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UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

OPERATIONS AT RIVER STATIONS, 1900

A REPORT OF THE

DIVISION OF HYDROGRAPHY

OF THE

UNITED STATES GEOLOGICAL SURVEY

PART I

WASHINGTON
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LETTER OF TRANSMITTAL.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF HYDROGRAPHY,
Washington, D. C., March 1, 1901.

SIR: I have the honor to transmit herewith a manuscript giving the results of operations at various river stations in 1900, and request that it be published in the series of Water-Supply and Irrigation Papers. In order to comply with the law limiting these papers to 100 pages, it is necessary to divide the material. This has been done n a general geographic basis, following the precedent of Water-Supply Papers Nos. 35 to 39, relating to similar operations for the year 1899. In the first paper are introductory remarks and the data relating to New England and Eastern streams. The succeeding papers take up in order the rivers flowing into the Atlantic Ocean, then those tributary to the Ohio and Mississippi rivers, the Great Lakes, Missouri River and the Rio Grande, the interior basin, and finally those flowing into the Pacific Ocean, from north to south, ending with the data relating to the streams of southern California.

The general conclusions drawn from the operations at the river stations, together with diagrams, maps, and illustrations, are being prepared for publication in Part IV of the Twenty-second Annual Report, this being designed to be in form and substance similar to preceding volumes known as Part IV of the Eighteenth to the Twenty-first Annual Reports.

Very respectfully,

F. H. NEWELL,
Hydrographer in Charge.

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.

OPERATIONS AT RIVER STATIONS, 1900.

PART I.

INTRODUCTION.

The following pages contain descriptions of the river stations maintained during 1900 by the United States Geological Survey, together with details of the average daily height of the water and results of measurements of discharge. The rating tables constructed from the latter and applicable in general for the calendar year will be given at the end of the publication. Similar facts have been printed for the year 1899 in Water-Supply Papers Nos. 35 to 39, inclusive, and a general description of the method of publication has been given on page 9 of Paper No. 35.

ACKNOWLEDGMENTS.

Most of the measurements herewith presented have been obtained through local hydrographers, a comparatively small part of the work having been conducted directly from the office of the Geological Survey at Washington. Acknowledgment is therefore due to these persons individually. Thanks should also be extended to individuals and corporations who have cooperated in various ways—by furnishing readings of the heights of water, by assisting in transportation, etc. The following list gives the names of the resident hydrographers or persons cooperating, arranged alphabetically by States:

California: J. B. Lippincott, civil engineer, Los Angeles.

Colorado: A. L. Fellows, civil engineer, Denver.

Georgia and Alabama: Prof. B. M. Hall, civil engineer, Atlanta; Prof. W. S. Yeates, State geologist, Atlanta; and Prof. Eugene A. Smith, State geologist, Tuscaloosa.

Idaho: N. S. Dils, civil engineer, Caldwell.

Kansas: W. G. Russell, Russell.

Maryland: Prof. W. B. Clark, State geologist, Baltimore.

Montana: Prof. Samuel Fortier, Bozeman; Prof. Fred D. Smith, Missoula.

Nebraska: Prof. O. V. P. Stout, State University, Lincoln, assisted by Adna Dobson and Glenn E. Smith.

Nevada: L. H. Taylor, civil engineer, Golconda.

New Mexico: P. E. Harroun, civil engineer, Albuquerque.

North and South Carolina: Prof. J. A. Holmes, State geologist, Chapel Hill, North Carolina, assisted by E. W. Myers.

Texas: Prof. Thomas U. Taylor, State University

Utah: Prof. George L. Swendsen, Logan.

Virginia and West Virginia: Prof. D. C. Humphreys, Washington and Lee University, Lexington, Virginia.

Washington: Sydney Arnold, civil engineer, North Yakima; William J. Ware, civil engineer, Port Angeles.

Wyoming: A. J. Parshall, civil engineer, Cheyenne.

In a number of instances related data have been inserted, such as results of computation of daily flow at milldams made by local engineers and data of river heights obtained from the United States Weather Bureau or the Corps of Engineers, United States Army. Reference to these facts, mainly unpublished, has been or will be made in other publications of this Survey, and they are therefore placed in consecutive order for convenience of reference.

The methods of measuring the discharge of various streams and of preparing the computations have been described on pages 18 to 30 of the Nineteenth Annual Report, Part IV, and on pages 20 to 22 of the Twentieth Annual Report, Part IV.

METHOD OF USING STREAM GAGINGS FOR THE COMPUTATION OF WATER POWER.[1]

One of the objects of the gagings which are made by the United States Geological Survey is to assist engineers in the estimation of available power on the larger streams of the United States. In an article by John W. Hays in the Manufacturers Record of January 10, 1901, there is given a description of the use which he has made of the daily records published by the Survey. The suggestions made by Mr. Hays are of such general interest that they are given herewith.

Speaking generally, to determine the power available on any stream it is necessary to know the fall and the flow. The fall can easily be determined by an engineer, but the flow of many of our streams is still very uncertain. Usually, an engineer, after obtaining all available data of the stream being studied and also of the neighboring streams, must rely largely upon his judgment to determine maximum and minimum flows and the power that can economically be developed. Often the only basis of estimate is the knowledge of what some other stream has been doing within a limited period, or a comparison with some power on the same stream. When it is remembered that during extreme low water a variation in level of only a few inches may affect the quantity of water passing as much as 100 per cent, it will be seen how misleading may be a single gage or float measurement, even when reinforced by the assurance of casual observers that "the river is as low as it ever gets." Yet it is upon such data that many estimates of prospective power have been made, mills built, and machinery installed, only to have the first dry season show conclusively that the estimates were greatly in error. Then has followed the raising of the dam for storage, which has rarely met expectations, and, after many

[1] Report of H. A. Pressey.

shut-downs, the inevitable steam auxiliary comes, and with it regret, on the part of the owners, that hydraulic development was attempted.

The method described by Mr. Hays in the article referred to has been used in computations made from time to time of the available power of the Potomac and other streams, and found to be reliable and convenient. Mr. Hays illustrates the method by quoting the record of Deep River, in North Carolina, as published by the Geological Survey. The various stages of that river for 1899, as read on the gage of the Survey, are given in the following table:

Daily gage height, in feet, of Deep River at Moncure, North Carolina, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.03	4.58	6.91	7.12	2.99	2.84	1.52	4.54	0.85	0.83	12.74	2.77
2	3.21	5.00	6.25	4.70	2.85	2.61	1.36	4.36	.79	.78	5.86	1.85
3	3.41	6.78	6.39	4.52	2.56	3.45	1.34	3.46	.75	.88	4.23	1.83
4	3.27	7.06	13.25	5.16	2.51	3.13	1.18	3.08	.91	.79	3.48	2.19
5	2.79	16.40	14.43	8.64	2.29	2.49	4.20	1.46	.73	.87	3.04	2.15
6	2.47	20.48	15.77	6.18	2.25	1.95	2.42	1.20	.71	7.20	2.74	1.49
7	10.27	23.21	15.67	6.40	2.47	1.65	2.72	4.54	.89	6.49	2.24	1.27
8	9.13	25.92	13.62	17.76	8.85	1.49	2.11	4.11	1.19	6.70	1.91	1.19
9	7.71	20.90	10.61	15.04	6.09	1.58	2.19	4.15	1.10	7.11	1.86	1.11
10	5.59	18.70	7.39	8.28	4.43	2.55	2.10	3.37	1.82	3.96	.84	1.19
11	4.99	12.26	5.05	6.16	3.85	3.23	1.79	1.39	2.10	3.19	.89	4.03
12	5.83	7.19	4.41	5.40	5.89	4.72	1.67	1.41	2.55	1.97	1.09	5.95
13	6.07	6.98	4.67	4.86	7.99	3.78	1.34	1.25	2.04	1.72	1.02	4.69
14	9.79	6.06	3.91	4.48	9.23	3.40	1.19	1.21	4.86	1.59	1.09	3.39
15	13.07	5.10	21.19	3.76	5.99	2.56	1.09	1.29	1.96	1.31	.96	2.35
16	8.61	6.76	22.51	3.98	4.46	2.42	1.28	1.31	1.04	1.17	.98	1.39
17	7.91	16.20	16.21	4.10	3.97	2.40	.90	1.17	.93	1.27	1.08	1.34
18	6.93	21.26	9.99	4.04	3.75	1.68	1.14	1.09	.84	1.04	1.26	1.47
19	5.99	19.34	14.69	3.54	3.69	1.58	1.11	1.25	.87	1.06	1.14	1.39
20	4.73	15.30	15.31	3.32	3.05	1.49	1.02	.88	1.71	1.12	1.02	.63
21	3.15	9.92	9.02	3.46	2.89	1.50	1.02	.74	1.99	.97	.98	1.27
22	3.36	9.05	7.15	2.97	2.67	1.47	1.02	.78	1.49	.90	1.10	1.13
23	3.08	8.22	5.87	3.10	3.25	1.77	1.19	.90	1.17	.87	1.05	1.07
24	3.17	7.92	5.43	2.96	2.85	1.37	1.11	.95	.87	.85	1.04	1.19
25	3.25	6.24	4.91	2.97	2.75	1.55	1.52	1.06	2.34	.91	1.00	1.13
26	3.27	6.92	4.41	5.60	2.51	1.57	1.67	.84	1.53	.92	1.32	1.11
27	3.54	12.94	4.14	5.54	2.25	1.71	5.19	1.00	1.35	1.01	1.92	1.07
28	3.19	18.22	7.07	4.46	2.02	2.15	4.35	.96	1.09	.98	1.83	.95
29	2.55	......	11.65	3.50	1.91	1.68	3.77	1.20	1.17	.94	3.78	1.03
30	2.21	......	10.31	3.04	2.54	1.60	2.11	1.22	1.04	.89	2.84	.97
31	3.23	......	8.44	......	2.96	.....	6.28	.89	......	1.13	......	1.03

As will be seen from an inspection of the foregoing table, the records kept by the Geological Survey show the stage of water of each stream measured on each day of the year, and the rating table, which is computed from numerous measurements, shows the quantity of water passing at each reading of the gage. These data may most conveniently be applied by developing a table as follows:

In the first column arrange in order all graduations of the gage rod from the lowest to the highest. In the succeeding columns write opposite each gage height the following: (*a*) The number of days during the year on which the gage read that particular height; (*b*) the equivalent volume in second-feet; (*c*) the effective head; (*d*) the equivalent gross horsepower; (*e*) the number of days during the year on which power would have been lessened by low water and by high water, respectively. By way of illustration: The gage read 1.6 feet on 17 days, equivalent to a volume of 380 second-feet, an effective head of 46.4 feet, and a gross horsepower of 2,004, which would be lessened on 121 days by deficient water and on 227 days by high water in the tailrace. If the gage readings at Moncure station from the records of the year 1899 be thus assembled and the variation of the effective head be noted, there results the following table:

Table showing method of determining the daily available horsepower of a stream from records kept by the United States Geological Survey, using the gage heights of Deep River at Moncure, North Carolina, for the year 1899 as a basis.

Gage height.	Number of days during year 1899 that gage stood at respective heights.	Equivalent volume.	Equivalent effective head.	Equivalent gross horsepower.	Number of days on which power indicated would have been diminished.			Ratio of diminution to total annual power.		
					By low water.	By high water.	Total.	Low water.	High water.	Total.
Feet.		*Sec.-ft.*	*Feet.*					*Per ct.*	*Per ct.*	*Per ct.*
0.6	1	210	47.4	1,128	0	364	364	0.000	0.077	0.07
0.8	27	230	47.2	1,232	1	337	338	.010	.075	.08
1.0	48	250	47.0	1,335	28	289	317	.022	.072	.09
1.2	27	290	46.8	1,544	76	262	338	.045	.067	.11
1.4	18	330	46.6	1,747	103	244	347	.065	.065	.13
1.6	17	380	46.4	2,004	121	227	348	.095	.058	.15
1.8	9	440	46.2	2,260	138	218	356	.125	.055	.18
2.0	13	500	46.0	2,530	147	205	352	.155	.055	.21
2.2	8	560	45.8	2,839	160	197	357	.189	.055	.24
2.4	9	630	45.6	3,192	168	188	356	.217	.052	.27
2.6	9	715	45.4	3,600	177	179	356	.250	.050	.30
2.8	10	805	45.2	4,050	186	169	355	.270	.050	.32
3.0	10	900	45.0	4,500	196	159	355	.300	.045	.34
3.2	11	1,070	44.8	5,379	206	148	354	.350	.040	.39
3.4	13	1,240	44.6	6,154	217	135	352	.390	.036	.43
3.6	3	1,410	44.4	6,926	230	132	361	.415	.035	.45
3.8	7	1,580	44.2	7,735	233	125	358	.430	.035	.46
4.0	8	1,750	44.0	8,536	240	117	357	.450	.035	.48
4.2	3	1,940	43.8	9,417	248	114	361	.470	.035	.50
4.4	7	2,130	43.6	10,289	251	107	358	.490	.033	.52
4.6	8	2,320	43.4	11,094	258	99	357	.510	.030	.54
4.8	3	2,510	43.2	11,197	266	96				
5.0	9	2,700	43.0	12,900	269	87				
5.5	6	3,175	42.5	14,960	278	81				
6.0	12	3,650	42.0	16,800	284	69				
6.5	6	4,125	41.5	19,000	296	63				
7.0	13	4,600	41.0	20,500	302	50				
7.5	1	5,100	40.5	22,923	315	49				
8.0	5	5,600	40.0	24,880	316	44				
8.5	3	6,100	39.5	26,741	321	41				
9.0	4	6,600	39.0	28,587	324	37				
9.5	2	9,100	38.5	30,338	328	35				
10.0	5	7,600	38.0	32,072	330	30				
11.0	1	8,600	37.0	35,335	335	29				
12.0	2	9,600	36.0	38,386	336	27				
13.0	4	10,600	35.0	41,195	338	23				
14.0	3	11,600	34.0	43,792	342	20				
15.0	11	12,600	33.0	46,200	345	9				
20.0	7	18,080	28.0	56,000	356	2				
25.0	2	23,580	23.0	61,640	363	0				
	365									

An inspection of the foregoing table will show to what extent any power plant which might have been installed at this place would have been affected by variations in the flow of the river during the year 1899, the number of days on which the power would have been diminished by high and low water, respectively, and the exact amount of such diminution. For instance, the power would have varied from 1,128 horsepower gross at extreme low water to 61,640 horsepower gross at extreme high water. There would have been but one day on which 1,232 horsepower gross could not have been realized, about two hundred days on which 5,000 horsepower gross could not have been realized, and two hundred and fifty days on which 10,000 horsepower gross could not have been realized. All of these figures are for continuous power, night and day. Should it be desired to concentrate flow into day service by night storage, which is practicable at Moncure, the installation for horsepower should be doubled. For instance, 10,000 horsepower gross would have been realized on one hundred days, and the power would have fallen below that amount on two hundred days.

It should be noted that the foregoing figures are based on a head of 47 feet normal, with which head little inconvenience would be experienced from high water, the maximum flood for the year being about 25 feet, and on only nine days did the water in the tailrace rise above 15 feet and on thirty days above 10 feet. But the physical conditions indicate a development of the power under two separate heads, which would be affected by flood water to a somewhat greater degree, as will be seen from an inspection of the table. Having accurate knowledge of the periods of decreased head and partial gate, it is possible to determine the capacity of the wheels for any required installation.

Should steam auxiliary be required, the table affords the data necessary to determine the exact proportion of steam power. For example, suppose it is desired to install a plant of 3,600 horsepower for night and day service, during what proportion of the year will steam power be required, and what proportion of the total power desired should be steam power? The following table shows the way of arriving at the answer. From the table on page 12 it will be seen that during one day of the year the available water power is 1,128 horsepower; so that to insure 3,600 horsepower every day in the year it will be necessary to install a steam plant of 2,472 horsepower. During twenty-seven days of the year the available water power is 1,232 horsepower, and on those days 2,268 horsepower of steam will be required, and so on, as shown in the table.

Table showing number of days and amount of steam power required during the year 1899 to develop daily 3,600 horsepower on Deep River at Moncure, North Carolina.

Number of days on which water power of the various amounts was available.	Water power available.	Steam power required.
	Horsepower.	*Horsepower.*
1	1,128	2,472
27	1,232	2,268
48	1,335	2,265
27	1,544	2,056
18	1,724	1,876
17	1,995	1,665
9	2,260	1,340
13	2,530	1,070
8	2,839	761
9	3,192	408
9	3,600	0

Summarizing, the total horsepower days (3,600 × 365) are 1,314,000; the total steam horsepower days are 325,743, or nearly 25 per cent, and steam power would have been required on 177 days of the year 1899.

For conciseness, the factors of wheel efficiency and partial gate are not considered in this estimate. A fair rating of the power of Deep River at this place would be 1,500 horsepower continuous, or 3,000 horsepower for day flow only, on a basis of thirty days' deficiency by reason of the dry season and thirty days' deficiency when the head would be decreased 10 per cent or more by flood water in the tailrace.

In the article referred to Mr. Hays also shows, basing his computations upon the Geological Survey records, that while in ordinary seasons, from the run-off of a drainage area of 12 square miles on Broad River we may expect 1 horsepower per foot of fall of the stream, it will require the run-off from a drainage area of 60 square miles to furnish 1 horsepower per foot of fall on Neuse River, 45 square miles on Cape Fear, Tar, Deep, and Haw rivers, 30 square miles on Roanoke River, 20 square miles on Yadkin River, 15 square miles on lower Catawba River, and 12 square miles on upper Catawba and French Broad rivers.

As the number of stations on any one stream is necessarily limited, it becomes desirable to apply the data obtained at one point to other points on the same stream. This may be done by determining the relative drainage areas. It should be noted, however, that the efficiency of a stream increases as the headwaters are approached. During the dry season of 1897 Yadkin River had nearly 33⅓ per cent greater efficiency at Salisbury than at Norwood, and the Catawba had nearly 20 per cent greater efficiency at the Catawba station, near Hickory, North Carolina, than it had at Rockhill, South Carolina. Neuse River has the lowest efficiency of any stream in North Carolina, its drainage area lying wholly in the eastern section of the State, where the geological formation is not conducive to perennial springs, and during the dry season of 1897 the run-off for that river at Selma, North Carolina, was only 15 per cent of that of Broad River at Gaffney, South Carolina, for the same drainage area. The drainage area of the latter stream lies wholly in the mountains; that of the former stream lies in the lowlands. In the year 1897 the maximum flood of the Neuse was 105 times its minimum flow, while the maximum flood of the Broad was only 24 times its minimum flow. These two streams are excellent illustrations of the effect of physical conditions on the efficiency of flow, and the physical conditions are almost invariably such as to give greater efficiency as the headwaters are approached.

A knowledge of the greatest flood volume of a stream is most essential in the construction of hydraulic works. Experience has shown that the failure of dams may in nearly every case be attributed to lack of sufficient knowledge of the floods which they will be required to withstand. In this respect also streams are very dissimilar. For instance: The maximum flood of the Roanoke in 1897 (gage height of 28 feet at Neal, North Carolina) was about 7 second-feet per square mile. In the same year Tar River gave a flood discharge of 6 second-feet, Neuse River a flood discharge of 7 second-feet, Cape Fear River 8 second-feet, Yadkin River 10 second-feet, and Broad River 13 second-feet, while the Catawba developed a flood of 26 second-feet to the square mile. The greatest flood ever recorded on the Cape Fear at Fayetteville, North Carolina, was a gage height of 58 feet above low water and a discharge of only 13 second-feet per square mile, or half that of the Catawba in 1897.

MEASUREMENT OF SEDIMENT.[1]

The following method has been employed for measuring the amount of sediment held in suspension by streams in Arizona: By means of a small bottle attached to a hollow rod, samples were taken from various parts of the stream and collected in a bucket. After thorough mixing, the water in the bucket represented as nearly as possible the average condition of the water flowing in the stream. A measured quantity of this water, usually 100 cubic centimeters, was placed in a tubular graduate of glass divided into cubic centimeters. Ordinarily this was allowed twenty-four hours to settle, but if longer time was required for thorough settlement, it was allowed. The clear liquid was then decanted and rejected, leaving a small quantity of water with the sediment in the bottom. If the amount of sediment was inconsiderable, another sample was added, taken on the day following that on which the first sample was procured, and after settlement it was decanted in like manner, the process being repeated from day to day until a sufficient quantity of sediment had accumulated to make a reading on the scale of the glass graduate. Under ordinary conditions, when the stream was not in flood, it sometimes required thirty days to accumulate samples which would show 2 or 3 cubic centimeters of sediment, but at times of flood a large quantity of sediment was sometimes obtained from a single sample of 100 cubic centimeters, in which case the quantity of sediment was ascertained by reading, and a new determination was started on the following day. The total quantity of sediment obtained from the samples or series of samples was divided by the quantity of water used in the accumulation, and a ratio was thus established which was applied to the total volume flowing in the river.

It was found that the mud obtained from these samples was of a very thin consistency and contracted greatly upon being dried. To determine the amount of this contraction for Gila River water a number of laboratory tests were made. The residue was dried at 100° C., and the dried material was weighed, its specific gravity also being determined. As might be expected, the results of these tests were by

[1] Report of A. P. Davis.

no means uniform, but the mean of the tests made indicated about one part of dry matter to five parts of mud, which factor has been used in reducing observations of this kind. In other words, it is assumed that after complete settlement the mud in the bottom of the water sample consists of one part of solid matter and four parts of water.

The foregoing method requires very little skill and time, and the apparatus used is extremely simple. The error of the determinations lies mainly in the assumption of the factor used in reducing the mud to solid matter, and it is probably considerable.

Another method which is now undergoing test is as follows: Samples of water are obtained in the manner already described, and a measured quantity is poured upon an ordinary filter paper in a funnel and is filtered as in the chemical laboratory. If the residue is inconsiderable the process is repeated until a measurable quantity of sediment is obtained, which is dried and afterwards is weighed. The reduction is made in the same way as in the first method, that is, the quantity of water used is to the sediment obtained as the quantity of water flowing in the stream is to the quantity of silt carried in suspension.

This method, to be used with any considerable degree of accuracy, requires the use of a pair of delicate scales. The error of the determination consists partly in the errors of observations, which would be greater than by the first method, unless great skill is employed in the filtering and weighing of the sediment, but chiefly in determining or assuming the specific gravity of the silt obtained, as it is volume and not weight that ordinarily is required. It is believed, however, that where the necessary instruments and skill are available it is much more accurate than the first method.

The method of estimating the turbidity by measurement of opacity is inaccurate in any country where the water is stained to any considerable degree by leaves and roots with which it comes in contact. This is clearly shown by the writer's experience on sluggish rivers in Nicaragua, notably the San Francisco and Deseado rivers. On the latter stream it was sometimes desired to gage the river in the absence of the electric recording apparatus, but attempts to do this showed that it was impossible to observe the revolutions of the meter more than 6 inches beneath the surface of the stream, owing to the opacity of the water. At the same time sediment samples were settled and accumulated for sixty days without yielding any measurable quantity of solid matter, showing that the water was free from sediment, the dense opacity being caused entirely by vegetable stains produced by the leaves, roots, and bark of the dense tropical vegetation with which it came in contact. However, vegetable stains and sediment are seldom found in considerable degree in the same water, for only sluggish waters remain long enough in contact with vegetation to become colored, and these carry but little sediment, so that in most cases opacity observations can profitably be used by carefully noting the true cause of the opacity.

Mr. Allen Hazen, member American Society of Civil Engineers, after reading the foregoing description, made the following comments:

Of course the aggregate amount of sediment carried by a stream, considered with reference to its tendency to fill a reservoir, is very different from the average amount of sediment carried by the water from a waterworks standpoint. In the first case, the maximum amount of sediment occurs, generally speaking, at times of maximum discharge, and, for most streams with which I am familiar, so large a percentage of the sediment as to be practically the whole of it would be carried by the water in floods occupying but a few days in each year. The average amount of sediment in the water taken for waterworks purposes, on the other hand, represents the average of the amounts in substantially equal volumes of water taken from the stream each day in the year. In comparing different streams with one another, I think it would make a great difference which method was used.

The statements regarding the colors of the waters in Nicaragua are of great interest. Of course color is an element of disturbance in any optical method of measuring turbidity. Computations and experiments conducted by Mr. Whipple and myself show, however, that water with a color which will be tolerated as a municipal supply, or which is capable of being decolorized at a reasonable cost, is not so highly colored as to affect the turbidity reading to a notable extent. The most deeply colored waters with which I have had experience have not much exceeded 2.00 on the platinum scale. The waters from Nicaragua referred to must have had colors many times deeper than this, and it would be very interesting to have accurate determinations of their colors made.

Mr. George W. Fuller, associate member of the American Society of Civil Engineers, made the following comments upon the methods described:

The determination of turbidity is a very important matter in connection with various water problems. Various methods are practiced for its determination, and thus far no standard method obtains. Apparently the "standard silica solution" is going to accomplish a great deal in this direction. Careful studies of this method are now being made at New Orleans, and the results are very promising. Messrs. Whipple and Jackson first described the standard silica solution method in the "Technology Quarterly," Vol. XII, No. 4.

The method used by Mr. Davis in Arizona was tried by myself at Louisville for several months, side by side with gravimetric determinations. It was found that the individual results were quite variable, although for the purpose for which he used them the method is probably much more satisfactory than under the conditions to which it was put in getting an accurate record of the rapidly changing Ohio River water.

The second method mentioned by Mr. Davis strikes me as a more satisfactory one, when reasonable facilities are available for carrying it out. It does not appear to me that it is so much the specific gravity of the sediment as the percentage of voids as actually found in the bottom of the reservoirs, that would materially affect the correctness of the estimates as to volume. This method has been used for a great many years on the Missouri and Mississippi rivers, and is described in the European text-books on water analysis. With coarse-grained turbidity it seems to work very well, and, all things considered, I presume that as a laboratory method it is entitled to high rating.

With the Ohio River water, which contains a considerable percentage of very fine clay, this method was not found to be practicable, as the clay would pass through a dozen or more thicknesses of the finest filter paper, to say nothing of the length of time necessary for filtering the clay. On that work it was the practice to determine the total residue on evaporation of the water as collected, and then of the filtrate after passing the water through a Pasteur filter. The suspended matter could then be obtained by the difference, and the results were quite satisfactory when the amount of sediment was not too low. There is a slight error in this procedure, due to the Pasteur filter sometimes absorbing and sometimes giving off dissolved substances. Taking everything into consideration, the standard silica solution seems to be the more practicable procedure at present for routine work, especially when used with a diaphanometer (see Technology Quarterly, Vol. XII, No. 2). At New Orleans this method is being depended upon very largely, although the weight of suspended matter is being determined by the same method as at Cincinnati, as frequently as time allows, in order to establish the ratio between the silica turbidity and the weight of suspended matter.

There are, of course, many instances where turbidity and dissolved color are both present in the same water. As a general proposition, however, this does not seem to be true, as the very highly turbid waters below the glacial drift formation do not generally contain much color. Strictly speaking, however, such a statement would apply only to large rivers, and not to very small streams, which are influenced by swamps. On the other hand, those streams for the most part on the drift or in the neighborhood of swamps, and which are highly colored, do not, as a rule, contain sufficient turbidity to justify any elaborate records of the suspended matter.

In future years the amount of dissolved vegetable matter giving color to a water is bound to be a factor. Information upon this subject is very desirable. As suggested by Mr. Hazen, it is likely that this matter could best be handled in the field by a graduated color scale on glass, the different tints or depths of color to be obtained progressively by the use of different shades of color, or different thicknesses of glass, as found most expedient.

TESTS TO DETERMINE THE ACCURACY OF DISCHARGE MEASUREMENTS OF NEW YORK STATE CANALS AND FEEDERS.[1]

During the summer of 1900 the State of New York undertook investigations to determine the flow, seepage, and evaporation of its canals. The work was under the immediate supervision of Mr. E. Kuichling, member American Society of Civil Engineers. Careful measurements were made by means of floats and current meters at various points on the Erie Canal and its branches. After completing the work it was thought wise to investigate the methods and determine the accuracy of the measurements taken. These special experiments were made under the direction of Prof. G. S. Williams, in charge of the hydraulic laboratory at Cornell University, assisted by the writer, by Mr. W. P. Boright, civil engineer, and by members of the senior class in experimental hydraulics at the university. Float and meter measurements were made in the flume at the hydraulic laboratory, and the results were compared to determine the variation between the two methods of measurement. It is thought that a brief description of the general method applied and of the results obtained will be of interest to engineers.

[1] Report of E. C. Murphy.

The movement of water in canals and feeders is quite different from that of a natural stream. This difference is due mainly to lockage and to irregular feed from one section to another, which cause rapid fluctuations of the surface level and of the velocity—in some cases the surface level dropped several inches in a few seconds and the velocity increased from 25 to 50 per cent. The disturbance of the water at a given place may be due either to lockage or to feed at one or both ends of the section. The water that is needed in a lower level should be passed through a culvert. Ordinarily, however, it is passed through the lock by opening one or more valves in the gates. In some cases four such valves are opened at once for a few minutes, but as a rule only one is opened for a longer time. It will readily be seen, then, that when a boat is passing in or out of a section which is being gaged, or is entering or leaving short adjacent sections, the water in that section is in a very disturbed condition. The length of time required for it to return to a normal condition after one of these disturbances, depends to some extent on the velocity of the water. The greater the velocity, the quicker it will return to normal condition; for very low velocities it requires hours to quiet down. In one case, with a steady gage, it was impossible to obtain a single gaging (which required only five minutes) in a whole day. It will readily be seen that, to be of any value, discharge measurements under such conditions must be made quickly. Even when the surface did not fluctuate the work was often stopped by one or more boats passing the place of measurement. Instantaneous measurements of discharge and a continuous record of surface fluctuations at the point of measurement are desirable. This was approximated by making a rod gaging in from four to ten minutes and reading the surface fluctuations every thirty to sixty seconds.

Two instruments were used to measure the velocity, viz, float rods and current meter. The float rods used were 1.90 inches in diameter, of wood, and weighted at the lower end with iron pipe and lead of the same diameter, so as to float upright. By adjusting the weight at the lower end the immersed length of the rod may bear any ratio to the depth of the water in which it floats. If the immersed length is equal to the depth, the speed or velocity of the rod is very nearly that of the average velocity of the water in the vertical plane in which the rod moves. On account of the action of the wind on the part of the rod which projected above the surface of the water, that part of the rod was limited in length to about 8 inches. Extensions of the rod were used when the depth required them.

In this work it was not possible to have the depth of immersion of the rods more than about 90 per cent of the depth of the water, on account of inequalities in the bottoms and sides of the canals. Neither was it advisable to have rods of many lengths, on account of the labor required to transport them from place to place. Rods of three lengths were carried, viz, 18, 40, and 80 inches, which, with a set of extensions to use on either the 40-inch or the 80-inch rods, gave five lengths. From these were selected those that could be used with the greatest depth of immersion and which would not project more than 8 inches out of the water. The discharge of the channel was computed from a number of gagings made very rapidly, when the surface fluctuated little, with different depths of immersion. It is very desirable that results obtained in this way should be tested by comparing them with results obtained under the same conditions by a more accurate method of measurement.

Two kinds of tests were made: (1) Rod discharge by one party with rod discharge by the other party, and rod discharge with meter discharge, made on the canals and feeders under actual conditions; and (2) rod discharge and meter discharge with discharge over standard weir, made in the hydraulic laboratory of Cornell University.

The discharge of the Erie Canal at Rochester was measured simultaneously with rods by two parties, and was again measured simultaneously with rods by one party and with meter by another party. At Lockport a similar comparison of rod discharge with meter discharge was made. Similar comparisons of rod discharge with rod discharge and of rod discharge with meter discharge were made on the Black River Canal at Boonville and on the Glens Falls feeder at Glens Falls. A comparison of the rod measurements of one party with the simultaneous rod measurements of the other party will show the error in measuring the loss of water between stations, and a comparison of the meter measurements made on the canals with the meter measurements made in the hydraulic laboratory at Cornell will serve to tie together the two sets of tests.

The common method of measuring discharge with a current meter, by observing the velocity at many points in a cross section, could not be used in this work because it required too much time. Two more rapid methods were used, viz, the six-tenths method and the integrating method. The former method consists in making a single observation in each vertical at a distance from the surface equal to six-tenths of the depth of the water. It generally gives, as do the float rods, the mean velocity in a vertical in one observation. The integrating method is more rapid than the six-tenths method, but it is not so accurate. It consists in moving the meter from the bottom to the surface and from the surface to the bottom several times while it is being carried from one side of the channel to the other. In this work the integrating method was only used as a check on the results obtained by the six-tenths method.

The current meter has a small revolving wheel with a rate of motion proportional to the velocity of the water in which it is held. Being small, one observation with this wheel gives the mean velocity for only a few square inches, and it is necessary to hold it in several places in a vertical in order to get the mean velocity in that vertical, while the float rods give the mean velocity in a vertical at one observation. The meter will give the velocity at any point in the depth; the rods will give the mean velocity only. The meter can also be used where the rods can not, and it is a less expensive method of measuring discharge.

The laboratory tests cover a range of velocities of 0.25, 0.50, 1, and 1.50 feet per second for channel depths of 7.5, 8.3, and 9 feet, and 0.5, 1, 1.50, and 2 feet per second for a channel depth of 6 feet. Two depths of immersion were used with each velocity, viz, 75 per cent and 90 per cent. Every velocity, depth of channel, and depth of immersion found in the field work could not be duplicated in the laboratory tests, so that the foregoing range covers only the most important cases. The laboratory experiments were made in the same way as the field experiments, using the same lengths of run and the same distance from the point of starting the floats to the upper chain.

The conditions of the flow were not quite the same in the field tests as in the laboratory tests. The Lockport comparison was made in a rock cut, with nearly vertical rough rock sides and a rough bottom. The meter section was 62.5 feet wide, 8.5 to 9 feet deep, and about 700 feet above the point where the rod measurements were made. The section where the rod discharge was measured was 65 feet wide and 8.5 to 10 feet deep. There was undisturbed flow for at least a half mile on each side of the place of measurement. The Rochester comparisons were made on the Rochester Aqueduct, which has very smooth and nearly vertical sides. The width was 43 feet, the depth 7.5 feet. The flow was undisturbed for a half mile above the point of measurement, but there was a very sharp curve less than 100 feet below the place where the rods were used. The Boonville comparisons were made in an earth cut with side slopes varying so as to make a gradual transition from the flat bottom to the top. The surface width was 43 feet, the greatest depth 7.7 feet. There was unobstructed flow for a quarter of a mile above the point of measurement and for a half mile below it. The sections where the Glens Falls comparisons were made have nearly vertical sides. The width is 32 feet, the greatest depth 6 feet. There is a bend in the feeder about 100 feet above the upper section, and another bend about 1,000 feet below the lower section. The meter section was between the rod-measuring sections, 75 to 100 feet distant from them.

The Cornell University canal has vertical sides of concrete and a concrete bottom. One side is at present roughened somewhat on account of the lining being cut out in places preparatory to its repair. The canal is 16 feet wide, 10 feet deep, and 415 feet long, with a standard sharp-crested weir, and with gates at the upper end for admitting water and at the lower end for controlling the depth of water in the canal, and with piezometers and gages for measuring accurately the head on the weir and the depth of water in the canal.

The discharge of the weir is known for any head on it, so that a simple measurement of the head gives the discharge of the canal. The discharge can then be measured with rods or current meter and compared with the weir discharge, and thus the error by the rods or meter be determined. The weir is 220 feet above the point where the rod measurements were made, and 15 feet below it are baffleboards for quieting the water. About 70 feet below the meter section is a bulkhead, and at the side of it are two rectangular gates. During the experiments the water passed out of the canal through two horizontal slits in the bulkhead, used to secure velocity in all of the water section. At the higher velocities some water passed out under one of these gates. The width of the Cornell channel was only from one-fourth to one-half that of the channels in which the field comparisons were made. At Cornell the water was probably moving in a more disturbed condition than in the canals and feeders. The retarding effect of bottom and sides was less in the former channel than in the latter, and the depth of water and the area of the channel were measured with greater accuracy at Cornell than on the canals.

The results of the field comparisons are given in the following table:

Results of field comparisons.

Place.	Date.	V′r.	V″r.	Vm.	Q′r.	Q″r.	Qm.	Q′r—Q″r in Q′r.	Q′r—Qm in Q′r.	Q″r—Qm in Q″r.
	1900.	*Feet.*	*Feet.*	*Feet.*	*Cu. ft. per sec.*	*Cu. ft. per sec.*	*Cu. ft. per sec.*	*Per ct.*	*Per ct.*	*Per ct.*
Lockport	Sept. 14		1.440	1.531		805.70	799.85			+0.73
Rochester	Sept. 20		.704	.736		235.12	251.57			−7.00
Do	Sept. 21	.893	.884		297.82	302.04		−1.41		
Do	do		.889	.929		301.35	310.83			−3.14
Do	do		.899	.939		307.08	317.54			−3.46
Boonville	Sept. 25	1.073	.813		227.22	227.51		− .13		
Do	do		.850	1.079		238.81	228.66			+4.25
Do	do		.836	1.111		233.54	234.70			− .49
Glens Falls	Oct. 8	.821	.690		164.73	172.77	161.50	−4.88	+1.94	+6.52
Do	do	.756	.640		149.66	158.57	155.23	−5.92	−3.72	+2.11

V′r =mean velocity found by party No. 1, with rods.
V″r=mean velocity found by party No. 2, with rods.
Vm=mean velocity found with meter, using six-tenths method.
Q′r =discharge found by party No. 1, with rods.
Q″r=discharge found by party No. 2, with rods.
Qm =discharge found with meter, using six-tenths method.

In the Lockport and Glens Falls comparisons the meter was suspended from a bridge by means of an insulated wire. In the Rochester and Boonville comparisons it was suspended from a boat by means of the same wire. The conditions were very good during the Lockport comparisons. There was very little wind, the surface did not fluctuate, there was a good measurable velocity in all parts of the cross sections, and no curve near to disturb the direct flow of the water. The meter discharge will be seen to agree closely with the rod discharge.

The conditions were not so good in the Rochester comparisons. The lower gaging station was too near a curve in the canal. The time of run of the individual rods at the same point differs by a considerable amount, much more than at the upper station. On the afternoon of September 20 the surface did not fluctuate much, but rain interfered somewhat with the work. The meter discharge for that day is 7 per cent greater than the corresponding rod discharge. The next day, September 21, the surface fluctuated somewhat, but not more than while much of the regular gaging work was being done. The rod discharge measurements for that day differ by 1.41 per cent, and the average meter discharge is larger than the rod discharge by 3.3 per cent.

At Boonville the conditions were all good. The rod discharges agree closely, as does one of the meter measurements with the corresponding rod measurement.

The Glens Falls comparisons are not very good—the upper gaging station was too near a curve, and there was a strong probability of leakage from the feeder between the points where the rod measurements were made. There was no leakage visible on the surface, but the point where the measurements were made is only a short distance below the portion of the feeder which is noted for its large leakage, so that there probably was some leakage here, although it does not show on the surface.

For the reasons stated we believe that the results of the Glens Falls comparisons should be given little weight, and that those at Rochester should be given only half the weight of those at Lockport and Boonville.

Results of experiments at Cornell hydraulic laboratory.[1]

Date.	Referred to standard weir.	Rod gagings in canal.				
		Depth of water.	Immersion, 75 per cent.		Immersion, 90 per cent.	
			Velocity.	Discharge.	Velocity.	Discharge.
1900.	*Cu. ft. per sec.*	*Feet.*	*Ft. per sec.*	*Cu. ft. per sec.*	*Ft. per sec.*	*Cu. ft. per sec.*
October 24	214.6	9.36	1.42	213.8	----------	----------
Do	140.5	9.25	.96	143.0	0.95	141.0
Do	71.7	9.34	.49	73.5	.48	71.4
Do	38.2	8.81	.28	39.1	.27	38.6
October 26	178.6	7.54	1.51	183.1	1.53	184.8
Do	125.3	7.55	1.08	131.0	1.06	128.3
October 27	61.3	7.47	.53	63.7	.52	62.5
Do	30.9	7.38	.27	31.6	.26	30.3
Do	196.4	6.16	2.07	204.7	2.04	202.4
Do	132.4	6.30	1.35	136.7	1.34	135.8
Do	91.1	6.23	.95	95.4	.94	94.5
Do	50.3	5.85	.56	52.2	.55	51.6
October 31	198.3	8.37	1.54	204.9	1.51	202.4
Do	125.3	8.39	.96	129.1	----------	----------
October 29	65.4	8.37	.51	68.8	.50	67.3
November 1	31.1	8.26	.25	33.1	.24	32.1

[1] A recomputation of this data gave results slightly different from those contained in this report.

Results of experiments at Cornell hydraulic laboratory—Continued.

Date.	Current-meter gagings in canal.									
	Referred to standard weir.	Depth of water.	Small Price meter (No. 363).				Small Price meter (No. 351), ordinary method.			
			Six-tenths method.		Integrating method.		Analytical.		Graphical.	
			Velocity.	Discharge.	Velocity.	Discharge.	Velocity.	Discharge.	Velocity.	Discharge.
1900.	*Cu. ft. per sec.*	*Feet.*	*Ft. per sec.*	*Cu. ft. per sec.*	*Ft. per sec.*	*Cu. ft. per sec.*	*Ft. per sec.*	*Cu. ft. per sec.*	*Ft. per sec.*	*Cu. ft. per sec.*
October 24	216.1	9.46	1.47	223.0	1.43	217.5	1.45	220.4	1.44	219.0
Do	140.5	9.37	.99	148.5	.98	148.1	.95	143.1	.95	143.2
Do	71.7	9.34	.49	73.2	.48	72.7	.48	71.5	.48	72.1
Do	38.3	8.92	.28	40.1	.31	44.4	.24	33.3	.25	35.5
October 26	178.6	7.67	1.49	184.1	1.52	187.8	1.41	174.7	1.43	176.2
Do	125.3	7.64	1.05	128.9	1.08	131.7	.98	120.8	1.00	123.1
October 27	61.3	7.58	.52	63.8	.52	63.8	.50	61.3	.50	60.7
Do	31.2	7.56	.26	31.5	.31	38.1	.23	28.1	.24	29.2
Do	196.4	6.28	1.99	201.4	2.03	205.4	1.86	188.2	1.90	192.1
Do	132.4	6.40	1.32	136.0	1.34	138.1	1.20	123.8	1.24	127.3
Do	91.1	6.32	.94	95.7	.92	93.8	.82	83.9	.86	87.3
Do	50.3	6.01	.54	52.7	.56	54.2	.48	46.5	.49	48.0
October 31	198.3	8.47	1.51	206.5	1.55	211.7	1.38	187.8	1.44	195.8
Do	125.3	8.51	.95	130.0	1.00	137.3	.84	114.5	.86	117.3
October 29	65.3	8.48	.50	67.7	.49	67.1	.44	60.5	.45	61.0
November 1	31.2	8.46	.24	32.7	.32	43.4	.19	25.2	.21	28.9

Date.	True velocity at meter station.	Error in discharge computed by different methods when referred to standard weir.						
		Rod measurements.		Meter measurements.				
		Immersion, 75 per cent.	Immersion, 90 per cent.	Six-tenths method.		Integrating method.	Ordinary method.	Ordinary method computed from velocity curves.
				Analytical.	Graphical.			
1900.	*Ft. per sec.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
October 24	1.41	+3.64	....	−4.11	−3.17	− 0.63	− 1.97	−1.13
Do	.93	−1.74	−0.37	−6.13	−5.70	− 5.37	− 1.84	−1.94
Do	.48	−2.56	+ .28	−2.08	−2.08	− 1.59	+ .24	− .64
Do	.27	−2.44	−1.02	−6.00	−4.86	−16.16	+12.84	+7.02
October 26	1.44	−2.57	−3.51	−3.09	−3.09	− 5.17	+ 2.17	+1.34
Do	1.02	−4.55	−2.40	−2.76	−2.86	− 5.12	+ 3.60	+1.75
October 27	.50	−3.94	−1.93	−4.88	−4.08	− 4.08	− .08	+ .90
Do	.26	−2.24	+2.01	−1.04	−1.04	−22.10	+10.00	+6.44
Do	1.94	−4.23	−3.06	−1.46	−2.55	− 4.86	+ 4.14	+2.20
Do	1.28	−3.24	−2.52	−3.18	−2.71	− 4.27	+ 6.49	+3.84
Do	.89	−4.75	−3.74	−5.32	−5.08	− 2.96	+ 7.89	+4.08
Do	.52	−3.74	−2.62	−5.92	−4.75	− 7.65	+ 7.67	+5.72
October 31	1.45	−3.36	−2.11	−3.71	−4.15	− 6.76	+ 5.28	+1.22
Do	.92	−3.05	....	−3.75	−3.75	− 9.54	+ 8.60	+6.41
October 29	.48	−5.14	−2.88	− .81	−2.35	− 2.80	+ 7.44	+6.62
November 1	.23	−6.14	−3.16	−2.47	−4.65	−39.30	+19.34	+7.57

NOTE.—Minus sign indicates that the discharge is greater than that by standard weir; plus sign indicates that it is less than that by standard weir.

Referring to the Rochester comparisons, it must not be inferred that because the rod discharges found by the two parties on September 21 agree closely, and the meter and rod discharges of the 20th differ by 7 per cent of the rod discharge, that this difference is all due to the meter. At least half of it is chargeable to the rod measurement. The two sets of velocity readings given by the meter on the 20th agree closely; there is nothing about them that will account for this large difference. The time of run of the rods, however, differs by a considerable amount, as already stated. The rod-measuring party was hindered by the rain and by the refusal of one of the men to work in the rain.

The results of the experiment work are given in the foregoing tables. The method of procedure was to open the head gates until the head on the weir was such as to give the desired discharge; then the slits in the bulkhead and the height of the gates at the lower end of the canal were adjusted so as to give the desired depth of water in the canal. As soon as the flow of water became steady, three parties began measuring the discharge of the canal, one with rods and two with current meters. Two lots of rods were used, one lot of 75 per cent depth of immersion, the other lot of 90 per cent depth of immersion; the former rods were lettered, the latter rods were numbered, so that they could easily be recognized as they passed under each wire. One of the current-meter parties measured the discharge in the ordinary way; the other party used the six-tenths and the integrating methods, and after completing their measurements they assisted the rod-measuring party, four stop watches being then employed and the number of rods observed in a given time being nearly doubled. The rod work was continued until the other meter party completed its measurement. During the experiment a gage giving the head on the weir and two gages giving the depth of water in the canal and the slope of the water surface, respectively, were read every 30 seconds. As a check on the weir gages and canal gage readings other readings were taken with a hook gage several times during the experiment. The length of run of the rods, or the distance between the chains was as follows: 25 feet for the 2-foot velocity, with a starting distance of 10 feet; 20 feet for the 1-foot and the 1.5-foot velocities, with a 10-foot starting run; 10 feet for the 0.5-foot velocity, with a 10-foot starting run; and 7 feet for the 0.25-foot velocity, with an 8-foot starting run. The number of rod observations made in an experiment varied from 50 to 150. The observations of each rod-discharge experiment were platted, using the distance from the side of the canal as abscissa and the time of run as ordinate, and a mean time curve was drawn. The mean time was found from this curve, and from that the mean velocity, which multiplied by the cross-sectional area gave the discharge.

In the six-tenths method the meter was held with its center at six-tenths of the depth from the surface, and, successively, at 1, 3, 7, 9, 13, and 15 feet from one side of the canal, and the revolutions in two consecutive periods of 50 seconds each were counted from the indications of an electric buzzer. The meter was then held at the same distances from the other side of the canal, and the revolutions in two consecutive 50-second periods were counted as before. These observations gave four measurements of velocity, covering a period of 50 seconds each, in these six verticals, at six-tenths of the depth below the surface. These points were platted, using the distance from the side of the canal as abscissa and the revolutions in 100 seconds as ordinate, and a mean curve was drawn. The mean number of revolutions for the whole cross section was computed from this curve and converted into mean velocity by the use of a rating table. The discharge was then found by multiplying the mean velocity by the cross-sectional area. The discharge was also found, analytically, without platting the points and drawing a mean curve. The difference between the weir discharge and the meter discharge, expressed in per cent, as found by these two processes, is given in the table on page 24. As a rule, the discharge found by using the curve is more accurate than that found without it.

In the integrating method the meter was moved in the following way: Its center started at 0.5 foot from the bottom and 1 foot from the side of the canal, and passed slowly to the surface at 4.5 feet from the side, then to 0.5 foot from the bottom and 8 feet from the side; then to the surface at 11.5 feet from the side, then to 0.5 foot from the bottom and 15 feet from the side. The time at the beginning and end of this operation was noted, and the revolutions of the meter wheel were counted, as indicated by the buzzer. The meter was then carried back over the same path at about the same speed, the time of passage being noted and the revolutions of the meter wheel counted as before. The discharge was computed by dividing the sum of the revolutions of the meter wheel in the passage across the canal and back again by the corresponding time, converting this into velocity and multiplying by the cross-sectional area.

In the ordinary method the meter was held by a rod at five points in the same six verticals in which the other meter was held, and the number of revolutions of the meter wheel, in single periods of 60 seconds each, were read from a recorder. The points in the verticals were usually $1\frac{3}{4}$ inches, 1 foot, and 2 feet from the bottom, the surface, and at one other point between the two. The recorder indicated only complete revolutions, while with the buzzer quarters of a revolution could be recognized. The mean velocity shown by the observations with this meter has been computed in two ways: (1) The mean number of revolutions per second of the meter wheel while being moved from one side of the canal to the other, at the five depths of immersion, have been computed and platted and a curve drawn through them, from which the mean number of revolutions per second for the whole cross section has been found, and this converted into mean velocity by the use of the rating table; and (2) the mean velocity has been computed by using with these observations the observations obtained at the same time with the other meter, using the six-tenths method, the mean revolutions per second at the different depths being converted into velocity and platted on a large scale, the velocity at six-tenths the depth being platted therewith and a mean velocity curve drawn among the points (not necessarily connecting them), from which the mean velocity for the whole cross section was found. The discharge found from the mean velocity computed in the latter way is given in the table on page 24, also the velocity found by the ordinary method.

Meter No. 351 used in the ordinary way did not work well on November 1. The wheel did not turn continuously for the small velocity 0.229 foot per second, but would stop for a few seconds and then start again. The other meter (No. 363) worked much better for the same velocity. The rating tables, however, indicate that the latter meter will measure a smaller velocity than the former. It should be said that the rating table for meter No. 351, which was used to convert revolutions into velocity, is for the meter suspended by a cable and not held by a rod. There was not sufficient time to rate it on a rod before making the computations.

In the table on pages 23 and 24 two values of depths are given; the one in the third column on page 23 is the mean depth for the 40 feet of distance passed over by the rods, the other (third column, top of page 24) is the mean depth at the meter station, and is for a distance of 15 feet. Two values of discharge of the standard weir are given for each experiment, the one in the second column being the average for the period during which discharge was measured by rods and meter, using the ordinary method; the other being for the period during which the discharge was measured by meter, using the six-tenths and integrating methods.

It will be seen from the table on pages 23 and 24 that the rod discharge and the meter discharge for the six-tenths method and for the integrating method are greater than the weir discharge, and that the meter discharge by the ordinary method is less than the weir discharge. The sign used is that of the correction to be applied to the meter or rod discharge to obtain the standard weir discharge. The rod discharge for 90-per cent rod immersion is on an average about 2 per cent greater than the weir discharge, and the rod discharge for 75-per cent rod immersion and the meter discharge by the six-tenths method are each on an average 3.5 per cent greater than the weir discharge. The variation from the weir discharge, which we will call the error, is in each case slightly greater for the lower velocities than for the higher velocities. The extreme percentage difference between any discharge and the mean of all the corresponding discharges is about 2.6 per cent. The error in the discharge as found with the current meter, using the ordinary method, is seen to increase as the velocity decreases, and the error in the meter discharge as found by the integrating method is seen to also increase as the velocity decreases. It also increases as the speed at which the meter is carried through the water increases. This we know must be the case, since the velocity indicated by the meter is the resultant of the velocity of the water and the velocity of the meter as it is moved through the water. When the velocity of the water is small, doubling the speed of the meter will nearly double the indicated velocity. In the following table is given the speed, in feet per second, of the meter, also the percentage of difference between the true velocity and the velocity as found by the integrating method. For a given speed of meter, the error is seen to be greater for the low velocities than for the higher, and for any given velocity of water the error increases with the speed of the meter.

Table showing effect of change of speed of meter in the integrating method, computed from experiments at Cornell University.

Date.	Depth of water.	(S) Speed of meter, integrating method.	(V) True velocity.	(V_1) Velocity by integrating method.	$\frac{V-V_1}{V}$.
1900.	*Feet.*	*Ft. per sec.*	*Ft. per sec.*	*Ft. per sec.*	*Per cent.*
October 24	9.460	0.118	1.409	1.429	− 1.42
Do	9.374	.142	.932	.982	− 5.36
Do	9.338	.164	.477	.485	− 1.68
Do	8.918	.107	.265	.308	−16.23
October 26	7.673	.137	1.444	1.519	− 5.20
Do	7.640	.135	1.018	1.079	− 5.99
October 27	7.582	.143	.502	.522	− 3.99
Do	7.557	.128	.255	.312	−22.35
Do	6.278	.180	1.940	2.030	− 4.64
Do	6.399	.154	1.283	1.338	− 4.29
Do	6.319	.188	.893	.920	− 3.02
Do	6.005	.142	.515	.555	− 7.77
October 29	8.476	.151	.478	.492	−29.29
October 31	8.470	.293	1.454	1.552	− 6.74
Do	8.508	.258	.915	1.002	− 9.51
November 1	8.455	.185	.229	.319	−39.30
November 29	8.476	.301	.478	.572	−19.67

CONCLUSIONS.

Assuming that the discharge given for the Cornell University weir is correct, the greatest percentage error in discharge when measured with rods of 90 per cent depth of immersion is 3.74 per cent. The range of percentage errors, omitting that on November 27 for velocity, 0.255 foot per second, is 4 per cent, the mean error for all depths and velocities is 2 per cent, and the greatest variation from this mean is 2.5 per cent. The greatest percentage error in the discharge when measured with rods of 75 per cent depth of immersion is 6.14 per cent. The range of these percentage errors, omitting that on November 24 for the velocity of 1.409 feet per second, is 4.4 per cent. The mean error for all depths and velocities is 3.5 per cent, and the greatest departure from this mean is 2.6 per cent. The greatest percentage error in the discharge as found with the current meter, using the six-tenths method, is 5.7 per cent, and the range of these percentage errors is 4.7 per cent. The mean percentage error for all depths and velocities is 3.5 per cent, and the greatest departure from this mean is 2.6 per cent.

From these facts we may conclude (1) that a discharge measurement of a canal or feeder may be in error 6 per cent when its mean velocity is small, but that, as a rule, the error will not be more than 3.5 per cent, and (2) that a measurement of loss from a section, which is mainly the difference between two simultaneous discharge measurements, may be in error 4.7 per cent—the largest difference that can be obtained by subtracting any two of the percentage errors in the third, fourth, and sixth columns of the table on page 24, except the two just mentioned, and it is very unlikely that this worst combination of errors will ever occur; but it is quite likely that the errors made by the two parties will be about the same in magnitude and have the same sign, in which case the measured percolation is nearly free from error. The average error in the measured percolation is probably not more than 2 per cent, and does not depend on the correctness of the standard weir discharge.

Of no little interest and importance is the fact, brought out by these comparisons and accuracy tests, that the current meter will give quickly and with a high degree of accuracy the discharge of canals and feeders or other channels of rectangular and trapezoidal cross section with fairly smooth bottoms.

The general subject of the relative accuracies of the various methods of measuring stream flow should be more thoroughly investigated, and it is hoped that more light will be thrown upon obscure points in river hydraulics and some improvements be suggested in the methods of measuring the flow of streams.

MEASUREMENTS AT RIVER STATIONS.

KENNEBEC RIVER AT WATERVILLE, MAINE.

This river was described by Prof. Dwight Porter in the Nineteenth Annual Report, Part IV, pages 65 to 84. Tables of its daily discharge from 1892 to 1898 will be found in Water-Supply Paper No. 27, pages 11 to 14; and similar data for 1898 and 1899 will be found in Water-Supply Paper No. 35, pages 25 and 26. The figures for the latter year, however (April to December, inclusive), were not computed with the same degree of accuracy as were those for former years, and since the publication of Water-Supply Paper No. 35 they have been recomputed, and the revised figures for the year 1899 and those for the year 1900 are presented herewith.

The computations for this station include the figuring of the discharge over the dam, through the waste gates and waste weirs, and through the various wheels of the Hollingsworth and Whitney mills. The Sunday flow at times, especially at low stages of the river, is found to be irregular, as the mill at Waterville is sometimes operated Saturday nights, drawing the water from the pond, so that on Sunday there is no flow except that due to leakage. During the dry season there is usually less water passing on Sundays than on week days, for at many of the mills on the river the dams are closed in order to allow the ponds to fill.

Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for 1899.

[Drainage area, 4,410 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,529	2,458	3,382	6,411	41,756	13,044	6,115	4,809	1,623	......	1,390	1,456
2	2,202	2,198	3,047	6,214	39,665	12,790	5,024	3,594	2,010	1,443	2,819	1,441
3	2,274	2,187	3,333	6,160	36,589	10,647	5,363	4,442	567	1,665	4,093	747
4	2,159	2,163	3,324	6,017	36,942	11,673	3,178	4,199	1,612	1,415	4,109	2,913
5	2,452	1,580	1,960	6,207	30,922	12,264	5,258	4,498	2,070	1,969	2,995	3,567
6	2,451	2,505	3,331	6,227	30,531	11,123	5,120	4,415	2,082	1,449	3,327	3,196
7	2,449	2,173	3,563	6,433	30,125	10,563	5,076	5,064	2,070	1,476	3,106	2,015
8	1,739	2,071	3,516	7,007	29,447	12,748	5,367	5,195	......	......	2,637	2,070
9	2,757	2,057	3,502	7,541	26,888	12,517	3,936	4,388	2,352	1,215	2,338	1,737
10	2,513	2,152	3,428	9,001	24,803	12,506	5,142	4,128	246	940	2,119	......
11	2,400	2,141	3,357	9,650	22,132	10,738	5,123	4,101	2,635	774	1,698	1,393
12	2,386	2,244	2,302	9,405	20,229	10,278	4,866	3,954	2,067	1,784	......	1,160
13	2,404	2,348	3,353	11,181	18,697	6,039	5,100	2,699	2,340	1,968	1,488	2,022
14	2,436	1,964	3,423	19,700	19,643	7,030	5,950	3,964	2,370	1,391	1,970	5,223
15	1,678	1,844	3,624	23,106	14,886	6,739	5,078	3,538	2,257	492	2,017	4,410
16	2,731	2,392	3,773	38,826	15,099	7,557	4,043	3,213	1,261	1,378	2,053	4,621
17	2,439	2,434	3,501	30,532	17,307	5,913	4,866	3,007	1,298	1,667	1,823	1,861
18	2,631	2,727	3,253	30,312	15,073	6,807	5,232	3,321	1,416	1,366	1,739	2,695
19	2,434	2,198	1,960	37,096	15,071	7,290	4,948	2,643	2,005	1,096	......	2,027
20	2,629	2,915	3,320	41,565	15,684	6,483	4,880	1,242	2,362	1,377	1,718	2,611
21	2,440	2,734	3,080	34,540	16,262	7,101	5,499	2,748	2,006	1,120	2,317	1,878
22	2,094	2,744	2,778	30,286	18,287	7,317	6,367	3,377	2,351	......	1,748	2,340
23	2,709	2,451	2,711	39,550	17,271	7,319	5,688	2,956	2,348	1,408	2,085	2,617
24	2,154	2,745	2,837	45,724	15,900	7,516	6,509	2,534	1,073	1,334	2,035	2,068
25	2,435	2,929	2,770	41,739	15,925	5,673	5,837	2,180	2,031	1,104	2,028	......
26	2,450	1,420	2,030	43,139	11,480	7,301	5,916	2,158	1,761	995	......	......
27	2,454	3,039	2,786	45,795	12,567	7,315	5,502	1,089	1,466	1,149	1,413	2,323
28	2,434	3,362	2,740	39,943	12,303	6,880	5,649	2,288	2,046	1,121	1,743	2,330
29	1,245	......	2,998	41,584	13,064	7,038	4,170	2,203	1,951	406	1,744	1,821
30	2,513	......	3,962	39,300	13,035	6,445	2,500	2,065	2,091	1,104	......	1,474
31	2,453	......	6,820	......	12,823	......	4,087	2,354	......	1,086	......	......
Mean	2,357	2,363	3,218	24,006	21,303	8,821	5,077	3,302	1,854	1,274	2,252	2,741

Daily discharge, in second-feet, of Kennebec River at Waterville, Maine, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,463	7,117	15,468	8,792	22,830	12,115	4,849	4,910	4,238	2,859	2,307	6,540
2	1,565	3,696	13,353	8,381	27,905	12,782	8,232	5,149	1,635	3,337	2,357	4,394
3	1,604	3,628	9,656	9,338	28,823	15,730	7,520	5,525	3,191	3,134	2,293	6,146
4	1,653	......	11,445	14,047	52,268	25,091	2,763	5,601	3,180	2,876	1,502	5,968
5	1,193	3,166	6,544	15,927	48,843	19,591	6,715	4,431	2,905	2,565	1,660	4,640
6	1,452	3,159	6,240	15,544	39,585	16,103	6,255	5,357	2,913	2,168	2,260	4,583
7	1,304	3,188	9,323	19,353	34,551	14,088	6,271	4,708	2,865	859	1,604	4,506
8	2,324	3,303	4,913	27,072	28,889	12,792	4,799	4,597	2,908	3,457	1,630	4,701
9	2,060	2,925	4,947	24,219	23,561	10,930	6,465	4,573	2,276	3,715	3,819	3,548
10	1,998	3,114	4,927	19,765	28,628	10,495	6,501	4,758	2,330	3,715	17,580	4,498
11	1,751	1,615	4,373	17,053	25,277	10,083	5,767	4,462	2,871	4,051	11,521	2,978
12	1,711	2,933	4,950	20,560	22,411	10,148	4,984	2,627	2,865	4,106	13,301	3,504
13	1,009	12,148	4,932	25,463	20,804	9,661	12,281	4,651	2,560	4,003	10,314	3,851
14	696	15,696	4,799	27,373	18,378	10,168	9,601	4,716	2,851	......	8,564	4,078
15	1,712	21,761	5,051	26,429	22,307	7,707	6,262	4,450	2,826	2,590	5,839	4,101
16	1,996	19,766	10,516	31,224	29,793	9,141	7,018	4,750	2,426	3,993	4,877	3,080
17	1,755	15,073	7,479	32,034	29,945	7,256	5,112	4,834	3,130	3,993	3,706	3,958
18	1,748	11,998	12,670	35,155	31,845	7,808	6,017	4,624	3,147	4,190	6,533	4,068
19	2,064	5,871	20,538	42,557	40,265	7,308	5,652	3,075	2,776	3,989	5,079	3,505
20	1,792	7,090	12,562	60,541	48,460	5,866	6,057	4,547	2,602	3,720	5,215	3,809
21	656	6,978	12,448	62,291	44,162	6,402	5,678	4,072	3,044	2,392	8,107	3,799
22	2,060	6,123	12,412	55,863	35,060	6,651	4,386	3,203	2,776	3,164	6,360	4,109
23	4,045	5,308	11,361	51,180	25,403	6,613	5,253	4,029	......	3,185	12,471	1,895
24	3,748	4,117	10,742	44,064	23,333	5,015	4,923	3,649	3,137	2,621	8,620	3,880
25	3,697	18,833	9,792	38,913	21,682	6,669	4,737	......	2,887	2,902	7,886	3,196
26	3,684	13,387	9,460	33,353	18,907	5,066	5,403	1,016	2,563	2,624	7,000	4,311
27	3,609	23,971	8,925	27,800	17,467	5,803	4,857	3,169	2,575	2,373	7,320	4,498
28	3,007	18,375	8,604	23,905	15,469	7,679	4,872	3,501	2,568	1,520	9,693	4,299
29	6,851	......	8,391	21,793	19,171	7,189	2,344	3,629	3,169	2,902	5,214	4,035
30	4,311	......	8,410	14,688	16,301	9,043	4,231	3,147	2,197	2,623	6,660	2,468
31	5,399	......	8,498	......	14,113	......	3,725	3,454	......	2,338	......	4,050
Mean	2,384	9,050	9,153	28,473	28,272	10,033	5,791	4,173	2,807	3,065	6,376	4,096

COBBOSSEECONTEE RIVER AT RESERVOIR DAM NEAR AUGUSTA, MAINE.

This river is described in the Nineteenth Annual Report, Part IV, pages 79 and 80. The record of the discharge measurements from 1890 to 1899, inclusive, will be found in Water-Supply Paper No. 35, pages 28 to 33. The following measurements of daily discharge for 1900 were furnished by Mr. Alexander H. Twombly, engineer of the Forest Paper Company, of Yarmouthville, Maine. The measurements are made at the reservoir dam, where the discharge of the river is controlled by gates, except during flood stages. The gates are closed on Sundays and no water is allowed to pass. The great Cobbosseecontee dam furnishes a supplementary supply to the reservoir below, and water is occasionally drawn from it.

Daily discharge, in second-feet, of Cobbosseecontee River at upper dam near Augusta, Maine, for 1900.

[Drainage area, 230 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	130	220	815	776	300	300	(a)	260	260	230	180	220
2	130	220	1,463	495	300	300	280	260	(a)	220	165	(a)
3	130	220	2,316	417	300	(a)	280	260	260	190	140	220
4	125	(a)	2,055	656	413	300	(a)	260	260	175	(a)	220
5	125	220	1,911	977	803	280	280	(a)	240	175	130	220
6	125	220	1,622	907	934	280	280	260	240	150	130	220
7	(a)	220	1,481	1,087	831	280	280	260	240	(a)	130	220
8	130	220	1,295	1,379	606	280	(a)	260	240	160	130	220
9	110	220	1,155	1,380	456	280	280	260	(a)	175	200	(a)
10	100	220	1,155	1,342	413	(a)	280	260	240	180	220	220
11	90	(a)	1,153	1,297	348	280	280	260	240	190	(a)	220
12	90	220	1,116	1,297	300	280	280	(a)	240	220	220	240
13	90	220	1,037	1,297	(a)	280	280	260	235	220	220	240
14	(a)	2,194	999	1,297	300	280	280	260	230	(a)	220	230
15	100	1,573	999	1,297	300	280	(a)	260	230	220	220	230
16	95	1,283	999	1,213	300	280	280	260	(a)	220	220	(a)
17	90	856	1,615	1,105	300	(a)	280	260	250	220	220	240
18	90	562	1,611	1,072	300	280	280	260	250	220	(a)	240
19	90	425	1,473	1,260	300	280	280	(a)	250	220	220	240
20	90	294	1,518	1,380	585	280	280	260	250	220	220	240
21	(a)	270	1,811	1,338	704	280	280	275	245	(a)	220	240
22	140	270	1,662	1,260	998	280	(a)	275	250	220	220	240
23	160	270	1,517	1,223	1,325	280	280	275	(a)	220	220	(a)
24	200	270	1,472	1,223	1,422	(a)	280	275	250	220	220	240
25	200	(a)	1,334	1,182	1,301	280	270	275	250	220	(a)	(a)
26	200	564	1,289	869	1,016	280	260	(a)	250	220	220	240
27	200	662	1,206	570	456	280	260	275	250	220	220	240
28	(a)	776	1,206	377	357	280	260	275	245	(a)	220	240
29	220	------	1,105	(a)	300	280	(a)	275	230	220	220	240
30	220	------	1,015	300	300	280	260	260	(a)	220	220	(a)
31	220	------	925	------	300	------	260	260	------	200	------	240
Mean	136	508	1,365	1,044	562	282	276	264	245	206	199	232

a Water shut back on Sunday when under control.

ANDROSCOGGIN RIVER AT RUMFORD FALLS, MAINE.

This river receives the drainage from the Rangeley and other lakes near the border line between Maine and New Hampshire. It flows in a southerly and southeasterly direction, descending with rapid fall, and is one of the most valuable streams in New England for water-power purposes. It is described in the Nineteenth Annual Report, Part IV, pages 84 to 97. Figures of daily discharge will be found in Water-Supply Papers No. 27, pages 14 to 16. and No. 35, page 28; also in the Twentieth Annual Report, Part IV, pages 67 to 69. Figures of monthly discharge for the year 1899 will be found in the Twenty-first Annual Report, Part IV, page 57.

The following table of the daily discharge of Androscoggin River for the year 1900 has been furnished by Mr. Charles A. Mixer, resident engineer of the Rumford Falls Power Company, who states that notable features of the discharge of the river for that year (1900) are the high maximum discharge and the high average for February. There is no previous record or recollection of thaws or rains in that section during that month, but in February, 1900, there were two such periods of thawing and rainfall. The precipitation for the month was 7.96 inches, the greatest on record, most of it in the form of rain. In 1898 the precipitation amounted to 7.25 inches, but all in the form of snow, so that the effect on the river was not apparent until spring.

Daily discharge, in second-feet, of Androscoggin River at Rumford Falls, Maine, for 1900.

[Drainage area, 2,320 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,231	1,351	3,063	1,830	16,182	5,582	1,780	1,611	1,650	1,985	1,530	3,264
2	1,170	1,295	2,849	1,933	13,249	5,952	1,781	1,560	1,600	1,856	1,466	3,250
3	1,171	1,346	2,791	2,026	12,008	6,850	1,705	1,504	1,650	1,987	1,504	3.059
4	1,190	1,869	2,190	2,561	17,092	7,458	1,640	1,512	1,682	2,137	1,460	3,192
5	1,198	1,362	2,434	2,734	13,700	7,016	1,760	1,500	1,672	2,062	1,479	2,088
6	1,258	1,277	2,136	2,791	10,555	6,196	1,744	1,486	1,603	2,056	1,466	2,173
7	1,224	1,334	2,047	3,592	10,165	6,341	1,791	1,490	1,482	2,079	1,547	2,375
8	1,289	1,354	1,794	4,730	9,121	5,627	1,800	1,505	1,299	2,010	1,694	2,833
9	1,189	1,438	1,810	4,603	8,283	5,550	1,803	1,685	1,264	2,053	10,131	2,030
10	1,115	1,420	1,826	3,836	9,468	4,948	1,798	1,722	1,275	2,006	12,061	1,939
11	1,130	1,654	1,801	3,318	8,024	4,850	1,719	1,620	1,247	2,703	7,525	1,983
12	1,135	1,467	1,768	3,989	7,038	4,509	1,777	1,630	1,273	3,754	5,230	2,339
13	1,211	1,777	1,749	4,138	6,720	4,609	1,781	1,592	1,390	3,197	4,436	2,571
14	1,139	6,009	1,600	4,099	7,734	4,263	1,949	1,648	1,352	2,731	3,870	2,329
15	1,178	5,570	1,772	4,943	10,917	4,113	2,000	1,811	1,332	3,472	3,636	2,470
16	1,147	4,151	1,620	6,230	13,415	4,487	1,880	1,942	1,389	3,615	3,610	2,650
17	1,251	3,599	1,901	8,171	12,062	4,439	2,561	2,009	1,478	3,033	3,104	2,003
18	1,196	2,972	2,549	9,220	13,877	3,015	2,992	1,918	1,667	3,007	3,330	2,071
19	1,181	2,954	2,425	16,130	18,383	2,956	3,168	1,703	1,660	3,255	3,330	2,114
20	1,241	2,562	2,179	22,025	24,531	3,384	3,042	1,714	1,656	2,042	3,893	2,357
21	2,195	2,408	2,491	21,980	22,126	3,311	2,850	1,522	1,658	1,930	6,398	2,215
22	3,221	2,306	2,729	21,317	19,930	2,955	2,885	1,462	1,913	1,509	6,794	2,042
23	2,169	2,146	2,647	21,593	17,632	2,037	2,834	1,437	1,860	1,754	5,819	2,265
24	1,879	2,002	2,255	21,837	16,391	1,948	2,779	1,459	1,860	1,765	4,681	1,764
25	1,765	2,326	1,894	20,250	14,778	1,893	2,844	1,391	1,712	1,676	3,500	2,420
26	1,698	5,157	1,930	17,679	13,408	1,855	2,828	1,318	1,745	1,618	2,934	2,622
27	1,628	4,626	1,819	15,739	12,295	1,855	2,727	1,382	1,697	1,430	3,374	2,300
28	1,382	3,814	1,776	13,458	9,687	1,810	2,530	1,387	2,025	1,430	3,112	1,871
29	1,215	......	1,836	12,877	9,250	1,931	2,020	1,369	1,930	1,492	2,624	1,983
30	1,285	......	1,788	13,274	6,973	2,070	1,782	1,413	1,860	1,482	2,834	1,831
31	1,350	......	1,919	......	6,632	......	1,686	1,503	......	1,500	......	1,865
Mean	1,408	2,555	2,109	9,763	12,633	4,127	2,201	1,574	1,596	2,213	3,945	2,331

MERRIMAC RIVER AT LAWRENCE, MASSACHUSETTS.

Careful records of the flow of this river at Lawrence, Massachusetts, have been kept for more than fifty years, but they have never been published in full. Figures for the monthly maximum and minimum discharge from 1890 to 1897 were published in the Nineteenth Annual Report, Part IV, pages 113 to 115, and similar figures for 1898 in the Twentieth Annual Report, Part IV, page 73. In Water-Supply Paper No. 35 will be found the figures for the daily discharge for 1897, 1898, and 1899. The figures for 1900 are published herewith.

Daily discharge, in second-feet, of Merrimac River at Lawrence, Massachusetts, for 1900.

[Drainage area, 4,553 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,230	4,631	17,350	11,129	10,674	5,332	479	2,134	1,389	2,763	2,456	8,975
2	2,696	4,408	33,802	12,507	11,597	4,356	2,653	2,192	417	2,490	2,468	7,374
3	2,471	2,871	37,732	13,412	11,485	4,397	2,370	2,338	284	2,289	1,608	7,641
4	1,860	2,468	33,090	15,389	12,887	6,520	311	1,505	2,340	2,137	277	6,844
5	1,902	5,520	26,893	16,797	15,881	7,492	2,226	113	2,206	2,109	2,643	11,383
6	1,209	5,687	20,329	17,602	13,223	7,616	2,369	2,038	2,099	1,482	2,478	17,046
7	82	5,910	17,011	19,458	11,654	6,491	1,695	1,694	1,912	246	2,263	15,505
8	2,649	5,933	14,368	21,184	10,332	5,721	350	1,771	1,252	2,315	2,082	12,137
9	2,561	7,112	13,356	21,511	9,817	4,178	2,471	1,860	90	2,515	2,526	9,237
10	2,220	9,550	13,067	18,308	9,661	3,873	2,372	1,939	1,901	2,580	12,221	7,839
11	2,182	9,060	12,211	15,157	10,324	5,275	2,315	1,347	1,637	2,752	12,035	6,101
12	2,327	9,930	11,403	13,660	8,880	3,899	2,339	100	1,540	3,300	9,477	6,020
13	1,463	12,720	11,067	14,497	7,629	3,701	2,270	2,562	1,626	4,406	6,906	5,764
14	266	47,000	10,875	14,557	7,972	3,702	1,629	2,461	1,428	2,914	5,804	5,537
15	2,654	52,989	8,984	13,646	7,001	3,811	186	2,218	732	4,103	5,063	4,338
16	2,574	41,745	10,684	14,643	8,313	2,705	2,022	2,354	37	3,316	4,473	4,023
17	2,269	28,923	13,364	15,945	10,062	2,800	2,206	2,483	1,673	2,904	3,158	5,321
18	2,335	19,311	14,243	17,886	8,772	4,368	2,228	1,986	2,155	3,201	2,466	4,268
19	2,394	13,731	14,536	22,372	7,885	3,526	2,299	1,372	2,242	3,117	4,473	3,692
20	1,893	12,947	16,437	29,896	11,519	2,940	2,283	3,541	2,202	2,283	3,626	3,798
21	2,041	11,549	20,324	34,926	18,169	2,931	1,483	2,469	1,977	890	3,348	4,245
22	6,810	12,317	19,517	30,809	15,538	3,062	146	2,229	1,245	3,248	6,071	3,177
23	7,950	19,300	16,729	27,402	12,433	2,233	2,125	2,072	36	2,702	7,477	3,125
24	8,184	20,400	14,555	24,627	10,344	1,487	2,365	2,072	2,175	2,643	6,235	4,826
25	7,234	24,772	12,680	23,144	9,195	3,915	2,133	1,433	2,385	2,438	4,868	5,034
26	6,027	27,591	12,449	20,338	7,867	2,987	2,159	296	2,229	2,447	7,257	7,615
27	4,401	23,911	11,429	16,730	6,824	2,732	2,189	1,754	2,209	1,568	12,845	7,827
28	3,891	19,187	11,065	14,422	7,271	2,377	1,641	2,030	2,159	961	15,338	6,859
29	6,291	......	11,264	11,727	6,455	2,448	242	1,958	1,498	2,887	12,689	5,119
30	5,323	......	11,290	11,326	5,109	1,825	2,487	1,889	309	2,484	10,844	4,139
31	4,776	......	11,484	....	6,272	......	2,317	1,956	......	2,523	......	5,473
Mean	3,360	16,481	16,245	18,500	10,034	3,957	1,818	1,876	1,513	2,517	5,849	6,783

NASHUA RIVER AT CLINTON, MASSACHUSETTS.

On the south branch of this stream, near the town of Clinton, the Metropolitan Water Board is now constructing the Wachusett reservoir, for the supply of water to the city of Boston and neighboring cities and towns. Measurements of the flow of Nashua River at Clinton have been made by that board since July, 1896, but the figures have not been published. They have, however, been presented in testimony in court, and have thus been made public. Careful records of rainfall on this watershed have also been made.

SUDBURY RIVER AND LAKE COCHITUATE, MASSACHUSETTS.

Sudbury River and Lake Cochituate have been studied by the engineers of the city of Boston, the State Board of Health of Massachusetts, and the Metropolitan Water Board, and records of rainfall in the Sudbury watershed have been kept since 1875 and in the Cochituate basin since 1852, but the latter have been considered of doubtful accuracy previous to 1872. The records of run-off from 1875 to 1898, inclusive, were published in the Twentieth Annual Report, Part IV, page 75, and those for 1899 in Water-Supply Paper No. 35, page 37, where will also be found a short description of the watersheds of the river and the lake. The following table gives the record for 1900. All of the records were furnished by Mr. Desmond Fitz Gerald.

Run-off of Sudbury River and Lake Cochituate watersheds, in second-feet per square mile, for 1900.

Month.	Sudbury River watershed.	Lake Cochituate watershed.	Month.	Sudbury River watershed.	Lake Cochituate watershed.
January	1.229	1.060	August	— .052	.558
February	5.880	4.136	September	.101	.640
March	5.653	4.020	October	.287	.689
April	2.088	1.454	November	1.026	1.087
May	2.031	1.641	December	1.696	1.502
June	.489	.455			
July	— .028	.293	Mean	1.674	1.445

MYSTIC LAKE, MASSACHUSETTS.

This lake has been a source of water supply for the city of Charlestown, Massachusetts, since 1864. A brief description of the watershed is given in Water-Supply Paper No. 35, page 39, and on page 40 the run-off, in inches, for the watershed from 1878 to 1897, inclusive. Records for 1898, 1899, and 1900 are not available, although observations have been continued. The lake is no longer used as a source of water supply.

CONNECTICUT RIVER AT ORFORD, NEW HAMPSHIRE.

This river has its source in Connecticut Lake, in the extreme northern portion of New Hampshire. A gaging and observation station was established August 6, 1900, by E. G. Paul, on the covered highway bridge over the river between Orford, New Hampshire, and Fairlee, Vermont, about 75 miles from the source of the stream. The gage for making observations of the variations in the height of water in the river consists of a scaleboard 20 feet long, graduated to feet and tenths, fastened horizontally to the inside timbers on the upper side of the bridge, 125 feet from the left-bank abutment, and a steel sash chain running over a side pulley with a 5-pound weight, the length of the chain from the extreme end of the weight to the copper-rivet marker being 42.95 feet.

The observer is Frank H. Gardner, of Orford, New Hampshire. One discharge measurement was made during 1900, as follows:

August 7: Gage height, 3.6 feet; discharge, 1,529 second-feet.

Daily gage height, in feet, of Connecticut River at Orford, New Hampshire, for 1900.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	3.00	5.30	4.60	8.55	17	6.90	3.05	7.95	6.90	6.60
2	......	3.65	6.50	4.50	8.40	18	6.45	2.95	7.60	6.25	6.50
3	......	3.70	6.30	4.40	8.00	19	5.60	2.85	7.15	6.50	6.50
4	......	3.25	5.20	4.15	7.70	20	5.20	2.85	6.80	7.95	6.60
5	......	3.00	4.80	3.85	7.50	21	4.60	2.75	6.50	11.30	6.70
6	3.90	2.35	4.20	3.80	7.40	22	4.15	3.05	6.25	13.90	6.50
7	3.65	2.75	5.15	4.30	7.50	23	3.85	4.35	5.65	14.80	6.70
8	3.75	2.70	6.20	6.00	7.50	24	3.60	5.00	5.75	14.30	6.90
9	4.05	2.80	5.85	11.25	7.50	25	3.40	4.60	5.65	12.70	7.90
10	4.85	3.00	6.15	13.40	7.90	26	3.45	4.15	5.75	11.05	9.00
11	4.95	2.80	7.20	13.35	7.50	27	3.45	3.75	5.70	11.20	8.80
12	5.10	2.70	12.43	12.40	7.50	28	2.70	3.50	5.45	11.40	8.50
13	5.35	2.45	12.80	10.35	7.60	29	3.15	4.15	5.40	9.95	8.20
14	5.75	2.70	10.65	9.55	7.50	30	3.10	4.85	5.00	8.90	......
15	6.65	2.65	8.90	8.35	7.20	31	3.05	......	4.75	......	......
16	7.50	2.75	8.15	7.95	6.70						

CONNECTICUT RIVER AT HOLYOKE, MASSACHUSETTS.

Measurements have been made of the flow of Connecticut River at Holyoke for many years. For records see Water-Supply Paper No. 35, pages 40 to 42. The figures are furnished by Mr. A. F. Sickman, assistant engineer of the Holyoke Water Power Company. The record for the year 1900 is not available.

CONNECTICUT RIVER NEAR HARTFORD, CONNECTICUT.

Observations of the height of Connecticut River near Hartford are made by the Connecticut River bridge and highway district, Edwin D. Graves, chief engineer, as noted in the Twentieth Annual Report, Part IV, page 77. Daily readings from February 8, 1896, to January 1, 1899, were published in Water-Supply Paper No. 35, pages 42 to 44. The record for 1900 is given in the following table:

Daily gage height, in feet, of Connecticut River near Hartford, Connecticut, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	5.7	7.5	......	12.1	5.7	......	3.1	2.5	2.0	3.3	7.1
2	4.0	5.6	17.6	7.0	10.7	5.0	2.4	2.9	......	2.0	3.3	7.0
3	4.0	5.6	18.9	8.0	......	......	2.8	2.7	2.0	2.0	3.0	6.6
4	......	......	15.1	8.7	10.9	4.8	2.0	2 5	2.5	2.0	3.3	6.3
5	......	6.9	12.9	8.3	11.2	7.0	2.2	......	2.5	2.6	3.0	8.0
6	......	9.8	10.5	9.8	......	7.5	2.6	1.9	2.5	2.0	2.9	9.3
7	......	8.7	8.7	10.5	10.2	6.7	2.4	1.9	3.0	2.6	2.9	9.9
8	2.5	7.3	7.8	......	9.5	5.9	......	2.4	2.5	2.6	3.3	8.4
9	......	8.6	7.3	14.2	9.0	5.5	2.3	2.5	......	2.9	3.6	6.9
10	3.0	10.7	7.3	13.5	8.4	......	2.4	2.0	.5	3.0	3.0	......
11	......	9.4	......	12.0	8.4	4.7	2.7	2.9	......	3.0	4.0	4.9
12	4.0	8.5	6.8	10.6	8.4	4.7	2.9	2.0	......	3.3	5.9	......
13	......	11.8	5.9	10.5	......	4.3	3.0	1.9	2.0	4.0	5.6	......
14	......	21.7	6.0	11.2	7.9	4.4	3.0	1.9	2.0	4.6	6.6	......
15	3.1	23.4	5.8	......	7.3	4.3	......	3.4	2.0	5.0	5.9	4.5
16	3.2	22.0	5.4	10.7	6.9	4.0	3.2	3.4	2.0	5.0	5.0	......
17	3.0	19.0	5.5	12.5	6.7	......	3.5	3.7	2.0	4.6	4.9	5.3
18	3.0	14.0	......	14.5	7.2	4.0	3.4	4.5	1.0	4.0	4.3	5.8
19	3.0	10.3	6.0	17.2	8.4	3.9	2.9	......	1.0	3.6	3.9	5.5
20	3.5	9.3	8.4	20.6	......	......	2.6	3.3	1.0	3.6	4.6	5.5
21	......	8.4	11.2	22.2	13.3	3.4	2.8	3.3	1.3	3.0	3.9	5.2
22	7.8	7.6	10.8	22.8	14.7	3.5	......	3.0	1.5	3.0	4.6	......
23	9.9	11.7	9.5	22.3	13.9	3.4	2.6	2.8	1.3	3.6	7.0	......
24	6.9	11.3	8.9	21.7	13.0	......	3.0	3.0	1.5	3.0	7.0	5.2
25	6.7	10.5	......	21.1	11.0	3.0	2.9	2.9	1.6	3.3	7.3	4.8
26	5.7	11.1	7.4	20.5	9.5	3.3	3.4	......	1.6	3.0	8.5	5.5
27	5.4	9.7	7.3	20.4	......	3.4	3.4	2.5	1.3	3.0	10.9	6.0
28	6.0	7.8	6.9	17.9	7.4	3.2	3.4	3.0	1.6	3.6	10.1	6.0
29	7.2	......	6.6	13.9	6.9	3.0	......	2.9	2.0	3.3	10.2	5.3
30	6.7	......	6.6	13.6	6.5	3.2	3.3	2.8	1.6	3.6	8.9	......
31	6.4	......	6.8	......	5.9	......	......	2.5	......	3.0	......	5.7

HOUSATONIC RIVER AT GAYLORDSVILLE, CONNECTICUT.

This gaging station was established October 24, 1900, by E. G. Paul. It is near Merwinsville Station, on the New York and New Haven Railroad. Gage-height observations are made by means of a weight suspended by a sash chain from the covered bridge across the river. The distance from the extreme end of the weight to the copper-rivet marker in the chain is 30.45 feet. The distance from the center of the side pulley to the datum of the gage is 29.35 feet. The gage is referred to a 16-foot scaleboard, graduated to feet and tenths, fastened horizontally to the woodwork on the inside of the covered bridge. The observer is G. H. Monroe, a farmer living within a short distance of the station. As the cross section of the river channel at the bridge was not favorable for making discharge measurements, a cable was stretched across the stream 1¼ miles below the bridge. The span of the cable is 200 feet. It is supported on the right bank by timbers 25 feet high, and is anchored to a large rock which was placed 5 feet below the surface of the ground. On the left bank the cable is fastened to a large sycamore tree, and is anchored to the base of a large oak tree by means of a turn-buckle. A tag wire with markers every 10 feet was placed above the cable. The initial point of sounding is the large sycamore tree which supports the cable on the left bank.

During 1900 the following discharge measurements were made by Mr. Paul:

August 9: Gage height, 3.30 feet; discharge, 450 second-feet.
August 10: Gage height, 3.25 feet; discharge, 422 second-feet.
October 20: Gage height, 3 feet; discharge, 303 second-feet.
October 24: Gage height, 3.10 feet; discharge, 370 second-feet.

Daily gage height, in feet, of Housatonic River at Gaylordsville, Connecticut, for 1900.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		3.2	4.9	12		3.7	4.2	23	2.9	3.9	4.8
2		3.1	4.6	13		3.6	4.2	24	3.1	3.9	5.1
3		3.1	4.3	14		3.7	4.2	25	3.2	3.8	4.3
4		2.9	4.2	15		3.7	Ice.	26	3.1	4.6	4.2
5		3.0	5.6	16		3.7	Ice.	27	3.1	5.5	4.1
6		2.9	5.8	17		3.6	Ice.	28	3.1	5.4	4.2
7		2.8	5.4	18		3.5	Ice.	29	3.1	5.1	4.0
8		3.2	5.1	19		3.6	Ice.	30	3.0	4.9	3.9
9		3.5	4.9	20		3.7	Ice.	31			4.2
10		4.1	4.5	21		4.1	Ice.				
11		3.9	4.2	22		4.0	Ice.				

MISCELLANEOUS MEASUREMENTS OF STREAMS NEAR GREATER NEW YORK.

Measurements of the discharge of three small streams near the city of New York were made by E. G. Paul in 1900. These streams—Tenmile River, Wallkill River, and Esopus Creek—have been under consideration as possible sources for increasing the water supply of Greater New York. Following are the discharge measurements made by Mr. Paul:

Miscellaneous measurements of streams near Greater New York.

Date.	Stream.	Locality.	Discharge.
1900.			*Sec.-ft.*
Aug. 9	Tenmile River	Webatuck, N. Y	46
Oct. 20	do	do	32
Aug. 13	Wallkill River	Rockford Bridge, N. Y	70
Aug. 14	Esopus Creek	Brodheads Bridge, N. Y	92

METHODS EMPLOYED IN THE GAGING OF NEW YORK STREAMS DURING THE YEAR 1900.[1]

The location of gaging stations which have been maintained or established in New York State during the year 1900 are given in the first of the tables which follow. Most of the older stations were established either in connection with the Upper Hudson storage survey of 1895 and 1896 or by the United States Board of Engineers on Deep Waterways in 1898. All of the older stations are in connection with dams and mills. The methods employed in computing the flow of streams from such records are described in Water-Supply Paper No. 35, page 39, and records of flow for past years will be found in the same paper. In connection with all such stations an effort has been made to improve upon the methods formerly used, and to check the previous results by making current-meter measurements to determine the volume of flow through turbines, and the proper allowance to be made for leakage of dams, also to check the calculated flow over dams.

Measurements of streams in New York State have been made with the cooperation of the State engineer and surveyor, Edward A. Bond, and the deputy State engineer and surveyor, William Pierson Judson. The stations established during the year are chiefly current-meter stations, a gage being read once or twice daily to determine the stage of the river, and the current-meter measurements made as opportunity permits, with the water at different stages. A sufficient number of current-meter measurements have not yet been made at any of the stations to permit the construction of rating curves, so that the daily flows in second-feet can not yet be given.

In addition examinations have been made of various streams, notably of those flowing from the northern slope of the Adirondack region, to determine favorable localities for establishing gaging stations, and a number of gaging records have been obtained which are not yet ready for publication.

No single method of gaging has been followed exclusively, but different methods have been pursued, with a view to checking the results obtained. In a number of instances weir and current-meter measurements have been combined at a single station, the former method being employed to calculate the flow over dams, the latter method to estimate diversion to canals or for water-power purposes.

Many of the older stations had been neglected, and at the beginning of the year the gages were out of repair. Many of the gages have been replaced by new ones having metallic figures and division marks, and other changes have been made with a view to increasing the accuracy of the results.

[1] Report of Robert E. Horton, under whose direction the measurements in New York State have been made.

Location of gaging stations on New York streams.

Stream.	Location.	Kind of station.	Duration of record.	Gage reader.
Mohawk River	Ridge Mills	Dam and waterworks.	Oct. 1, 1898, to Nov. 28, 1900.	Daniel Brown.
Oriskany Creek	Oriskany	Dam and feeder	Oct. 16, 1898, to Jan. 31, 1901.	Frank Baker.
Sauquoit Creek	New York Mills (No. 3).	Dam and mill	Sept. 20, 1898, to Sept. 30, 1900.	Robert Hughes.
West Canada Creek.	Twin Rock Bridge.	Bridge	Sept. 9, 1900—Cont'd	Utica Elec. Lt. and Power Co.
Do	Middleville	Dam and mill	Oct. 7, 1898—Cont'd *a*	E. J. Nelson.
Mohawk River	Little Falls	Dam and mills	Sept. 23, 1898—Cont'd	J. J. Gilbert and Wm. Hoffman.
East Canada Creek.	Dolgeville	Dam and power plant.	Sept. 23, 1898—Cont'd	Henry Meyer.
Cayadutta Creek.	Below Johnstown.	do	Oct. 1, 1898—Cont'd	A. N. Terry.
Schoharie Creek	Fort Hunter	Dam and feeder	Sept. 23, 1898, to July 31, 1900. *b*	H. J. Wittemeier.
Do	Erie Canal aqueduct.	Bridge	May 2, 1900, to Oct. 13, 1900.	James Shutts.
Do	Mill Point	do	July 6, 1900—Cont'd	Henry Peters.
Do	Schoharie Falls	Dam and plant	June, 1900—Cont'd	Empire State Power Co.
Mohawk River	Near Schenectady.	Bridge	Feb. 1, 1899—Cont'd *c*	L. Diggins.
Do	Rexford Flats	Dam and feeder	Dec. 8, 1898—Cont'd	H. R. Betts.
Do	Dunsbach Ferry	Dam	Mar. 12, 1898—Cont'd *d*	Kept for D. J. Howell, C. E.
Indian River	Indian Lake dam	Storage dam	July 22, 1900—Cont'd	Frank Pelon
Schroon River	Below Warrensburg.	Dam and mill	Nov. 1, 1895—Cont'd	Joseph Goodfellow.
Hudson River	Fort Edward	Dam and mills	Dec. 1, 1895—Cont'd	B. A. Carr.
Do	Mechanicsville	do	Dec. 1, 1887—Cont'd	The Duncan Co.
Seneca River	Baldwinsville	do	Nov. 12, 1898—Cont'd	Chas. Brannock.
Chittenango Creek.	Bridgeport	do	Sept. 16, 1898—Cont'd	Jefferson Downs.
Oneida Creek	Kenwood	Dam and mill	Oct. 4, 1898, to Dec. 31, 1900. *e*	Wm. Padgham.
Fish Creek, West Branch.	McConnellsville	Dam and mills	Sept. 13, 1898—Con'd *f*	Frank S. Harden.
Oswego River	High dam	do	Apr. 1, 1897—Cont'd	Oswego Waterworks Co.
Do	Above Minetto	Cable	Sept. 14, 1900—Cont'd	H. L. Woodcock.
Salmon River	Above Pulaski	Bridge	Sept. 4, 1900—Cont'd	H. A. Walker.
Moose River	Moose River	Cable	June 5, 1900—Cont'd	Frank W. Smith.
Black River	Huntingtonville dam.	Waterworks dam.	Feb. 22, 1897—Cont'd	Alonzo Dressor.

a No record February 1 to May 9, 1900, inclusive.
b No record December, 1899, and February, 1900.
c No record October 3, 1899, to April 7, 1900, inclusive.
d No record April 1, 1899, to August 31, 1900, inclusive.
e No record August and September, 1899, and February and May, 1900.
f No record August, 1899, to April, 1900.

In the foregoing table there have been included a number of rivers which belong to the Great Lakes drainage, descriptions of which will be found in Water-Supply Paper No. 49, the same being Part III of this series, a geographic arrangement of the streams having been followed, as in former years. The streams referred to are Seneca River at Baldwinsville, Chittenango Creek at Bridgeport, Oneida Creek at Kenwood, West Branch of Fish Creek at McConnellsville, Oswego River at Minetto and at high dam, Salmon River above Pulaski, Moose River below McKeever, Beaver River, and Black River at Huntingtonville.

The following table gives the results of current-meter measurements made on the principal of these streams during the year 1900. A modified form of the Price meter which has been adopted by the United States Geological Survey was used. The usual mode of procedure was to submerge the meter six-tenths of the depth of the stream, at measured intervals across the channel, and record the revolutions for a period of 100 seconds. In cases of doubt, surface and bottom velocities were also taken, or, as a check, the flow was determined by the integrating method. Many of these measurements were made at places where permanent stations have not been maintained, and the gage-height figures given are the distances to water surface measured from some fixed point of reference, usually the coping of either a pier or an abutment. In addition to the results included in the table, 35 current-meter measurements have been made in headraces, feeders, power canals, and other channels, to determine the leakage of dams, the flow through turbines, and the amount of diversions. The results of these measurements will be found in connection with the descriptions of the various gaging stations.

Summary of current-meter measurements of New York streams during 1900.

Date.	Stream.	Location.	Point of measurement.	Hydrographer.	Gage height	Discharge.
					Feet.	*Sec.-ft.*
May 29	Mohawk River	Riverside Bridge	Two miles above Rome.	R. E. Horton	14.90	202
Aug. 31	do	Rome	Below Erie Canal feeder dam.	do		38
Do	do	do	Above Erie Canal feeder dam.	do		188
Apr. 22	do	Ridge Mills	At highway bridge above dam.	H. A. Pressey	1.96	1,385
Aug. 23	do	do	In channel below dam.	R. E. Horton		116
Apr. 30	Oriskany Creek	Oriskany	Wood road bridge	do	12.20	289
Sept. 7	West Canada Creek.	Twin Rock Bridge.		do	.37	182
Sept. 10	do	Middleville		do		245
May 1	Mohawk River	Little Falls	Suspension bridge	do	18.70	4,773
May 23	do	do	Astronga Bridge	do	1.33	1,569
May 22	East Canada Creek.	Dolgeville	Iron highway bridge	do	20.12	412
July 27	do	do	do	do	20.16	452
July 29	do	do	Below High Falls dam.	do		108
Apr. 24	Schoharie Creek	Fort Hunter	West Shore railroad bridge.	H. A. Pressey		5,573
May 2	do	do	Erie Canal aqueduct	E. D. Walker	2.26	1,257
June 21	do	do	Inflow to Mohawk	R. E. Horton		30
July 18	do	do	Below aqueduct; inflow to Mohawk.	E. D. Walker		38
Do	do	do	Total outflow at dam.	do		114
Aug. 22	do	do	Below aqueduct; inflow to Mohawk.	do		44
July 5	do	Mill Point		do	.64	87
Aug. 22	do	do		do	.47	141
May 12	Mohawk River	Schenectady	Freeman's bridge	do	6.50	4,135
July 17	do	do	do	do	5.26	667
Aug. 21	do	do	do	do	5.40	976
Oct. 19	Indian River	Sabael	Below Indian Lake dam.	R. E. Horton	8.20	451
July 25	Schroon River	Warrensburg	Two miles above Warrensburg.	do	16.40	383
Aug. 9	do	do	One mile above mouth.	do		286
July 26	Hudson River	Fort Edward	Highway bridge below paper mill.	do		2,704
Oct. 20	do	Mechanicsville	Highway bridge below Duncan & Co.'s dam.	do	21.50	1,871
June 11	Seneca River	Baldwinsville		do		1,863
June 16	Chittenango Creek.	Bridgeport	Highway bridge below Butternut Creek.	do		95
Sept. 17	Oneida Creek	Kenwood	Headrace above mill.	do	3.25	20
June 1	do	Oneida Castle		do	8.50	36
May 17	Fish Creek, East Branch.	Point Rock		do		485
Sept. 15	Oswego River	Cable station	Three miles above Minetto.	do	5.40	1,677
Sept. 4	Salmon River	Bridge station	Two miles above Pulaski.	do	1.03	103
June 6	Black River	Glen Park Bridge	Two miles below Watertown.	do		2,175

Field work was begun so late that in many instances current-meter measurements to check the calculated flow over dams during high water could not be made. Additional meter measurements are also needed at all of the current-meter stations to establish discharge curves. This report must therefore be considered as in some degree preliminary.

For mill streams, where the water is held back as pond storage during the dry season, and where the mills are stopped on Sundays or holidays, it is impossible to determine the natural regimen of flow. If at the time the water wheels are stopped the water stands below the level of the crest of the dam, the flow in the stream channel below will be nil, or at best will only equal the leakage of the dam, flumes, or penstocks. With regard to estimation of Sunday flow, no uniform rule has been followed. In some of the older records the Sunday flow during the dry season has been taken as the mean of the calculated flow for the preceding and following days, and in cases where this method had previously been used it has been adhered to in computing the daily discharge of the streams. In other instances the daily flow given in the table is that shown by the gaging record, and represents as nearly as may be the actual amount of water flowing in the stream channel below the dam, but it may be quite different from the amount entering the pond above the dam.

The relation existing between the canals of New York and the streams of the central portion of the State is very complicated. In many cases diversion from the headwaters of the streams for the supply of canals virtually reduces their effective drainage areas. As a result, the watersheds during the summer may be materially less in area, and in their water-yielding characteristics may differ widely from the region tributary to the streams when the canals are not in operation. It is evident that the run-off from such streams is not comparable with that from streams having an undisturbed regimen.

It often happens that a single gage reading taken at or near the culmination of a flood shows a larger flow than the mean for any single day. The results of such isolated observations, together with other data relative to extremes of flow, have been given for a number of stations.

The drainage areas of the various streams above the gaging stations and at other points are given in the following table:

Drainage areas of New York streams.

Stream.	Location.	Area.
		Sq. miles.
Batten Kill *a*	At mouth	*b* 438
Beaver River	do	322
Do	Above Beaver	153
Do	Below Beaver	169

a Hudson River tributary. *b* Upper Hudson storage surveys.

Drainage areas of New York streams—Continued.

Stream.	Location.	Area.
		Sq. miles.
Black Creek *a*	At mouth	39
Black River	do	1,930
Do	At gaging station	1,889
Do	At Forestport	*b* 268
Cayadutta Creek *c*	At mouth	*b* 62
Do	At gaging station	*b* 40
Chittenango Creek	At mouth	*b* 309
Do	At Bridgeport *d*	*b* 307
East Canada Creek *c*	At mouth	283
Do	At gaging station	256
Fish Creek, East Branch	At Point Rock	*b* 104
Fish Creek, West Branch	At McConnellsville *d*	*b* 187
Fulton Chain	Above Old Forge	41
Hoosic River *e*	At mouth	*f* 730
Hudson River	At Troy	*f* 8,000
Do	Above Mohawk	4,627
Do	At Mechanicsville	*f* 4,500
Do	At Fort Edward	*f* 2,800
Do	At Hadley *g*	*f* 1,092
Indian Lake *e*	At gaging station	146
Lake Neatahwanta *a*	At mouth of outlet	23
Mohawk River	At mouth	*b* 3,468
Do	At Rexford Flats *d*	*b* 3,385
Do	At Schenectady *d*	3,212
Do	At Little Falls *d*	*b* 1,306
Do	At Ridge Mills *d*	*b* 153
Moose River	At mouth	406
Do	At cable station	346
Ninemile Creek *c*	At mouth	*b* 74
Do	At gaging station	*b* 63
Oneida Creek	At mouth	*b* 149
Do	At Kenwood *d*	*b* 59
Oneida River	At mouth	*b* 1,402
Oriskany Creek *c*	do	*b* 146
Do	At State dam *d*	*b* 144
Oswego River	At mouth	5,002
Do	At high dam	5,000
Do	At cable station	4,990
Do	At Fulton	4,916
Do	Below Three River Point	*b* 167
Sacandaga River *e*	At mouth	*b* 1,056
Salmon River	At bridge station	264
Do	One mile above falls	*b* 191
Sauquoit Creek *c*	At mouth	67
Do	At gaging station	52
Schoharie Creek *c*	At mouth	*b* 947
Do	At Fort Hunter *d*	*b* 947
Do	At Mill Point *d*	934
Do	At Schoharie Falls *d*	930
Schroon River	At gaging station	563
Seneca River	At mouth	*b* 3,433
Do	At Baldwinsville *d*	*b* 3,103
West Canada Creek *c*	At mouth	569
Do	At Middleville *d*	518
Do	At Trenton Falls	375
Do	At Twin Rock Bridge *d*	252

a Oswego River tributary.
b United States Board of Engineers on Deep Waterways.
c Mohawk River tributary.
d Gaging station.
e Hudson River tributary.
f Upper Hudson storage surveys.
g Not including Schroon River.

MOHAWK RIVER GAGING STATIONS.

Gaging records have been kept on this stream at the following dams and mills: Rome waterworks pumping station at Ridge Mills, lower dam at Little Falls, New York State dam at Rexford Flats, and West Troy Company's dam at Dunsbach Ferry. A current-meter station at Freeman's bridge, below Schenectady, has also been maintained.

An important series of gagings has also been instituted on Mohawk River by the New York State canal survey, under the direction of Edward A. Bond, State engineer and surveyor. A statement regarding these gagings has been furnished by Mr. D. J. Howell, consulting engineer of the New York State canal survey. Gages have been erected at various places along the stream, from Herkimer to the confluence of the river with Hudson River at Cohoes, both above and below each dam and near the points of inflow of the more important tributaries, and the positions of the gage zeros have been determined with reference to mean tide as a datum. Gages previously maintained by the United States Geological Survey have been used wherever available. Observers are employed to take simultaneous daily readings of the gages, from which the slope of the water surface for each level or division will be determined and the velocity of flow computed. It is the intention to take cross sections of the stream channels in each level, at different stages, and to make current-meter or other discharge measurements during high water.

The regimen of Mohawk River during the navigation season is undoubtedly influenced to a large extent by the Erie Canal, which runs parallel to it from Rome to Cohoes. The water supply of the Erie Canal east of the summit level at Rome is, with a single exception, derived from Mohawk River and its tributaries. The State dams and feeders are located as follows:

Location of State dams and feeders.

Stream.	Location.
Mohawk River	Delta, 6 miles above Rome.
Do	Rome.
Oriskany Creek	Oriskany.
Mohawk River	Little Falls.
Do	Fivemile or Rocky Rift dam.
Schoharie Creek	Fort Hunter.
Mohawk River	Rexford Flats.

A large diversion from the watershed at these feeders is in some measure counterbalanced by return water to the main channel, from seepage through canal and feeder banks, and from flow over wasteweirs.

The gaging records at Rexford Flats and at Little Falls indicate that during the navigation season the yield of the watershed, in second-feet per square mile, and frequently, also, the actual flow of the river, in second-feet, is considerably less at the former station than at the latter station. The drainage area above Rexford Flats is 3,385 square miles, or 2.6 times that at Little Falls, which is 1,306 square miles. This fact appears to be confirmed by the other gaging records kept on the stream, but the results of these have not been sufficiently worked up to permit a final discussion of the subject at this time. The diminished water-yielding capacity of the lower Mohawk Basin may be attributed in part to the low water of Schoharie Creek. The total drainage area of that creek is 947 square miles. Weir measurements at Schoharie Falls show that the flow sometimes falls below 50 second-feet. During practically the entire summer no water flows over the crest of the State dam at Fort Hunter; the major portion of the flow is diverted to the Erie Canal feeder, and the remainder leaks through the dam. During the summer of 1900, from June to October, inclusive, the direct inflow to the Mohawk from this tributary did not, with the exception of a few days, exceed 45 second-feet, or 0.05 second-foot per square mile.

MOHAWK RIVER AT RIDGE MILLS, NEW YORK.

A description of this station will be found in Water-Supply Paper No. 35, page 45. During the present season (1900) the calculated discharge of the turbines has been made to depend on current-meter measurements, instead of on the observed wheel-gate openings, as formerly.

Table showing relation of speed of pumps to water flowing in tailrace.

Date.	Speed of pumps.	Measured flow in tailrace.
1900.	*Rev. per min.*	*Second-feet.*
May 29	15	122
August 23	12	95

The discharge of the turbines is sensibly proportional to the rate at which the waterworks pumps which they drive are run, and a straight-line diagram has been prepared, using the foregoing data, from which the flow through the turbines has been estimated.

On August 23, when no water was flowing over the crest, a measurement of the leakage of the dam was made in the stream channel below; it was found to be 20 second-feet, and an allowance of that amount has been made in estimating the daily flow. The results of other meter measurements at this station, and in the vicinity, will be found in the table on page 39.

The gaging record at Ridge Mills does not include any allowance for diversion to Black River Canal at the Delta feeder, 4 miles upstream, nor for return water from seepage and wasteweirs.

Daily discharge, in second-feet, of Mohawk River at Ridge Mills, New York, for 1898.

[Drainage area, 153 square miles.]

Day.	Oct. *a*	Nov. *a*	Dec. *a*	Day.	Oct. *a*	Nov. *a*	Dec. *a*
1	154	269	123	18	215	294	169
2	149	249	144	19	199	294	144
3	133	215	133	20	249	304	159
4	127	199	133	21	215	279	342
5	143	215	169	22	999	369	609
6	249	249	184	23	859	697	974
7	199	369	144	24	794	409	639
8	173	259	169	25	519	294	419
9	159	249	169	26	609	215	344
10	149	1,134	154	27	1,251	191	319
11	143	2,134	184	28	574	199	159
12	149	697	184	29	409	134	219
13	154	515	121	30	539	104	324
14	259	439	136	31	314	-------	644
15	889	371	159				
16	349	359	159	Mean	369	401	261
17	319	315	154				

a Revised figures.

Daily discharge, in second-feet, of Mohawk River at Ridge Mills, New York, for 1899.

Day.	Jan. *a*	Feb. *a*	Mar. *a*	Apr. *a*	May. *a*	June.	July.	Aug.	Sept.	Oct.	Nov. *a*	Dec. *a*
1	316	214	351	364	321	337	262	218	-------	93	515	225
2	243	214	394	319	319	319	252	233	-------	203	515	695
3	296	214	366	254	239	279	232	248	-------	233	345	395
4	298	214	306	311	204	259	249	131	-------	253	295	345
5	2,373	199	176	344	176	214	202	146	-------	200	365	295
6	896	164	1,074	391	151	232	127	131	-------	310	295	295
7	409	123	735	439	102	232	262	126	-------	290	265	275
8	316	166	414	1,264	94	262	322	121	-------	260	295	235
9	299	126	346	1,034	129	259	669	125	85	290	295	235
10	219	129	219	686	138	279	499	129	85	310	245	235
11	164	129	254	799	344	249	379	139	85	340	315	315
12	157	129	1,174	1,364	414	282	359	169	95	260	295	3,625
13	157	129	1,211	1,499	296	282	339	265	89	310	265	1,155
14	153	173	701	2,181	361	302	339	245	85	260	265	510
15	911	265	364	1,744	214	402	319	275	99	310	265	455
16	725	258	321	1,841	161	399	399	295	115	240	265	365
17	459	184	239	1,364	389	359	319	230	135	220	295	295
18	324	126	219	1,654	361	339	399	230	112	290	295	295
19	223	166	274	2,226	549	282	382	245	85	290	265	1,075
20	199	151	581	2,034	614	279	339	245	79	290	245	1,495
21	193	160	464	1,404	436	262	302	265	79	240	245	1,095
22	208	494	364	1,264	319	259	382	295	56	260	265	315
23	214	697	389	1,139	274	299	299	272	56	260	265	315
24	261	389	436	959	239	259	282	289	56	310	265	345
25	338	346	416	766	219	259	275	262	60	540	295	315
26	318	296	344	614	204	259	262	269	69	220	265	285
27	244	436	274	549	189	249	289	309	69	310	265	285
28	223	451	241	439	386	249	165	309	53	340	265	285
29	208	-------	536	354	1,136	249	133	278	53	360	205	285
30	170	-------	436	319	546	229	178	315	79	260	205	75
31	170	-------	436	-------	344	-------	178	200	-------	260	-------	75
Mean	377	244	467	997	320	281	310	226	81	278	291	532

a Revised figures.

Daily discharge, in second-feet, of Mohawk River at Ridge Mills, New York, for 1900.

Day.	Jan.*a*	Feb.	Mar.	Apr.	May.*b*	June.*b*	July.*b*	Aug. *b*	Sept.*b*	Oct.*b*	Nov.
1	270	200	784	810	130	168	125	104	155	175	395
2	270	132	815	1,080	130	216	115	120	115	185	365
3	270	100	750	1,245	130	285	105	120	109	165	340
4	290	180	630	1,135	130	230	105	92	105	113	340
5	310	100	280	1,065	130	180	160	90	112	115	460
6	310	248	224	1,245	130	168	158	104	112	113	1,970
7	340	128	354	2.205	130	215	175	84	112	115	965
8	1,115	125	359	1,845	130	180	170	84	104	111	835
9	475	1,628	320	1,070	130	230	112	107	85	113	705
10	530	1,128	300	740	130	230	110	100	100	127	725
11	475	854	280	680	130	185	120	88	100	118	725
12	420	738	219	930	125	180	150	154	107	118	640
13	415	3,162	254	930	100	180	137	365	92	109	620
14	305	1,928	254	835	100	215	130	458	95	102	645
15	305	1,058	219	900	100	165	100	364	115	395	580
16	265	618	164	1,485	105	155	100	88	115	395	580
17	265	578	149	1,685	210	158	160	84	215	395	620
18	345	284	159	3,375	210	180	140	80	325	109	640
19	365	202	169	1,805	147	165	163	84	118	90	1,550
20	1,365	188	544	935	147	170	165	92	179	90	1,760
21	1,535	198	590	930	130	170	250	98	625	95	1,480
22	875	288	594	1,235	130	165	185	124	615	95	965
23	655	803	594	930	112	185	125	97	415	95	965
24	285	714	370	675	105	205	132	84	435	895	735
25	365	268	164	555	105	140	515	165	395	415	1,665
26	480	172	160	365	105	145	270	165	205	395	3,990
27	285	202	164	365	105	123	198	120	175	410	(*c*)
28	265	132	160	315	105	180	175	185	127	395	......
29	270	......	164	275	110	130	180	125	185	345	......
30	270	......	116	225	105	124	107	124	205	95	......
31	270	......	112	......	105	......	117	179	......	95	......
Mean	160	581	336	1,062	126	180	160	140	198	212	971

a Record doubtful; owing to ice on crest of dam.
b Record doubtful; flashboards changed frequently.
c Dam and gage injured in flood.

ORISKANY CREEK AT ORISKANY, NEW YORK.

A description of this station, as well as of a second station which was maintained for a time at Coleman, on the same stream, will be found in Water-Supply Paper No. 35, page 47. The Oriskany station is located at the New York State dam. During the summer the entire flow, less leakage, is ordinarily diverted to the canal feeder. H. Waterbury & Company's dam, located just below the State dam, backs water above the toe of the latter dam, so that direct measurements of the leakage of the State dam can not readily be made. During the winter and spring the flow of the river is available for power from the lower dam, but during the season of navigation the inflow to the river from this tributary amounts to only a few second-feet. The computed flow at the gaging station represents the total outflow from the pond above the State dam, and includes water diverted from Chenango River through the channel of Oriskany Creek to feed Erie Canal. A record is kept of the height of water in the pond above the dam, and also of that in the feeder channel below the head gates. The observed difference, or the head on the feeder gates, together with the area of the gate openings, have been used in the formula for discharge through submerged orifices to determine the flow. A screen rack in the forebay, just above the feeder gates, often becomes clogged with drift, causing a loss of head of several inches. In order that the correct head on the feeder gates might be obtained, at the beginning of the navigation season of 1900 a gage was placed in the forebay between the screen rack and the feeder gates.

Current-meter measurements have been made in the Oriskany feeder, as follows:

Current-meter measurements in Oriskany feeder.

Date.	Hydrographer.	Measured discharge.	Computed discharge.
		Second-feet.	*Second-feet.*
October 15, 1898	W. D. Lockwood	49.5	48.9
Do	do	118.9	119.1
April 28, 1900	R. E. Horton	167.9	170.3
May 29, 1900	do	103.2	

During the dry season the gateways leading to the feeder are wide open and the water flows through unobstructed, as in an open channel, so that the formula for discharge through orifices can not be applied.

In this connection the difficulties encountered in gaging the flow in canal feeders are worthy of comment. Broadly speaking, the amount of water required for the supply of canals is proportional to lockage and evaporation jointly, with, perhaps, a constant factor added for seepage losses. As a matter of fact, however, the rate of flow in the feeder often fluctuates, within wide limits, several times a day. Usually gates are placed in both the inlet and the outlet ends of the feeder channel. The height of the water in the feeder is influenced by the height of the water in the canal and in the supply pond above, while the velocity of flow may be varied by changes in the gate openings at either end. Isolated discharge measurements are of value in a general way, but it may be said that nothing short of a continuous record, both of the stage of the water in the feeder and of its velocity of flow, will serve to determine the actual diversion from day to day.

Daily discharge, in second-feet, of Oriskany Creek at Oriskany, New York, for 1898.

[Drainage area, 144 square miles.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		329	266	18	212	304	160
2		298	259	19	231	310	220
3		274	428	20	266	392	195
4		276	413	21	248	359	300
5		266	457	22	328	263	380
6		269	445	23	350	300	825
7		267	445	24	316	324	410
8		236	462	25	230	278	355
9		284	393	26	330	253	210
10		370	388	27	564	502	150
11		740	425	28	457	335	100
12		370	460	29	403	309	235
13		365	346	30	339	254	235
14		333	160	31	336		285
15		352	150				
16	338	311	300	Mean	325	327	327
17	248	304	280				

Daily discharge, in second-feet, of Oriskany Creek at Oriskany, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	180	157	495	180	238	90	......	206	83	180	320	90
2	180	167	355	170	144	80	......	206	87	138	175	103
3	195	150	425	160	139	80	......	167	73	108	115	73
4	220	177	460	260	139	80	......	126	10	99	138	108
5	220	167	910	390	129	80	......	126	75	119	144	80
6	250	217	650	425	124	80	138	177	108	132	346	107
7	285	230	410	525	122	80	184	177	101	122	374	99
8	220	243	300	1,270	122	80	170	195	133	138	429	40
9	260	277	240	770	124	80	104	195	176	95	364	30
10	220	277	215	600	124	80	110	195	180	58	394	10
11	255	343	175	490	28	89	117	195	159	106	634	45
12	255	343	645	1,220	28	94	124	195	95	97	534	340
13	410	364	490	1,440	25	89	124	195	73	92	564	330
14	505	343	340	1,160	25	94	124	195	87	26	584	80
15	550	364	280	910	30	104	124	206	85	72	564	65
16	505	337	255	625	105	101	208	206	89	45	484	80
17	380	343	200	370	122	94	208	206	115	106	524	40
18	315	337	230	340	134	113	197	206	123	58	584	65
19	255	304	355	290	139	113	183	206	119	71	202	250
20	260	297	370	260	120	113	183	206	138	48	53	130
21	290	390	330	230	140	113	270	206	161	82	124	110
22	270	410	285	130	160	113	270	206	129	73	154	50
23	290	404	355	50	140	118	270	206	162	85	174	50
24	290	303	280	50	115	118	196	206	102	88	214	70
25	260	287	285	50	115	118	196	206	112	70	174	50
26	285	297	240	416	159	118	196	194	181	70	438	40
27	305	367	220	406	144	118	196	184	222	54	318	30
28	340	244	215	120	139	113	196	184	216	158	318	35
29	305	......	205	335	139	113	196	184	185	72	582	30
30	290	......	190	325	129	113	196	98	206	55	789	65
31	300	......	190	......	134	......	196	98	......	115	......	70
Mean	295	291	342	466	119	99	180	186	126	91	360	89

Daily discharge, in second-feet, of Oriskany Creek at Oriskany, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	64	139	254	1,318	238	95	110	100	82	70	186	250
2	133	212	786	1,391	192	95	110	100	74	70	191	205
3	81	326	876	1,046	163	95	110	100	76	70	136	185
4	96	286	776	546	163	95	110	100	84	70	117	175
5	41	416	736	426	144	95	110	100	66	70	122	607
6	76	302	398	916	183	95	140	100	81	70	73	427
7	54	218	756	896	161	95	88	100	85	70	95	330
8	101	302	454	596	163	97	73	100	85	175	101	285
9	54	1,871	366	308	136	95	104	100	61	66	105	205
10	114	596	302	206	133	95	101	100	73	63	35	177
11	56	416	218	194	150	95	107	100	73	75	185	202
12	96	139	163	286	70	95	105	100	61	75	151	147
13	51	3,116	157	316	105	95	105	100	70	75	106	292
14	68	454	157	254	94	95	105	124	70	75	113	142
15	81	248	139	212	105	95	105	107	70	78	136	112
16	133	139	133	206	118	95	105	103	70	84	96	157
17	145	114	127	470	144	95	105	100	70	81	113	202
18	114	76	76	1,090	171	95	105	100	70	78	114	217
19	546	60	170	427	156	95	107	100	70	80	81	217
20	1,376	81	696	315	148	95	105	100	70	80	127	337
21	576	127	496	212	161	95	107	100	70	75	127	277
22	721	170	294	877	115	95	124	100	70	75	78	242
23	176	236	326	379	113	95	105	100	70	77	158	272
24	91	96	386	260	113	95	105	100	70	83	161	1,172
25	481	91	254	239	113	95	114	100	70	75	430	427
26	156	56	236	235	113	95	110	100	70	75	2,592	242
27	51	170	183	201	113	95	112	110	70	103	857	217
28	106	133	227	283	113	97	108	132	75	100	342	172
29	91	......	286	282	113	95	33	111	85	100	242	172
30	114	......	686	272	113	95	32	100	85	100	297	192
31	156	......	846	......	113	95	30	100	......	191	......	177
Mean	199	378	386	488	136	95	100	103	73	85	255	272

SAUQUOIT CREEK AT NEW YORK MILLS, NEW YORK.

A description of this station will be found in Water-Supply Paper No. 35, page 48. During the summer little water flows over the dam, the entire volume being used to drive the water wheels in the adjoining cotton mills. The leakage of the dam was measured by current meter on May 31, and was found to be 5.6 second-feet.

This station was discontinued October 1, 1900.

Daily discharge, in second-feet, of Sauquoit Creek at New York Mills, New York, for 1898.

[Drainage area, 52 square miles.]

Day.	Sept.	Oct.	Nov.	Dec.
1	...	16	42	49
2	...	*7	43	44
3	...	27	38	34
4	...	18	36	*50
5	...	31	32	46
6	...	54	*59	42
7	...	35	38	44
8	...	23	36	49
9	...	*23	38	42
10	...	35	132	28
11	...	52	140	*22
12	...	46	58	42
13	...	46	*69	42
14	...	46	62	36
15	...	144	52	37
16	...	*80	49	42
17	...	105	49	34
18	...	105	49	*30
19	...	60	43	42
20	18	36	*95	38
21	26	38	46	76
22	18	42	61	104
23	16	*73	69	288
24	22	71	76	99
25	*37	48	42	*76
26	30	59	66	62
27	40	140	*62	46
28	40	74	36	44
29	30	68	43	38
30	21	*66	42	74
31	...	57	...	52
Mean	27	56	57	57

* Sunday.

Daily discharge, in second-feet, of Sauquoit Creek at New York Mills, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*72	42	77	45	56	42	12	17	18	(*)	53	19
2	158	36	48	*40	50	34	(*)	11	5	29	42	13
3	58	38	48	57	48	18	27	43	(*)	24	21	*23
4	111	18	42	73	36	*30	10	30	...	21	26	32
5	140	*40	*480	104	33	42	30	12	33	15	*29	22
6	74	36	109	165	28	56	27	(*)	32	16	32	26
7	50	36	72	188	*26	48	18	26	6	8	22	26
8	*13	26	73	47	47	39	16	25	21	*13	24	19
9	58	30	62	*156	35	23	*25	22	12	18	24	12
10	38	21	60	100	26	34	31	...	(*)	18	19	*14
11	30	6	85	144	30	*13	30	25	22	18	29	16
12	36	*65	*300	160	50	28	27	14	19	18	*29	72
13	54	35	87	585	25	20	19	(*)	19	16	29	64
14	41	35	85	350	*9	19	22	25	8	7	24	38
15	*185	29	82	253	47	30	13	22	5	*13	24	32
16	57	29	71	*228	36	34	*30	18	15	18	21	35
17	68	33	50	122	52	38	23	5	(*)	15	24	*35
18	48	37	43	118	47	*7	27	18	19	16	21	38
19	30	*13	*447	119	51	30	27	5	19	18	*24	32
20	36	48	80	98	52	30	19	(*)	13	14	26	42
21	42	58	65	90	*12	23	11	22	14	12	26	54
22	*13	409	87	53	52	21	3	19	21	*18	26	35
23	48	100	90	*86	35	25	(*)	16	10	24	25	32
24	52	62	90	59	36	23	27	5	(*)	18	21	*30
25	44	50	55	80	29	*23	30	15	22	22	18	25
26	44	*65	*95	76	33	26	22	10	15	19	*22	32
27	42	173	69	58	20	20	27	(*)	22	15	24	28
28	14	62	79	54	*40	19	11	22	13	7	24	16
29	*59	...	76	43	42	20	14	30	18	*19	21	19
30	36	...	71	*50	42	21	(*)	18	10	32	21	13
31	30	...	78	...	43	...	27	5	...	26	...	*14
Mean	58	58	111	127	38	23	20	16	14	17	26	29

* Sunday.

Daily discharge, in second-feet, of Sauquoit Creek at New York Mills, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	86	87	69	*207	81	42	*5	23	27
2	46	77	81	337	81	20	38	23	*5
3	46	97	35	267	81	*29	38	34	5
4	40	*45	*21	135	87	42	5	10	23
5	40	69	81	135	30	42	38	*5	23
6	17	72	74	91	*43	35	86	30	17
7	*25	67	89	269	87	29	34	23	20
8	50	147	89	*207	81	40	*9	23	26
9	36	495	86	103	81	24	65	20	*5
10	42	65	38	87	74	*17	65	17	23
11	40	*67	*17	87	77	42	28	15	37
12	46	172	74	113	41	46	32	*5	5
13	18	1,413	74	95	*55	41	32	23	5
14	*9	130	68	87	87	25	22	20	10
15	50	92	68	*135	65	32	*5	17	17
16	43	68	63	85	26	24	42	20	*5
17	50	37	42	207	35	*5	35	20	13
18	50	*55	*13	297	35	29	35	37	17
19	306	74	68	170	24	41	28	*5	17
20	272	68	371	95	*29	38	32	30	17
21	*117	68	95	193	35	38	33	18	17
22	92	379	93	*295	35	25	*5	20	13
23	97	392	93	95	35	27	38	17	*9
24	115	34	55	103	35	*5	38	17	13
25	95	*13	*67	91	35	32	48	18	17
26	65	80	89	87	14	38	42	*5	13
27	22	47	68	87	*33	25	32	30	17
28	*68	74	87	49	28	32	22	37	13
29	83	....	86	*55	22	57	*5	35	13
30	91	....	199	91	5	33	38	35	*5
31	63	....	165	....	35	....	35	37	....
Mean	72	146	84	138	49	32	32	22	15

* Sunday.

WEST CANADA CREEK AT TWIN ROCK BRIDGE, NEW YORK.

Twin Rock Bridge crosses West Canada Creek 2 miles above Hinckley, at practically the point of emergence of the stream from the Adirondacks. The bridge is of iron, has two spans, and is 167.5 feet long between abutments. The stream bed is of gravel and rock, and the conditions are unusually favorable for a current-meter station. A gage board was set and a record commenced on September 7, 1900. The gage is read at 7 a. m. and at 6 p. m. each day, and the average of the two daily readings is given in the appended table. A current-meter measurement made on September 7 showed the discharge to be 182 second-feet. The gage reading was 0.37 foot.

The record at Twin Rock Bridge is kept by the Utica Electric Light and Power Company. This company is erecting a power plant at Trenton Falls, 4 miles farther downstream. A concrete dam has been constructed, which will give a head of 265 feet on the turbines, which are of special design. It is the intention, after the plant is completed, to keep a continuous record of the amount of water used by the turbines and of the flow over the spillways.

The drainage areas at the different gaging stations are as follows:

Drainage areas of West Canada Creek.

	Square miles.
At mouth	569
At Middleville	519
At Trenton Falls	375
At Twin Rock Bridge	252

Daily gage height, in feet, of West Canada Creek at Twin Rock Bridge, New York, for 1900.

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		0.85	0.90	1.60	17	0.45	1.05	1.50	1.50
2		.75	1.60	1.85	18	.30	1.00	1.80	1.50
3		.65	1.10	2.00	19	.30	.95	5.50	1.50
4		.70	1.05	1.90	20	1.65	1.15	5.30	1.50
5		.60	1.15	1.75	21	2.90	.62	5.30	1.50
6		.55	1.70	1.55	22	2.35	.60	4.45	1.50
7		.65	4.55	1.40	23	1.50	2.30	3.75	1.75
8		.85	4.25	1.40	24	.95	2.45	2.00	1.70
9	0.35	.75	3.05	1.50	25	1.10	1.75	6.25	1.65
10	.32	.90	1.45	1.50	26	.90	1.70	6.20	1.60
11	.35	.85	2.05	1.50	27	.95	2.55	4.40	1.55
12	.32	.70	1.90	1.50	28	1.00	1.95	3.55	1.50
13	.35	.60	1.55	1.50	29	.85	1.15	1.90	1.50
14	.35	1.25	1.60	1.50	30	.90	1.20	1.70	
15	.38	1.30	1.50	1.50	31		1.50		
16	.78	1.10	1.50	1.50					

WEST CANADA CREEK AT MIDDLEVILLE, NEW YORK.

A description of this station will be found in Water-Supply Paper No. 35, page 49. In the past the principal element of uncertainty with regard to this record was considered to be the leakage of the dam, etc., which had been taken at 50 second-feet. Current-meter measurements were made on September 10, 1900, to determine the leakage of the dam and the low-water flow of the stream at this station, with the following results:

	Second-feet.
Highway bridge below dam, measured flow in main stream channel	113
Measured flow in hydraulic canal	132
Total flow by current-meter measurements	245

The calculated flow from the gage record is as follows:

	Second-feet.
Flow over dam, gage reading 0.67 foot	60
Leakage previously estimated	50
Total flow in main channel	110
Calculated diversion to water wheels	131
Total estimated flow	241

Unfortunately no current-meter measurements to check the calculated flow during high water have been made. The highest water observed was in August, 1898, when it reached a depth of 5.5 feet on the crest of the Middleville dam. The discharge at that time can not accurately be estimated, as a part of the water flowed around the end of the dam and passed overland to the stream channel below. High-water marks at the Newport dam indicate that the spring freshet discharge has been as great as 22,000 second-feet, or 46.6 second-feet per square mile, from a drainage area of 472 square miles. The lowest water in this stream occurs on Sundays, when the flow is held back, as pond storage, by dams above Middleville. Aside from this, the most notable low-water period was September 2 to 12, inclusive, 1899, the mean flow at Middleville for eleven days being 183 second-feet per square mile.

Daily discharge, in second-feet, of West Canada Creek at Middleville, New York, for 1898.

[Drainage area, 519 square miles.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	....	777	650	18	968	752	*1,349
2	....	670	580	19	783	800	1,374
3	....	584	580	20	689	*970	1,469
4	....	595	*539	21	737	904	1,288
5	....	450	589	22	981	801	1,614
6	....	*550	651	23	*1,894	990	2,072
7	1,662	911	588	24	1,758	983	2,083
8	407	626	465	25	1,299	775	*1,739
9	*404	711	483	26	1,055	602	1,425
10	398	1,679	624	27	2,436	*740	1,181
11	447	4,240	*519	28	2,554	1,224	892
12	461	4,163	531	29	1,580	679	711
13	481	*2,410	552	30	*1,129	713	1,082
14	569	1,318	742	31	979	....	1,492
15	2,152	1,071	1,123				
16	*1,894	788	1,362	Mean	1,161	1,110	1,024
17	1,263	816	1,413				

* Sunday.

Daily discharge, in second-feet, of West Canada Creek at Middleville, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*1,216	1,135	1,563	821	2,979	1,114	198	273	257	*480	1,281	330
2	1,241	1,205	1,354	*523	4,760	763	*140	292	191	510	2,867	580
3	1,378	1,335	1,208	620	2,696	593	200	345	*145	470	1,744	*710
4	1,376	1,340	1,191	622	2,735	*550	116	316	145	436	1,199	710
5	3,445	*1,292	*1,348	680	1,926	531	240	237	210	337	*1,040	518
6	3,500	1,203	1,635	680	1,455	480	240	*155	205	253	831	540
7	1,858	1,101	1,835	748	*1,238	294	256	286	195	288	469	1,750
8	*1,315	1,172	1,207	1,697	1,187	314	204	262	219	*190	542	1,670
9	1,173	937	942	*1,503	2,170	258	*675	256	169	232	482	840
10	782	1,535	812	1,601	1.422	182	993	242	*145	220	390	*700
11	462	1,350	751	1,588	1,073	*130	807	246	188	234	420	640
12	786	*1,690	*1,340	2,230	1,189	283	443	214	201	210	*410	3,150
13	1,119	1,418	1,724	2,465	1,003	297	445	*125	221	239	342	4,710
14	1,132	1,227	1,632	3,228	*995	248	343	254	205	219	313	2,530
15	*1,615	1,666	1,181	3,582	1,196	753	236	216	204	*140	372	740
16	1,760	2,640	1,071	*3,513	888	839	*430	253	189	241	343	840
17	1,771	2,500	814	3,549	1,143	499	600	239	*145	238	363	*640
18	1,102	2,111	944	3,751	1,064	*320	560	235	197	235	372	1,060
19	621	*2,410	*1,060	4.477	1,183	339	479	174	208	217	*220	1,880
20	519	1,562	1,175	5,717	1,633	331	345	*110	213	152	337	3,520
21	563	1,816	1,555	5,564	*1,240	373	327	221	239	261	310	2,530
22	*535	1,966	1,412	5,381	1,274	346	225	245	238	*190	363	1,400
23	568	2,044	1,179	*6,083	996	263	*140	257	204	245	293	990
24	616	1,764	1,180	5,956	884	203	241	229	*145	225	273	*1,150
25	701	1,660	1,203	5,904	844	*155	241	254	209	238	273	900
26	763	*1,490	*1,313	6,994	801	283	241	183	476	231	*249	840
27	640	1,564	764	6,208	728	273	244	*110	433	267	312	580
28	626	1,444	795	5,779	*810	280	239	255	248	224	292	540
29	*605	....	762	4,969	1,255	308	171	247	213	*965	310	640
30	818	....	685	*4,513	1,179	275	*115	262	386	1,040	310	540
31	1,010	....	758	....	1,191	....	234	269	....	629	....	*860
Mean	1,150	1,594	1,176	3,365	1,456	397	324	235	221	324	577	1,259

* Sunday.

Daily discharge, in second-feet, of West Canada Creek at Middleville, New York, for 1900.

Day.	Jan.	May.a	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	824	....	415	*320	362	457	470	450	1,517
2	722	....	358	338	450	*320	469	320	*1,232
3	984	....	*530	381	450	459	426	285	1,025
4	1,001	....	490	330	315	453	401	*270	1,175
5	1,219	....	524	299	*190	464	336	270	1,325
6	1,227	....	522	289	249	494	219	340	1,325
7	*1,240	....	491	358	235	534	*193	360	1,044
8	1,244	....	557	*500	206	421	369	880	1,030
9	1,156	....	676	523	205	*280	467	1,010	*818
10	1,106	1,667	*480	448	168	401	404	1,010	677
11	972	1,643	536	454	200	393	339	*700	573
12	937	1,228	495	538	*363	324	327	580	483
13	930	*1,429	420	442	437	278	330	430	483
14	*965	1,037	412	350	971	270	*280	430	483
15	1,011	1,281	368	*320	1,021	176	576	430	399
16	1,051	1,069	341	439	1,516	*136	726	340	*390
17	1,068	1,127	*284	424	541	227	646	340	413
18	1,442	1,268	332	517	490	266	466	*410	413
19	2,440	1,205	389	523	*370	282	466	580	463
20	1,485	*1,362	334	487	415	291	324	1,430	502
21	*2,680	959	281	547	344	321	*170	2,900	564
22	2,403	744	316	*530	327	818	290	2,630	559
23	2,006	637	298	488	269	*947	299	2,340	*560
24	2,874	595	*284	349	258	940	778	1,900	812
25	2,396	544	273	511	398	608	958	*3,120	942
26	2,093	437	219	636	*320	574	727	5,920	898
27	2,394	*390	306	567	506	464	461	5,670	900
28	*730	466	326	445	551	364	*460	2,900	900
29	870	423	520	*373	674	286	464	1,980	900
30	780	380	431	481	599	*320	454	1,665	*1,020
31	530	413	....	386	534	....	594	....	955
Mean	1,366	924	406	451	463	419	448	1,536	800

a No record for February, March, and April.
* Sunday.

MOHAWK RIVER AT LITTLE FALLS, NEW YORK.

This gaging station, which has been described in Water-Supply Paper No. 35, page 51, is located at the lower (Gilbert's) dam at Little Falls. Current-meter measurements have been made to check the calculated flows, with very satisfactory results. They are as follows:

		Second-feet.
October 20 to 21, 1898, at suspension bridge 2 miles below Little Falls, W. D. Lockwood, hydrographer:		
Total flow by current meter		1,758
Computed flow (mean of two days)		1,733
May 1, 1900, at suspension bridge 2 miles below Little Falls, R. E. Horton, hydrographer:		
Total flow by current meter		4,773
Computed flow over dam	4,060	
Computed diversion to Gilbert's mill	183	
Computed diversion to paper mill	556	
Total computed flow		4,799
May 23, 1900, at Astronga Bridge, Little Falls, R. E. Horton, hydrographer:		
Total flow by current meter		1,567
Computed flow over dam	950	
Computed diversion to Gilbert's mill	176	
Computed diversion to paper mill	405	
Total computed flow		1,531

Diversion to paper mill, September 19, 1900:

Metered flow in headrace	302
Computed flow through turbines, etc	288

There are three dams at Little Falls. The two lower are used for water-power development; the upper one is a State dam, diverting water for the supply of Erie Canal. The gage record kept at the lower dam shows the amount of water flowing downstream from Little Falls, but does not include the diversion at the State dam above the gaging station, and hence does not represent the total yield or inflow from the tributary drainage area of 1,306 square miles.

Current-meter measurements were made in the feeder channel below the State dam, as follows:

Current-meter measurements in feeder channel below State dam.

Date.	Measured diversion.
1900.	*Second-feet.*
May 23	143
September 19	179

Adding the foregoing amounts to the mean daily flow at Gilbert's dam for the same dates, we obtain the following:

Volumes of inflow and outflow at Little Falls diversion.

Date.	Total inflow at Little Falls.	Outflow in main channel.
1900.	*Second-feet.*	*Second-feet.*
May 23	1,596	1,453
September 19	693	514

Water is again diverted to the canal at Fivemile dam, below Little Falls. On November 3, 1900, the measured flow in this feeder, at Lansing's farm bridge, was 236 second-feet.

High water occurred at Little Falls as follows:

High water at Little Falls.

Date.	Depth of water on crest of dam.	Volume.	
	Feet.	*Second-feet.*	*Sec.-ft. per sq. mile.*
April 15, 1899	7.33	13,000	10.0
April 20, 1900	8.21	15,240	11.7

The most notable low-water period was August 3 to August 10, inclusive, 1899, the mean flow for eight days being only 120 second-feet, or 0.07 second-foot per square mile.

Daily discharge, in second-feet, of Mohawk River at Little Falls, New York, for 1898.

[Drainage area, 1,306 square miles.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	....	1,121	2,261	1,499	18	....	2,265	2,220	*1,173
2	....	*916	1,880	1,547	19	....	1,699	2,399	1,499
3	....	849	1,790	1,451	20	....	1,745	*2,878	1,499
4	....	895	1,560	*1,173	21	....	1,722	2,771	1,834
5	....	2,083	1,345	1,553	22	....	2,646	2,361	2,909
6	....	1,627	*1,501	1,763	23	1,125	*4,096	2,794	4,734
7	....	1,558	1,946	1,639	24	3,484	4,339	2,694	5,279
8	....	1,179	2,040	1,269	25	*4,093	3,240	2,538	*4,708
9	....	*916	1,700	969	26	2,718	2,574	1,950	3,759
10	....	900	4,420	1,462	27	2,445	6,290	*1,473	2,209
11	....	867	9,433	*1,508	28	2,220	6,188	1,137	1,899
12	....	915	7,925	1,709	29	1,615	5,121	1,412	1,499
13	....	1,028	*6,728	1,409	30	1,320	*3,246	1,562	1,929
14	....	1,040	5,245	1,259	31	....	2,628	....	3,979
15	....	5,490	3,520	1,309					
16	....	*5,026	2,891	1,259	Mean	2,378	2,493	2,891	2,036
17	....	3,081	2,370	1,434					

Sunday.

Daily discharge, in second-feet, of Mohawk River at Little Falls, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	*2,854	941	3,258	3,041	6,360	1,957	569	506	278	*704	2,829	2,096
2	1,796	906	3,154	*2,519	6,708	1,610	*493	506	271	651	6,600	1,709
3	1,846	861	2,304	2,329	5,619	1,321	359	135	*30	651	4,738	*1,962
4	1,936	884	2,298	2,536	3,925	*1,075	424	136	396	491	3,081	2,175
5	6,821	*646	*3,408	2,387	2,905	1,466	490	166	545	534	*3,262	2,097
6	7,440	1,063	5,544	4,297	2,339	1,216	663	*000	382	399	2,847	1,668
7	5,886	983	5,544	4,637	*1,560	1,016	627	133	272	240	1,908	1,468
8	*4,269	983	5,154	7,212	1,801	1,062	651	131	275	*160	1,718	1,588
9	4,377	846	4,534	*6,759	1,571	962	*1,660	131	211	357	1,628	1,630
10	2,529	803	3,054	7,079	1,470	764	2,593	130	*7	297	1,451	*1,016
11	1,467	871	2,572	6,729	1,469	*1,176	1,800	316	273	274	717	2,779
12	1,378	*789	*3,967	7,979	1,846	660	1,320	383	270	305	*1,112	6,704
13	1,298	983	6,614	9,644	2,273	660	1,222	*000	270	274	1,526	10,996
14	1,992	903	6,529	12,484	*1,920	685	941	329	211	258	1,448	8,435
15	*4,104	1,222	6,304	12,502	2,212	960	884	352	230	*196	1,150	7,367
16	4,848	1,333	6,354	*12,649	1,746	1,860	*643	351	184	354	1,069	3,500
17	4,703	748	2,129	11,339	1,896	1,800	1,315	244	*55	339	1,120	*1,326
18	4,279	1,326	2,254	10,716	2,492	*965	1,211	251	278	344	1,037	1,692
19	1,509	*669	*3,195	10,869	2,843	568	1,086	216	267	339	*984	4,812
20	1,608	1,248	3,658	11,638	3,742	1,010	1,008	*65	281	355	1,070	8,540
21	1,687	1,523	2,704	12,159	*3,650	1,105	767	158	220	331	1,120	7,216
22	*1,794	2,598	3,429	10,878	3,143	985	95	223	249	*142	1,145	5,822
23	1,885	4,506	3,494	*10,409	2,172	866	*363	235	129	350	1,066	5,147
24	1,859	4,001	3,694	10,920	1,696	745	496	203	*55	401	987	*1,753
25	2,284	3,664	3,824	9,870	1,470	*851	496	203	238	392	909	2,186
26	2,060	*1,456	*3,258	8,990	1,309	759	516	246	225	369	*829	1,877
27	1,813	2,376	2,829	9,180	1,290	634	496	*136	556	387	822	1,571
28	1,175	3,201	2,345	7,880	*1,680	585	510	348	920	314	969	1,641
29	*1,574	....	2,514	7,139	2,323	560	460	188	642	*1,398	969	1,390
30	1,154	....	3,029	*6,299	3,827	535	*50	219	723	2,293	*886	1,049
31	1,126	....	3,029	....	2,903	....	697	277	....	1,882	....	*932
Mean	2,753	1,510	3,757	8,102	2,651	1,014	803	223	298	509	1,699	3,360

* Sunday.

Daily discharge, in second-feet, of Mohawk River at Little Falls, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	595	1,594	1,454	*5,785	4,673	645	*395	481	629	667	1,289	4,845
2	961	1,372	1,496	8,497	4,510	761	1,053	509	*545	849	1,289	*4,027
3	1,040	1,251	1,539	10,124	4,362	*1,119	1,804	515	455	881	1,197	3,200
4	1,040	*421	*1,001	9,162	4,014	1,346	311	339	503	499	*1,264	3,109
5	608	1,457	2,228	8,114	3,774	1,174	644	*93	503	491	885	6,316
6	578	1,682	2,013	7,936	*2,443	1,014	505	284	503	493	920	5,504
7	*180	1,594	1,967	9,998	1,658	760	788	274	629	*282	982	5,727
8	1,592	1,814	2,125	*10,065	1,698	1,214	*625	195	228	449	3,350	5,620
9	1,966	4,712	2,228	8,587	2,304	1,643	1,048	374	*326	665	5,335	*4,725
10	1,921	5,053	2,250	6,660	2,591	*1,283	876	452	294	747	3,837	2,579
11	1,772	*3,449	*1,889	5,053	2,595	1,134	754	153	326	747	*2,673	2,562
12	1,726	5,305	2,013	4,532	2,330	1,134	754	*181	200	499	1,901	2,388
13	1,576	10,192	1,818	4,304	*2,132	864	694	365	483	598	1,738	2,388
14	*1,731	11,128	1,875	4,202	1,462	864	666	2,041	515	*459	1,600	2,178
15	1,636	11,642	1,818	*4,607	1,859	896	*545	2,370	377	691	1,598	1,586
16	1,496	8,292	1,726	5,672	1,732	801	668	1,434	*461	1,231	1,368	*1,866
17	1,455	8,961	1,696	7,261	1,927	*555	724	1,084	515	1,032	1,207	1,630
18	1,455	*3,671	*1,380	11,128	1,778	702	826	874	713	983	*1,336	2,230
19	1,592	3,678	1,496	13,542	1,882	599	754	*745	501	881	1,998	1,825
20	4,302	2,334	1,967	15,242	*1,745	561	794	651	492	785	3,929	2,361
21	*7,291	1,968	3,345	15,032	1,732	650	1,170	494	599	*622	6,057	2,180
22	7,194	2,386	3,740	*11,275	1,637	579	*1,430	494	1,777	564	5,353	1,981
23	7,736	4,303	3,740	10,624	1,453	437	1,088	499	*1,380	643	4,515	*1,828
24	6,150	3,614	4,135	9,437	1,453	*72	696	475	953	1,114	3,417	3,509
25	4,740	*1,681	*3,720	8,497	1,165	474	1,424	527	1,034	2,137	*3,094	5,291
26	4,670	1,592	3,405	7,282	1,085	390	2,109	*795	915	1,884	12,083	5,177
27	4,242	1,456	3,030	6,921	*1,014	474	1,898	689	819	1,470	14,551	4,143
28	*1,528	1,541	3,030	5,490	751	474	1,384	657	914	*1,356	13,520	3,007
29	2,176	......	3,150	*4,559	751	674	*1,262	1,255	652	1,632	8,615	2,606
30	1,772	......	4,233	4,672	723	740	874	959	*668	1,322	4,734	*1,909
31	1,496	......	5,024	......	723	......	696	721	......	1,192	......	2,159
Mean	2,523	3,862	2,469	8,142	2,063	801	943	694	630	899	3,854	3,240

*Sunday.

EAST CANADA CREEK AT DOLGEVILLE, NEW YORK.

A description of this station, together with the estimated daily discharge as originally computed, June to December, 1899, will be found in Water-Supply Paper No. 35, page 52. A new rating table for the dam has been prepared, using coefficients of discharge derived from Freeman's experiments on a model of the round-crested portion of the Croton dam, which apparently corresponds closely with the ogee section of the Dolgeville dam, as regards friction on the crest, vertical contraction of the nappe, and siphonage.[1]

In computing the record here given, the new rating table has been used, beginning June 1, 1899. The flow through the turbines has also been computed from current-meter measurements made in the tailrace of the electric power plant, instead of from the observed head and the gate openings of the water wheels, as formerly. The effect of these changes has been to slightly increase the extreme high-water and low-water flows, the estimated flow for mean stages remaining substantially the same.

[1] See Report on New York's Water Supply, made to Bird S. Coler, comptroller (1900), by John R. Freeman, p. 137.

Current-meter measurements were made from the bridge across the tailrace below the power plant, as follows:

Current-meter measurements of flow in tailrace at Dolgeville electric-light and power dam.

Date.	Flow in tailrace.	Gate opening of 36-inch wheels.	Wheel.
1900.	*Second-feet.*	*Per cent.*	
May 22	84	0.50	No. 2.
July 27	76	.38	No. 2.
July 29	63	.28	No. 1.
August 9	80	.38	No. 1.

Only one of the two 36-inch Victor turbines was running in each instance, together with the 15-inch exciter wheel. The depths of gate openings of the 36-inch wheels are shown in the foregoing table. The 15-inch exciter wheel ran at thirteen-hundredths gate in each case. The head on the wheels was 72 feet. Observations of the wheel-gate openings were taken at the beginning and end of each test, and the average is given in the table.

The results of the current-meter measurements of the total flow of the stream have been given in the general table on page 39.

The relation between the metered and calculated flows on different days is shown in the following tables, from gage readings taken at the time the measurements were made:

Current-meter measurements of East Canada Creek.

Date.	Flow in tailrace.	Flow over dam.	Total flow.
1900.	*Second-feet.*	*Second-feet.*	*Second-feet.*
May 22	84	328	412
July 27	76	376	452
August 7	80	*a* 28	108

a Measured in stream channel above point of confluence with tailrace.

Calculated flow of East Canada Creek.

Date.	Crest gage reading.	Flow over dam.	Flow in tailrace.	Total flow.
1900.	*Feet.*	*Second-feet.*	*Second-feet.*	*Second-feet.*
May 22	0.69	282	84	366
July 27	.79	362	84	.446
August 7	.20	29	78	107

In the first two cases the total flow was measured at the Dolgeville bridge above the dam, and the difference between the observed and calculated flows in the first instance is probably due to pond storage.

The accompanying tables of mean daily flow show the amount of water passing down the stream from the dam each day, with the exception of Sundays, for which the flow has been taken as a mean between that of the preceding and following days. Dams on this stream are not numerous, nor is there extensive pond storage, so that the tables may be taken as a fair representation of the natural regimen of flow.

The highest water observed was on April 19, 1900, when a depth of 4.5 feet on the crest of the dam was reached, corresponding to a flow of 5,750 second-feet, or 22.6 second-feet per square mile. The most notable low-water period was September 13 to 16, inclusive, 1899, when the average volume of flow was 67 second-feet, or 0.3 second-foot per square mile.

Daily discharge, in second-feet, of East Canada Creek at Dolgeville, New York, for 1898.

[Drainage area, 256 square miles.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		275	503	372	18		465	540	(a)
2		*330	478	372	19		447	540	(a)
3		275	443	372	20		477	*630	400
4		270	363	*372	21		452	570	650
5		310	343	372	22		637	535	775
6		330	*395	372	23	485	*1,323	500	1,275
7		290	398	(a)	24	1,180	1,082	465	975
8		280	378	(a)	25	943	832	440	*700
9		*213	398	(a)	26	680	762	370	600
10		252	648	(a)	27	625	1,222	*305	600
11		242	333	(a)	28	465	1,082	235	500
12		267	1,937	(a)	29	370	877	235	400
13		287	*1,620	(a)	30	355	*635	279	450
14		322	1,360	(a)	31		602		600
15		1,422	1,110	(a)					
16		*1,073	850	(a)	Mean	638	581	689	564
17		690	590	(a)					

* Sunday. *a* Ice on crest of dam.

Daily discharge, in second-feet, of East Canada Creek at Dolgeville, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*486	472	542	462	1,701	384	116	118	109	*135	1,046	134
2	486	462	447	*359	1,401	294	*82	192	145	118	1,674	292
3	530	447	372	355	1,301	218	112	210	*145	106	874	*335
4	530	492	422	412	1,261	*212	79	139	78	106	757	388
5	1,320	*370	*833	452	1,006	206	106	99	78	94	*648	282
6	1,390	402	852	512	771	200	103	*81	71	89	540	234
7	1,135	397	787	642	*474	194	126	118	68	89	404	152
8	*992	397	682	922	421	234	215	112	67	*94	372	152
9	922	397	542	*713	371	194	*324	100	67	92	340	132
10	722	372	472	822	371	194	394	106	*67	89	322	*195
11	622	372	447	952	421	*183	270	126	67	77	282	258
12	542	*348	*550	1,217	401	194	194	143	74	75	*258	2,000
13	502	410	742	1,642	431	194	194	*123	67	74	234	3,029
14	562	462	772	2,152	*534	206	194	103	67	74	234	1,530
15	*342	502	722	2,972	601	264	175	83	67	*74	234	1,094
16	1,187	502	602	*2,077	541	249	*304	78	67	74	288	914
17	1,167	397	562	2,512	441	175	374	104	*67	77	258	*733
18	1,942	402	472	2,682	601	*134	264	78	67	118	234	1,325
19	822	*370	*490	3,532	811	239	175	76	67	100	*234	1,947
20	742	447	542	4,182	741	161	126	*75	74	103	234	676
21	642	477	572	4,472	*674	274	119	74	74	100	208	1,422
22	*542	590	602	3,472	601	206	100	74	74	*90	292	874
23	572	992	602	*3,791	541	174	*112	67	74	81	292	757
24	652	742	702	3,972	471	133	106	74	*74	100	184	*648
25	672	512	672	3,992	421	*112	110	94	74	94	152	542
26	672	*460	*520	4,132	391	152	135	74	192	94	*148	436
27	642	742	447	3,782	371	152	111	*44	192	89	143	330
28	602	742	492	3,592	*324	144	135	74	139	89	143	282
29	*542		472	3,017	391	119	115	74	126	*266	134	282
30	522		492	*2,141	373	119	*101	74	152	372	134	254
31	472		472		421		87	74		246		*259
Mean	816	439	519	1,978	633	196	166	97	92	112	377	706

* Sunday.

Daily discharge, in second-feet, of East Canada Creek at Dolgeville, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	264	288	252	*631	1,476	(a)	*130	153	132	120	(a)	(a)
2	264	288	240	794	1,188	(a)	112	126	*151	185	242	*(a)
3	288	288	252	914	800	(a)	112	110	129	145	218	(a)
4	288	*288	*227	914	610	(a)	115	111	190	144	*194	(a)
5	300	288	240	914	474	591	118	*93	167	110	242	1,192
6	346	266	192	1,626	*410	394	152	82	149	116	218	844
7	*346	264	152	2,321	346	372	184	89	157	*100	242	614
8	410	288	192	*2,714	474	608	*193	98	118	94	632	614
9	410	800	258	1,374	610	827	200	108	*118	99	722	*577
10	372	718	340	1,094	800	*643	182	98	73	94	582	614
11	362	*718	*321	1,002	610	460	167	87	152	85	*432	279
12	318	718	306	1,012	546	406	145	*111	142	84	398	279
13	300	3,759	270	1,020	*454	376	132	192	142	84	(a)	224
14	*258	4,320	234	1,020	362	394	124	396	136	*81	(a)	224
15	264	2,467	234	*1,197	342	376	*137	274	128	238	(a)	210
16	252	1,632	192	1,374	342	335	150	250	*93	205	(a)	*82
17	240	1,232	152	1,926	288	*304	162	185	117	199	(a)	63
18	682	*939	*173	4,626	288	274	202	167	104	186	*(a)	210
19	546	646	262	5,335	288	256	190	*133	95	180	(a)	215
20	960	562	306	4,917	*264	256	158	92	73	185	1,005	345
21	*1,704	518	340	4,842	240	250	310	110	196	*158	1,197	215
22	1,380	540	340	*4,368	288	246	*252	111	184	153	1,148	215
23	1,144	709	340	3,895	288	326	194	142	*130	171	1,016	*342
24	1,012	562	340	3,095	288	*300	374	117	154	582	713	310
25	820	*470	*340	2,840	276	274	686	117	99	510	*1,146	438
26	709	378	306	2,355	264	294	767	*77	(a)	322	3,802	345
27	604	346	282	2,243	(a)	294	422	92	(a)	350	3,164	345
28	*508	312	282	1,586	(a)	300	276	223	(a)	*306	1,689	317
29	410	......	306	*1,506	(a)	300	*219	136	(a)	292	1,128	317
30	346	......	420	1,207	(a)	149	162	181	*(a)	268	929	*252
31	346	......	468	......	(a)	......	110	151	......	(a)	......	263
Mean	531	879	276	2,086	486	370	221	144	133	195	957	368

a No record. * Sunday.

CAYADUTTA CREEK NEAR JOHNSTOWN, NEW YORK.

A description of this station will be found in Water-Supply Paper No. 35, page 53. The record is kept at the dam of the Johnstown Electric Light and Power Company, 1 mile below Johnstown. Since the establishment of the station standard sharp-crested gaging weirs have been erected by Prof. Olin H. Landreth, C. E. One of these weirs has been placed across the main stream above the head of slack water from the dam. A second weir has been placed in the tailrace below the power house.

During the summer the water does not ordinarily flow over the dam, which is practically tight, but the entire flow passes through the turbines. A series of gagings at the tailrace weir has been made in order to determine the discharging capacity of the water wheels when running under different conditions.

Dams are located at frequent intervals along the stream, and during the dry season the amount of flow from one to another is largely controlled by the water wheels.

Daily discharge, in second-feet, of Cayadutta Creek near Johnstown, New York, for 1898.

[Drainage area, 40 square miles.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	24	41	39	18	47	57	*27
2	*10	36	48	19	46	97	33
3	22	38	46	20	39	*67	35
4	25	32	*51	21	47	67	45
5	119	39	23	22	55	50	58
6	246	*12	51	23	*105	54	98
7	67	32	50	24	56	63	67
8	55	35	39	25	48	55	*60
9	*14	179	38	26	36	42	75
10	37	734	38	27	58	*24	42
11	23	429	*25	28	55	46	31
12	27	110	46	29	138	59	34
13	33	*64	37	30	*13	42	50
14	38	68	36	31	41	------	44
15	290	55	33				
16	*117	49	32	Mean	64	91	44
17	68	57	34				

* Sunday.

Daily discharge, in second-feet, of Cayadutta Creek near Johnstown, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*20	27	66	72	57	30	21	20	16	*12	33	19
2	39	25	48	*70	66	28	*15	22	20	24	31	------
3	31	29	36	83	36	29	24	32	*12	24	28	*14
4	42	26	40	132	32	*17	17	22	19	25	48	37
5	71	*19	*111	252	28	29	20	21	28	17	*34	27
6	69	29	282	263	27	28	20	*11	16	15	26	23
7	40	23	122	313	*12	18	19	19	23	19	28	23
8	*64	19	71	503	29	30	34	20	22	*9	26	23
9	42	18	72	*320	26	21	*16	20	17	18	22	23
10	29	18	67	413	25	19	27	20	*7	20	27	*13
11	24	20	53	579	27	*18	25	17	16	24	26	27
12	27	*14	*123	415	47	30	18	23	19	23	*20	238
13	26	19	155	811	29	25	18	*8	20	13	28	207
14	43	21	105	751	*31	24	16	20	17	20	28	145
15	*125	24	84	802	25	25	18	20	19	*17	30	55
16	51	25	46	*218	28	25	*13	20	20	24	20	40
17	43	26	38	190	34	25	23	20	*11	26	21	*44
18	35	27	35	196	33	*17	25	20	19	33	20	36
19	31	*15	*66	225	43	25	26	19	20	21	*6	51
20	33	32	67	168	47	37	20	*9	21	------	27	85
21	28	33	66	135	*34	32	19	15	20	------	27	62
22	*16	55	50	142	34	33	23	16	17	(*)	26	42
23	35	91	74	*123	26	32	*8	14	19	------	25	26
24	40	39	59	41	31	32	18	16	*14	------	24	*19
25	27	40	52	65	26	*18	22	16	20	21	26	56
26	32	*43	*54	66	25	29	19	14	32	18	*14	60
27	32	53	48	44	30	26	16	*11	36	18	30	25
28	24	48	54	52	*15	30	17	15	26	19	28	24
29	*13	------	48	60	32	30	17	16	27	*16	28	20
30	33	------	46	*31	13	22	*14	16	26	30	15	19
31	33	------	48	------	28	------	25	16	------	30	------	*11
Mean	39	31	74	251	31	26	20	18	20	21	26	49

* Sunday.

Daily discharge, in second-feet, of Cayadutta Creek near Johnstown, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27	39	41	*250	38	36	*6	12	11
2	27	29	42	292	25	22	14	22	*7
3	25	22	44	339	25	*8	20	20	21
4	20	*20	*23	212	25	30	6	18	17
5	18	251	55	199	28	26	15	*7	17
6	20	43	41	200	*24	25	15	20	17
7	*24	42	50	293	30	23	15	20	17
8	60	148	45	*155	25	24	*7	20	21
9	39	235	45	102	81	33	31	22	*8
10	43	76	44	78	63	*13	19	18	21
11	37	*82	*39	77	30	29	18	14	20
12	34	116	66	91	24	29	20	*4	6
13	30	1,404	48	106	*19	16	23	27	7
14	*14	89	40	78	23	24	18	28	18
15	35	77	41	*91	26	29	*12	29	16
16	37	59	39	133	23	22	19	34	*9
17	29	46	41	200	24	*9	20	35	19
18	40	*23	*19	314	29	24	18	33	21
19	92	42	42	164	26	24	17	*10	19
20	705	41	45	102	*22	24	14	18	21
21	*306	39	52	76	25	22	19	21	21
22	101	44	52	*116	24	21	*7	20	21
23	83	107	111	92	19	17	15	21	*14
24	55	87	82	80	22	*10	18	22	32
25	71	*41	*52	71	23	17	17	22	32
26	50	60	46	64	26	19	26	*7	21
27	43	42	50	48	*19	14	25	20	21
28	*23	39	49	46	22	17	26	19	23
29	44	------	106	*22	19	19	*13	20	23
30	36	------	165	25	20	18	13	20	*10
31	31	------	296	------	22	------	13	18	-----
Mean	71	119	62	137	27	21	17	20	18

* Sunday.

NOTE.--Records for October, November, and December are not available at present.

SCHOHARIE CREEK AT FORT HUNTER, NEW YORK.

Schoharie Creek rises on the western slope of the Catskill Mountains. In its lower stages it flows through a long, flat valley, in a stream bed covered with cobbles and gravel, over which the water finds its way in a thin sheet during the dry season.

The State dam at Fort Hunter is near the mouth of the stream, and high water from Mohawk River backs up to the toe of the dam. The condition existing at this station during the summer months has been described in connection with the Mohawk River gaging stations, page 42. A record has been kept of the elevation of the water surface in the pond above the dam, and also in the channel below the dam. The average difference, or head, is 5.25 feet, and it is nearly constant, except when water falls below the crest level above the dam.

The dam is of timber backed with gravel, and there are a number of leaks above the gravel line 2 feet below the crest. During the summer this leakage represents practically the total inflow from Schoharie Creek to the Mohawk. Current-meter measurements of the leakage were made below the Erie Canal aqueduct, at a point where the entire flow is concentrated in a narrow channel.

Current-meter measurements of leakage of Fort Hunter dam.

Date.	Hydrographer.	Leakage.
1900.		*Second-feet.*
June 21	R. E. Horton	30
July 18	E. D. Walker	38
August 22	do	44

In the computation the leakage of the dam has been assumed to be 35 second-feet.

In establishing this station the intention was to maintain a record of the height of the water above and below the head gates, at the entrance to the canal feeder, from which the effective head of the gate openings could be determined and the flow computed by the formula for submerged orifices. During the dry season the water falls below the lip of the gates and flows in an open channel, making this method inapplicable. In recomputing the record the diversion to the canal feeder was estimated from the following current-meter measurements:

Current-meter measurements of flow of water in feeder.

Date.	Hydrographer.	Measured flow.
1900.		*Second-feet.*
June 21	R. E. Horton	112
July 18	E. D. Walker	76
August 22	do	73

Inflow to the Erie Canal is controlled by gates at the lower end of the feeder channel, so that the flow in the feeder is not directly a function of the stage of the water. Owing to the uncertainty of the low-water measurements, this station was abandoned July 31.

The accompanying tables show the total outflow from the pond above the Fort Hunter dam. A table of the flow, as originally computed, allowing 315 second-feet for leakage, will be found in Water-Supply Paper No. 35, page 55.

The drainage areas tributary to Schoharie Creek at various gaging stations are as follows:

Drainage areas of Schoharie Creek.

	Square miles.
At mouth	947.0
At Erie Canal aqueduct	946.8
At Fort Hunter dam	946.7
At Mill Point bridge	934.0
At Schoharie Falls dam	930.0

Daily discharge, in second-feet, of Schoharie Creek at Fort Hunter, New York, for 1898.

[Drainage area, 947 square miles.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	....	161	1,617	1,139	18	....	791	1,517	1,539
2	....	161	1,717	939	19	....	861	2,417	859
3	....	161	917	1,339	20	....	791	3,967	689
4	....	161	917	1,439	21	....	791	2,842	814
5	....	1,661	767	1,839	22	....	791	2,067	1,639
6	....	3,211	767	1,639	23	....	1.061	1,967	2,639
7	....	1,361	847	1,839	24	129	861	1,967	2,089
8	....	791	767	1,839	25	129	861	1,517	3,289
9	....	1,761	667	1,739	26	129	861	1,517	814
10	....	791	5,067	1,239	27	129	1,361	1,217	1,539
11	....	611	9,517	939	28	129	2,261	917	1,539
12	....	611	5,767	1,639	29	129	1,911	767	939
13	....	581	2,917	1,539	30	129	1,561	767	1,239
14	....	1,661	2,967	1,639	31	....	1,661	....	3,864
15	....	2,136	2,417	1,539					
16	....	2,461	1,817	1,639	Mean	129	1,142	2,148	1,573
17	....	711	1,517	1,339					

Daily discharge, in second-feet, of Schoharie Creek at Fort Hunter, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	1,741	1,651	4,915	1,335	1,515	295	182	148	148	3,867	935
2	1,641	1,351	3,655	1,335	1,460	295	178	152	148	1,967	1,615
3	1,641	1,651	3,165	1,335	1,560	395	182	145	145	1,767	1,515
4	941	1,251	2,935	2,135	1,140	395	182	138	145	2,247	935
5	5,791	1,251	6,635	2,785	860	295	185	142	148	2,467	935
6	4,791	951	13,635	3,185	860	295	185	145	148	1,967	765
7	3,541	951	6,235	3,655	710	295	190	148	148	1,767	935
8	3,141	851	3,435	7,685	585	225	195	138	142	1,547	935
9	3,541	901	2,935	5,335	585	205	198	138	152	1,767	785
10	2,241	901	3,535	3,655	610	195	185	135	152	967	765
11	1,991	851	4,085	4,585	440	195	182	138	152	967	935
12	1,641	851	7,685	5,735	440	195	190	138	148	1,547	1,615
13	1,841	657	11,135	7,685	340	195	198	132	148	1,547	1,835
14	1,841	701	4,455	7,635	260	195	202	132	145	1,967	1,515
15	2,091	801	3,175	9,335	260	195	202	135	145	1,547	1,515
16	2,341	951	2,635	7,685	340	195	198	138	142	2,247	935
17	3,291	951	2,235	5,215	480	195	202	138	138	967	935
18	2,741	1,551	2,035	4,085	585	195	202	138	145	797	765
19	2,291	1,751	2,335	4,385	510	195	195	142	145	587	765
20	2,341	1,551	2,515	3,812	585	195	195	145	148	967	765
21	1,991	3,151	2,775	3,532	585	195	190	142	148	797	635
22	1,641	2,876	2,775	2,342	510	195	185	148	148	587	635
23	1,541	3,407	2,775	3,532	440	195	185	148	148	967	453
24	1,541	3,726	2,635	3,342	340	195	165	142	148	797	453
25	2,741	3,726	2,515	3,193	340	195	198	145	152	1,967	515
26	1,991	4,301	2,335	3,883	260	195	190	148	182	1,767	455
27	2,091	4,885	2,035	2,633	260	195	185	142	6,984	2,147	425
28	1,841	6,035	2,135	2,698	260	195	182	148	6,126	1,547	335
29	1,541	....	1,435	2,298	340	195	190	145	5,740	1,967	335
30	1,641	....	1,335	2,948	260	195	190	148	4,790	2,147	295
31	1,541	....	1,435	....	260	....	190	145	....	1,547	....
Mean	2,307	1,944	3,792	4,100	579	226	187	142	916	1,603	875

NOTE.—No record for December.

Daily discharge, in second-feet, of Schoharie Creek at Fort Hunter, New York, for 1900.

Day.	Jan.	Mar.	Apr.	May.	June.	July.
1	735	3,465	2,915	835	360	111
2	735	7,335	2,775	985	155	102
3	575	7,515	3,335	835	245	102
4	575	6,785	3,635	985	245	111
5	435	5,585	3,335	1,208	284	90
6	315	2,485	3,335	490	239	76
7	435	3,335	3,635	412	212	76
8	315	3,335	2,635	409	242	76
9	485	3,035	2,495	315	515	135
10	435	2,740	2,135	519	276	140
11	315	3,335	2,015	472	360	143
12	365	3,035	2,015	390	305	140
13	485	2,775	2,275	300	305	135
14	575	2,355	2,915	293	257	127
15	435	2,255	2,915	312	260	123
16	575	2,015	3,635	327	260	118
17	575	1,885	4,735	319	235	118
18	735	1,755	6,035	312	220	111
19	2,785	1,755	4,935	330	157	111
20	4,595	1,755	4,595	1,530	153	111
21	8,235	3,035	5,355	1,550	147	106
22	4,595	2,135	6,615	1,020	143	72
23	3,465	1,755	6,615	500	139	122
24	3,145	2,495	5,095	412	139	130
25	1,325	2,275	4,035	409	139	144
26	735	2,635	3,335	315	105	135
27	735	2,495	2,915	315	113	127
28	485	2,775	2,635	250	122	127
29	575	3,035	1,885	322	122	118
30	485	3,035	1,325	355	122	118
31	435	3,035	....	360	......	111
Mean	1,313	3,137	3,530	561	219	115

NOTE.—No record for February; station abandoned July 31.

SCHOHARIE CREEK AT ERIE CANAL AQUEDUCT, NEW YORK.

The Erie Canal crosses Schoharie Creek between the Fort Hunter dam and Mohawk River. A gaging station was established at the aqueduct on May 2, 1900, by Prof. E. D. Walker. A current-meter measurement of the flow through the archways of the canal aqueduct was made by him on that day, the result being a discharge of 1,257 second-feet, with a gage height of 2.26 feet. Owing to cross currents above the aqueduct, the conditions are not favorable for meter measurements, and the station was abandoned on October 13. The record is chiefly of interest in connection with slope measurements of Mohawk River, described elsewhere (p. 42).

Daily gage height, in feet, of Schoharie Creek at Erie Canal aqueduct, New York, for 1900.

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.
1	......	1.38	0.60	0.67	0.54	0.53	17	1.58	0.82	0.58	1.43	0.65
2	2.24	1.47	.62	.65	.53	.54	18	1.52	.71	.56	1.32	.65
3	2.20	1.76	.58	.64	.54	.51	19	1.47	.82	.60	1.92	.65
4	2.14	1.62	.60	.63	.53	.53	20	1.98	.70	.61	.97	.65
5	2.10	.94	.60	.62	.54	.58	21	2.84	.72	.63	.78	.65
6	2.00	.95	.57	.61	.54	.61	22	2.43	.70	.65	.71	.65
7	1.10	.87	.56	.52	.53	.62	23	2.14	.67	.62	.68	.64
8	2.00	.90	.50	.52	.54	.58	24	1.93	.60	.68	.64	.62
9	1.97	1.90	.43	.51	.64	.54	25	1.87	.60	.71	.63	.53
10	2.00	1.84	.52	.50	.64	.52	26	1.80	.60	.73	.54	.56
11	1.10	1.80	.60	.52	.65	.59	27	1.67	.60	.78	.53	.57
12	1.97	1.40	.63	.53	.65	.56	28	1.40	.62	.72	.54	.53
13	1.89	1.68	.64	.52	.65	.57	29	1.47	.61	.60	.53	.52
14	1.76	1.40	.60	.57	.64	......	30	1.45	.60	.63	.53	.53
15	1.70	1.13	.54	.54	.65	......	31	1.40	......	.64	.54	......
16	1.67	1.20	.53	.53	.64	......						

SCHOHARIE CREEK AT MILL POINT, NEW YORK.

The current-meter station was established at the Mill Point highway bridge on July 5, 1900, by Prof. E. D. Walker. The stream bed is stony and fairly permanent. The channel is of nearly constant width at all stages of the stream. The following current-meter measurements were made by Professor Walker:

July 5: Gage height, 0.64 foot; discharge, 87 second-feet.
August 22: Gage height, 0.70 foot; discharge, 141 second-feet.

Daily gage height, in feet, of Schoharie Creek at Mill Point, New York, for 1900.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	0.65	0.35	0.50	0.55	2.10	17	0.60	0.95	0.35	0.40	0.65	1.65
2	......	.65	.35	.50	.45	1.90	18	.65	1.45	.30	.45	.70	1.70
3	......	.45	.35	.45	.60	1.80	19	.65	.95	.35	.45	.75	1.82
4	......	.40	.30	.40	.60	1.70	20	.65	.72	.25	.45	.98	1.95
5	......	.50	.25	.40	.50	3.02	21	.60	.70	.00	.40	1.45	2.30
6	0.60	.35	.22	.45	.40	2.60	22	.95	.75	.00	.30	1.42	2.10
7	.35	.40	.40	.35	.60	2.35	23	.90	.70	.00	.60	1.50	1.70
8	.70	.35	.30	.30	.60	2.25	24	.80	.60	.30	.60	1.35	1.88
9	.50	.30	.30	.15	.65	2.10	25	.85	.55	.35	.50	1.30	2.95
10	.80	.30	.25	.00	.85	1.80	26	.80	.50	.30	.70	1.72	3.70
11	.70	.40	.45	.00	.60	1.75	27	.80	.45	.30	.75	3.60	1.70
12	.70	.40	.45	.35	.60	1.75	28	.80	.50	.35	.52	2.75	2.05
13	.60	.45	.35	.45	.80	1.72	29	.70	.50	.45	.45	2.25	1.95
14	.60	.30	.35	.15	.90	1.70	30	.70	.55	.45	.52	2.15	1.50
15	.60	.25	.30	.30	.72	1.65	31	.65	.43	......	.50	......	1.60
16	.65	.40	.35	.30	.70	1.60							

SCHOHARIE CREEK AT SCHOHARIE FALLS, NEW YORK.

A dam and power plant have been erected by the Empire State Power Company, of Amsterdam, New York, at Schoharie Falls, 7 miles from Amsterdam. The dam is of masonry, backed with timber. It has a flat crest, nearly level, 380 feet long, 1 foot wide, and a slope on the upstream face of approximately $2\frac{1}{2}$ to 1. The dam was completed early in the summer of 1900, and a record of the depth of water flowing over the main spillway was kept by the engineers of the company from July 18 to December 31. Some further data are needed, however, for the final reduction of this record, which is reserved for future publication. The dam is about 1 mile above the current-meter station on Schoharie Creek, at the Mill Point highway bridge, and it is the intention to use the results of the meter measurements made there in the preparation of a calibration curve for the spillway of the dam.

Soon after the completion of the dam a weir of standard form was placed in an opening in the water-power canal embankment, at a point where the entire flow of the stream could be concentrated so as to pass over the gaging weir. The weir has a sharp crest, 25 feet in length, with two complete contractions, and the following observations of flow were computed from the observed depths by the Francis formula:

Flow over weir at Schoharie Falls dam.

Date.	Time of measurement.	Discharge.	Date.	Time of measurement.	Discharge.
1900.		*Second-feet.*	1900.		*Second-feet.*
June 25	11 a. m.	86.2	June 29	5 p. m.	86.2
June 26	11 a. m.	91.6	June 30	11 a. m.	92.9
Do	5 p. m.	91.5	Do	5 p. m.	92.9
June 27	11 a. m.	92.9	July 1	11 a. m.	92.9
Do	5 p. m.	92.9	Do	5 p. m.	91.5
June 28	11 a. m.	86.2	July 2	11 a. m.	91.6
Do	5 p. m.	91.5	Do	5 p. m.	92.9
June 29	11 a. m.	86.2	July 3	9 a. m.	93.4

The power plant at the dam contains two double horizontal Samson turbines, each 40 inches in diameter. The turbines are designed to work under a head of 42 feet, and are rated at 1,800 horsepower per pair. A wheel similar to these has been tested at Holyoke, and with the rating curve established, which shows the proportional discharge of the wheels for various depths of gate opening, the turbines can be used as water meters to determine the flow in the power canal. The plant was set in operation about January 1, 1901, and a gaging record is being kept, which shows the depth of flow over the crest of the dam and spillway, the discharge through the flood gates, and the amount of water used by the turbines. It should be stated that this stream is subject to extreme variations of flow, and that the weir measurements given above represent unusually low water. Plans have been made for a system of storage reservoirs to conserve the entire discharge of the stream and maintain a nearly uniform regimen of flow throughout the year.

MOHAWK RIVER AT SCHENECTADY, NEW YORK.

A current-meter station at Freeman's tollbridge, near Schenectady, was established by Prof. E. D. Walker February 1, 1899, and remained under his supervision until October 1, 1900. A description of this station is contained in Water-Supply Paper No. 35, page 55. The following current-meter measurements were made by Professor Walker:

April 3, 1899: Gage height, 7.18 feet; discharge, 5,294 second-feet.
May 26, 1899: Gage height, 6.22 feet; discharge, 2,092 second-feet.
June 30, 1899: Gage height, 5.38 feet; discharge, 482 second-feet.
May 12, 1900: Gage height, 6.50 feet; discharge, 4,135 second-feet.
July 17, 1900: Gage height, 5.26 feet; discharge, 667 second-feet.
August 21, 1900: Gage height, 5.40 feet; discharge, 976 second-feet.

A rating curve for the cross section at this station has not yet been prepared.

Daily gage height, in feet, of Mohawk River at Schenectady, New York, for 1900.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1		7.40	5.50	5.22	5.38	5.35	5.20	5.55	7.80
2		7.40	5.50	5.20	5.35	5.25	5.25	5.60	7.35
3		7.10	5.50	5.22	5.25	5.22	5.20	5.58	7.00
4		6.90	5.75	5.18	5.23	5.20	5.25	5.50	6.75
5		6.80	5.65	5.15	5.25	5.10	5.20	5.45	8.75
6		6.65	5.55	5.20	5.20	5.15	5.20	5.42	8.85
7		6.45	5.60	5.20	5.15	5.22	5.02	5.35	8.15
8	11.15	6.20	5.40	5.20	5.18	5.15	5.10	5.35	8.00
9	10.05	6.45	5.60	5.25	5.10	5.18	5.18	6.40	7.70
10	8.85	6.70	6.45	5.35	5.08	5.05	5.10	7.05	7.25
11	8.18	6.70	6.00	5.40	5.10	5.10	5.10	6.60	6.75
12	7.90	6.50	5.75	5.35	5.10	5.15	5.18	6.15	6.15
13	8.25	6.25	5.60	5.32	5.10	5.10	5.15	5.85	6.70
14	8.15	6.10	5.55	5.30	5.15	5.10	5.25	5.80	6.85
15	7.80	6.05	5.50	5.30	5.25	5.08	5.15	5.75	6.20
16	8.10	6.00	5.50	5.28	6.25	5.10	5.18	5.70	6.00
17	8.50	6.05	5.45	5.29	5.90	5.05	5.20	5.65	5.85
18	10.65	6.00	5.42	5.20	5.80	5.08	5.20	5.50	5.95
19	12.05	6.95	5.35	5.23	5.62	5.00	5.42	5.60	5.90
20	11.90	6.05	5.22	5.35	5.45	5.05	5.35	5.80	6.00
21	11.68	6.50	5.25	5.35	5.40	5.08	5.20	6.95	6.15
22	10.85	6.20	5.25	5.40	5.32	5.10	5.20	7.60	6.20
23	11.65	6.10	5.35	5.70	5.25	5.10	5.18	7.30	6.10
24	11.90	5.95	5.22	5.58	5.20	5.70	5.20	7.00	6.10
25	10.05	5.90	5.20	5.43	5.25	5.53	5.28	6.70	6.70
26	9.35	5.75	5.20	5.38	5.28	5.45	6.15	8.48	8.00
27	8.60	5.70	5.18	6.15	5.22	5.35	6.00	11.65	7.60
28	8.25	5.55	5.20	6.05	5.20	5.22	5.70	11.35	7.08
29	7.72	5.50	5.22	5.72	5.25	5.28	5.65	10.05	6.70
30	7.45	5.45	5.20	5.55	5.20	5.22	5.75	8.50	6.40
31		5.50		5.50	5.45		5.65		6.25

MOHAWK RIVER AT REXFORD FLATS, NEW YORK.

This station, which is located at the New York State feeder dam 4 miles below Schenectady, is described in Water-Supply Paper No. 35, page 57.

The accompanying tables of daily and monthly mean flow include the amount diverted to the Erie Canal. They therefore represent the total inflow of Mohawk River at this point, which is considerably greater than the amount which passes downstream from the dam during the season of canal navigation. Prior to 1900 the amount of diversion to the Erie Canal was assumed to be 128 second-feet. During the present year a different method of estimating diversion to the canal has been used. Current-meter measurements in the Rexford Flats feeder gave the following results:

Current-meter measurements in Rexford Flats feeder.

Date.	Hydrographer.	Flow in canal feeder.
		Second-feet.
October 27, 1898	W. D. Lockwood	128
June 25, 1900	R. E. Horton	272

These results were compared with the mean rate of evaporation from a water surface, as determined for several years at Rochester,[1] and it was found that an apparently constant relation existed between the two. The diversion for the remaining months of the canal season has been estimated from the observed evaporation, as follows:

Estimated monthly flow in Rexford Flats feeder.

	Second-feet.
May	200
June	260
July	290
August	270
September	220
October	148

The flow over the dam—that is, the amount of water passing downstream from Rexford Flats—compares with the total flow as follows:

Table showing relation of flow over Rexford Flats dam to total inflow of feeder.

Month.	Total inflow.	Flow below dam (inflow less diversion).
1900.	*Second-feet.*	*Second-feet.*
May	2,857	2,657
June	1,503	1,243
July	1,447	1,157
August	1,746	1,476
September	981	761

The water did not fall below the crest of the dam during the summer of 1900, so that it was not possible to make measurements of the leakage, or a new profile of the crest, which is greatly needed. During high water for several days of the year 1900 the water on the downstream side of the dam rose above the crest level and the dam was completely submerged. Experiments on the flow over a similar submerged weir are not available, and the high-water flows have been taken from the usual discharge curve. On the morning of February

[1] See annual reports of the executive board of the city of Rochester, 1892 to 1899, inclusive.

14, 1900, the water attained a depth of 9.25 feet on the crest of the dam, corresponding to a discharge of 55,700 second-feet, or 16.5 second-feet per square mile. This is the highest water observed since the record was started.

During 1900 the following discharge measurements were made by Prof. E. D. Walker, at Freeman's bridge, 3 miles above the Rexford Flats gaging station:

May 12: Gage height, 6.50 feet; discharge, 4,135 second-feet.
July 17: Gage height, 5.26 feet; discharge, 667 second-feet.
August 21: Gage height, 5.40 feet; discharge, 976 second-feet.

Daily discharge, in second-feet, of Mohawk River at Rexford Flats, New York, for 1898.

[Drainage area, 3,385 square miles.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
8	5,050	15	4,959	22	2,850	29	3,350
9	5,050	16	3,250	23	5,150	30	2,400
10	5,050	17	2,450	24	11,550	31	1,800
11	5,450	18	2,300	25	9,350		
12	4,200	19	2,675	26	7,350	Mean	4,471
13	3,625	20	2,550	27	4,450		
14	5,250	21	2,300	28	4,900		

Daily discharge, in second-feet, of Mohawk River at Rexford Flats, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9,000	2,950	6,300	5,850	9,828	2,288	928	328	228	2,728	1,368	1,328
2	4,850	3,460	5,750	6,350	8,828	2,288	928	328	228	2,928	1,368	1,328
3	3,350	4,350	5,170	5,350	8,428	2,078	679	438	228	2,928	2,928	3,208
4	3,600	3,950	4,650	5,270	8,528	2,078	608	438	228	2,628	5,028	2,448
5	9,350	3,950	6,920	7,880	5,828	2,078	608	528	228	2,628	6,528	2,628
6	16,850	4,550	25,700	10,510	5,178	1,538	608	608	228	2,628	6,528	2,908
7	12,550	3,350	15,110	14,050	2,628	1,538	438	328	228	2,478	8,628	3,578
8	9,350	2,700	9,770	18,330	2,328	1,538	438	278	228	2,328	9,028	4,548
9	7,925	2,600	8,450	21,770	2,328	1,378	608	278	228	2,178	7,928	6,078
10	4,850	2,400	8,350	13,340	2,178	1,378	528	278	228	1,428	4,828	8,328
11	4,250	2,100	7,000	15,590	2,178	1,128	438	278	228	728	2,778	8,958
12	3,600	2,850	9,160	18,600	2,428	1,128	438	278	228	728	2,178	10,028
13	2,850	3,350	20,670	24,040	2.328	928	378	278	228	728	1,578	10,828
14	3,825	4,750	14,000	29,550	2,078	928	328	278	228	728	1,928	15,828
15	4,650	4,650	10,950	30,630	1,828	1,038	328	278	238	1,228	2,078	21,358
16	5,400	3,850	10,050	29,350	2,428	1,038	328	278	278	1,578	1,578	24,228
17	8,750	3,460	8,350	22,000	1,978	2,928	758	278	278	1,828	1,368	19,128
18	9,200	2,700	5,750	20,550	1,778	3,528	928	278	278	1,928	1,368	13,128
19	5,400	2,400	5,470	20,350	1,678	4,628	678	278	278	1,428	1,128	8,128
20	4,475	2,400	8,250	21,150	4,778	5,128	678	228	278	1,348	1,128	10,228
21	2,850	2,250	13,560	21,628	6,028	2,628	438	228	278	1,348	1,228	6,328
22	2,850	2,600	12,600	19,228	6,828	3,228	328	228	278	1,348	1,478	4,928
23	2,750	5,450	11,400	17,878	6,728	2,168	328	228	278	1,228	1,578	4,578
24	3,050	10,150	6,460	17,878	5,428	2,168	308	228	278	1,148	1,578	4,578
25	3,450	5,750	7,050	17,878	4,928	2,078	288	228	278	1,128	1,468	2,428
26	4,300	5,550	6,740	17,028	4,378	1,538	288	278	3,228	1,028	1,368	2,928
27	4,475	4,650	5,370	16,428	3,128	1,538	328	278	9,178	828	1.128	2,928
28	4,950	7,000	4,750	16,428	2,228	1,538	438	238	6,328	728	1,128	2,828
29	4,750	......	4,650	15,668	1,828	1,428	328	208	1,678	1,228	1,128	2,628
30	5,575	......	5,560	11,148	2,778	1,538	378	208	2,778	1,348	1,368	2,428
31	4,850	......	5,170	......	2,778	......	338	208	......	1,348	......	2,228
Mean	5,739	3,935	9,004	17,057	4,084	2,014	498	294	980	1,608	2,824	7,001

Daily discharge, in second-feet, of Mohawk River at Rexford Flats, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,030	2,850	4,650	8,750	5,500	1,470	1,500	1,970	1,920
2	1,500	1,860	4,650	9,400	4,800	1,470	940	1,830	1,670
3	1,500	2,030	4,450	11,150	4,150	1,580	940	1,720	1,670
4	1,260	3,830	4,450	11,400	3,300	1,710	940	1,720	1,540
5	1,260	4,450	4,450	12,850	2,850	1,710	820	1,720	1,430
6	1,500	4,950	4,800	13,550	3,000	1,470	750	1,970	1,430
7	1,860	5,550	3,325	13,850	3,450	1,470	750	1,720	1,430
8	2,250	7,150	3,000	14,650	3,300	1,710	820	1,970	1,020
9	2,550	7,250	2,250	15,070	3,800	1,710	1,090	1,970	1,020
10	2,550	7,950	2,250	15,950	4,400	1,960	1,090	1,970	1,120
11	1,860	10,730	1,860	17,150	3,800	2,240	1,290	1,970	1,220
12	1,610	13,050	1,610	18,300	3,650	2,910	1,500	1,970	1,020
13	1,500	27,250	1,500	15,650	3,300	2,240	1,500	1,970	870
14	1,500	45,050	1,500	13,850	3,300	1,580	1,290	2,250	870
15	1,860	24,850	1,370	9,390	3,800	1,580	1,290	2,390	430
16	2,700	14,850	1,260	9,000	3,300	1,580	1,290	2,470	430
17	3,830	9,650	1,160	12,350	3,000	1,710	1,090	5,020	680
18	6,500	5,750	1,160	20,750	2,850	1,710	1,090	1,830	680
19	10,730	3,150	1,750	27,450	2,700	1,470	1,090	1,830	750
20	21,850	2,470	3,150	25,550	2,250	1,260	1,090	1,970	870
21	45,750	3,830	3,950	26,250	2,250	1,260	1,400	1,070	870
22	27,850	5,150	4,800	28,370	1,750	1,260	1,610	1,070	680
23	28,450	6,690	4,800	26,050	1,650	1,060	1,740	1,070	1,020
24	21,750	8,750	5,150	21,730	1,650	1,060	1,990	1,270	1,020
25	13,300	7,850	5,950	17,050	1,650	1,060	2,270	1,170	750
26	9,250	6,150	6,900	11,900	1,500	1,060	2,270	1,070	680
27	6,100	5,150	7,700	11,400	1,900	1,060	2,490	920	680
28	5,150	4,650	7,700	9,850	1,650	910	2,380	1,000	540
29	5,150	....	8,430	8,750	1,425	910	2,270	1,000	600
30	4,450	....	8,550	7,250	1,425	910	2,270	1,070	540
31	4,250	....	8,750	....	1,425	......	1,990	1,170	......
Mean	7,860	9,032	4,235	14,996	2,857	1,503	1,447	1,746	981

NOTE.—Records for October, November, and December are not available at present.

MOHAWK RIVER NEAR DUNSBACH FERRY, NEW YORK.

A gaging record has been kept at the dam of the West Troy Water Company near Dunsbach Ferry, 9 miles from the mouth of Mohawk River. The dam is of masonry, and has a flat granite crest 5.5 feet wide, standing 0.75 foot higher at the crest lip than at the upstream edge. An island in the center of the stream divides the dam into two sections. The crest of the right wing, at the upper end of the island, is 380 feet long, with an average elevation of 174.15 feet. The crest of the left wing, at the lower end of the island, is 280 feet in length, and stands at an elevation of from 173.46 to 173.50 feet. Openings which existed in the dam during a part of the time the record has been kept should be taken into consideration in computing the flow.

The crest of the dam at the present time stands nearly level. The elevation of the zero of the crest gage is 172 feet. Readings are taken twice daily, usually between 6 and 7 a. m. and between 5 and 6 p. m. The mean of the readings taken for each day is given in the accompanying table.

In the adjacent pumping station are two Eclipse turbines, built by Stout, Mills & Temple, of Dayton, Ohio. One is 68 and the other 72 inches in diameter. They are run with gates wide open, under a head of from 7 to 8 feet.

The record at Dunsbach Ferry was established primarily for the purpose of checking a system of levels which were run for the United States Board of Engineers on Deep Waterways, by D. J. Howell, C. E., who furnished the record to the Geological Survey. No record was kept from April 1, 1899, to July 31, 1900.

The drainage area above the station at Dunsbach Ferry is 3,422 square miles.

Daily gage height, in feet, of Mohawk River near Dunsbach Ferry, New York, for 1898.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	....	4.00	3.20	3.00	1.40	2.50	2.80	2.40	3.60	3.20
2	....	3.60	3.10	2.70	1.00	5.50	2.40	2.40	3.40	3.10
3	....	3.20	3.20	2.40	.60	2.20	2.20	2.40	3.20	3.00
4	....	3.00	3.60	2.40	.40	2.70	2.20	2.40	3.20	3.00
5	....	2.80	4.20	2.40	.20	2.60	2.10	2.60	3.00	3.10
6	....	2.60	4.20	2.20	.00	3.50	2.20	5.80	3.00	3.40
7	....	2.50	4.20	2.00	—.10	3.00	2.40	4.20	3.00	3.30
8	....	2.60	3.50	1.80	—.10	2.40	2.60	3.30	3.00	3.20
9	....	2.60	3.10	1.70	—.10	2.00	3.00	3.20	3.10	3.20
10	....	2.40	2.60	1.70	—.20	1.60	2.70	3.10	3.30	3.20
11	....	2.40	2.60	1.80	—.30	1.80	2.30	2.80	8.40	3.10
12	7.60	2.40	2.40	1.80	—.40	1.50	2.00	2.70	6.80	3.00
13	8.20	2.40	3.60	2.70	—.60	1.20	1.80	2.70	5.50	2.90
14	8.40	2.50	3.80	3.40	—.60	1.00	1.60	2.80	4.90	2.80
15	7.50	2.60	3.40	3.10	—.60	.90	1.40	3.60	4.40	2.80
16	6.40	2.80	3.00	2.90	—.60	.80	1.30	4.90	4.00	2.80
17	5.60	3.00	2.80	2.60	—.80	1.40	1.30	4.30	3.60	2.80
18	5.60	2.80	2.60	2.20	—.70	2.40	1.20	3.80	3.60	2.80
19	5.30	2.70	2.40	2.00	—.70	2.50	1.20	3.40	3.60	2.80
20	6.50	2.80	2.50	2.00	1.70	2.90	1.80	3.30	4.80	2.80
21	6.20	3.20	2.60	2.60	2.20	3.40	2.20	3.30	4.30	2.80
22	5.40	3.30	2.60	2.20	1.90	2.90	2.00	3.40	3.80	3.00
23	4.80	3.40	2.40	2.20	1.70	2.60	2.00	4.00	3.70	3.60
24	4.80	4.70	2.50	2.00	.80	3.00	2.20	4.20	3.80	4.60
25	4.10	7.00	3.30	1.80	—.20	6.10	3.00	4.00	3.80	4.50
26	3.80	6.80	4.80	1.70	.00	6.40	3.20	3.80	3.50	4.20
27	3.60	6.20	5.20	1.70	1.20	5.20	2.80	4.40	3.50	3.80
28	3.60	5.00	5.20	1.60	1.80	4.00	2.80	5.40	3.00	3.40
29	4.00	4.30	4.00	1.40	1.60	3.20	2.60	5.00	3.00	3.00
30	4.80	3.70	3.40	1.40	1.20	2.80	2.50	4.30	3.00	2.80
31	4.70	....	3.20	....	.60	2.80	....	3.80	....	3.20

Daily gage height, in feet, of Mohawk River near Dunsbach Ferry, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Day.	Jan.	Feb.	Mar.
1	3.90	2.60	4.00	17	4.20	2.20	4.40
2	3.40	2.60	3.80	18	4.00	2.30	3.80
3	3.20	2.60	3.60	19	3.80	2.40	3.60
4	3.30	2.60	3.30	20	3.40	2.40	4.20
5	4.00	2.60	3.40	21	3.20	2.60	4.40
6	5.80	2.60	6.60	22	3.00	3.00	4.00
7	5.00	2.50	6.00	23	3.00	3.40	3.80
8	4.40	2.40	4.80	24	3.00	4.60	4.00
9	4.00	2.20	4.20	25	3.10	3.90	4.40
10	3.60	2.20	4.10	26	3.20	3.60	4.00
11	3.20	2.20	3.80	27	3.20	3.50	3.80
12	3.20	2.20	3.90	28	3.00	3.80	3.60
13	3.00	2.20	6.00	29	2.80	....	3.60
14	3.10	2.20	5.60	30	2.70	....	3.60
15	3.60	2.20	4.90	31	2.70	....	3.50
16	4.40	2.20	4.50				

Daily gage height, in feet, of Mohawk River near Dunsbach Ferry, New York, for 1900.

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.30	2.20	2.00	2.40	3.75	17	2.70	1.80	2.00	2.45	2.85
2	2.20	2.20	2.00	2.40	3.70	18	2.60	1.80	2.20	2.35	2.80
3	2.10	2.10	2.00	2.45	3.55	19	2.40	1.60	2.20	2.40	2.90
4	2.00	2.00	2.00	2.35	3.50	20	2.30	1.60	2.20	2.50	2.90
5	2.10	2.00	2.00	2.30	4.80	21	2.20	1.70	2.00	3.50	2.85
6	2.00	1.80	2.00	2.20	4.80	22	2.20	1.80	2.00	4.00	2.80
7	2.00	1.80	2.00	2.15	4.40	23	2.00	2.00	2.00	3.80	2.90
8	1.90	1.80	1.90	2.20	4.40	24	2.00	2.50	2.00	3.45	2.90
9	1.80	1.90	1.80	2.85	4.20	25	2.00	2.40	2.00	3.30	3.35
10	1.80	2.00	1.70	3.55	3.70	26	2.20	2.20	2.75	4.10	4.25
11	1.80	2.00	1.70	3.10	3.25	27	2.20	2.20	2.75	6.50	3.75
12	1.80	2.20	1.80	2.90	3.00	28	2.10	2.20	2.50	6.35	3.55
13	1.80	1.70	1.80	2.75	3.25	29	2.00	2.00	2.45	5.50	3.35
14	1.90	1.70	1.80	2.55	3.20	30	2.00	2.00	2.50	4.50	3.20
15	2.20	1.70	1.90	2.50	3.10	31	2.20	......	2.40	......	3.10
16	2.80	1.70	1.90	2.50	2.95						

INDIAN RIVER AT INDIAN LAKE DAM, NEW YORK.

Indian River, a tributary of the upper Hudson, has a precipitous forested mountain area of 146 square miles in eastern Hamilton County. In 1898 a masonry storage dam was built at the foot of Indian Lake, replacing the lumbermen's dam which was formerly there, and raising the level of the artificial lake so formed 23 feet. The storage capacity of the present lake is 5,000,000,000 cubic feet, the area of its water surface is 5,035 acres, and the elevation of the spillway crest above mean tide is 1,650 feet. The dam was built by a federation of water-power users on Hudson River, in cooperation with the State of New York, under the direction of Mr. George W. Rafter, engineer in charge, the primary object being to store flood waters from this drainage area, to be turned into the Hudson during the low-water period of the year, thereby equalizing to some extent the flow of that stream. Water is also used for sluicing logs during the river driving season.[1]

Since July 22, 1900, a gaging record has been kept at the dam, with a view to determining the total outflow from this reservoir. The facts recorded are the elevation of the water surface in the reservoir, the depth of water flowing over the spillway or flashboards, the depth of opening and the head on the main and subsidiary logways, and the depth of the opening and the effective head on each of the 5-foot sluice gates. These data enable a calculation of the outflow from the reservoir to be made, and, by comparison with gaging records kept on Hudson River at Fort Edward and Mechanicsville, the effect of storage on the low-water flow of the latter river can be determined.

A meteorological station has been established at the dam by the United States Weather Bureau, and records are kept of the rainfall, temperature, etc. The regimen of flow of Indian River below the dam is largely artificial, though in the course of a year or more the total annual run-off of the drainage area will appear in the stream,

[1] Engineering News, May 18, 1899.

and it is hoped, in the course of time, to determine the relation between the rainfall and run-off of what constitutes a rather typical Adirondack watershed.

When the reservoir is full the excess of inflow passes over the spillway, which has a level crest 106.05 feet long in the clear. To facilitate the calculation of discharge over this spillway a series of experiments was made at Cornell University June 6, 1899, on a full-sized model of the spillway section (6.58 feet long), from which the proper coefficients of discharge have been determined.[1]

The discharge through the two 5-foot sluice gates, provided for the purpose of drawing the water down as required, is calculated from the observed head and from the area of the lune-shaped gate orifices by the ordinary formula, the value of the coefficients of discharge to be applied being checked by current-meter measurements made at a convenient bridge below the dam.

A meter measurement of the flow at this point on October 19, 1900, showed the rate of draft from the reservoir to be 451 second-feet, both sluice gates being wide open and under an effective head of 11 feet. A measurement of Hudson River at Mechanicsville, made on the afternoon of the following day, October 20, showed the total flow at that point to be 1,871 second-feet.

The following table shows the stage of the Indian Lake reservoir during the year 1900, the depth being measured from the base of the invert of the 5-foot discharge tunnels, also the estimated storage capacity of the reservoir at different depths:

Estimated storage capacity of Indian Lake reservoir.

Water surface.	Elevation.	Area.	Storage capacity.
	Feet.	*Acres.*	*Cubic feet.*
Original lake	1,616-17	1,000	....
Lumbermen's dam	1,627	3,007	800,000,000
Crest of present dam	1,650	5,035	4,468,000,000
Top of flashboards of present dam	1,651.1	....	5,000,000,000

Depth of water, in feet, in Indian Lake reservoir, New York, for 1900.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	29.42	25.01	16.00	8.62	......	17	......	27.00	20.50	11.83	6.33	......
2	......	29.17	25.00	15.75	8.37	9.50	18	......	27.00	20.08	11.54	6.17	10.83
3	......	28.92	24.83	15.46	8.17	......	19	......	27.00	19.75	11.25	6.08	......
4	......	28.75	24.58	15.17	8.00	......	20	......	27.00	19.42	11.82	6.33	......
5	......	28.58	24.33	14.87	7.79	......	21	......	27.00	19.17	10.79	6.50	......
6	......	28.33	24.17	14.58	7.58	......	22	33.50	27.00	18.87	10.54	6.58	11.08
7	......	28.25	23.92	14.42	7.42	......	23	33.00	26.92	18.54	10.33	6.58	......
8	......	28.08	23.58	14.08	7.33	......	24	32.50	26.75	18.25	10.12	......	11.25
9	......	27.92	23.29	13.79	7.33	10.25	25	32.17	26.63	17.92	9.96	......	......
10	......	27.83	22.00	13.50	7.29	......	26	31.92	26.37	17.58	9.79	......	11.58
11	......	27.67	22.71	13.21	7.25	......	27	31.25	26.17	17.25	9.58	......	......
12	......	27.33	22.37	12.92	7.17	10.42	28	30.83	26.00	16.92	9.38	......	......
13	......	27.29	21.00	12.67	7.00	......	29	30.42	25.83	16.67	9.17	......	11.83
14	......	27.25	21.63	12.42	6.87	......	30	30.08	25.58	16.33	8.96	9.25	......
15	......	27.21	21.25	12.25	6.71	......	31	29.75	25.33	......	8.83	......	12.08
16	......	27.12	20.88	12.08	6.50	10.75							

[1] Proc. Am. Soc. Civ. Engs., March, 1900, p. 288.

SCHROON RIVER AT WARRENSBURG, NEW YORK.

A gaging record was established at the dam of the Schroon River Pulp Company, 2 miles below Warrensburg, by George W. Rafter, member American Society of Civil Engineers, November 1, 1895, in connection with the upper Hudson storage surveys.[1] The conditions at the Warrensburg gaging station are somewhat peculiar. During ordinary water an attempt is made to turn the entire flow of the stream, less leakage, through the water wheels, which run 24 hours a day, Sundays excepted. This is accomplished by the use of flashboards and by draft from the storage impounded by the Starbuckville dam. During extreme low water the mill is shut down altogether. As a rule, no water passes over the dam at this time, the entire flow leaking through. A balance is maintained between the inflow and the outflow by fluctuations in the pond level, thereby varying the pond storage and also the head on the leaks. As no record is kept when the mill is not running, it has been necessary to estimate the low-water flow, which was taken at 150 second-feet in 1899, this being the assumed leakage of the Starbuckville dam.[2] The apparently uniform regimen of the stream during considerable periods may be accounted for as the result of draft and storage from the Starbuckville dam.

A current-meter measurement of the leakage of the dam, flume, and flashboards at the Schroon River Pulp Company's mill was made on August 9, 1900, in the open channel about a half mile below the dam. The flow at that point was found to be 285 second-feet, which amount has been taken as the low-water flow and leakage during the present year (1900). The dam is of timber, and was considered nearly water-tight when built, but there is evidence that the leakage has increased year by year.

The flow over the dam without flashboards has been taken from a diagram deduced from experiments made at Cornell University on a weir having a similar cross section. The flow over the flashboards has been calculated by means of Francis's formula, with a constant coefficient of 3.33.

[1] Ann. Rept. State Engineer and Surveyor of New York, 1895, p. 118; also Water-Supply and Irrigation Paper U. S. Geol. Survey No. 35, p. 58.

[2] Report on a water supply from the Adirondack Mountains for the city of New York, by Geo. W. Rafter: Rept. of Merchants' Association of New York on the water supply of the city of New York, p. 337.

Daily discharge, in second-feet, of Schroon River at Warrensburg, New York, for 1899.

[Drainage area, 563 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*641	478	478	708	4,854	1,506	304	150	150	*381	1,468	708
2	641	478	478	*708	4,854	1,506	*304	150	150	381	1,468	708
3	641	478	478	708	4,854	1,506	304	150	*150	381	1,468	*708
4	641	478	478	708	4,854	*1,367	304	150	150	381	1,468	708
5	641	*478	*478	708	4,854	1,228	304	150	150	478	*1,468	708
6	641	478	478	708	4,854	1,228	304	*150	150	478	1,468	708
7	608	478	478	708	*4,487	1,228	304	150	150	478	1,468	708
8	*575	478	478	708	4,121	1,228	304	150	150	*478	1,468	708
9	575	478	478	*1,999	4,121	1,228	*304	150	150	478	1,318	708
10	575	478	478	3,291	4,121	1,228	304	150	*150	478	1,318	*708
11	575	478	478	3,291	4,121	*1,228	304	150	150	478	1,171	708
12	575	*478	*478	3,291	4,121	1,228	304	150	150	478	*1,106	708
13	575	478	478	3,291	3,493	1,228	150	*150	150	478	1,041	931
14	608	478	478	3,291	*3,307	1,228	150	150	150	478	983	983
15	*641	478	478	3,291	3,121	1,228	150	150	150	*478	901	1,041
16	641	478	478	*3,362	3,121	1,228	*150	150	150	478	861	1,101
17	641	478	478	3,443	2,931	1,228	150	150	*150	478	841	*1,127
18	641	478	559	3,443	2,931	*1,228	150	150	150	478	841	1,153
19	641	*478	*641	3,443	2,931	1,228	150	150	150	478	*841	1,153
20	641	478	641	3,443	2,381	1,228	150	*150	381	478	841	1,153
21	608	478	641	3,443	*2,181	1,228	150	150	381	478	841	1,153
22	*575	478	641	3,443	1,981	1,228	150	150	381	*478	841	1,153
23	575	478	641	*4,273	1,981	1,228	*150	150	381	478	841	1,153
24	575	478	718	5,103	1,981	970	150	150	*381	478	841	*1,153
25	575	478	718	5,103	1,981	*675	150	150	381	478	841	1,153
26	575	*478	*718	5,103	1,981	381	150	150	381	478	*774	1,153
27	575	478	718	5,103	1,506	381	150	*150	381	478	708	1,101
28	575	478	718	5,103	*1,448	381	150	150	381	478	708	1,101
29	*575	......	718	5,103	1,391	381	150	150	381	*478	708	1,041
30	575	......	718	*5,103	1,391	381	*150	150	381	478	708	1,041
31	575	......	718	....	1,391	....	150	150	......	478	....	*1,041
Mean	606	478	564	2,877	3,150	1,093	210	150	234	462	1,047	948

* Sunday.

Daily discharge, in second-feet, of Schroon River at Warrensburg, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	810	810	1,360	*1,162	3,965	1,085	*885	285	285	285	517	939
2	810	810	1,290	1,215	2,885	1,217	810	285	*285	535	517	*285
3	810	810	1,230	1,315	2,625	*1,349	810	285	285	535	517	989
4	810	*810	*1,204	1,395	2,305	1,565	810	285	285	535	*285	989
5	810	810	1,178	1,535	2,155	1,990	810	*285	285	517	535	989
6	810	810	1,140	1,535	*2,045	1,890	810	285	285	517	535	989
7	*810	810	1,123	1,741	1,935	1,890	810	285	285	*285	535	989
8	810	810	1,123	*1,947	1,748	1,890	*810	285	285	535	517	989
9	810	810	1,123	2,155	1,715	1,890	616	285	*285	535	517	*285
10	810	810	1,123	2,155	1,715	*1,725	616	285	285	535	517	989
11	810	*1,895	*1,123	2,155	1,715	1,565	616	285	285	517	*285	989
12	810	2,035	1,123	2,225	1,715	1,425	616	*285	285	517	535	989
13	810	1,165	1,123	2,305	*1,670	1,300	616	806	285	517	535	989
14	*810	1,945	1,123	2,465	1,625	1,290	616	806	285	*285	535	989
15	810	1,945	1,123	*2,765	1,605	1,300	*616	806	285	535	517	989
16	810	1,945	1,123	3,065	1,585	1,300	539	806	*285	535	517	*285
17	810	1,945	1,123	3,365	1,545	*1,187	539	806	285	535	517	788
18	810	*1,892	*1,120	3,545	1,535	1,075	539	806	285	517	*285	788
19	810	1,840	1,117	4,115	1,525	963	365	*285	285	517	401	788
20	810	1,795	1,107	5,365	*1,470	963	365	806	285	517	535	788
21	*810	1,710	1,100	7,010	1,415	963	285	806	285	*285	535	788
22	810	1,608	1,089	*7,745	1,375	963	*285	806	285	535	535	788
23	810	1,608	1,085	6,945	1,355	963	285	806	*285	535	574	285
24	810	1,608	1,085	6,945	1,295	*963	285	612	285	535	285	*285
25	810	*1,571	*1,085	6,210	1,295	963	285	612	285	517	*285	788
26	810	1,535	1,085	6,685	1,125	963	285	*285	285	517	806	788
27	810	1,475	1,155	6,315	*1,025	963	285	285	285	517	806	788
28	*810	1,435	1,130	5,365	1,085	963	285	285	285	*285	806	788
29	810	....	1,110	*5,095	1,085	963	*285	285	285	535	806	788
30	810	....	1,110	4,825	1,085	963	285	285	*285	535	806	285
31	810	....	1,110	....	1,085	....	285	285	......	535	......	*788
Mean	810	1,380	1,140	3,688	1,688	1,280	528	474	285	488	530	773

* Sunday.

HUDSON RIVER AT FORT EDWARD, NEW YORK.

This station, located at the dam of the International Paper Company, was established in 1895, by George W. Rafter, member American Society of Civil Engineers, in connection with upper Hudson storage surveys. The dam is of timber, on slate rock foundation, and has but little leakage. The crest is straight, very nearly level, and 587.6 feet in length. The zero of the crest gage stands at the level of the lip of the dam proper. Flashboards from 15 to 18 inches in height are usually maintained on the dam. A record is kept of the height of the flashboards and of the times of their setting and removal.

In the adjoining mill there are 62 water wheels, nearly all of modern types, which have been tested at the Holyoke flume. A record is kept of the daily run of each wheel, in hours, as well as of the working head, which usually is 19 feet. The discharge through the turbines is estimated from diagrams expressing the flow as a function of the working head and the number of wheel-hours run.

In the winter of 1896–97 a flood spillway was cut around the south end of the dam, over which the water flows whenever it reaches the level of the crest of the flashboards. The profile of the spillway is very irregular, and causes some uncertainty in the calculated flows during high water.

When the flashboards are off the flow is computed by means of the East Indian Engineers' formula;[1] when they are on the flow is computed by Francis's well-known formula for sharp-crested weir. During the dry season little water passes over the dam, the entire flow being employed to drive the turbines. A current-meter measurement was made at the highway bridge below the dam on July 26, 1900, and the flow was found to be 2,704 second-feet.

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[1] Mullin's Irrigation Manual.

Daily discharge, in second-feet, of Hudson River at Fort Edward, New York, for 1899.

[Drainage area, 2,800 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*2,415	2,822	3,744	6,514	23,033	3,106	583	363	923	*2,181	9,268	1,941
2	2,619	2,822	3,744	*1,600	23,033	3,106	*945	363	923	2,181	11,948	1,941
3	2,619	2,502	3,744	4,378	23,033	3,106	945	363	*20	1,785	12,250	*1,280
4	2,619	2,606	6,154	4,378	19,689	*1,356	945	363	1,186	1,785	9,403	4,267
5	2,619	*945	*2,415	4,378	19,689	2,218	583	363	1,186	1,211	*14,930	4,307
6	2,877	1,839	5,444	4,378	21,949	2,218	289	*(a)	1,184	912	9,402	4,307
7	2,877	1,539	5,444	4,654	*12,340	2,218	743	(a)	920	1,172	5,668	4,243
8	*4,335	1,539	5,444	4,654	21,940	2,218	762	(a)	920	*20	7,974	4,243
9	4,320	1,539	5,444	*1,560	21,949	2,218	*100	(a)	920	1,008	7,951	4,243
10	3,896	1,539	5,444	4,334	8,283	2,138	1,547	(a)	*20	1,112	6,149	*1,016
11	3,872	1,162	5,444	9,202	6,549	*1,356	1,547	(a)	975	1,182	6,149	2,194
12	2,944	*942	*3,025	9,967	7,049	1,917	1,817	(a)	953	1,182	*1,860	2,369
13	3,225	2,109	5,444	9,967	2,049	1,917	1,817	*(a)	867	1,182	8,923	9,675
14	4,300	2,109	5,444	17,428	*6,960	1,912	1,817	574	631	919	3,817	11,410
15	*2,415	2,109	5,444	17,406	7,049	1,912	1,817	574	620	*20	3,135	11,410
16	5,368	2,109	5,315	*20,095	5,204	1,860	*455	574	577	1,177	3,133	8,130
17	5,388	2,109	4,335	21,222	5,204	1,720	1,817	916	*20	575	3,133	*5,882
18	5,388	1,504	4,335	21,222	5,204	*945	1,817	916	624	576	3,133	8,229
19	5,388	*1,150	*3,344	21,800	5,204	1,683	1,817	916	624	826	*20	8,229
20	5,388	1,682	6,099	27,059	8,617	1,454	1,817	*20	577	861	2,900	8,574
21	5,388	1,682	6,229	29,545	*700	988	1,645	1,176	954	1,184	2,900	8,574
22	*1,356	1,682	6,229	29,618	4,864	752	1,645	1,176	1,024	*20	2,900	8,574
23	3,491	2,012	6,229	*25,640	4,864	590	*465	1,176	1,024	1,446	2,580	8,220
24	3,776	2,308	5,703	32,158	4,184	590	1,368	916	*20	1,439	2,311	*2,415
25	3,618	1,600	5,703	32,159	4,282	*747	1,300	916	1,184	923	2,044	2,415
26	3,623	*1,600	*2,415	29,619	3,901	1,329	1,103	916	3,404	918	*20	4,809
27	3,623	2,853	5,444	29,619	3,901	894	1,103	*574	4,889	919	2,311	4,234
28	3,041	2,842	5,444	29,620	*1,356	888	1,275	1,176	4,889	919	2,206	4,234
29	*925	......	5,506	27,032	3,104	585	1,275	576	4,181	*20	2,206	4,234
30	2,816	......	5,506	*23,120	3,104	583	*20	576	4,181	1,183	2,206	4,234
31	2,816	......	5,506	......	3,104	......	461	948	......	1,183	......	*20
Mean	3,527	1,902	5,005	16,811	9,561	1,617	1,150	714	1,347	1,033	5,098	5,157

* Sunday. *a* No record.

Daily discharge, in second-feet, of Hudson River at Fort Edward, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,001	3,481	2,879	*3,237	12,486	4,924	*175	1,927	1,044	827	1,620	5,586
2	1,957	3,221	4,242	4,932	11,899	4,924	827	1,401	*956	827	1,266	*5,611
3	1,957	3,221	4,362	5,261	10,776	*3,422	827	1,719	190	827	1,406	7,697
4	1,957	*1,810	*3,019	5,701	11,626	4,921	30	1,332	1,445	827	*302	4,421
5	1,957	2,961	4,462	5,701	9,646	5,094	1,216	*1,087	827	827	1,462	4,421
6	2,053	2,447	3,215	7,376	*3,015	4,674	931	1,256	715	827	834	4,183
7	*1,401	2,447	3,859	10,566	7,351	4,419	821	1,087	827	*20	1,226	4,661
8	2,217	2,447	3,741	*11,360	8,246	4,440	*1,215	1,350	827	1,466	1,006	4,181
9	2,217	3,221	3,471	14,316	5,836	4,539	1,288	1,579	*827	1,216	1,119	*7,281
10	2,217	3,889	4,208	11,636	8,246	*1,367	1,255	1,740	1,211	1,216	2,203	2,454
11	2,217	*2,062	*3,259	11,636	6,608	3,859	827	1,729	1,211	1,258	*875	2,061
12	2,217	4,136	3,879	11,636	6,608	3,201	1,260	*1,053	1,211	1,238	2,203	2,806
13	2,217	7,369	3,659	10,776	*4,450	2,924	841	2,271	827	1,366	2,203	2,656
14	*1,571	16,615	3,723	10,776	5,361	2,921	1,467	2,565	1,579	*872	1,883	2,388
15	2,217	17,747	3,759	*9,202	6,378	2,981	*803	3,019	1,293	1,818	1,947	2,138
16	2,217	18,499	3,571	10,776	7,348	2,268	2,171	3,233	*686	1,504	1,691	*965
17	2,217	18,975	3,095	12,946	5,993	*795	1,248	3,347	1,233	1,306	2,947	2,275
18	2,217	*13,045	*1,302	17,076	6,987	2,941	1,220	2,989	1,233	1,450	*1,133	1,826
19	2,217	15,531	3,479	23,626	5,961	1,677	934	*1,420	1,112	1,246	2,040	1,940
20	2,217	9,340	3,479	31,495	*3,015	1,957	1,360	2,242	1,112	1,224	1,901	1,920
21	*1,401	9,141	4,830	34,899	7,342	2,407	1,268	1,250	1,211	*872	4,863	2,138
22	5,858	7,611	4,942	*34,470	5,967	1,915	*30	1,534	1,175	1,611	7,074	2,138
23	7,312	7,013	4,942	43,900	6,336	1,979	1,306	977	*912	1,040	10,213	*1,795
24	7,577	6,259	4,942	36,061	5,111	*20	1,338	940	1,612	1,118	6,482	1,590
25	6,991	*5,609	*2,911	30,945	3,677	2,607	2,033	901	1,661	1,106	*3,260	3,170
26	6,991	4,694	4,742	26,635	4,912	2,191	1,467	*95	1,557	1,251	6,268	2,637
27	5,862	4,232	4,742	23,536	*415	1,178	3,441	928	1,329	1,773	......	3,136
28	*2,041	4,045	4,466	18,480	4,366	2,181	3,263	928	1,435	*804	......	2,887
29	5,212	......	4,882	*14,250	4,319	1,241	*175	1,487	1,180	2,703	......	2,887
30	4,287	......	4,942	14,210	3,372	1,069	1,987	1,531	*865	2,447	......	*2,637
31	3,571	......	4,942	......	3,460	......	1,656	1,791	......	1,647	......	2,637
Mean	3,211	7,074	3,934	16,914	6,358	2,834	1,248	1,652	1,110	1,243	2,670	3,198

* Sunday.

HUDSON RIVER AT MECHANICSVILLE, NEW YORK.

A record of the flow of Hudson River at Mechanicsville has been kept by the Duncan Company since December, 1888. The record includes two daily readings of the depth of water on the crest of the dam and a continuous record of the water wheels in the adjoining paper mill. The accompanying tables give the daily mean flow at Mechanicsville, computed by Mr. R. P. Bloss, the engineer of the Duncan Company. A record is kept of the length and height of the flashboards at all times, with the dates of their setting and removal.

The flow over the dam has been computed by the Francis formula for the Merrimac dam, $Q=3.01\ LH^{1.53}$, L being 794 feet. The same formula has been used in all cases, whether flashboards are on or off.

The flow through the water wheels has been taken from the rating tables of the manufacturers. The working head on the wheels varies from 15 to 17 feet, depending on the condition of the flashboards on the dam. A test made by Mr. Bloss of a 39-inch Hercules wheel in the mill, which has been in use about eight years, shows the actual discharge to be substantially the same as that given in the manufacturers' tables when running at the speed of greatest efficiency. When running at higher speeds the discharge may be several per cent less.

A current-meter measurement of the flow below the dam was made at the Mechanicsville tollbridge October 20, and showed a discharge of 1,871 second-feet. The result is somewhat uncertain, however, owing to slack water. No water was flowing over the dam, and the calculated turbine discharge was 1,977 second-feet.

The flow of Hudson River at Mechanicsville has been calculated by George W. Rafter, member American Society of Civil Engineers, using the East Indian Engineers' formula for flow over dam.[1] This formula gives a somewhat greater discharge than that obtained by using the Francis formula for the Merrimac dam.

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[1] Rept. State Engineer and Surveyor of New York, 1895, p. 105; also Water-Supply and Irrigation Paper U. S. Geol. Survey No. 24, p. 78

Daily discharge, in second-feet, of Hudson River at Mechanicsville, New York, for 1898.

[Drainage area, 4,500 square miles.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,252	4,340	5,011	20,306	*13,474	9,490	3,179	3,005	*a* 4,345	3,222	7,954	6,300
2	(*)	4,839	4,998	18,016	11,545	8,159	3,014	3,888	*a* 4,007	*2,877	7,667	6,130
3	5,319	5,034	4,927	*15,810	9,702	7,558	*3,007	6,225	*a* 4,145	2,835	6,590	5,698
4	5,276	4,114	4,909	13,890	10,820	6,292	3,007	5,72[illegible]	**a* 4,340	2,780	6,500	*5,185
5	5,563	3,956	4,791	11,932	10,570	*5,808	3,364	6,031	4,547	11,210	5,890	5,994
6	5,698	(*)	(*)	10,692	11,300	5,508	2,588	5,832	4,145	20,089	*5,803	6,500
7	6,873	4,000	4,998	9,928	11,032	4,729	2,453	*5,415	4,007	9,472	5,890	6,322
8	7,592	5,286	4,875	8,787	*10,250	4,399	2,514	5,091	4,930	8,261	5,503	5,456
9	(*)	5,139	6,418	8,158	9,700	4,249	2,220	4,335	4,217	*7,872	5,872	4,150
10	6,431	5,145	7,004	*7,924	8,695	3,978	*1,163	3,926	3,813	6,960	6,238	4,675
11	6,249	5,865	9,746	7,915	7,875	3,425	2,000	3,743	*3,368	6,038	20,256	*4,345
12	5,136	7,639	20,202	7,646	8,420	*3,857	2,182	3,387	3,304	6,109	16,262	4,290
13	11,930	(*)	(*)	8,553	11,054	4,299	2,058	3,331	3,188	5,331	*14,510	3,739
14	11,424	9,732	39,231	9,815	10,585	4,945	2,080	*[illegible],148	2,732	4,829	13,202	3,540
15	10,557	8,078	36,155	9,824	*10,161	7,662	2,184	3,362	2,597	6,888	11,385	3,850
16	(*)	7,706	31,310	12,188	9,967	6,872	2,159	3,250	2,487	*7,338	10,366	4,007
17	10,176	5,396	31,069	*12,575	10,082	5,681	*1,163	3,223	2,597	8,125	9,722	4,495
18	7,898	6,978	31,794	12,188	10,637	4,620	2,192	3,235	*2,873	7,250	8,910	*4,590
19	7,318	7,224	29,304	11,155	9,404	*4,851	2,224	3,660	2,873	6,500	8,922	4,590
20	8,401	(*)	(*)	11,157	9,412	5,593	2,175	4,507	3,365	6,508	*10,505	4,885
21	14,053	7,445	35,917	10,922	8,355	4,603	2,192	*4,495	2,975	6,418	11,167	5,035
22	10,625	7,348	33,660	10,127	*7,954	4,399	3,188	4,718	2,899	6,310	10,366	5,035
23	(*)	6,746	30,004	9,815	8,000	4,198	3,565	3,927	2,666	*6,894	9,610	6,908
24	11,873	6,149	26,754	*9,627	8,400	4,348	*3,549	5,779	3,297	7,578	8,898	8,369
25	9,866	5,915	24,034	20,440	9,491	4,097	3,928	*a* 11,167	*5,231	7,178	8,685	*7,747
26	9,173	5,461	21,040	24,210	11,953	*4,024	4,665	*a* 9,953	6,878	6,693	7,847	6,885
27	8,171	(*)	(*)	24,338	14,758	4,115	4,258	*a* 8,125	5,706	9,382	*6,413	5,872
28	8,101	5,380	19,077	20,440	15,327	3,556	3,656	**a* 8,250	4,775	11,042	5,820	4,618
29	7,727	......	19,818	18,165	*14,140	3,508	3,352	*a* 6,109	4,345	10,485	6,300	4,628
30	(*)	......	22,777	14,873	12,727	3,238	3,175	*a* 4,829	3,650	*10,059	6,300	4,828
31	4,822	......	21,805	......	10,490	......	*3,015	*a* 4,217	......	9,953	......	5,348
Mean	8,173	6,038	19,617	13,047	10,525	5,069	2,751	5,029	3,810	7,516	8,978	5,291

a Discharge August 25 to September 4 approximate, owing to irregular flashboards.
* Sunday.

Daily discharge, in second-feet, of Hudson River at Mechanicsville, New York, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	*4,262	3,910	7,847	7,980	26,900	3,990	2,220	1,520	1,713	(*)	4,564	3,005
2	4,262	4,268	7,040	7,159	27,617	3,796	*1,047	629	1,561	4,042	8,889	3,414
3	5,209	4,268	6,403	6,955	25,551	3,601	2,128	1,213	(*)	3,453	12,020	*3,753
4	6,065	4,150	......	7,938	22,472	*2,220	......	1,153	1,293	2,850	11,899	5,545
5	9,146	*4,002	(*)	9,504	19,242	2,990	2,741	1,085	1,860	2,745	*10,346	6,678
6	8,460	4,223	16,501	9,955	15,152	2,840	1,610	(*)	1,764	2,650	11,049	5,974
7	8,355	4,048	12,266	11,719	*12,662	2,728	1,670	1,494	1,706	2,571	9,308	5,210
8	*8,350	4,275	9,077	19,708	10,960	2,805	1,211	1,616	1,680	(*)	8,140	4,558
9	8,026	3,448	8,665	*18,275	9,270	2,525	(*)	1,475	1,466	2,590	7,166	3,806
10	6,562	3,665	7,909	15,062	8,587	2,290	3,000	484	(*)	2,712	6,662	*3,265
11	5,766	3,622	7,315	15,582	7,446	(*)	3,533	1,148	1,480	2,903	6,182	3,569
12	5,250	*4,062	*11,739	16,875	7,550	2,399	3,296	993	1,598	2,874	*5,490	4,979
13	5,272	4,196	15,437	17,145	7,155	2,505	3,243	(*)	1,471	2,926	6,321	11,183
14	5,960	4,508	12,153	21,378	*7,060	2,230	3,002	1,580	1,567	2,353	5,536	14,576
15	*7,435	4,600	10,555	27,975	7,772	2,135	2,800	1,680	1,484	(*)	5,179	14,979
16	8,910	4,798	10,012	*29,730	7,346	3,078	(*)	1,501	1,549	2,177	4,858	13,452
17	10,155	5,598	9,080	31,112	5,738	3,060	2,861	1,815	(*)	2,132	5,283	*9,646
18	9,685	5,691	7,895	29,667	5,729	*2,762	3,338	979	711	1,853	4,857	9,534
19	7,339	*5,620	*9,322	29,711	5,928	2,950	2,860	1,390	1,636	1,798	*4,359	9,968
20	6,385	5,267	11,350	33,940	5,917	2,508	2,560	(*)	957	1,997	4,838	10,950
21	6,297	4,855	9,670	36,210	*5,925	2,372	2,485	1,610	941	2,185	4,729	11,048
22	*5,770	5,686	9,337	36,210	6,187	2,280	2,295	1,123	1,448	(*)	4,587	10,721
23	5,697	10,083	8,645	*37,146	5,313	2,105	(*)	1,743	1,464	2,466	4,297	9,642
24	5,522	7,501	8,657	38,283	4,756	1,878	2,240	2,460	(*)	2,698	3,964	*8,068
25	6,950	5,583	8,095	39,064	4,710	*304	2,233	1,383	1,516	2,372	3,731	8,241
26	5,775	*5,255	*7,492	41,475	4,462	1,878	2,188	1,463	2,116	2,304	*3,472	7,821
27	5,438	6,450	6,895	40,664	4,117	2,241	2,021	(*)	6,000	2,128	4,027	5,832
28	4,545	10,326	6,615	38,300	*3,985	2,290	2,140	1,756	5,127	2,216	3,495	5,435
29	*4,290	......	7,835	33,908	4,125	2,368	1,686	1,738	4,413	(*)	3,439	4,889
30	4,345	......	8,765	*30,292	3,787	2,512	(*)	1,739	4,870	3,198	3,318	4,075
31	4,066	......	7,602	......	3,918	......	2,055	1,477	......	3,815	......	*2,585
Mean	6,437	5,141	9,316	24,607	9,591	2,539	2,402	1,417	2,054	2,616	6,066	7,303

* Sunday.

Daily discharge, in second-feet, of Hudson River at Mechanicsville, New York, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,612	4,163	5,623	(*)	16,713	4,288	*2,364	2,977	2,365	2,102	2,531	9,107
2	3,276	3,349	12,924	10,088	15,493	4,932	2,368	2,809	*2,297	2,223	2,094	*8,316
3	3,294	3,737	10,299	10,413	14,676	*3,482	2,368	2,464	2,177	2,144	2,413	7,444
4	3,263	(*)	*3,800	11,188	14,593	7,644	2,191	2,386	2,519	2,071	*2,159	6,459
5	3,277	6,556	7,998	11,188	12,494	6,793	2,701	*2,167	2,289	1,752	1,977	10,694
6	3,602	8,140	5,932	12,267	*9,444	6,083	2,382	2,135	2,125	1,768	1,925	9,033
7	*3,000	7,204	9,312	15,149	9,741	5,554	2,109	2,266	2,031	*2,094	1,576	7,920
8	3,816	6,777	6,900	*17,520	10,924	5,329	*2,200	2,607	1,725	1,895	1,666	7,624
9	3,556	19,351	6,738	18,804	9,066	5,329	2,130	2,785	*1,248	1,888	2,028	*6,880
10	3,998	11,373	7,420	16,633	9,403	*4,430	2,007	2,752	713	1,965	2,520	6,181
11	3,698	*9,666	*6,342	14,742	10,716	5,827	1,437	2,182	1,738	1,692	*3,860	5,019
12	3,218	7,799	6,305	14,237	8,530	4,759	1,692	*2,550	1,916	2,063	4,331	4,663
13	3,159	24,539	5,563	14,362	*7,500	4,175	1,342	2,541	1,801	1,947	3,820	4,988
14	(*)	41,285	5,761	13,554	7,626	3,911	2,002	2,691	1,118	*1,931	3,805	4,856
15	3,067	25,354	5,363	*11,988	7,750	4,033	*2,263	3,292	1,433	2,123	3,315	4,250
16	3,158	22,593	4,411	13,588	9,390	4,054	2,292	4,299	*1,820	2,061	3,136	*4,250
17	3,180	19,527	4,719	15,918	7,549	*3,700	2,185	5,773	2,063	2,233	2,911	4,195
18	3,139	*16,547	*3,675	22,761	8,241	4,269	2,189	4,617	1,904	2,013	*3,036	4,265
19	4,668	14,173	4,935	33,150	7,500	3,617	1,991	*4,014	2,087	1,978	3,287	3,909
20	16,115	12,825	15,344	40,131	*9,450	2,941	1,580	3,955	2,032	1,954	3,829	4,129
21	*18,307	11,555	11,058	42,908	10,953	2,774	1,565	3,154	1,412	*1,977	5,292	3,953
22	11,307	10,060	7,999	*42,300	9,141	2,968	*2,180	2,834	1,581	2,017	9,332	4,004
23	10,176	13,310	8,324	43,546	8,029	3,141	2,299	2,510	*1,704	1,955	10,120	*4,210
24	9,853	10,188	9,399	41,940	7,354	*1,877	2,271	2,351	1,822	2,253	9,321	5,239
25	9,295	*9,301	*10,686	38,575	6,345	2,868	2,092	1,831	1,978	2,195	*8,796	3,763
26	8,449	7,042	8,226	33,983	5,758	3,210	2,690	*1,708	1,953	2,167	9,483	6,536
27	6,913	5,390	7,541	28,578	*4,651	3,713	4,082	1,702	2,002	2,203	11,027	4,700
28	(*)	5,252	7,626	25,618	6,454	2,787	3,898	1,814	2,422	*2,320	11,694	4,679
29	6,145	....	7,626	*25,741	5,333	2,361	*2,836	2,192	2,145	2,583	11,347	4,459
30	5,808	....	8,014	19,510	4,042	2,530	3,951	2,142	*2,135	3,287	9,670	*4,593
31	4,453	....	9,075	....	3,857	....	3,248	2,278	....	3,124	....	4,535
Mean	5,841	12,484	7,740	22,614	8,992	4,093	2,352	2,703	1,886	2,128	5,077	5,331

* Sunday.

CROTON RIVER AT OLD CROTON DAM, NEW YORK.

Records of the yield of the Croton watershed have been prepared by the engineers of the aqueduct commission. Tables of the monthly discharge of the river, in second-feet, for the years 1870 to 1898, inclusive, were printed in the Twentieth Annual Report, Part IV, page 83, and in the Twenty-first Annual Report, Part IV, page 75, is a table of the rainfall and run-off of the watershed for the years 1868 to 1899, inclusive. The following table, furnished by Mr. W. R. Hill, chief engineer of the aqueduct commission, is the record for 1900. The figures of rainfall are those obtained at Boyds Corners, in Croton Basin.

Estimated monthly discharge of Croton River at old Croton dam, New York, for 1900.

[Drainage area, 338 square miles.]

Month.	Discharge.	Total.	Run-off.		Rainfall.
			Per square mile.	Depth.	
	Second-feet.	*Acre-feet.*	*Second-feet.*	*Inches.*	*Inches.*
January	537	33,020	1.59	1.83	4.18
February	2,179	121,032	6.45	6.71	7.97
March	1,724	106,013	5.10	5.88	5.06
April	553	32,915	1.64	1.83	2.16
May	716	43,991	2.12	2.45	6.40
June	357	21,254	1.06	1.18	2.17
July	78	4,774	.23	.27	4.28
August	77	4,716	.23	.27	1.75
September	107	6,357	.32	.36	3.27
October	174	10,674	.51	.59	4.73
November	346	20,573	1.02	1.14	4.91
December	639	39,258	1.89	2.18	2.58
The year	624	444,577	1.85	24.69	49.46

DELAWARE RIVER AT LAMBERTVILLE, NEW JERSEY.

This station, which was established July 23, 1897, by E. G. Paul, is described in Water-Supply Paper No. 35, page 62. The results of measurements for 1899 will be found in the Twenty-first Annual Report, Part IV, page 77. During 1900 the following measurements of discharge were made by Mr. Paul:

May 22: Gage height, 5.10 feet; discharge, 17,750 second-feet.

September 27: Gage height, 2.95 feet; discharge, 1,824 second-feet.

Daily gage height, in feet, of Delaware River at Lambertville, New Jersey, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	(a)	(a)	5.40	4.25	4.45	3.30	2.65	3.40	2.95	2.90	2.80	4.15
2	(a)	(a)	12.00	4.20	4.35	3.40	2.50	3.15	3.05	2.50	2.75	4.05
3	(a)	(a)	10.70	4.30	4.25	3.45	2.60	3.00	2.75	2.55	2.85	3.95
4	(a)	7.00	7.95	4.40	4.20	3.65	2.90	3.05	2.90	2.65	3.20	3.95
5	(a)	6.85	6.80	4.50	4.05	3.80	3.10	3.05	2.70	2.80	3.25	4.40
6	(a)	5.75	6.20	4.40	4.00	3.70	3.40	2.70	2.70	2.55	3.20	4.90
7	(a)	5.30	6.05	4.30	3.95	3.55	3.80	3.25	2.60	2.75	3.20	5.40
8	(a)	5.45	5.80	4.40	3.90	3.35	3.65	2.70	2.65	2.70	3.15	4.95
9	(a)	5.60	6.00	4.60	3.80	3.30	3.65	2.60	2.90	2.75	3.20	4.60
10	(a)	6.95	5.60	4.55	3.80	3.55	3.55	2.65	2.85	2.75	3.10	4.45
11	(a)	6.55	5.45	4.45	3.90	3.85	3.50	2.80	3.00	2.75	2.90	4.20
12	5.65	5.60	5.20	4.30	3.80	3.80	3.35	2.55	3.25	2.60	2.75	3.95
13	4.35	7.46	4.90	4.35	3.80	3.50	3.35	2.55	3.10	2.50	2.55	3.90
14	3.95	11.40	4.60	4.40	3.80	3.45	3.20	3.05	3.00	3.15	2.70	4.40
15	3.70	9.70	4.55	4.50	3.70	3.95	3.30	3.05	2.85	2.95	2.60	(a)
16	3.60	8.10	4.50	4.45	3.60	3.95	3.10	2.80	3.45	3.00	2.85	(a)
17	3.85	6.65	4.20	4.30	3.60	3.85	3.35	2.85	3.25	2.80	2.85	(a)
18	3.80	5.95	4.20	4.75	4.00	3.70	3.25	2.80	3.00	2.60	3.10	(a)
19	3.70	5.25	4.10	6.60	4.80	3.45	3.30	2.95	3.00	2.40	2.85	(a)
20	4.45	5.05	5.15	7.15	5.35	3.45	3.35	3.15	2.70	2.35	2.80	(a)
21	7.70	4.90	5.90	6.50	5.40	3.25	3.30	3.10	2.55	2.60	2.75	(a)
22	7.75	6.05	6.30	6.00	5.05	3.20	3.50	2.95	2.65	2.65	2.85	(a)
23	6.20	9.65	5.65	5.85	4.60	3.05	3.35	2.90	2.85	2.25	3.10	(a)
24	5.75	8.70	5.30	5.95	4.25	3.15	3.45	2.80	2.85	2.40	3.40	3.40
25	5.25	7.10	5.15	5.95	4.15	3.20	3.35	2.65	2.80	2.40	3.15	3.60
26	5.00	6.10	5.00	5.70	4.05	3.15	4.35	3.10	2.90	2.50	3.75	3.50
27	5.20	5.25	4.85	5.25	3.95	3.00	4.10	3.05	2.95	2.50	3.50	3.80
28	(a)	4.90	4.95	4.95	3.75	2.90	3.85	2.95	2.90	2.85	4.10	4.05
29	(a)	......	4.60	4.80	3.60	2.70	3.65	2.80	2.65	2.80	4.75	4.05
30	(a)	......	4.50	4.65	3.60	2.70	3.60	2.85	2.95	2.85	4.40	(a)
31	(a)	......	4.35	......	3.45	......	3.50	3.10	......	2.95	......	4.00

a Frozen.

TOHICKON CREEK AT POINT PLEASANT, PENNSYLVANIA.

The stream is described in the Twentieth Annual Report, Part IV, page 98, which also contains (pages 98–103) the figures for monthly flow for the years 1890 to 1898. Figures for daily flow for 1899 were published in Water-Supply Paper No. 35, page 64. In the Twenty-first Annual Report, Part IV, pages 83 to 85, will be found the monthly flow for 1899 and diagrams of the discharge from 1883 to 1899, inclusive. The following tables give the figures for daily flow since 1883, when the station was established, from which the diagrams were constructed. Daily records of gage heights were not kept during 1900. The average monthly discharge, which will appear in the Twenty-second Annual Report, Part IV, has been computed by Mr. John E. Codman, hydrographer of the water department of the city of Philadelphia, from the rainfall and the monthly flow of Neshaminy and Perkiomen creeks.

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1883.

[Drainage area, 102.2 square miles.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1		3	90	49	18	11	7	20	41
2		6	55	46	19	5	9	15	41
3		10	39	43	20	4	18	23	41
4		28	33	31	21	3	12	17	110
5		24	26	43	22	4	12	21	100
6		11	26	37	23	2	13	18	100
7		11	30	41	24	2	456	18	100
8		11	30	61	25	5	189	21	100
9		13	36	81	26	5	99	24	100
10		7	35	122	27	8	95	220	100
11		12	151	81	28	6	69	165	260
12		7	118	41	29	5	356	85	250
13	4	9	79	41	30	5	687	49	240
14	7	5	54	41	31		179		230
15	7	7	43	41					
16	1	18	29	41	Mean	5	77	53	86
17	2	15	20	41					

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1884.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	331	406	384	359	29	10	589	35	29	7	150	159
2	473	395	376	333	26	10	372	41	18	6	125	159
3	515	395	368	400	20	8	247	30	18	5	102	139
4	445	396	360	279	20	6	216	52	18	5	205	48
5	354	396	419	217	20	5	2,309	100	11	5	313	44
6	354	396	392	155	20	7	1,507	103	5	4	253	256
7	467	1,989	365	92	19	8	863	76	7	2	81	1,560
8	2,593	2,412	362	80	18	9	612	42	7	2	64	309
9	3,492	1,270	359	408	17	10	256	32	7	2	21	164
10	2,749	1,270	356	373	129	35	131	22	7	2	21	77
11	1,579	889	1,113	338	150	35	39	20	9	1	22	50
12	590	399	1,871	305	103	34	25	20	6	1	23	662
13	590	1,743	1,148	223	75	33	31	19	2	1	19	651
14	502	2,103	425	141	349	33	31	11	2	1	12	178
15	390	585	410	160	204	33	31	10	3	1	12	1,112
16	390	434	395	300	93	33	31	8	3	1	12	387
17	390	621	380	258	54	33	26	5	3	0	12	159
18	377	1,218	365	216	36	34	22	5	3	0	12	108
19	361	1,000	1,114	173	34	34	22	4	4	0	10	73
20	361	1,862	1,390	109	49	33	15	4	4	0	13	251
21	382	1,314	414	46	67	31	15	4	2	0	25	315
22	409	1,204	400	42	59	22	15	7	3	0	25	323
23	409	2,008	380	38	43	9	10	12	3	2	46	363
24	409	900	1,000	44	29	4	9	11	4	4	859	211
25	409	855	425	35	24	4	9	9	5	5	211	159
26	409	739	800	28	22	4,379	7	4	4	4	106	123
27	409	623	568	21	15	1,460	5	3	2	5	68	100
28	411	507	336	15	13	1,242	7	4	2	8	52	83
29	415	392	321	15	10	1,024	11	17	2	20	201	107
30	415	......	306	41	10	807	20	26	6	20	159	240
31	415	......	385	......	9	......	22	28	......	250	......	2,372
Mean	703	990	580	175	57	314	242	25	7	12	108	353

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1885.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,614	75	59	1,291	50	8	1	1	8	1	84	123
2	480	73	61	1,004	62	12	2	35	7	5	635	149
3	138	72	102	518	60	15	3	696	7	3	345	164
4	138	75	119	1,013	60	10	3	1,489	7	5	131	155
5	140	58	183	3,664	55	13	109	188	2	5	73	128
6	1,599	79	218	2,411	28	12	325	50	5	3	61	132
7	949	116	231	868	37	9	107	58	5	6	55	83
8	232	135	196	203	172	6	14	210	4	7	953	121
9	176	425	174	169	186	9	5	180	6	6	1,137	172
10	167	1,463	115	146	82	10	5	120	4	5	286	543
11	82	1,885	83	118	63	10	4	54	6	10	151	258
12	1,404	738	69	118	63	9	4	29	6	3	94	110
13	423	403	59	112	63	4	3	33	7	18	69	382
14	103	283	64	76	61	2	3	61	4	12	57	809
15	293	477	149	76	29	4	3	49	1	14	41	367
16	784	697	162	76	25	6	3	29	3	12	46	144
17	1,267	724	202	76	23	8	1	25	5	11	39	144
18	216	238	180	59	23	3	1	19	2	10	35	128
19	101	218	178	42	22	7	1	17	1	6	26	103
20	94	202	170	42	16	6	1	7	1	8	33	76
21	87	192	116	40	14	6	1	11	5	44	29	63
22	91	177	69	29	14	5	0	18	1	112	23	63
23	98	163	64	29	14	4	0	17	1	66	244	53
24	101	150	51	29	19	4	1	17	4	34	720	57
25	104	116	190	29	20	1	1	14	2	17	449	50
26	97	107	592	36	25	2	1	10	2	24	363	57
27	82	90	931	39	18	4	1	8	1	27	322	66
28	90	86	1,027	43	20	5	1	13	1	24	235	80
29	96	......	783	49	16	4	1	12	1	12	194	38
30	99	......	783	49	15	2	1	5	1	244	147	30
31	89	......	850	......	12	......	1	8	......	202	......	65
Mean	401	340	265	415	44	7	20	112	3	31	236	158

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1886.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	278	172	169	2,523	32	29	24	17	3	2	15	62
2	112	137	159	647	21	25	19	21	1	4	12	46
3	83	113	149	198	17	27	20	18	5	4	14	59
4	833	146	139	149	26	36	10	12	2	3	12	110
5	3,352	138	130	222	23	37	17	11	1	1	8	104
6	720	132	95	3,692	26	24	15	9	2	1	13	63
7	148	126	55	2,320	24	28	12	15	1	2	9	88
8	113	120	50	1,085	2,121	19	10	18	1	3	9	68
9	105	114	44	428	1,746	18	9	22	3	2	7	63
10	182	95	42	239	348	22	14	16	2	1	9	86
11	207	4,060	41	160	159	42	19	11	1	1	10	55
12	258	5,359	38	150	117	32	21	7	5	3	9	23
13	236	5,404	46	285	649	25	19	8	4	2	28	34
14	176	2,299	42	283	1,319	176	16	10	5	1	30	252
15	110	1,392	45	130	313	482	16	7	5	2	33	283
16	149	836	41	85	673	181	256	5	2	2	28	156
17	150	207	38	72	283	95	378	6	2	1	21	225
18	150	142	35	52	136	72	132	6	2	2	166	372
19	227	149	43	50	116	39	275	7	2	1	413	1,016
20	372	136	46	43	125	26	83	6	2	5	96	710
21	110	107	2,061	43	140	26	51	3	5	1	42	230
22	171	140	1,088	32	117	22	52	4	5	1	31	148
23	223	91	308	26	237	1,030	40	3	3	2	446	99
24	163	87	146	31	140	825	26	4	2	1	621	148
25	311	1,123	125	37	115	210	20	3	1	2	756	985
26	197	2,108	101	35	94	128	366	6	1	4	2,064	336
27	117	324	100	35	77	81	100	6	2	8	257	189
28	679	231	783	34	81	54	36	8	1	15	107	103
29	984	------	948	32	67	38	28	7	3	17	73	142
30	908	------	2,150	24	43	28	25	3	1	12	61	144
31	200	------	2,598	------	41	------	25	2	------	15	------	175
Mean	388	910	382	438	304	129	69	9	2	4	180	212

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1887.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	330	205	246	106	57	188	18	1,148	20	18	24	25
2	400	109	155	101	49	161	12	196	18	20	18	33
3	300	107	152	132	39	148	10	279	16	25	16	24
4	220	127	121	153	38	90	11	86	14	26	18	24
5	150	155	96	142	36	50	434	52	15	22	14	20
6	180	136	86	101	29	40	1,858	85	15	22	15	24
7	130	438	180	73	244	35	419	116	13	14	9	35
8	120	884	816	61	669	44	149	68	10	16	14	35
9	100	838	736	54	508	38	82	46	11	11	15	30
10	110	531	1,149	44	195	34	79	24	11	14	13	70
11	130	770	612	49	118	25	68	22	10	14	20	1,201
12	115	623	210	46	73	17	43	39	180	13	18	639
13	110	275	159	40	58	23	35	39	349	14	18	470
14	720	168	145	33	43	20	23	22	111	13	16	114
15	744	425	109	33	31	14	15	24	59	11	22	428
16	416	644	83	33	37	11	14	18	41	9	20	708
17	252	329	66	24	34	14	70	21	31	7	20	205
18	236	1,581	51	40	26	13	63	19	18	11	16	75
19	145	2,357	50	162	20	9	40	16	21	10	22	131
20	113	463	48	312	20	25	29	22	15	10	47	137
21	110	252	59	131	18	27	22	19	19	90	79	184
22	175	332	125	83	15	23	19	23	15	75	49	291
23	523	375	275	67	20	1,483	78	166	17	54	35	320
24	2,544	641	284	113	31	446	335	1,883	14	35	28	234
25	1,112	466	945	96	45	139	284	549	10	25	27	177
26	602	166	884	134	32	63	106	151	12	22	27	187
27	214	613	351	147	24	46	57	89	14	19	19	158
28	202	466	1,538	88	17	30	42	47	19	17	21	701
29	1,473	------	540	100	31	25	30	36	25	22	27	1,139
30	1,542	------	176	92	19	23	26	27	20	14	30	652
31	415	------	144	------	------	------	36	23	------	21	------	306
Mean	449	517	342	93	87	110	145	173	38	23	24	283

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1888.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,190	150	122	318	37	43	11	8	21	38	94	144
2	3,492	150	120	235	32	33	7	8	18	40	80	294
3	683	116	130	189	31	22	9	7	20	37	76	275
4	294	109	164	131	28	27	4	11	17	35	71	81
5	217	201	154	692	28	27	11	16	21	32	65	81
6	154	446	125	2,019	28	22	3	22	19	72	60	83
7	198	712	106	1,790	29	25	3	14	9	265	51	87
8	669	671	85	911	31	17	7	47	10	199	49	83
9	514	608	83	135	33	12	4	48	25	99	67	172
10	237	521	79	780	34	14	8	11	111	47	336	262
11	143	401	100	1,797	39	13	8	11	199	36	494	159
12	151	253	908	435	89	20	6	26	604	38	173	115
13	188	208	123	237	92	22	11	34	337	41	98	84
14	280	190	750	382	78	27	7	29	165	42	81	71
15	234	122	473	344	70	17	3	23	87	42	1,130	71
16	334	104	380	254	63	6	3	15	103	43	982	63
17	606	118	570	291	51	6	8	18	1,351	43	333	2,374
18	714	127	620	150	45	4	4	15	5,546	39	237	2,689
19	647	352	494	113	45	8	8	11	1,991	39	935	434
20	590	1,377	950	103	52	8	2	4	270	53	864	148
21	590	2,768	2,659	86	47	9	2	392	2,710	62	311	133
22	369	1,751	1,886	63	36	12	8	3,489	472	56	175	176
23	350	890	594	61	34	9	7	333	191	48	131	205
24	310	828	253	52	35	6	8	92	117	82	132	117
25	185	2,188	151	44	39	8	5	52	84	110	132	72
26	226	1,650	173	41	38	8	5	30	75	82	214	72
27	242	661	1,633	38	35	3	6	25	73	491	423	345
28	405	526	938	33	37	7	11	24	60	993	401	337
29	120	277	1,330	32	63	10	10	19	41	694	212	198
30	86	......	630	36	78	13	9	15	36	239	169	111
31	289	......	460	......	57	......	9	17	......	131	......	91
Mean	571	637	556	393	46	15	7	157	499	138	286	310

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1889.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	86	124	36	295	135	340	210	2,602	17	63	139	151
2	87	99	52	958	101	441	939	815	16	68	131	120
3	77	92	386	330	79	156	1,482	367	17	62	1,041	111
4	72	86	2,567	183	71	82	1,053	195	15	49	813	103
5	124	82	2,141	133	63	64	697	211	20	46	263	85
6	968	71	864	103	54	52	574	194	11	42	166	75
7	637	89	320	83	48	45	123	119	9	35	131	75
8	263	125	195	78	43	39	80	84	11	33	116	136
9	691	148	134	75	42	32	54	66	11	31	3,394	351
10	1,080	88	108	66	36	31	38	62	14	39	2,308	214
11	288	61	100	55	43	31	70	55	16	32	406	165
12	149	60	84	53	40	242	111	51	16	55	233	148
13	104	60	79	64	40	308	77	83	44	96	963	111
14	99	61	92	67	44	63	141	2,115	160	314	1,339	103
15	87	45	97	64	44	110	2,156	2,177	155	248	331	248
16	81	70	84	61	38	565	787	406	532	111	166	171
17	1,530	514	75	56	37	263	188	164	2,019	68	119	560
18	742	819	88	54	34	383	82	98	3,028	51	102	606
19	230	683	105	49	16	161	262	69	920	44	1,623	337
20	112	228	113	49	363	82	1,975	59	367	43	1,041	241
21	418	143	214	44	911	50	422	49	201	97	508	158
22	397	94	951	42	450	39	139	41	163	129	816	119
23	263	66	623	71	186	33	88	37	115	104	302	106
24	211	51	266	54	95	28	69	39	85	97	163	92
25	258	74	158	29	68	29	48	33	459	72	457	74
26	313	73	114	424	68	807	41	35	524	57	557	150
27	778	45	97	2,126	357	610	58	37	260	2,958	724	225
28	1,096	37	112	1,439	744	214	65	33	140	1,648	2,768	100
29	440	......	124	582	244	368	91	22	93	392	645	75
30	187	......	104	241	118	215	844	19	70	194	234	69
31	191	......	87	......	80	......	4,714	20	......	147	......	55
Mean	389	149	341	264	151	189	570	334	317	207	733	172

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1890.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	51	114	766	176	41	51	14	22	34	23	75	28
2	53	84	349	197	34	50	125	17	30	18	64	35
3	57	95	124	126	34	33	436	12	27	810	52	62
4	51	155	92	378	24	33	687	15	21	783	48	87
5	62	239	87	721	461	37	147	18	17	194	48	87
6	98	131	83	191	282	38	71	53	18	96	42	74
7	102	75	71	143	297	107	47	32	12	294	38	74
8	87	2,512	71	182	153	66	36	27	14	281	37	140
9	76	2,000	64	778	115	41	45	25	12	163	35	134
10	57	293	71	758	78	32	23	21	17	91	37	60
11	48	176	563	241	60	22	18	16	10	67	45	44
12	45	141	978	128	53	91	12	22	15	49	107	45
13	49	117	440	99	47	485	12	19	97	25	89	142
14	45	420	1,182	84	117	352	12	14	438	54	63	141
15	1,110	806	1,993	68	1,037	118	16	13	612	75	48	51
16	1,586	192	588	61	480	65	18	11	797	73	43	64
17	422	124	228	54	146	46	19	10	624	935	112	243
18	160	107	166	48	88	38	20	14	179	405	249	1,044
19	108	94	132	48	65	36	17	27	81	143	100	239
20	169	693	151	42	214	31	12	478	43	118	89	154
21	265	414	1,290	36	292	31	12	290	32	104	64	121
22	109	146	2,942	42	117	34	11	130	32	79	54	90
23	120	107	1,908	44	70	35	4	159	32	469	85	88
24	109	115	422	39	53	44	9	57	22	2,624	82	68
25	78	186	214	36	42	42	11	38	24	944	41	80
26	50	219	436	42	1,278	27	317	36	24	358	31	173
27	62	154	264	51	1,967	20	122	405	27	183	26	193
28	71	482	1,695	56	416	17	68	261	23	122	21	191
29	64	......	919	50	154	15	43	95	23	103	33	106
30	97	......	206	43	92	25	34	119	22	128	27	73
31	160	......	161	......	67	......	29	45	......	115	......	68
Mean	181	371	602	165	270	68	79	81	112	320	63	135

Daily discharge, in second-feet of Tohickon Creek at Point Pleasant, Pennsylvania, for 1891.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	61	1,726	202	125	24	19	8	172	276	10	27	56
2	1,397	1,105	148	178	20	18	7	91	123	11	30	38
3	1,421	779	110	814	21	13	8	60	92	10	20	33
4	243	614	85	406	61	11	7	38	78	8	17	681
5	150	213	93	178	51	12	7	31	326	15	17	1,418
6	116	180	93	125	40	13	6	31	598	15	18	330
7	148	210	82	104	34	12	6	31	249	11	21	915
8	104	637	116	91	33	14	5	31	116	20	16	464
9	85	516	713	77	29	26	13	23	68	16	7	231
10	57	972	1,500	68	22	24	9	21	53	10	16	129
11	767	386	601	118	25	15	12	16	49	9	20	99
12	2,331	204	718	797	25	13	5	19	49	11	29	82
13	354	152	1,184	273	15	12	4	16	42	18	27	73
14	179	130	627	133	18	7	7	14	36	12	29	69
15	127	97	238	102	18	14	3	43	30	10	24	63
16	94	975	158	82	24	12	7	47	23	10	21	60
17	185	782	228	75	20	26	3	54	26	7	58	63
18	748	820	113	73	27	15	34	587	31	18	136	74
19	267	663	97	62	29	16	299	672	24	5	98	71
20	188	241	255	51	27	35	120	167	67	95	61	46
21	141	751	2,858	45	21	23	62	77	67	70	46	39
22	2,451	1,071	1,219	45	23	30	41	57	18	127	42	41
23	1,146	383	1,004	45	18	28	28	214	18	212	128	410
24	364	190	506	51	16	23	29	3,159	18	100	386	1,670
25	250	248	241	49	12	22	31	2,700	13	52	108	1,400
26	250	418	158	38	20	14	25	516	13	86	84	668
27	234	405	119	32	19	21	23	237	13	93	75	819
28	204	272	105	28	21	17	17	596	15	49	65	291
29	466	......	95	28	15	6	571	357	15	39	54	184
30	1,269	......	79	27	20	9	611	345	7	33	59	887
31	1,091	......	79	......	16	......	515	415	......	29	......	351
Mean	545	540	446	144	25	17	81	349	85	39	58	379

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1892.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	148	157	1,645	113	40	76	59	21	20	15	8	160
2	1,090	145	831	100	47	60	46	37	16	8	9	98
3	1,177	205	433	100	159	43	249	31	12	11	8	71
4	262	237	348	105	108	45	455	33	10	14	6	62
5	158	180	283	95	70	64	164	21	15	17	9	59
6	108	140	218	86	60	73	78	24	19	14	9	57
7	120	134	237	73	55	58	44	9	13	7	6	49
8	156	119	1,421	61	57	43	31	15	13	8	7	157
9	150	175	1,447	57	51	90	26	15	16	7	8	380
10	122	129	625	47	43	555	20	15	12	9	57	118
11	100	102	390	49	39	287	19	16	5	11	301	105
12	79	57	207	37	42	108	18	57	9	14	113	78
13	2,863	71	130	35	39	61	16	101	10	11	64	54
14	3,158	79	97	33	39	46	17	38	13	6	48	283
15	2,580	72	84	133	143	41	14	28	17	8	803	623
16	660	77	68	177	125	32	12	23	13	8	2,962	300
17	260	86	66	90	86	31	10	13	15	6	522	158
18	261	74	86	57	57	29	11	14	12	8	669	119
19	1,618	53	87	42	55	17	12	11	16	6	896	97
20	880	35	65	35	340	22	7	9	17	7	509	80
21	352	73	65	44	401	23	6	11	27	4	370	85
22	161	109	65	95	529	15	5	10	11	8	88	74
23	146	112	65	191	458	15	8	10	18	5	64	85
24	131	105	271	131	250	17	9	8	25	4	51	125
25	121	92	727	71	177	16	8	9	13	4	48	184
26	119	156	574	57	132	20	8	12	227	6	40	246
27	129	190	1,036	46	1,333	26	5	80	59	11	35	154
28	193	121	1,115	46	522	21	5	92	33	10	180	201
29	277	87	413	50	184	14	8	75	22	6	676	168
30	226	......	194	50	112	14	9	30	19	5	195	103
31	166	......	135	......	86	......	12	30	......	5	......	68
Mean	580	116	433	77	188	65	45	29	24	8	292	148

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1893.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	474	489	78	78	279	35	16	8	49	11	51	122
2	1,406	803	97	68	348	33	15	12	41	11	48	102
3	301	1,366	108	51	832	21	15	9	32	15	48	191
4	158	1,118	108	58	2,994	20	25	4	25	12	1,094	1,420
5	104	948	108	50	1,102	19	12	3	21	10	1,288	478
6	100	1,166	103	41	872	37	13	9	17	12	489	197
7	131	1,113	87	49	413	95	12	5	22	17	184	171
8	140	742	103	140	207	53	12	4	35	12	123	141
9	140	320	985	145	124	39	9	10	21	10	101	137
10	160	2,597	2,200	132	89	37	9	5	13	12	79	141
11	204	1,735	800	249	81	32	11	4	18	11	71	215
12	160	437	2,400	156	71	21	9	6	23	11	62	142
13	236	462	856	106	62	37	6	5	13	12	54	101
14	203	846	575	358	58	14	6	6	15	30	60	153
15	138	905	600	1,687	65	13	12	3	26	47	103	186
16	165	1,113	380	701	330	17	12	3	834	49	130	1,260
17	170	672	251	238	919	16	12	3	531	39	90	1,593
18	118	248	191	165	613	15	13	3	131	31	60	383
19	95	237	165	135	301	13	9	4	75	22	53	178
20	63	201	162	515	87	9	7	345	55	20	48	132
21	64	162	197	1,903	71	9	5	409	55	23	46	117
22	72	136	246	448	57	170	6	79	54	15	496	97
23	105	114	266	185	54	217	6	36	34	39	312	79
24	93	92	295	135	49	58	4	1,814	16	68	120	89
25	61	87	318	102	46	25	3	503	25	59	81	131
26	59	87	254	97	42	42	3	119	27	46	62	143
27	65	87	158	237	40	38	4	58	17	79	55	109
28	53	73	114	289	33	25	7	44	18	506	1,244	82
29	83	......	97	160	31	21	9	499	20	279	479	81
30	312	......	92	118	33	21	7	198	17	116	188	83
31	511	......	83	......	33	......	4	92	......	66	......	75
Mean	197	655	402	293	333	40	10	139	76	55	244	275

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1894.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	73	125	216	64	47	267	20	7	4	13	522	37
2	76	113	148	62	41	189	16	6	4	16	189	242
3	75	89	297	62	35	142	12	8	3	11	1,193	430
4	61	65	790	54	33	125	10	25	3	12	707	163
5	74	88	1,065	254	34	91	12	30	2	13	719	97
6	114	119	1,174	141	34	75	29	24	2	11	966	73
7	131	156	1,102	92	58	64	47	35	3	7	282	58
8	109	115	488	79	53	61	31	18	4	9	545	126
9	87	651	258	71	50	49	22	8	5	12	439	606
10	70	1,113	220	73	42	40	17	5	20	1,674	224	284
11	52	911	188	73	28	34	16	5	31	885	168	635
12	46	383	153	128	29	27	11	5	33	127	115	3,342
13	46	140	131	1,168	16	23	7	5	25	125	83	1,811
14	49	140	109	1,283	17	23	10	6	23	186	71	377
15	49	119	92	800	19	20	7	6	20	116	61	195
16	64	107	102	223	17	19	3	8	21	68	65	143
17	64	113	93	144	17	15	6	8	23	47	79	119
18	51	928	71	103	16	15	10	11	3,510	39	104	97
19	51	1,606	67	79	17	14	8	11	3,556	34	104	83
20	46	1,257	64	71	616	10	6	8	1,306	32	73	75
21	41	723	61	71	8,650	12	11	8	245	27	73	66
22	43	379	71	303	4,310	7	68	9	83	23	97	61
23	45	208	534	321	904	7	49	9	50	21	93	58
24	51	118	351	132	1,827	6	25	9	41	29	75	57
25	89	151	143	101	1,577	13	21	10	29	725	63	46
26	98	151	122	81	450	36	14	6	23	477	61	42
27	75	151	100	68	228	29	10	6	19	168	49	44
28	68	231	76	70	1,386	26	8	11	20	99	44	83
29	68	......	70	58	2,252	19	5	4	36	67	46	109
30	107	......	79	47	506	19	4	4	28	52	39	143
31	137	......	79	......	267	......	6	4	......	649	......	113
Mean	71	373	275	209	760	49	17	10	306	186	245	316

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1895.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	62	138	1,296	122	107	36	61	7	4	3	15	22
2	62	156	1,064	117	86	33	96	6	3	3	23	54
3	80	180	706	210	157	39	61	8	5	3	23	176
4	89	163	495	239	47	32	57	310	6	3	29	86
5	127	119	352	131	42	26	579	145	2	2	16	51
6	50	193	248	99	39	57	648	29	4	3	22	38
7	381	104	197	89	40	58	240	16	5	3	21	25
8	628	71	1,116	1,404	37	47	100	9	6	3	17	20
9	418	54	943	3,857	35	26	54	12	4	4	12	18
10	498	92	494	1,760	35	29	35	10	3	3	10	20
11	2,942	168	451	616	31	23	27	9	3	3	9	18
12	1,109	168	317	146	25	20	21	229	3	5	15	14
13	262	108	383	1,131	29	26	18	41	3	15	13	17
14	204	92	1,519	1,191	39	22	12	27	3	26	12	11
15	146	70	437	528	155	12	15	25	3	27	13	8
16	146	51	200	271	93	10	18	17	3	25	12	6
17	169	40	166	117	63	9	12	17	3	19	11	7
18	169	35	192	88	44	10	11	8	3	14	15	7
19	112	49	343	75	31	11	10	6	3	14	22	7
20	80	58	430	62	33	11	8	10	3	11	15	6
21	88	148	328	51	33	9	8	9	3	5	15	14
22	79	246	328	49	35	10	25	5	3	7	11	420
23	89	255	362	47	32	8	20	7	3	8	12	242
24	107	255	334	43	33	7	14	6	3	7	9	91
25	107	245	525	41	34	9	12	5	3	6	9	54
26	1,632	245	576	41	23	14	11	5	3	6	16	46
27	515	266	299	42	81	16	11	4	3	6	63	60
28	184	902	229	59	351	41	9	4	3	5	78	68
29	141	......	189	76	120	45	7	5	3	5	38	57
30	97	......	132	92	53	50	11	4	3	5	27	64
31	102	......	114	......	50	......	7	4	......	8	......	109
Mean	351	167	476	426	62	25	71	32	3	8	20	59

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1896.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	327	55	498	297	20	35	11	113	3	167	23	177
2	93	90	192	236	23	31	10	56	3	59	19	104
3	59	83	50	193	18	28	10	35	4	27	20	78
4	39	58	48	101	21	18	7	27	5	27	22	65
5	39	138	59	71	26	10	5	17	10	29	1,851	59
6	28	6,515	59	72	25	12	13	22	1,665	24	1,249	51
7	17	1,720	57	81	25	11	16	12	319	20	273	61
8	16	487	44	85	19	9	38	12	95	17	180	72
9	13	201	42	72	13	12	13	10	44	10	279	289
10	9	174	44	57	11	11	104	9	29	16	131	242
11	7	225	35	53	12	9	76	12	23	16	109	98
12	7	156	40	51	13	7	34	9	14	29	133	71
13	8	91	51	11	4	4	22	10	10	1,130	136	59
14	13	180	51	51	11	9	15	47	10	430	103	56
15	13	327	41	40	12	28	10	16	10	215	73	53
16	6	206	71	33	11	20	12	7	16	103	55	44
17	6	107	77	33	7	24	10	8	21	63	47	52
18	6	90	54	36	7	28	9	8	328	48	44	57
19	5	85	2,028	25	11	23	6	8	112	38	46	44
20	5	75	3,343	21	12	17	6	9	49	28	42	49
21	5	75	1,205	40	10	8	9	7	35	29	36	51
22	4	70	742	49	14	14	2,417	5	23	33	36	42
23	6	62	449	40	20	16	704	3	19	28	36	44
24	151	47	193	31	16	11	304	6	20	55	35	44
25	239	51	98	35	17	15	87	7	13	76	37	35
26	136	69	371	39	23	21	46	6	11	54	42	39
27	70	88	596	39	18	18	47	5	8	38	35	39
28	59	229	311	35	48	10	163	5	8	31	45	39
29	46	851	2,444	26	137	13	184	5	14	31	856	35
30	28	......	1,238	20	143	15	2,182	3	156	30	439	31
31	31	......	527	......	97	......	410	3	......	27	......	27
Mean	48	435	486	67	27	16	225	16	102	94	214	71

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1897.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	31	73	58	46	20	70	10	64	17	3	6	86
2	49	97	65	40	2,587	40	9	49	14	3	1,400	57
3	157	79	54	31	954	44	7	43	31	3	616	49
4	330	65	75	15	376	66	6	38	42	4	131	60
5	404	49	142	42	207	76	6	103	21	4	63	1,765
6	256	430	523	70	114	71	5	75	17	5	44	670
7	89	2,312	296	71	80	52	4	110	14	5	34	216
8	71	882	119	56	60	61	5	84	11	6	29	131
9	65	311	102	1,454	47	2,389	6	33	11	7	41	97
10	53	175	135	957	58	906	6	28	11	3	63	79
11	49	109	152	227	60	240	5	19	10	3	61	65
12	49	68	191	119	57	111	4	22	10	3	60	338
13	49	78	210	93	3,683	75	6	20	5	3	60	285
14	49	89	150	75	1,987	53	35	15	6	3	42	1,751
15	44	65	147	101	973	50	35	8	7	8	37	3,125
16	31	73	135	160	354	48	22	50	7	9	42	848
17	23	246	89	137	144	46	14	36	7	5	59	234
18	80	404	79	109	90	49	879	34	6	3	64	150
19	117	320	220	74	74	44	230	32	4	6	53	105
20	133	122	927	54	54	37	177	22	6	3	43	79
21	1,221	203	380	44	61	33	201	16	6	3	32	71
22	551	329	150	39	73	30	922	12	4	4	33	68
23	157	659	125	39	56	23	477	17	4	9	33	66
24	73	397	514	37	62	18	193	745	8	8	33	93
25	171	151	513	31	128	15	83	123	12	11	35	193
26	181	111	146	33	124	15	64	69	10	15	36	101
27	119	87	97	33	57	12	413	42	10	12	1,106	119
28	109	65	76	26	46	14	1,817	36	9	12	385	86
29	87	......	61	24	35	14	1,292	21	5	21	148	76
30	97	......	54	19	25	9	321	20	4	9	112	79
31	73	......	47	......	113	......	116	25	......	13	......	79
Mean	160	287	194	142	411	157	238	65	11	7	163	362

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1898.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	133	110	82	251	151	65	4	7	7	5	113	364
2	131	99	67	131	103	53	5	13	7	3	60	271
3	90	98	70	98	79	44	4	8	7	5	46	201
4	49	95	79	82	71	35	3	10	8	5	37	1,230
5	49	90	79	80	73	31	5	28	5	5	31	2,932
6	36	89	68	83	109	31	6	96	5	7	31	683
7	55	87	64	111	404	27	3	44	5	5	27	466
8	87	80	61	103	2,940	14	3	39	14	3	31	139
9	87	73	53	73	1,711	15	3	39	14	4	28	87
10	87	73	49	65	398	15	3	326	9	6	1,503	79
11	87	65	43	68	229	16	2	574	9	6	1,697	71
12	144	450	43	73	337	15	4	167	7	6	357	65
13	239	634	47	63	557	15	3	74	7	9	146	53
14	216	327	43	60	246	20	3	40	7	4	107	49
15	452	253	39	338	1,201	16	3	35	8	6	89	51
16	696	198	39	289	847	16	5	32	6	8	60	46
17	251	138	39	154	789	11	5	25	7	8	60	35
18	107	132	39	89	299	9	6	17	6	17	378	23
19	87	154	39	71	145	9	5	134	5	23	3,451	27
20	375	4,160	39	68	125	9	7	88	4	23	896	472
21	748	1,737	57	64	117	10	17	64	4	24	279	531
22	367	860	376	61	91	9	20	39	6	79	136	237
23	2,890	427	469	53	69	5	13	27	8	70	811	2,134
24	680	231	304	569	297	5	7	23	13	52	518	536
25	226	159	283	544	573	5	11	21	15	66	283	251
26	279	115	175	323	767	5	11	22	5	224	210	131
27	320	97	131	238	495	7	11	14	7	495	185	107
28	439	97	242	525	266	7	11	6	10	171	194	89
29	370	......	393	810	158	4	5	11	9	68	248	79
30	133	......	1,078	322	119	4	8	11	7	94	341	73
31	259	......	433	......	89	......	8	5	......	169	......	114
Mean	328	397	162	195	447	17	7	66	8	54	412	375

Daily discharge, in second-feet, of Tohickon Creek at Point Pleasant, Pennsylvania, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	144	158	793	178	35	15	14	4	18	46	52	34
2	136	125	600	131	31	9	11	399	13	40	181	34
3	154	118	601	97	31	9	19	267	9	27	121	44
4	204	151	708	79	31	10	12	113	93	25	921	49
5	1,172	184	2,819	68	31	9	10	52	42	23	366	44
6	1,360	210	1,109	61	27	8	10	28	28	18	121	39
7	1,400	189	520	73	23	7	8	22	19	20	73	39
8	503	142	277	1,328	23	7	8	17	16	23	58	39
9	503	180	217	389	23	5	7	15	287	20	53	31
10	413	183	203	160	20	8	6	254	210	17	40	23
11	124	110	418	108	28	6	7	417	203	17	35	27
12	158	90	1,225	92	35	6	5	182	499	16	42	44
13	169	119	1,702	87	27	7	7	66	163	13	51	95
14	186	102	416	79	31	5	11	38	58	11	53	101
15	311	65	709	70	31	3	9	28	46	10	47	60
16	432	157	934	153	20	5	5	19	36	9	46	49
17	569	416	348	393	17	5	7	14	18	9	47	44
18	488	782	502	144	20	4	7	12	18	9	45	39
19	258	767	2,492	84	23	3	8	11	23	9	38	39
20	177	695	938	68	20	2	8	8	708	9	34	85
21	116	914	308	61	17	2	3	8	545	9	33	101
22	84	1,414	1,051	58	17	7	5	6	404	9	33	65
23	79	1,582	1,006	53	20	2	3	7	239	14	49	53
24	526	1,000	449	49	17	2	3	7	61	16	57	879
25	2,032	541	220	49	17	7	3	3	42	18	44	913
26	392	616	624	45	15	7	4	2	1,522	18	35	203
27	230	3,222	633	41	12	12	4	359	604	11	30	97
28	145	1,058	779	39	9	5	4	317	158	11	31	79
29	166	......	1,307	39	12	17	6	62	78	10	36	65
30	169	......	520	39	14	27	7	34	51	12	39	53
31	184	......	239	......	15	......	4	27	......	17	......	49
Mean	419	546	797	144	22	7	7	90	271	17	94	113

NESHAMINY CREEK, PENNSYLVANIA, BELOW THE FORKS.

This station, which was established in 1884, is described in the Twentieth Annual Report, Part IV, pages 103 and 104. The same report contains also (pages 104 to 108) the figures for monthly flow for the years 1890 to 1898, inclusive, as well as diagrams of discharge for the same period. Water-Supply Paper No. 35 contains, on page 65, a table of daily discharge for 1899. The results by months and a diagram of the daily discharge for that year are given on page 86 of the Twenty-first Annual Report, Part IV. The following tables give the daily discharge of this stream from 1884 to 1900, inclusive.

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1884.

[Drainage area, 139.3 square miles.]

Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	......	24	116	15	5	13	55	18	13	14	20	5	4	5	157
2	......	19	101	11	5	14	44	19	9	18	21	5	6	5	175
3	......	27	56	10	6	12	26	20	10	16	16	4	6	9	200
4	......	25	57	10	6	8	20	21	8	13	18	4	5	10	363
5	......	235	436	12	8	16	23	22	7	15	18	5	5	5	959
6	......	905	462	8	8	18	235	23	5	16	17	5	5	3	940
7	......	146	105	6	6	19	1,907	24	5	14	17	5	5	441	937
8	......	76	69	6	5	15	192	25	6	15	17	5	4	110	811
9	......	48	48	4	5	15	98	26	2,271	17	17	4	4	47	710
10	12	36	38	4	5	11	74	27	331	17	13	4	4	29	684
11	12	27	34	4	5	7	56	28	80	14	10	4	4	24	693
12	14	27	31	4	5	7	841	29	56	22	13	5	7	180	693
13	17	22	28	4	4	6	414	30	31	29	20	5	11	124	1,053
14	15	17	25	4	4	7	166	31	......	36	18	......	12	......	1,161
15	12	19	22	3	3	8	2,354								
16	10	18	22	4	3	6	336	Mean	139	62	61	6	5	39	534
17	12	14	17	4	3	5	173								

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1885.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	666	139	74	334	46	19	7	3	9	1	29	117
2	215	128	284	222	52	22	4	4	6	1	722	97
3	125	142	343	137	55	14	4	723	4	1	207	93
4	120	146	492	1,761	47	15	4	2,377	3	8	91	88
5	130	156	1,053	450	44	15	3	94	5	6	55	76
6	1,886	150	948	206	38	9	4	39	7	5	44	109
7	823	137	456	154	63	10	41	17	4	6	38	122
8	342	138	208	168	474	13	28	18	3	6	190	138
9	252	1,714	137	181	222	13	10	17	4	5	746	109
10	204	4,484	80	120	141	11	7	16	5	4	179	216
11	151	1,067	84	117	114	11	7	16	2	7	106	157
12	1,377	631	78	121	78	10	4	15	4	2	82	76
13	355	260	65	115	66	8	3	11	5	42	71	667
14	190	156	114	93	57	6	4	11	5	67	70	1,803
15	220	131	136	87	44	6	4	7	4	28	57	457
16	653	3,454	169	88	44	9	3	9	4	16	44	213
17	1,026	2,423	160	80	44	10	5	6	4	11	43	167
18	233	209	84	80	37	7	3	7	3	8	38	151
19	268	133	85	67	34	5	3	6	4	5	35	144
20	249	96	69	50	32	9	4	6	3	7	28	111
21	173	89	60	47	28	8	4	6	4	63	27	97
22	190	85	52	46	28	6	5	9	2	103	23	104
23	242	82	48	42	31	4	3	7	4	54	325	96
24	236	76	46	42	31	4	3	4	3	31	670	97
25	227	81	42	50	26	6	2	4	2	16	543	84
26	182	87	78	55	29	7	2	6	3	11	378	99
27	197	54	138	55	26	5	2	8	2	11	267	134
28	255	33	126	54	20	5	2	7	1	11	164	116
29	231	......	111	58	20	9	2	5	2	10	136	77
30	220	......	161	54	21	9	2	5	1	44	134	63
31	192	......	298	......	22	......	2	8	......	54	......	114
Mean	382	589	203	171	65	9	6	112	4	21	185	200

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1886.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	209	452	165	1,637	59	64	38	36	8	4	14	46
2	109	415	154	391	48	49	35	33	8	3	13	48
3	83	380	143	270	51	53	32	32	6	3	10	59
4	141	425	132	252	48	53	29	24	7	4	9	89
5	2,478	350	121	423	49	45	26	20	4	3	10	64
6	413	300	109	4,734	41	39	28	18	5	2	9	46
7	195	250	97	1,198	51	35	22	26	6	2	7	57
8	265	200	94	513	2,346	36	20	33	5	2	7	87
9	599	175	92	371	749	35	19	46	6	2	10	68
10	601	150	88	303	227	45	182	31	4	2	11	74
11	574	5,767	78	231	168	49	149	24	4	4	11	85
12	417	5,132	77	207	140	37	48	18	4	2	10	64
13	346	4,195	89	293	218	29	32	19	3	2	85	105
14	322	830	77	319	566	194	27	16	4	2	74	342
15	307	508	84	207	232	291	44	13	5	2	27	345
16	300	528	75	168	615	100	294	12	10	2	27	393
17	285	217	70	157	242	95	297	16	7	2	16	279
18	272	173	66	139	159	108	100	11	7	2	26	649
19	285	204	79	133	164	67	136	15	4	3	37	2,228
20	287	199	93	120	167	39	90	11	4	2	26	671
21	372	202	902	108	155	34	58	9	6	3	17	278
22	660	146	477	99	131	31	75	6	5	2	16	190
23	580	127	216	93	173	732	62	6	4	3	111	133
24	375	122	141	90	134	315	48	6	4	3	203	203
25	330	694	132	85	113	149	31	7	3	3	160	662
26	321	1,103	122	93	108	276	60	8	6	4	770	212
27	390	189	128	86	89	111	598	6	3	11	124	175
28	1,744	177	439	81	96	73	114	6	4	28	64	145
29	3,735	......	456	76	85	63	73	4	2	38	52	228
30	1,269	......	1,389	65	67	45	42	9	2	25	50	178
31	615	......	1,870	......	59	......	41	9	......	15	......	229
Mean	609	843	266	431	244	110	92	17	5	6	67	272

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1887.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	323	239	296	204	115	208	42	144	21	47	37	40
2	580	156	262	202	105	137	41	149	24	33	34	39
3	434	220	335	228	96	104	34	218	22	33	28	26
4	344	203	195	222	87	101	30	139	17	31	27	29
5	254	204	162	177	83	53	132	88	23	23	22	23
6	221	165	186	147	76	39	1,570	73	19	22	25	55
7	193	612	324	124	160	107	223	73	20	18	19	48
8	181	742	719	121	310	158	135	65	18	18	23	40
9	138	625	545	111	244	84	150	50	23	20	18	29
10	181	337	828	107	148	54	942	44	18	21	24	176
11	181	767	405	107	118	44	146	108	14	21	52	1,648
12	159	552	221	92	91	35	89	236	492	19	47	400
13	153	189	213	81	77	31	66	67	229	14	28	199
14	740	223	196	77	69	26	53	44	83	19	21	153
15	940	597	160	78	56	23	47	41	54	17	33	610
16	420	504	154	80	56	28	40	41	43	14	28	607
17	230	370	139	69	55	24	56	36	28	13	29	210
18	300	1,344	129	210	48	35	58	92	26	18	23	277
19	210	1,703	120	359	47	50	39	71	27	13	26	303
20	160	430	110	118	38	34	40	40	23	18	31	249
21	130	321	109	134	34	29	35	30	26	398	51	411
22	220	406	413	108	33	411	38	37	24	139	44	447
23	590	376	551	294	32	3,159	462	64	22	63	37	289
24	2,891	630	437	663	41	412	1,047	379	20	43	31	248
25	628	314	691	203	53	179	484	288	21	36	29	169
26	490	294	432	275	86	119	177	84	20	34	27	175
27	532	1,210	255	205	44	102	282	45	20	34	26	145
28	400	454	2,185	153	39	81	134	42	26	29	29	1,597
29	1,661	......	521	191	25	62	147	39	41	31	61	913
30	900	......	246	154	33	51	121	32	74	27	38	364
31	408	......	235	......	32	......	141	31	......	32	......	435
Mean	490	507	380	176	82	199	226	93	51	42	32	334

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1888.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,890	233	160	376	77	65	19	10	12	68	131	178
2	2,786	235	145	306	72	12	13	11	13	75	124	152
3	505	230	139	262	72	39	15	11	15	65	114	140
4	388	285	114	211	72	36	13	9	15	50	106	135
5	323	1,553	95	295	63	31	13	7	12	47	97	131
6	267	2,111	162	2,227	51	31	15	7	9	191	93	139
7	310	798	77	428	51	29	13	7	9	212	87	136
8	636	389	101	254	54	22	10	17	224	130	84	120
9	404	308	95	206	48	25	14	21	376	74	91	118
10	261	310	88	631	48	24	22	14	134	57	171	132
11	251	313	602	1,394	78	21	21	11	129	52	347	135
12	432	283	1,571	341	129	23	14	78	474	53	137	118
13	682	230	338	271	103	17	11	206	280	68	105	80
14	493	220	375	242	75	15	10	154	174	69	100	178
15	356	220	432	197	61	17	9	22	88	63	1,821	248
16	287	235	564	781	58	19	11	20	84	53	588	131
17	342	287	743	557	57	14	12	15	1,052	69	301	3,759
18	455	362	565	200	48	10	11	9	3,099	63	209	1,821
19	480	587	367	171	52	16	10	7	401	63	877	431
20	477	2,112	1,001	160	61	20	11	6	227	68	560	311
21	288	2,675	3,126	154	56	20	11	29	1,710	69	258	230
22	199	579	1,455	125	40	14	8	1,500	319	54	193	253
23	206	411	350	119	36	65	10	153	185	60	166	365
24	251	265	264	119	40	57	11	55	151	101	153	354
25	172	3,619	248	97	40	14	9	36	132	132	150	302
26	151	938	449	88	45	15	9	15	135	82	245	209
27	186	368	1,387	80	43	11	65	19	125	406	671	351
28	175	228	783	80	42	8	125	20	92	688	345	553
29	195	191	1,485	72	95	15	24	15	72	459	218	329
30	226	......	578	68	130	24	19	14	64	209	196	127
31	232	......	489	......	91	......	19	13	......	151	......	135
Mean	558	709	592	350	64	25	18	80	327	129	291	380

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1889.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	139	183	101	87	214	312	94	1,760	53	185	244	324
2	140	140	114	558	182	293	346	1,083	58	179	216	275
3	131	154	484	250	154	158	649	1,047	51	155	616	263
4	116	159	3,197	198	138	120	905	761	53	133	526	238
5	197	144	1,364	156	122	122	598	705	44	126	254	203
6	940	120	503	139	108	116	247	480	38	117	212	197
7	490	214	296	120	105	95	168	595	41	123	186	188
8	260	328	215	111	89	88	135	296	50	106	180	207
9	552	188	169	111	80	96	113	228	41	94	2,879	333
10	776	116	142	96	80	97	94	321	44	94	1,044	109
11	275	102	133	92	72	93	124	239	57	91	461	176
12	200	110	131	88	71	143	158	174	108	87	364	182
13	166	124	131	92	77	120	490	152	777	267	1,422	223
14	157	133	137	84	108	141	332	746	381	208	1,179	270
15	145	118	138	72	134	89	3,386	2,046	835	401	276	338
16	144	396	130	65	86	172	425	188	463	213	296	228
17	800	738	115	61	59	118	237	226	2,560	137	253	288
18	449	1,116	115	68	50	301	173	186	2,947	113	253	443
19	227	294	115	60	41	108	180	163	618	98	2,965	378
20	148	177	116	51	822	61	3,950	152	429	92	868	299
21	970	125	263	59	781	57	401	136	376	116	547	250
22	497	92	937	68	301	54	263	133	281	138	888	214
23	286	88	475	62	180	43	208	132	216	133	409	184
24	255	97	253	61	127	40	169	149	198	172	324	168
25	387	110	204	48	100	40	148	130	990	137	668	156
26	394	99	169	689	215	562	132	110	564	102	458	142
27	1,130	89	146	2,258	738	400	201	105	384	3,749	1,171	222
28	872	87	143	1,121	538	148	231	89	242	967	3,528	211
29	361	......	141	501	403	92	174	72	201	388	415	128
30	213	......	122	284	330	80	528	65	184	274	407	121
31	214	......	89	......	141	......	5,531	49	......	232	......	116
Mean	356	208	348	257	214	145	658	410	443	304	783	228

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1890.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	107	135	722	346	115	95	30	38	46	28	145	52
2	110	114	347	351	87	80	33	41	31	32	135	72
3	108	157	306	250	68	53	135	27	27	391	130	91
4	101	163	197	610	64	53	566	20	25	188	123	137
5	108	192	178	626	114	48	107	31	26	88	102	144
6	130	147	282	272	138	65	56	21	26	67	90	102
7	128	111	229	228	191	65	44	27	20	135	90	116
8	113	2,848	141	270	132	43	42	19	18	129	89	192
9	97	974	132	666	175	35	29	28	21	133	85	190
10	90	293	149	639	96	35	27	17	18	78	79	103
11	92	250	581	280	75	112	19	16	19	83	116	81
12	80	228	560	219	76	1,150	17	16	26	75	140	85
13	84	212	282	180	78	667	15	13	29	64	114	165
14	84	526	1,203	159	70	272	17	10	29	77	95	106
15	1,591	601	1,309	149	142	279	30	10	55	74	85	74
16	800	237	544	139	223	225	22	14	180	64	75	83
17	281	192	323	119	87	75	19	27	147	564	118	276
18	187	189	290	105	62	70	60	27	61	188	231	848
19	150	339	261	96	49	60	33	27	50	130	120	193
20	281	1,101	315	88	165	51	19	26	38	136	84	355
21	298	331	1,939	86	264	65	19	222	31	136	85	182
22	144	197	2,990	85	94	76	21	670	29	146	81	106
23	170	266	1,512	71	63	56	20	118	20	585	73	115
24	159	213	500	74	52	41	17	50	20	2,400	68	105
25	155	266	404	97	47	48	21	38	19	783	72	120
26	110	278	473	101	192	43	415	37	27	341	68	165
27	119	210	320	96	1,986	39	180	163	40	240	66	201
28	119	357	1,419	104	309	29	59	48	33	198	52	189
29	101		635	87	168	27	113	56	23	203	70	173
30	162		367	61	126	27	54	54	29	204	52	157
31	182		313		102		34	58		167		130
Mean	201	397	620	232	181	133	73	63	39	262	98	165

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1891.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	128	1,585	370	379	51	34	16	77	164	27	41	91
2	1,953	773	242	252	41	35	17	80	128	22	37	74
3	844	739	212	931	57	27	20	89	101	17	39	50
4	275	588	289	362	83	26	24	53	85	17	29	347
5	371	263	269	247	57	30	20	39	555	18	35	994
6	605	200	196	206	56	27	15	36	1,939	22	43	199
7	527	334	202	184	57	28	16	30	341	26	37	920
8	376	623	266	155	41	38	22	21	203	26	39	443
9	308	786	994	152	36	37	26	18	154	26	39	205
10	253	981	1,291	137	40	28	22	33	129	26	35	167
11	1,377	423	443	226	34	26	20	33	106	21	54	142
12	1,594	306	689	402	38	22	22	20	93	19	75	167
13	354	261	1,662	226	39	20	17	20	84	23	75	99
14	185	225	538	164	31	18	19	17	77	17	57	99
15	147	193	275	140	30	23	21	40	63	12	39	100
16	140	1,410	303	131	51	22	19	56	54	19	39	105
17	283	1,156	242	136	47	25	17	38	51	19	48	97
18	805	640	213	134	28	126	16	38	45	19	98	94
19	279	350	201	114	31	58	127	299	39	17	87	93
20	223	360	266	104	33	41	91	86	34	328	60	61
21	191	906	3,446	93	26	36	40	47	31	194	48	57
22	3,257	1,135	789	93	31	42	29	27	27	155	42	76
23	768	415	1,053	93	36	38	26	43	27	340	91	1,495
24	356	332	512	86	31	29	26	3,276	27	121	261	1,630
25	930	334	358	77	26	73	24	1,264	27	63	123	1,040
26	642	569	288	55	26	20	19	278	31	48	94	5,218
27	506	553	248	55	30	19	14	182	27	101	109	650
28	430	368	239	66	30	15	19	335	22	109	239	261
29	1,084		222	62	37	16	150	208	27	58	105	299
30	1,679		196	67	34	16	214	267	31	52	81	1,070
31	935		182		31		122	248		52		674
Mean	703	600	525	182	39	31	40	235	157	65	73	366

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1892.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	999	191	2,582	179	79	118	39	69	15	5	6	149
2	1,870	179	554	167	107	102	82	51	14	6	6	106
3	743	174	329	179	133	103	297	51	12	5	6	102
4	293	159	259	174	114	99	519	35	11	4	7	80
5	242	149	269	154	86	92	144	20	10	4	7	77
6	194	144	221	144	73	111	73	23	13	4	5	68
7	200	135	207	133	73	107	53	20	13	4	5	59
8	192	129	1,359	121	55	79	42	18	8	5	6	63
9	180	131	942	119	50	93	34	17	6	6	8	101
10	178	122	389	110	55	140	31	17	6	5	32	93
11	144	120	309	99	55	130	31	21	7	4	99	68
12	146	115	257	96	50	80	31	60	7	5	43	51
13	3,584	125	214	92	50	58	31	52	8	5	19	60
14	2,364	121	155	102	59	53	31	25	96	6	19	417
15	767	93	159	186	437	48	48	17	17	6	734	559
16	408	81	149	193	215	39	31	19	15	5	2,346	236
17	363	81	130	108	127	34	31	15	15	5	234	162
18	444	81	125	97	84	36	22	18	11	8	605	112
19	2,172	77	135	99	144	36	31	17	10	8	643	85
20	731	82	144	87	459	31	24	15	10	5	184	130
21	382	93	135	93	341	32	16	13	10	4	114	220
22	322	115	114	152	419	32	14	10	10	4	86	97
23	280	124	117	185	492	29	14	11	9	5	89	132
24	250	108	386	161	297	26	15	12	9	5	56	214
25	257	103	502	109	177	72	16	16	13	6	45	122
26	280	159	409	94	165	54	16	21	19	7	39	241
27	332	184	900	90	756	75	15	22	10	5	54	119
28	331	125	1,026	88	376	109	15	19	7	5	241	101
29	286	117	440	88	187	69	19	19	4	5	611	106
30	273	......	251	88	154	37	191	16	3	4	243	115
31	233	......	209	......	142	......	101	13	......	5	......	120
Mean	627	125	431	126	194	71	66	24	13	5	220	127

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1893.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,357	385	463	133	362	57	23	14	59	26	61	175
2	1,678	568	599	116	318	57	23	11	54	21	59	154
3	227	741	481	102	646	57	25	10	48	23	59	217
4	150	692	281	109	3,154	46	21	7	39	24	1,281	1,938
5	125	540	710	98	571	54	18	7	35	21	1,759	316
6	125	484	199	85	894	73	18	7	28	20	352	274
7	100	1,590	169	98	420	154	17	9	29	22	221	211
8	90	714	326	153	512	75	20	11	34	21	188	253
9	130	307	2,337	140	652	51	21	9	31	30	241	186
10	135	2,727	2,394	177	404	45	20	7	27	27	179	305
11	120	869	943	380	188	39	23	7	27	24	139	325
12	150	398	2,436	198	176	36	22	6	31	24	124	186
13	140	861	920	153	159	39	19	6	31	23	115	144
14	140	1,299	683	544	149	41	17	5	31	70	115	258
15	130	1,136	895	2,448	144	39	15	6	53	77	303	205
16	135	858	358	467	273	36	15	8	749	34	234	1,323
17	140	495	302	290	617	36	18	9	258	28	131	999
18	176	625	273	229	223	35	19	12	107	25	120	330
19	168	371	251	198	161	33	15	11	76	21	109	325
20	175	395	236	742	135	27	15	174	56	20	94	148
21	165	484	244	1,012	117	24	14	254	48	21	101	170
22	154	404	244	831	108	29	12	63	41	18	330	160
23	154	385	232	293	105	284	9	29	36	199	213	146
24	154	309	272	235	105	90	9	1,692	32	263	135	144
25	149	258	285	213	89	42	11	197	29	119	99	152
26	154	179	232	221	72	39	11	80	39	64	91	154
27	147	194	184	418	72	45	10	43	33	40	112	120
28	136	242	156	362	72	35	8	31	29	481	1,500	102
29	164	......	139	232	77	35	14	1,078	33	206	996	119
30	215	......	133	205	77	29	9	214	30	104	210	133
31	321	......	133	......	63	......	8	90	......	88	......	124
Mean	242	661	565	363	358	56	16	132	72	70	322	316

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1894.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	107	115	198	128	97	368	68	32	7	40	428	115
2	109	110	227	110	86	285	43	19	8	47	196	268
3	100	90	882	97	98	247	37	400	8	41	1,371	315
4	89	58	936	111	95	233	34	145	6	45	640	161
5	98	60	776	189	80	231	36	48	6	71	860	133
6	130	58	777	142	68	280	165	31	6	65	866	124
7	136	57	698	112	76	315	177	56	5	43	245	110
8	116	60	416	115	80	235	75	61	857	34	342	229
9	105	1,063	313	114	68	194	51	28	1,247	41	464	616
10	97	757	291	113	57	161	40	14	102	1,715	313	257
11	88	517	277	146	43	144	34	16	108	380	258	629
12	88	267	243	363	39	130	36	15	73	173	198	1,824
13	88	164	380	1,521	39	127	34	67	36	164	179	853
14	76	164	355	833	42	127	29	82	28	250	175	241
15	73	130	171	490	45	116	26	24	28	172	165	300
16	88	250	178	303	39	97	101	23	23	110	149	257
17	92	114	171	239	36	92	212	20	19	106	170	228
18	82	1,630	144	198	36	94	60	15	1,001	90	227	194
19	78	1,990	144	174	36	87	31	11	3,197	78	176	172
20	81	1,185	141	166	685	77	31	16	797	72	145	159
21	79	603	136	188	9,012	72	31	22	245	63	150	147
22	83	399	179	418	4,036	69	23	22	148	59	170	149
23	88	366	571	291	823	60	21	11	111	59	154	145
24	88	287	279	186	3,779	51	26	15	91	60	152	125
25	96	204	194	159	1,523	51	29	13	81	200	143	135
26	80	105	182	141	532	82	27	14	81	233	125	135
27	75	147	159	122	277	89	22	14	62	125	120	135
28	88	200	131	114	2,893	60	22	10	46	93	112	135
29	67	------	149	109	2,036	45	19	8	48	82	103	130
30	108	------	164	105	553	65	19	7	40	79	96	130
31	188	------	152	------	443	------	44	7	------	790	------	111
Mean	95	37	323	250	895	143	52	41	284	180	296	279

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1895.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	155	156	1,217	160	192	46	528	27	8	6	27	15
2	98	98	1,019	249	145	42	148	20	8	6	31	27
3	117	106	584	367	118	82	74	18	9	4	30	76
4	98	147	533	231	98	95	59	1,225	10	5	15	50
5	98	201	475	163	87	95	664	526	11	5	17	45
6	156	189	265	142	88	157	616	94	8	5	16	51
7	357	176	321	124	88	126	202	54	7	5	17	40
8	891	176	1,531	2,542	82	56	115	43	7	6	12	25
9	818	176	694	3,234	74	41	92	34	6	7	11	50
10	579	188	594	584	72	38	73	29	6	7	9	56
11	2,289	188	605	359	63	41	49	20	6	7	8	27
12	830	176	273	280	56	48	44	71	6	8	7	16
13	550	176	723	661	65	134	48	70	6	16	9	8
14	349	188	1,632	755	76	145	40	40	6	29	8	6
15	295	178	396	338	78	62	35	29	5	34	8	6
16	295	177	292	253	71	44	39	22	6	27	9	6
17	295	175	240	204	59	36	48	22	7	22	7	6
18	150	182	376	182	53	34	48	17	8	19	7	7
19	150	201	625	168	47	31	39	13	7	15	13	10
20	164	242	526	152	41	28	26	19	7	13	9	10
21	186	323	287	136	65	25	19	20	7	8	10	9
22	191	385	363	130	88	26	32	14	6	7	9	89
23	166	385	253	130	71	31	39	13	5	6	7	81
24	150	258	292	118	48	29	39	10	5	5	8	43
25	120	242	445	107	41	25	36	9	5	5	7	27
26	2,053	287	450	101	39	49	28	9	5	5	11	23
27	479	368	247	127	165	89	24	13	5	5	34	32
28	203	903	213	261	225	202	21	13	4	5	28	37
29	178	------	190	159	105	106	18	11	6	6	18	32
30	178	------	160	187	63	78	25	10	6	6	15	24
31	178	------	149	------	48	------	31	10	------	9	------	573
Mean	412	237	515	417	84	68	106	81	7	10	14	49

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1896.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	186	39	960	286	81	24	27	71	11	155	28	299
2	83	45	463	286	65	22	22	48	8	60	30	193
3	69	51	99	260	51	22	24	37	8	38	33	115
4	72	51	57	217	63	22	24	35	10	31	36	115
5	55	63	57	172	59	17	19	30	75	29	1,305	100
6	32	8,707	101	154	39	17	17	24	673	33	579	90
7	48	2,535	127	164	44	20	22	25	214	29	220	90
8	36	600	111	154	41	17	87	30	65	24	106	120
9	23	635	88	135	30	18	57	31	32	26	289	307
10	19	624	85	129	23	66	86	22	22	24	119	252
11	19	383	82	129	25	46	71	17	20	19	115	154
12	15	228	102	125	38	31	29	25	15	44	154	130
13	14	187	91	125	42	24	22	23	14	1,480	169	125
14	14	282	79	120	34	196	20	28	17	345	135	100
15	15	379	92	110	31	236	17	74	14	206	102	95
16	15	274	81	93	31	73	17	36	13	129	88	90
17	15	121	77	82	31	52	17	22	593	100	88	95
18	19	119	118	93	31	138	16	17	765	74	85	95
19	19	110	5,408	92	31	72	13	17	290	62	80	80
20	23	109	1,994	81	31	35	13	17	169	51	73	75
21	31	88	715	135	31	29	13	14	57	53	66	75
22	27	90	414	147	31	26	1,373	11	40	51	69	60
23	32	85	309	97	31	29	499	10	33	43	72	55
24	565	75	250	88	31	31	166	14	26	61	72	54
25	377	84	211	97	31	36	92	14	26	63	72	52
26	142	85	349	97	31	54	68	10	24	59	68	50
27	59	66	403	88	31	50	77	10	19	53	64	50
28	53	70	257	85	110	32	97	14	17	37	143	50
29	59	1,542	2,061	81	135	43	180	15	21	33	869	45
30	43	......	760	81	61	43	561	12	308	38	385	40
31	36	......	389	......	86	......	155	13	......	40	......	30
Mean	71	611	528	133	46	50	126	25	120	112	190	106

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1897.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	88	41	88	93	76	445	45	221	43	17	80	105
2	88	41	115	77	1,610	115	42	184	41	13	1,354	94
3	121	41	169	71	439	84	42	115	41	13	287	91
4	209	41	290	65	239	124	41	105	37	13	108	118
5	351	41	190	131	179	273	37	105	32	17	81	1,305
6	233	1,094	360	166	135	130	32	97	31	17	71	396
7	125	2,973	208	125	111	84	29	85	31	15	42	204
8	125	840	144	99	92	103	29	77	31	15	36	155
9	107	334	144	1,750	80	4,677	31	80	31	12	61	144
10	80	166	160	606	75	774	31	83	27	10	74	136
11	72	135	160	272	97	224	27	86	28	13	60	126
12	72	115	220	205	96	216	27	83	30	15	55	336
13	57	110	220	166	2,215	228	36	63	28	15	49	314
14	41	94	171	144	755	202	75	54	29	15	39	2,436
15	48	72	215	208	800	159	61	64	27	15	37	2,696
16	48	63	149	218	235	144	36	289	24	14	40	492
17	41	54	129	164	190	137	31	160	23	11	41	318
18	41	48	135	145	150	131	31	67	22	13	41	245
19	41	41	179	125	140	124	140	54	19	15	41	197
20	93	48	700	107	126	117	356	63	19	15	40	175
21	1,856	131	328	88	164	112	367	66	21	15	40	175
22	369	529	209	88	165	97	3,083	64	22	14	41	173
23	139	1,826	170	88	117	76	1,256	53	24	14	39	162
24	97	301	469	88	127	73	630	1,075	27	14	39	154
25	73	105	327	80	711	85	391	209	27	59	36	154
26	48	89	189	84	185	74	181	119	23	85	36	154
27	48	63	154	84	110	53	491	93	21	48	1,033	154
28	36	63	139	72	84	59	2,119	73	21	27	238	171
29	31	......	129	66	74	56	900	60	21	22	142	166
30	31	......	125	66	77	48	298	50	21	19	124	154
31	36	......	115	......	628	......	214	49	......	16	......	539
Mean	156	339	210	191	331	307	358	130	27	20	147	395

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1898.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	377	164	164	249	193	115	29	32	24	12	65	436
2	340	164	160	150	162	105	29	251	17	8	39	300
3	340	164	160	176	147	105	21	65	14	6	31	288
4	233	164	164	159	138	97	15	41	14	7	24	1,777
5	135	164	154	164	129	117	15	105	13	7	19	3,059
6	125	164	144	164	140	110	23	119	14	7	17	511
7	105	164	144	164	362	69	25	36	14	6	25	304
8	101	164	139	199	3,153	62	22	22	16	8	27	218
9	92	189	131	131	846	62	22	22	20	7	24	147
10	88	213	127	122	378	55	26	32	17	7	933	144
11	97	294	122	120	303	45	15	397	12	9	852	135
12	188	566	115	133	349	43	16	99	13	10	239	125
13	257	530	109	123	483	48	17	57	11	14	165	115
14	215	258	106	115	254	51	17	36	9	13	125	105
15	633	228	97	195	1,473	45	16	32	8	10	125	105
16	553	313	88	136	1,060	45	22	27	10	7	85	105
17	264	105	88	125	983	48	19	22	14	8	161	105
18	166	130	90	105	386	42	14	228	11	8	373	93
19	139	387	87	105	329	31	17	1,615	7	14	3,529	85
20	493	5,076	77	105	349	34	14	278	6	13	552	1,006
21	654	1,205	108	93	439	48	58	113	6	24	268	293
22	398	691	196	81	258	31	66	65	7	49	202	480
23	2,985	445	349	77	213	28	36	45	9	49	828	1,670
24	476	330	273	294	258	34	22	36	11	27	484	408
25	313	273	164	400	280	34	18	31	13	24	355	203
26	554	221	166	254	250	36	20	31	12	59	269	149
27	462	200	175	189	242	31	22	31	14	176	242	129
28	267	182	246	645	209	34	22	27	14	87	445	115
29	215	......	391	782	170	34	19	22	11	40	322	110
30	176	......	1,232	574	157	29	17	26	13	28	464	90
31	164	......	420	......	138	......	14	29	......	81	......	161
Mean	374	469	199	211	459	55	23	128	12	27	376	418

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1899.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	527	213	611	349	67	31	15	27	15	36	144	54
2	453	213	569	280	73	31	13	248	15	31	154	51
3	97	213	540	243	67	27	9	1,262	28	31	162	48
4	71	213	686	221	61	19	10	104	41	27	1,257	51
5	405	173	3,687	201	53	17	14	43	32	22	252	54
6	2,105	119	913	176	50	17	13	23	19	38	145	48
7	1,298	97	593	255	47	13	10	15	15	59	107	41
8	306	97	377	1,047	45	13	13	15	15	53	85	41
9	277	105	388	362	46	15	14	14	13	36	81	36
10	213	97	343	245	38	19	14	488	43	27	81	36
11	213	80	510	204	64	19	13	2,577	38	22	81	36
12	213	72	959	186	89	17	10	151	80	19	85	36
13	213	72	1,318	176	73	17	10	71	68	19	85	65
14	228	72	407	166	53	15	10	48	23	22	77	80
15	203	72	1,172	159	48	15	8	36	15	19	72	60
16	189	89	813	193	48	15	8	27	15	19	68	45
17	457	319	242	301	43	15	9	22	15	22	68	36
18	252	553	722	177	54	15	9	19	13	123	68	31
19	145	574	2,490	149	68	15	8	19	41	113	56	36
20	115	974	742	139	57	15	6	17	430	57	51	57
21	105	1,373	382	129	36	15	6	14	166	41	48	72
22	105	1,373	1,765	115	36	15	6	19	138	32	41	57
23	100	1,402	976	105	45	15	6	19	65	27	77	41
24	1,117	849	405	105	51	13	6	19	41	27	147	792
25	1,927	446	414	105	48	11	6	19	41	22	90	401
26	333	809	490	105	36	13	11	13	578	22	74	125
27	242	3,950	417	101	31	13	23	11	204	22	72	89
28	213	815	1,398	92	31	13	27	13	89	17	63	72
29	213	......	2,417	88	27	14	22	13	63	24	63	72
30	213	......	588	73	22	15	325	14	48	17	63	63
31	213	......	443	......	27	......	68	15	......	24	......	48
Mean	411	551	895	208	49	16	23	174	80	34	130	89

Daily discharge, in second-feet, of Neshaminy Creek, Pennsylvania, below the forks, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	60	173	2,675	105	64	47	31	36	17	15	11	39
2	63	194	1,434	105	52	41	27	31	11	11	11	34
3	48	182	725	110	40	41	22	27	10	8	13	31
4	57	188	431	110	44	41	22	22	10	14	15	711
5	80	2,302	209	105	40	37	52	19	10	10	15	635
6	88	533	205	105	33	31	59	15	9	10	15	153
7	88	521	224	102	36	26	42	15	8	9	15	123
8	88	1,330	228	97	40	27	51	15	8	8	13	102
9	88	1,244	213	96	41	39	54	15	8	11	10	59
10	88	339	201	84	44	45	43	15	8	15	13	54
11	97	322	176	76	45	41	27	14	8	13	13	54
12	219	379	154	84	43	43	27	14	6	10	13	54
13	2,095	2,235	135	87	41	38	31	78	5	10	11	48
14	310	566	115	84	35	31	29	23	5	118	8	41
15	374	358	105	78	31	33	24	16	7	52	9	41
16	251	340	105	76	30	33	22	15	58	31	9	41
17	250	191	147	82	26	36	20	15	27	27	8	36
18	213	142	176	101	107	36	18	15	16	19	8	26
19	250	142	154	470	3,990	31	18	13	10	15	8	22
20	295	173	1,972	860	2,449	31	14	10	10	15	9	22
21	2,588	139	457	583	277	31	10	9	10	15	9	22
22	841	3,163	214	230	134	24	10	14	8	15	8	22
23	288	1,865	175	147	139	26	21	10	6	15	9	22
24	183	930	139	116	216	24	27	13	8	14	9	22
25	160	463	173	115	137	22	37	15	10	13	9	19
26	153	338	115	99	156	19	250	11	8	11	840	15
27	219	355	101	85	115	1,221	94	14	6	10	223	19
28	237	375	189	68	82	860	43	13	6	10	71	22
29	147	......	146	64	61	104	23	85	6	13	48	22
30	105	......	116	64	54	48	232	88	11	13	41	22
31	119	......	105	......	53	......	73	22	......	10	......	290
Mean	327	696	378	153	279	102	47	23	11	18	50	91

PERKIOMEN CREEK AT FREDERICK, PENNSYLVANIA.

Measurements of this creek were begun on August 20, 1884. The station is described in the Twentieth Annual Report, Part IV, pages 89 and 90, followed by tables of monthly flow for the years 1890 to 1899, inclusive. Water-Supply Paper No. 35 contains tables of the daily discharge for the entire period from 1884 to 1899, inclusive. Diagrams of daily discharge, constructed from these tables, were published in the Twenty-first Annual Report, Part IV, pages 79 and 80, and figures for the monthly flow for 1899 on page 78 of that report. The following records of daily discharge for 1900 are furnished by Mr. John E. Codman, hydrographer of the water department of Philadelphia.

Daily discharge, in second-feet, of Perkiomen Creek at Frederick, Pennsylvania, for 1900.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	52	168	360	148	84	52	29	84	41	36	41	58
2	53	178	1,648	158	80	55	24	64	31	36	36	55
3	43	178	1,212	148	102	55	34	54	29	36	31	44
4	35	188	371	138	110	46	62	45	36	31	31	270
5	32	3,606	190	133	84	52	71	51	31	26	36	565
6	30	772	342	123	60	52	71	47	29	58	36	197
7	38	284	368	115	56	46	52	36	29	47	41	107
8	36	1,505	219	98	63	49	38	36	26	36	41	75
9	43	1,370	203	93	67	44	31	36	31	33	38	67
10	41	198	188	93	75	23	36	34	31	34	43	58
11	64	198	193	88	63	43	36	24	22	37	32	58
12	2,071	198	208	135	58	63	64	36	14	31	46	52
13	460	3,112	208	163	52	54	52	41	23	26	67	43
14	123	772	208	183	56	52	38	31	36	39	42	43
15	106	284	219	101	63	55	26	26	47	63	31	43
16	135	203	255	98	58	54	24	26	58	67	31	38
17	138	198	260	145	58	51	22	31	44	52	29	36
18	101	188	260	362	58	46	24	122	33	46	24	36
19	126	168	267	1,212	585	46	41	198	31	46	20	36
20	2,342	158	699	315	693	49	41	93	31	46	24	41
21	1,147	146	415	195	246	49	24	63	33	41	31	41
22	358	2,501	273	178	129	46	18	54	31	36	36	36
23	249	1,984	255	173	98	46	18	41	33	36	31	44
24	196	615	267	158	88	37	255	31	38	31	31	55
25	185	442	193	138	102	34	690	31	36	26	41	63
26	203	375	178	115	102	38	1,505	68	33	26	150	63
27	188	389	168	93	80	41	245	80	36	26	222	47
28	178	360	158	84	67	46	116	58	36	26	123	47
29	168	......	133	84	71	41	71	52	36	26	58	47
30	158	......	118	84	67	36	52	46	36	31	58	36
31	158	......	128	......	58	......	135	43	......	41	......	207
Mean	299	741	321	178	117	47	127	54	33	38	50	84

[Continued in Water-Supply and Irrigation Paper No. 48.]

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