

SOUTH BRANCH.—Windsor County; rises in the northeastern part of the town of Reading, at an altitude of 1,600 feet; flows northeastward and northward through the town of Woodstock into Ottauquechee River (tributary to the Connecticut) near Woodstock; numerous unnamed branches; fall, 930 feet; length, 8 miles. Woodstock sheet.

SOUTH BROOK.—Franklin County; rises in the eastern part of Averys Gore; flows northward into Tamarack Brook (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Montgomery; about 4 miles long; called Trout Brook on Colton map and post-route map; South Brook on Walker map.

SOUTH BROOK.—Orleans County; rises in the southwestern part of town of Jay; flows northeastward into Jay Brook (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 6 miles long. Colton map.

SOUTH BROOK.—Rutland County; rises on the southwestern slope of Spoon Moun
    tain, in the southern part of the town of Middletown, at an altitude of 1,050 feet
    above sea level; flows northward and northwestward to its junction with Poultney
    River (tributary to Lake Champlain and thus through Richelieu River to the
    St. Lawrence) three-fourths of a mile west of Middletown Springs; length, 3½
    miles; fall, 270 feet; several small tributaries draining the slopes of Spoon, Mor-
    gan, and Barber mountains; principal tributary, Coy Brook. Pawlet sheet.
SOUTH FORK.—Bennington County; rises in the southeastern part of Sunderland, at
    an altitude of 3,000 feet above sea level; flows southwestward about 1 mile, west
    1 mile, then irregularly northwestward to its junction with Roaring Branch (tribu-
    tary to Batten Kill and thus to the Hudson); about 5 miles long; fall, 1,500
    feet. Equinox sheet.
SOUTH POND.—Lamoille County; south-central part of the town of Eden; inlet from
    Rush Pond; outlet, a stream about a mile long flowing northwestward and west-
    ward to Gihon River (tributary through Lamoille River to Lake Champlain and
    thus through Richelieu River to the St. Lawrence); 1½ miles long by half a
    mile wide; immediately east of South Pond is Fletcher Pond, for which no out-
    let is shown on the maps. Colton map and Walker map.
SOUTH POND.—Orange County; a small pond in the western part of the town of Brook-
    field, drained by a stream flowing eastward into Colts Pond; outlet, a stream
    flowing to Ayers Brook and thus through Third Branch of White River to White
    River and to the Connecticut. Walker map.
SOUTH POND.—Windham County; southeastern part of the town of Marlboro; outlet,
    a stream 3½ miles long flowing in general southwestward into Green River (tributary
    through Deerfield River to the Connecticut); altitude, 1,640 feet; area, 198 acres.
    Brattleboro sheet.
SOUTH STREAM.—Bennington County; rises in the eastern part of Pownal, west of
    The Dome, at an altitude of 1,880 feet; flows west of north into Barber Pond;
    thence northward into Bennington, joining Walloomsac River (tributary through
    Hoosic River to the Hudson) at the city of Bennington; several small ponds lying
    in its course; chief tributaries, Roaring Branch and Jewett Brook; fall, 1,150
    feet; length, 8 miles. Bennington sheet.
SPAULDING BROOK.—Essex County; a stream about a mile long rising in the south-
    eastern part of the town of Averill and flowing southeastward to East Branch of
    Nulhegan River (tributary to the Connecticut). Walker map and private surveys.
SPRUCE POND.—Addison County; southern part of the town of Orwell; outlet, a
    stream three-fourths of a mile long flowing southward to northwest end of Sunset
    Lake (outlet through Little Pond to Hubbardton and Poultney rivers and Lake
    Champlain and thus through Richelieu River to the St. Lawrence); elevation
    above sea level, 670 feet; fall of outlet, 167 feet. Ticonderoga sheet.
STAMFORD POND.—Bennington County; northern part of Stamford; outlet, a stream
    about 2 miles long flowing northeastward into West Branch of Deerfield River
    (tributary through Deerfield River to the Connecticut); area, 11 acres; altitude,
    2,380 feet; small. Bennington sheet.
STAMFORD STREAM.—Bennington County; rises on the slopes of the Green Mountains
    in the northwestern part of Stamford, at an altitude of 2,760 feet; flows irregularly
    northward through Dunville Hollow into City Stream, a branch of Walloomsac
    River (tributary through Hoosic River to the Hudson); receives a stream from
    Sucker Pond; fall, 1,300 feet; length, 5 miles. Bennington sheet.
STANDING POND.—Windsor County; northwestern part of Sharon; outlet, short
    stream flowing westward to Fay Brook, branch of White River (tributary to the
    Connecticut); area, 17 acres. Strafford sheet.
STANHOPE BROOK.—Franklin County; rises in the eastern part of Richford; flows
    northwestward into Missisquoi River (tributary to Lake Champlain and thus
    through Richelieu River to the St. Lawrence) at Stevens Mills post office; 3½
    miles long. Colton map and Walker map.

STANLEY BROOK.—Orleans County; rises near the center of the town of G⁻eensboro; flows southward into Greensboro Brook (tributary through Lamoille River to Lake Champlain, and thus through Richelieu River to the St. Lawrence); about 2½ miles long. Walker map.

STANNARD POND.—Caledonia County; southeastern part of the town of Stannard; outlet, a stream about 3 miles long (considered the head of Joes Brook, tributary through Passumpsic River to the Connecticut), discharging into Coles Pond. Walker map.

STAPLES POND.—Orange County; a small pond in the northern part of Will'amstown, discharging by a stream flowing through Cutters Pond to Stevens Branch of Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map.

STEELE BROOK.—Franklin County; rises in the southeastern part of the town of Highgate; flows northward into Rock River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); 1½ miles long. St. Albans sheet.

STEPHENS BROOK- *See* Stevens Brook.

STERLING BROOK.—Washington County; rises in the northwestern part of Warren; flows southeastward to Clay Brook (tributary through Mad River to Winooski River and Lake Champlain and thus through Richelieu River to the St. Lawrence); 1½ miles long. Walker map.

STETSON BROOK.—Addison County; rises in the northwestern part of Granville; flows north of east into Mad River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southern part of Warren, Washington County; about 1 mile long. Walker map.

STEVENS BROOK.—Franklin County; rises near the central part of the town of St. Albans; flows northward, northwestward, and then southwestward into Lake Champlain (outlet through Richelieu River to the St. Lawrence) at the head of St. Albans Bay; about 8 miles long; principal tributary, Jewett Brook. Colton map, Walker map, and St. Albans sheet.

STEVENS BROOK.—Orange County; rises in the northern part of Will'amstown; takes a general northerly course to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Berlin; principal tributaries, Jail and Ketchum Brooks and stream from Berlin Pond; about 8 miles long. Colton map, Walker map, and post-route map. Spelled "Stephens" on Colton and post-route maps.

STEVENSONS BROOK.—Orleans County; rises in the northeastern part of Lowell; flows westward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Walker map.

STEVENS RIVER.—Caledonia County; rises in the southwestern part of town of Danville; flows southeastward across the northeastern corner of Peacham into Barnet, where it joins Connecticut River; principal tributaries, streams draining small ponds in Peacham and Harvey Lake in Barnet. Walker map; called Peacham Hollow Brook on Colton map.

STILES POND.—Caledonia County; northern part of the town of Waterford; outlet, a stream about a mile long flowing northwestward into Moose River (tributary through Passumpsic River to the Connecticut). Walker map.

STOCKER BROOK.—Caledonia County; rises in the west-central part of the town of Danville; flows eastward 4 miles, then northeastward 1½ miles into the western part of the town of St. Johnsbury, where it joins Sleepers River (tributary through Passumpsic River to the Connecticut). Walker map; called Stoker Brook on Colton map.

STONES BROOK.—Franklin County; rises in the northern part of Fletcher; flows southwestward to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southern part of the town of Fairfax; about 6 miles long. Walker map.

STONE BRIDGE BROOK.—Franklin County; rises in the northeastern part of Milton; flows northward then westward about 2½ mills, northward 2 miles, then westward and southwestward about 5 miles to Lake Champlain (outlet through Richelieu River to the St. Lawrence). Colton map, Walker map, and Milton sheet.

STONES POND.—Orleans County; town of Glover; inlet, from Daniels Pond; outlet, a stream a mile long flowing south of east into Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence). Walker map.

STONY BROOK.—Bennington County; rises in the southeastern part of the town of Dorset, at an altitude of 1,000 feet above sea level; flows south westward to its junction with Batten Kill (tributary to the Hudson); length, 1½ miles; fall, 290 feet. Equinox sheet.

STONY BROOK.—Lamoille County; rises in the northern part of Johnson; flows northwestward into North Branch of Lamoille River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Waterville; about 2 miles long. Colton map and Walker map.

STONY BROOK.—Rutland and Windsor counties; rises in the northeastern part of the town of Sherburne; flows north into Fletcher Brook, a branch of White River (tributary to the Connecticut); length, 5 miles. Walker map and Rutland sheet.

STRATTON BROOK.—Bennington County; rises in the southwest corner of Glastenbury on a western slope of the Green Mountains, at an altitude of 2,550 feet; flows southwestward across the southeast corner of Shaftsbury into northeastern Bennington, where it joins Furnace Brook, a branch of Walloomsac River (tributary through the Hoosic River to the Hudson); fall, 1,700 feet; length, 3 miles. Bennington sheet.

STRATTON POND.—Windham County; a pond about 1 mile long in the northwestern part of Stratton; altitude, 2,470 feet; several small inlets; outlet, a stream flowing north into Winhall River, a branch of West River (tributary to the Connecticut; area, 244 acres. Londonderry sheet.

STREETER BROOK.—Chittenden County; rises on Arrowhead Mountain in Milton; flows northwestward 2½ miles, then southward and southeastward 2½ miles to its junction with Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Milton sheet.

SUCKER BROOK.—Addison County; rises in the northwestern part of Goshen; takes a general but very irregular westerly course to Lake Dunmore (outlet through Leicester River to Otter Creek and Lake Champlain and thus through Richelieu River to the St. Lawrence); length, about 6 miles; fall, somewhat more than 1,000 feet, of which 600 feet occurs within 1½ miles of the lake; several small tributaries, including Dutton Brook and stream from Silver Lake. Brandon and Rochester sheets.

SUCKER BROOK.—Chittenden County; rises on the northern slope of Mount Pritchard, in the eastern part of the town of St. George, at an altitude of 700 feet above sea level; flows irregularly northwestward to its junction with Muddy Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southwestern part of the town of Williston; about 3 miles long; fall, about 380 feet. Walker map and Burlington sheet.

SUCKER BROOK.—Grand Isle County; rises in the southern part of Alburg, at an altitude of 140 feet above sea level; flows southwestward into La Motte Passage, Lake Champlain (outlet through Richelieu River to the St. Lawrence); 2½ miles long; fall, 43 feet. Rouses Point sheet.

SUCKER BROOK.—Rutland County; rises in the southeastern part of the town of Hubbardton, at an altitude of 1,100 feet above sea level; flows southwestward into Bomoseen Lake (outlet through Castleton and Poultney rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence); length, 4½ miles; fall, about 687 feet. Castleton sheet.

SUCKER POND.—Bennington County; in the northwestern corner of Stamford; outlet, a stream less than a mile long flowing into Stamford Stream, a branch of City Stream, tributary through Walloomsac River to Hoosic River (tributary to the Hudson); altitude, 2,250 feet; area, 39 acres. Bennington sheet.

SUGAR HOLLOW BROOK.—Rutland County; rises in the northeastern part of Brandon, at an altitude of 1,300 feet above sea level; flows southward to its junction with Furnace Brook (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) half a mile southwest of Pittsford Mills; length, about 9 miles; fall, 900 feet. Brandon and Castleton sheets.

SUNDERLAND BROOK.—Chittenden County; rises in the southeastern part of Colchester; flows northward 4 miles, then westward and southward 3 miles into Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Walker map and Milton sheet.

SUNSET LAKE.—Rutland County; northeastern part of the town of Benson; inlets from Spruce, Doughty, and Mud ponds; contours indicate that outlet may be by a channel about 350 feet long leading from northeast corner of lake to Little Pond (outlet through Hubbardton and Poultney rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence), though no connecting stream is shown on the map; area, 256 acres; elevation above sea level, 503 feet. Ticonderoga and Whitehall sheets.

SWEENEY POND.—Orleans County; town of Glover; outlet, a stream (head of Roaring Brook) to Parker Pond (outlet, Roaring Brook to Barton River, tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); small. Walker map.

SWIFT BROOK.—Franklin County; rises in the central part of Fairfax; flows west of south into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Milton sheet.

SYKES HOLLOW BROOK.—Rutland County; rises on the southern slope of Woodlawn Mountain in the town of Danby, at an altitude of 2,800 feet above sea level; flows westward and southwestward 2½ miles into Mettawee River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near North Rupert; fall, 2,060 feet. Pawlet sheet.

SYMS POND.—Caledonia County; northeastern part of town of Ryegate; inlet and outlet, Manchester Brook (tributary to Connecticut River). Walker map.

T

TABOR BROOK.—Orange County; rises in the northern part of the town of Topsham flows southward and enters Waits River (tributary to the Connecticut) at East Corinth post office; about 10 miles long. Walker map.

TAFT BROOK.—Orleans County; rises in the central part of Westfield; flows southeastward then northeastward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); tributary, Tin Brook; about 4½ miles long. Walker map.

TAMARACK BROOK.—Franklin County; rises in the southern part of Montgomery; flows northeastward into Trout River (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Montgomery Center; about 3 miles long. Walker map and Colton map.

TANNER BROOK.—Bennington County; rises on the southern slope of Equinox Mountain in the western part of Manchester, at an altitude of about 3,100 feet above sea level; takes a general southerly course to its junction with Batten Kill (tributary to Hudson River) at Sunderland; length, 3½ miles; fall, 2,500 feet, of which 2,300 feet occurs in the upper 2 miles of its course. Equinox sheet.

TAYLOR BROOK.—Addison County; town of Hancock; a stream about 2 miles long rising on Gillespie Mountain and flowing southward into Hancock Branch (tributary through White River to the Connecticut) near Branch School. Rochester sheet.

TENNEY BROOK.—Rutland County; rises near Mendon, at an altitude of 960 feet above sea level; flows southwestward into East Creek (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Rutland; length, about 4 miles; fall, 420 feet. Rutland sheet.

TERRY BROOK.—Bennington County; rises in the northern part of Sandgate; flows southwestward 3½ miles to its junction with Camden Valley creek (tributary through Batten Kill to the Hudson). Equinox sheet.

TEXAS BROOK.—Addison County; rises in Texas Gap in the town of Granville; flows southwestward 2 miles, then southeastward 1 mile into Hancock Branch (tributary through White River to the Connecticut). Rochester sheet.

THATCHER BROOK.—Addison County; rises in the southeastern part of the town of Granville; flows southwestward 3½ miles into White River (tributary to the Connecticut). Walker map and Rochester sheet.

THAYER BROOK.—Orange County; rises in the southwestern part of the town of Braintree; flows southeastward and eastward 4 miles, and joins Third Branch of White River (tributary through White River to the Connecticut) at the village of Randolph. Walker map.

THORPE BROOK.—Chittenden County; rises near Charlotte, at an elevation of about 250 feet above sea level; flows southward 2½ miles, then westward half a mile into Lake Champlain (outlet through Richelieu River to the St. Lawrence); fall, 150 feet; length, 3 miles. Willsboro sheet.

THUNDERING BROOK.—Rutland County; rises in the southwestern part of the town of Sherburne, at an altitude of 2,520 feet; flows northwestward through Pico Pond, northward and northeastward, and joins Ottauquechee River (tributary to the Connecticut) in the northern part of Sherburne. Walker map; shown but not named on Rutland sheet.

TICKLENAKED POND.—Caledonia County; southern part of town of Ryegate; outlet, a stream 1 mile long flowing southwestward into Wells River (tributary to the Connecticut). Walker map.

TIDD HOLLOW BROOK.—Bennington County; a stream rising on the west slope of Red Mountain and flowing northwestward and westward into Green River (tributary through Batten Kill to the Hudson) in the southern part of the town of Sandgate. Equinox sheet.

TIGERTOWN BROOK.—Windsor County; rises in the southwestern part of Norwich, at an altitude of 1,400 feet; flows westward and southwestward and joins Podunk Brook about one-quarter of a mile northeast of its junction with White River (tributary to the Connecticut); fall, about 1,000 feet; length, 3½ miles. Hanover sheet.

TILDEN POND.—Windsor County; a small pond in the eastern part of the town of Norwich, discharging by a short stream flowing somewhat west of south into Connecticut River. Walker map.

TIN BROOK.—Orleans County; rises in the central part of Westfield; flows southeastward into Taft Brook (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about a mile long. Walker map.

TINKER BROOK.—Rutland and Windsor counties; rises in the northeastern part of Shrewsbury; flows southeastward into Plymouth Pond, which discharges by a stream into Black River (tributary to the Connecticut); about 2½ miles long. Walker map.

TINMOUTH POND.—Rutland County; south of Clark Mountain in southeastern corner of Tinmouth; outlet, a stream three-fourths of a mile long flowing westward into Clarendon River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) about 1 mile below the head of the latter; elevation above sea level, 1,210 feet; fall of outlet, 110 feet. Pawlet sheet.

TOAD POND.—Orleans County; town of Charleston; a small pond in the western part of the town of Charleston, discharging by a short stream flowing northeastward into Clyde River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

TOAD POND.—Orleans County; a small pond in the northeastern part of Morgan, discharging by a stream flowing southwestward into Seymour Lake (outlet by way of Mill River through Echo Pond to Clyde River, which is tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

TODDY BROOK.—Orange County; town of Braintree; a stream 1½ miles long, flowing northeastward into Riford Brook (tributary through Third Branch of White River to White River and thus to the Connecticut). Rochester sheet.

TOWNSEND BROOK.—Rutland County; a stream about 3 miles long, flowing eastward from the eastern part of the town of Chittenden into Pittsfield, where it enters Tweed River (tributary through White River to the Connecticut); fall, 1,700 feet. Rochester sheet.

TRACY BROOK.—Franklin County; rises in the central part of Fairfax; flows southwestward into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 3 miles long. Colton map and Walker map.

TRAIN BROOK.—Rutland County; rises in the northeastern part of Middletown, at an altitude of 1,950 feet above sea level; flows southward to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) 1 mile east of Middletown Springs; length, about 2¼ miles; fall, 950 feet. Castleton and Pawlet sheets.

TROUT BROOK.—Chittenden County; rises near the central part of the town of Milton; flows west of south 2 miles, northwestward 2 miles, then southwestward again 1 mile into Lake Champlain (outlet through Richelieu River to the St. Lawrence). Milton sheet.

TROUT BROOK.—Franklin County; rises in the central part of Berkshire; flows southwestward to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the northwestern part of the town of Enosburg; about 4 miles long. Colton map and Walker map.

TROUT BROOK.—Orleans County; rises in the northwestern part of Brownington; flows southwestward 4 miles into Barton River (tributary through Lake Memphremagog to Magog and St. Francis rivers and thus to the St. Lawrence). Walker map.

TROUT LAKE.—Franklin County; southeastern part of Bakersfield; outlet, a stream 2 miles long flowing northwestward into Black Creek (tributary through Missisquoi River to Lake Champlain and thus through Richelieu River to the St. Lawrence); about half a mile long. Walker map.

TROUT RIVER.—Franklin County; rises in the northwestern part of Westfield; flows southwestward into the town of Montgomery, where it turns and flows westward and then northwestward to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the southeastern part of Berkshire; about 13 miles long; principal tributaries, Tamarack and Mill brooks. Colton map, Walker map, and post-route map.

TUCKER BROOK.—Addison County; town of Hancock; a stream about 2 miles long, rising on the south slope of Gillespie Mountain and flowing southeastward and southward into Hancock Branch (tributary through White River to the Connecticut) half a mile east of Branch School. Rochester sheet.

TUNNEL BROOK.—Addison County; town of Hancock; rises near Hancock Tunnel, east of Philadelphia Peak; flows northwestward 1 mile, then northeastward 1½ miles into White River (tributary to the Connecticut) northwest of Cobble Hill. Rochester sheet.

TWEED RIVER.—Rutland County; rises in the northeastern part of the town of Mendon; flows north of east into the town of Sherburne, then in general northward, crossing corners of the towns of Sherburne, Stockbridge, and Chittenden, to the eastern part of Pittsfield, thence eastward into Stockbridge again, where it joins White River (tributary to the Connecticut); length, 10 miles. Walker map and Rutland and Rochester sheets.

TWEED RIVER, WEST BRANCH.—Rutland County; rises in the northern part of the town of Chittenden, at an altitude of 3,200 feet; flows southeasterly 9½ miles and joins Tweed River (tributary through White River to the Connecticut) at the village of Pittsfield; fall, 2,150 feet. Rochester sheet.

TWENTYMILE STREAM.—Windsor County; rises in the southwestern part of Reading; flows southeastward into Black River (tributary to the Connecticut) in the town of Cavendish near Proctorsville post office; several small tributaries; length, about 7 miles. Walker map.

TYLERS BRANCH.—Franklin County; rises in the southern part of Enosburg; flows northwestward to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the eastern part of the town of Sheldon; about 9 miles long; tributaries, Cold Hollow and Bogues brooks. Walker map, Colton map, and post-route map.

<h2 style="text-align:center">U.</h2>

UMPIRE BROOK.—Essex County; a stream about 4 miles long rising in the northern part of the town of Victory and flowing southeastward to its junction with Mill Brook, with which it forms Bog Brook (tributary through Moose River to Passumpsic River and thus to the Connecticut). Walker map.

<h2 style="text-align:center">V.</h2>

VAIL BROOK.—Rutland County; rises in the northwestern part of the town of Middletown, at an altitude of 1,240 feet above sea level; flows southward to its junction with Poultney River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) 1 mile west of Middletown Springs; length, about 2 miles; total fall, 470 feet. Castleton and Pawlet sheets.

VERSHIRE BROOK.—Orange County; a short tributary of Ompompanoosuc River (tributary to the Connecticut), draining the central part of the town of Thetford. Walker map.

<h2 style="text-align:center">W.</h2>

WAITS RIVER.—Orange County; rises on Knox Mountain in the northern part of the town of Orange; flows southeastward across the southwest corner of Topsham, the northeast corner of Corinth, and the center of Bradford into Connecticut River; length, 20 miles; principal tributaries, Tabor Brook and South Branch. Walker map and Colton map.

WAITS RIVER, SOUTH BRANCH.—Orange County; rises in the southwestern part of the town of Corinth; flows very irregularly eastward to its junction with Waits River (tributary to the Connecticut) in the western part of the town of Bradford; about 10 miles long; principal named tributary, Potash Brook. Walker map.

WALKERS POND.—Orleans County; northern part of Lowell; outlet, a stream 1 mile long flowing southeastward into Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about half a mile long. Walker map.

WALLACE BROOK.—Essex County; rises in the eastern part of the town of Granby; flows southwestward 1½ miles, then southeastward 3 miles into Connecticut River in the eastern part of the town of Guildhall. Walker map.

WALLACE POND.—*See* Forest Lake.

WALLINGFORD POND.—Rutland County; southern part of Wallingford; outlet, by a stream about 3 miles long flowing very irregularly northeastward into Mill River (tributary through Otter Creek to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the town of Mount Holly; elevation above sea level, 2,157 feet; fall of outlet, 925 feet; nearly a mile long; area, 87 acres; connected by channel about one-fourth of a mile long with a small pond lying south of it. Wallingford sheet.

WALLOOMSAC BROOK.—Bennington County; rises as Bolles Brook in the southern part of Glastenbury, at an altitude of 3,100 feet; flows southwestward through northwestern Woodford into Bennington, whence it is called Walloomsac River; chief branches, Bickford Hollow Brook and City Stream. Bennington sheet.

WALLOOMSAC RIVER.—Bennington County, Vt., and Rensselaer County, N. Y.; rises in the southern part of Glastenbury, Vt., at its headwaters being called Bolles and Walloomsac brooks; altitude, 3,100 feet above sea level; flows irregularly southwestward across northwestern Woodstock into Bennington, thence northwestward and westward to Hoosick Junction, Rensselaer County, N. Y., where it joins Hoosic River (tributary to the Hudson); chief tributaries in Vermont, Walloomsac and Furnace brooks, South Stream, and Paran, Little White, and White creeks; fall, 2,720 feet, of which 2,200 feet occurs in 8 miles above Bennington; length, 25 miles. Hoosick, Bennington, Equinox, and Cambridge sheets.

WARDEN POND.—Caledonia County; central part of town of Barnet; one inflowing stream; connected by a short southward-flowing stream with Moores Pond (outlet to Connecticut River). Walker map.

WARM BROOK.—Bennington County; rises on the eastern slope of West Mountain, about 1 mile north of Shaftsbury Center, at an altitude of 1,300 feet above sea level; flows northeastward to its junction with Fayville Branch (tributary through Roaring Branch to Batten Kill and thus to Hudson River) at East Arlington; length, about 8 miles; fall, 590 feet. Bennington and Equinox sheets.

WATER ANDRIC BROOK.—Caledonia County; rises in the western part of the town of Danville; flows southeastward about 9 miles to the northern part of the town of Barnet, where it joins Passumpsic River (tributary to the Connecticut). Walker map.

WATERBURY RIVER.—Lamoille County; rises in the northeastern part of Stowe; flows southeastward about 3 miles, then turns abruptly and flows southwestward to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 15 miles long; principal tributaries, West Branch, Gold Brook, and Miller Brook; gaging station near Waterbury, 1910. Colton map, Walker map, and post-route map.

WATERBURY RIVER, WEST BRANCH.—Lamoille County; rises in the northwestern part of Stowe; flows southeastward into Waterbury River (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence) near the center of the township; about 6 miles long. Walker map and post-route map.

WELLS BROOK.—Rutland County; rises on the western slope of Tinmouth Mountain in the town of Tinmouth, at an altitude of 2,300 feet above sea level; flows southwestward, southward, westward, and southwestward to its junction with Mettawee River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) near Blossoms Corners in the northwestern part of the town of Pawlet; length, about 10 miles; fall, 1,900 feet, of which 1,200 feet occurs in 2 miles at the head of the stream; receives a number of small tributaries draining precipitous slopes. Most important tributary, Mill Brook, the outlet of Little Pond, the southern arm of St. Catharine Lake. Pawlet sheet.

WELLS RIVER.—Caledonia and Orange counties; rises in Groton Pond, in the northern part of the town of Groton; flows southeastward through Lunds Pond, crossing Groton and the southwestern corner of Ryegate into the northeastern corner of Newbury, where it joins Connecticut River; principal tributaries, streams draining small areas in Groton, Ryegate, Topsham, and Newbury. Walker map.

WELLS RIVER POND.—See Groton Pond.

WEST BRANCH.—Essex County; rises in Lewis Pond in the northern part of the town of Lewis; flows southeastward 4 miles into Black Branch (tributary through Nulhegan River to Connecticut River). Walker map.

WEST BROOK.—Caledonia County; rises in the central part of the town of Wheelock; flows southeastward 8 miles into Passumpsic River (tributary to the Connecticut). Walker map.

WEST BROOK.—Orleans County; rises in Corey Pond in the southern part of Lowell; flows northward 1½ miles, then northeastward 4 miles to its junction with Missisquoi River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

WESTFORD POND.—Chittenden County; southwestern part of town of Westford; outlet, Pond Brook to Rogers Brook (tributary through Browns and Lamoille rivers to Lake Champlain and thus through Richelieu River to the St. Lawrence); altitude, 790 feet. Milton sheet.

WEST HILL POND.—Washington County; near central part of Cabot; inlet from Coits Pond; outlet, Winooski River to Lake Champlain (outlet through Richelieu River to the St. Lawrence). Walker map.

WEST POND.—Essex County; northwestern part of town of Maidstone; inlet, a stream from the northwest 1¾ miles long; outlet, South Branch of Wheeler Stream (tributary to Wheeler Stream and thus to the Connecticut); area, about 7 acres. Walker map and private surveys.

WEST RIVER.—Rutland, Windsor, Bennington, and Windham counties; rises in the southeastern part of Mount Holly, at an altitude of 2,400 feet above sea level; flows southward across Weston and Londonderry and southeastward across Jamaica, Townshend, Newfane, and Dummerston into Brattleboro, where it joins Connecticut River. Near the south line of Londonderry it receives Winhall River; in Jamaica it receives two large branches from the west and one from the east, and in Newfane it receives Marlboro and Smith branches; length, about 45 miles. The branches afford considerable power. The basin contains a number of ponds, of which Stratton Pond, in Stratton, Lowell Lake, in Londonderry and North Pond, in Marlboro, are the largest. Walker map and Wallingford and Londonderry sheets.

WHEELER POND, SOUTH.—Essex County; southern part of town of Brunswick; inlet, a stream from West Pond; outlet, South Branch of Wheeler Stream (tributary to Wheeler Stream and thus to the Connecticut); area, about 135 acres. Walker map and private surveys.

WHEELER STREAM.—Essex County; rises in Notch Pond in the eastern part of town of Ferdinand; flows in a general southeasterly direction 4½ miles across the town of Brunswick and joins Connecticut River about 2 miles below Bloomfield; passes through Dennis Pond; principal tributary is South Branch, which drains West and South Wheeler ponds; total drainage area, about 20 square miles. Walker map and private surveys.

WHEELER STREAM, SOUTH BRANCH.—Essex County; rises in southeastern part of town of Ferdinand; flows southeastward 1¾ miles to West Pond, then northeastward 2¼ miles through South Wheeler Pond and joins Wheeler Stream (tributary to the Connecticut) about half a mile above its mouth. Walker map and private surveys.

WHEELOCK POND.—Caledonia County; western part of Wheelock; outlet, a stream about 2 miles long flowing northwestward to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

WHEELOCKS POND.—Washington County; northeastern part of Calais; inlet, from Nelsons Pond; outlet, a stream about 4 miles long flowing in a general southerly direction to Kingsbury Brook (tributary through Winooski River to Lake Champlain and thus through Richelieu River to the St. Lawrence). Colton map and Walker map.

WHETSTONE BROOK.—Windham County; rises in the south-central part of the town of Marlboro, at an altitude of 1,660 feet above sea level; flows northeastward to Reservoir Pond, then eastward and southeastward to the city of Brattleboro, where it enters Connecticut River; fall, 1,440 feet; length, 12 miles. Brattleboro sheet.

WHETSTONE BROOK.—Windham County; rises in the southeastern part of the town of Stratton, at an altitude of 1,960 feet above sea level; flows northeastward 12 miles into West River (tributary to the Connecticut); many short tributaries draining steep slopes in northwestern Wardsboro. Londonderry sheet.

WHITE CREEK.—Bennington County; rises on the northern slope of Bear Mountain in the southeastern part of Rupert, at an altitude of 2,500 feet above sea level; flows westward about 6 miles, then turns abruptly and flows southwestward to its junction with Black Creek (tributary through Batten Kill to Hudson River) near East Greenwich, Washington County, N. Y.; length, about 15 miles; total fall, about 2,100 feet, of which 1,100 feet occurs in the first mile of its course and 600 feet more in the next 2½ miles; principal tributaries, Trout and Beaver brooks, both in New York. Equinox and Cambridge sheets.

WHITE CREEK.—Bennington County; rises half a mile west of Lye Brook Meadows in the eastern part of Sunderland, at an elevation of 2,740 feet above sea level; flows in a general northeasterly direction 1¼ miles to its junction with Lye Brook (tributary through Batten Kill to Hudson River); fall, 540 feet. Equinox sheet.

WHITE CREEK.—Bennington County, Vt., and Rensselaer County, N. Y. *See* Little White Creek.

WHITE RIVER.—Addison and Windsor counties; rises in the town of Ripton; flows eastward into Granville, thence southeastward, passing across the eastern corner of Hancock, through Rochester, into Stockbridge, then turns abruptly and flows northeastward into Bethel, then southeastward across Royalton and Sharon to its junction with Connecticut River in Hartford; length, about 50 miles; drainage area, 710 square miles. It receives from the north three large branches, the First and Second branches joining it in Royalton and the Third in Bethel. It was called White River long before the country in its neighborhood was settled, and the name is supposed to have been given to it by the early hunters because of the clearness of its water and the light color of its pebbles. Gaging station at Sharon 1903–4; 1909–1914; and at West Hartford, 1915–16. Post-route map, Walker map; Physical geography and geology of Vermont, by Zadock Thompson, Burlington, 1848; Rochester sheet.

WHITE RIVER, EAST BRANCH.—Orange County; rises in the western part of Washington; flows west of south across Chelsea and Tunbridge into Royalton, where it joins White River (tributary to the Connecticut) at South Royalton; length, about 20 miles; called First Branch on Walker map; chief branches, Jenken, Jail, Crams, Bicknell, Dewey, and Farnham brooks. Strafford sheet.

WHITE RIVER, ROBINS BRANCH.—*See* Robins Branch.

WHITE RIVER, SECOND BRANCH.—Washington County; rises in the southern part of Williamstown; flows southward through Cutters Pond, crossing the eastern part of Brookfield and Randolph, the eastern corner of Bethel, and the western corner of Royalton to North Royalton, where it joins White River (tributary to the Connecticut); receives streams from Rood and Pierce ponds; several unnamed branches; about 20 miles long. Industrial Vermont and Walker map.

WHITE RIVER, THIRD BRANCH.—Washington County; rises in the west-central part of the town of Roxbury; flows southward across the eastern corner of the town of Granville, southward and southeastward through the town of Braintree, across the western corner of the town of Randolph, and east of south to the southeastern part of the town of Bethel, where it joins White River (tributary to the Connecticut); length, about 20 miles. Walker map.

WHITE RIVER, WEST BRANCH.—Addison and Windsor counties; rises in the southwestern part of the town of Hancock; flows southeastward to West Rochester, then eastward into Rochester, where it joins White River (tributary to the Connecticut); length, about 10 miles. Rochester sheet.

WHITING BROOK.—Orange County; rises in Halls Pond in the south-central part of the town of Newbury; flows southeastward into Chalmers Brook (tributary to the Connecticut); 3 miles long. Walker map.

WHITMAN·BROOK.—Windsor County; rises in eastern part of Pomfret, at an altitude of 1,600 feet; flows southward and southeastward about 3 miles into Ottauquechee River (tributary to the Connecticut) in the southwestern part of Hartford; small stream; fall, 1,000 feet. Hanover sheet.

WHITTAKER BROOK.—Franklin County; rises near the central part of Richford; flows northwestward into Missisquoi River (tributary to Lake Champlain and through Richelieu River to the St. Lawrence); about 2 miles long. Walker map.

WILD BROOK.—Lamoille County; rises in the eastern part of the town of Eden; flows south and southwest into Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) in the western part of Wolcott Township; about 10 miles long; Colton map, Walker map, and post-route map. •

WILD BROOK.—Lamoille County; rises in the western part of the town of Eden; flows southeastward to its junction with Gihon River (tributary through Lamoille River to Lake Champlain and thus through Richelieu River to the St Lawrence) in the eastern part of the town of Johnson; about 4½ miles long. Colton map and Walker map.

WILLARD STREAM.—Essex County; rises in the eastern part of the town of Averill; flows southeastward 3 miles, then eastward 3 miles, and enters Connecticut River in the southeastern part of the town of Canaan. Walker map.

WILLEY POND.—Lamoille County; east-central part of the town of Eden; south of North Pond; no outlet shown on map. Walker map.

WILLIAMS RIVER.—Windsor County; Lyman Branch, considered the continuation of the main stream, rises in Andover and flows eastward across Chester; below Chester Williams River flows southeastward across Rockingham and enters Connecticut River 3 miles north of Bellows Falls; length to head of Lyman Branch, about 20 miles. Walker map.

WILLIAMS RIVER, NORTH BRANCH.—Windsor County; rises in the town of Andover, its principal headwater stream being called Chase Brook. From the eastern slope of Mount Terrible Chase Brook flows eastward to Spafford, where it joins the stream called North Branch of Williams River (tributary through Williams River to the Connecticut); length of the North Branch from Chester to the head of Chase Brook, about 13 miles. Walker map. ·

WILLIAMS RIVER, SOUTH BRANCH.—Windsor County; rises in the southeastern corner of Andover and flows somewhat north of east to Chester, where it joins Williams River (tributary to the Connecticut); length, about 8 miles. Walker map.

WILLOUGHBY LAKE.—Orleans County; town of Westmore; inlets, Sheffield and Mill brooks and several smaller streams; outlet, Willoughby River to Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); about 5 miles long and 1½ miles wide. Walker map.

WILLOUGHBY RIVER.—Orleans County; rises in Willoughby Lake in the town of Westmore; flows northwestward across the southern part of Browningtn and the northern part of Barton to its junction with Barton River (tributary to Lake Memphremagog and thus through Magog and St. Francis rivers to the St. Lawrence); length, about 10 miles. Walker map.

WILSON BROOK.—Caledonia County; a stream about 2 miles long draining a small area in the southwestern part of Ryegate and flowing southeastward into Wells River (tributary to the Connecticut). Walker map.

WINHALL BROOK.—Bennington and Windham counties; rises in the southern part of Peru on the eastern slope of Bromley Mountain, at an altitude of 2,900 feet; flows southeastward across the southeastern part of Peru and the southwestern part of Londonderry into Winhall River about a mile above its junction with West River (tributary to the Connecticut); fall, 1,900 feet, of which 1,400 feet occurs in the first 2 miles of its course; length, about 8 miles. Londonderry sheet.

WINHALL RIVER.—Windham and Bennington counties; rises in the north-central part of Stratton, at an altitude of 3,700 feet; flows northwestward into Winhall through the southern part of Winhall, eastward and northeastward through the northwestern corner of Jamaica and joins West River (tributary to the Connecticut) in the southern part of Londonderry; branches, streams from Stratton Pond, in Stratton, and Little Pond, in Winhall, and Mill and Winhall brooks; fall, 2,800 feet; length, about 16 miles. Londonderry sheet.

WINOOSKI (or ONION) RIVER.—Washington County; rises in the northern part of Cabot; flows in a general southwesterly course across the towns of Marshfield and Plainfield to the southern part of East Montpelier, where it turns and flows northwestward to Lake Champlain (outlet through Richelieu River to the St. Lawrence) in Colchester, about 4 miles northwest of Burlington; between Waterbury and Jonesville the river cuts through the Green Mountains; length, about 60 miles; drainage area, approximately 1,100 square miles; headwater region contains a number of lakes, but the proportion of lake surface to the entire area is small; upper part of basin mountainous and fairly well forested; below Montpelier the slope of the river is in general rather flat. Mean annual rainfall in this region ranges from about 33 inches at Burlington to about 40 inches at the headwaters of Winooski River. Principal tributaries, Kingsbury and North branches (Worcester Branch), and Dog, Mad, Waterbury, and Huntington rivers. Many of these tributary streams are fed by ponds. Gaging stations: Above Stevens Branch, 1909–1913; at Montpelier, 1909–1916; at Richmond, 1903–1907, 1910; at Winooski, 1903. Walker map, Burlington and Plattsburg sheets and post-route map; Report on geology of Vermont, 1861, Edward Hitchcock and others (2 vols.); U. S. Geol. Survey Water-Supply Paper 264, pp. 112–119, 1910.

WINOOSKI RIVER, NORTH BRANCH (WORCESTER BRANCH).—Lamoille County; rises in central part of town of Elmore; flows southward to its junction with Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence) at Montpelier; about 18 miles long; several small tributaries, of which only two—Minister and Martins brooks—are named on the maps; one of the important tributaries of the Winooski; gaging station at Montpelier, 1909–1914. Colton map, Walker map, and post-route map; U. S. Geol. Survey Water-Supply Paper 264, pp. 116–117, 1910; called Worcester Branch in the water-supply paper, but North Branch on all the maps.

WINOOSKI RIVER POND. *See* Onion River Pond.

WOLCOTT POND.—Lamoille County; eastern part of Wolcott; outlet by Pond Brook to Lamoille River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about three-fourths of a mile long by one-fourth of a mile wide. Colton map and Walker map.

WOODFORD LITTLE POND.—Bennington County; in the northern part of Woodford; outlet, a stream to Redfield Brook, which flows into Rake Branch (tributary through Deerfield River to the Connecticut); altitude, 2,620 feet; area, 12 acres. Bennington sheet.

WORCESTER BRANCH.—*See* Winooski River, North Branch.

WORCESTER POND.—Washington County; eastern part of Worcester; inlet, from Flat Pond; outlet, North Branch of Winooski River to Winooski River (tributary to Lake Champlain and thus through Richelieu River to the St. Lawrence); about 1 mile long. Colton map and Walker map.

Y.

YAW POND BROOK.—Bennington County; rises in the eastern part of Woodford, at an altitude of 2,230 feet; flows south about 2½ miles into West Branch of Deerfield River (tributary through Deerfield River to the Connecticut); fall, 300 feet. Bennington sheet.

YELLOW BRANCH.—Essex County; rises in the central part of the town of Lewis; flows east of south 6 miles and unites with Nulhegan River (tributary to the Connecticut) in the northwestern part of the town of Brunswick; drainage area, 10.5 square miles. Walker map and private surveys.

YOUNGMAN BROOK. —Franklin County; rises in the southern part of the town of Highgate; flows in general northwestward into Dead Creek (tributary to Lake Champlain and thus through Richelieu River to the St Lawrence). St. Albans sheet.

Z.

ZACH WOOD POND.—Lamoille County; eastern part of Hyde Park; no outlet shown on Walker map.

INDEX.

O