DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 412

SURFACE WATER SUPPLY OF THE UNITED STATES

1915

PART XII. A. PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
C. L. PARKER and W. A. LAMB, District Engineers

Prepared in cooperation with
THE STATES OF WASHINGTON, MONTANA, AND IDAHO

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SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN, 1915.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1915.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in the organic law (20 Stat. L., p. 394):

Provided, That this officer [the Director] shall have the direction of the Geological Survey and the classification of public lands and examination of the geological structure, mineral resources, and products of the national domain.

The work was begun in 1888 in connection with special studies relating to irrigation in the arid west. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

Annual appropriations for the fiscal years ending June 30, 1895–1916.

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100.000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911 to 1916, inclusive	150,000

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgements for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on pages 14–15.

Measurements of stream flow have been made at about 3,800 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1915, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many

miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water supply papers from time to time. Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

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

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross-section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the tables of convenient equivalents (pp. 9–11).

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

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

An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

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

The following terms not in common use are here defined:

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

"Control," "controlling section," and "point of control"; terms used to designate the section or sections of the stream below the gage which determine the stage-discharge relation at the gage. It

should be noted that the control may not be the same section or sections at all stages.

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

CONVENIENT EQUIVALENTS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1 second-foot for one year (365 days) covers 1 square mile 1.1312 feet, or 13.5744 inches deep.

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

1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one year (365 days) equals 724 acre-feet.
1 second-foot for one day equals 86,400 cubic feet.
1,000,000,000 (1 United States billion) cubic feet equals 11,570 second-feet for one day.
1,000,000,000 cubic feet equals 414 second-feet for one 28-day month.
1,000,000,000 cubic feet equals 399 second-feet for one 29-day month.
1,000,000,000 cubic feet equals 386 second-feet for one 30-day month.
1,000,000,000 cubic feet equals 373 second-feet for one 31-day month.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1914, and ending September 30, 1915. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

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

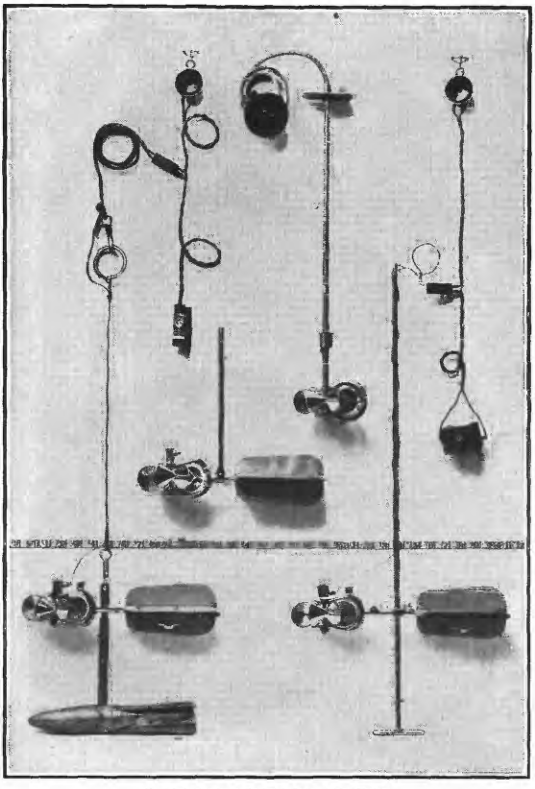
The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving results of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge, tables giving daily gage heights and results of discharge measurements are published.

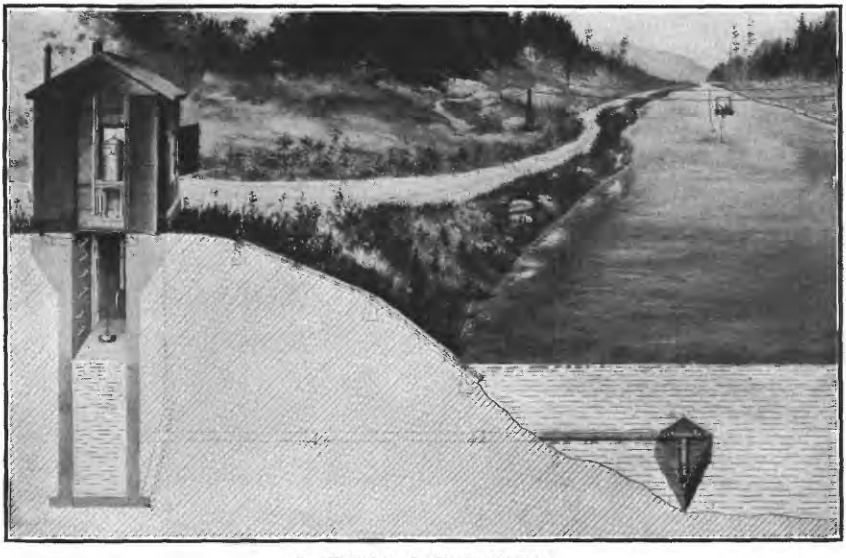
The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the constancy of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of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

The table of daily discharge in general gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the day. If such stations are equipped with water-stage recorders the mean daily discharge may be obtained by averaging discharge at regular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

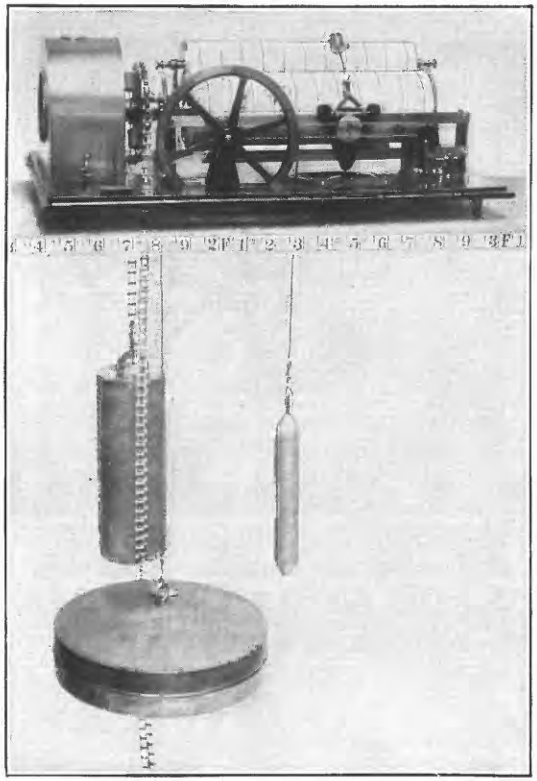
In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when



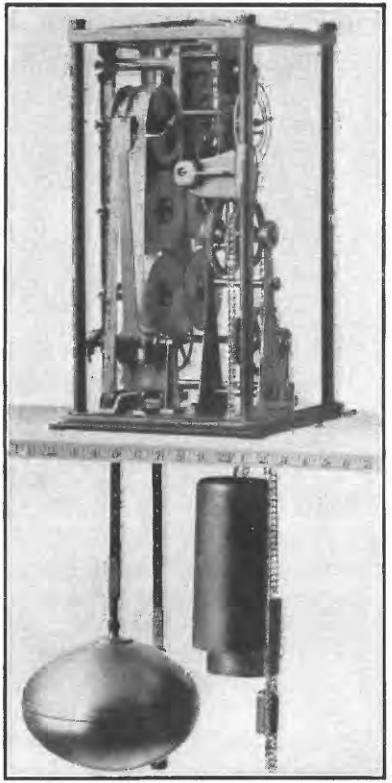
A. PRICE CURRENT METERS.



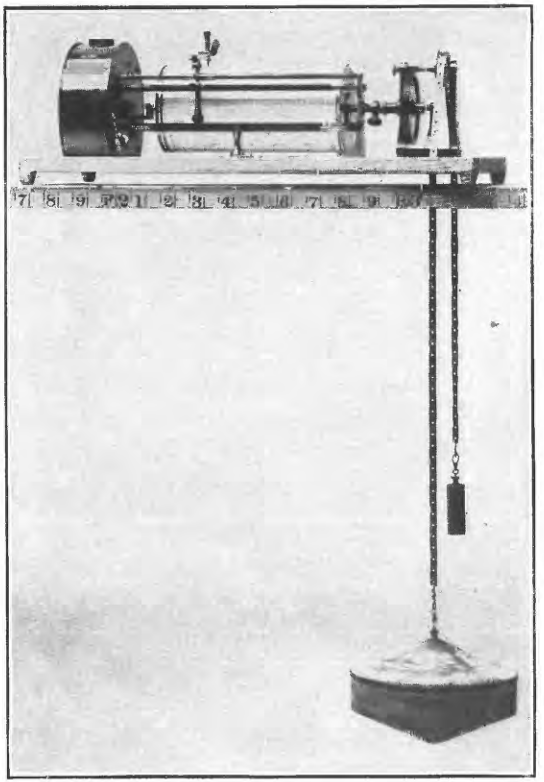
B. TYPICAL GAGING STATION.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 6, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large non-contributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary

estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

During the year ending September 30, 1915, the work in Washington, Montana, and Idaho has been done under cooperative agreements between the United States Geological Survey and the respective States.

Cooperation with the States is effected under contracts which are made between the Director of the Federal Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys. The State contracts are essentially of the same order, the principal provisions being substantially as follows:

1. The United States Geological Survey retains direct supervision of the field work and the preparation of the data for publication.

2. The Federal Survey retains possession of all material collected—field notes, maps, etc.—but this material is open at all times to inspection by the State officials, and if not satisfactory the agreements can be terminated at any time.

3. The salaries of gage observers and the salaries and traveling and field expenses of the engineers are divided between the two parties in some manner agreed upon, the accounts being rendered monthly in accordance with the regulations of the Federal Survey.

4. The streams and localities in which investigations shall be made are determined by conference between the State officials and the representatives of the United States Geological Survey.

5. The cost of publication is borne entirely by the Federal Survey.

In general, the cooperative agreements specify that the United States Geological Survey shall allot from its appropriation a sum equal to that appropriated from State funds.

The work in Washington was done in cooperation with the Board of Geological Survey, composed of Ernest Lister, governor; L. F. Hart, lieutenant governor; Edward Meath, treasurer; Henry Landes, acting president of the University of Washington; and E. A. Bryan, president of the State College. The board was very efficiently represented in the cooperative investigations by Henry Landes, State geologist.

Special acknowledgments are due to A. W. Mahon, State engineer of Montana, and to J. H. Smith, State engineer of Idaho, for the very efficient manner in which they represented their States in the cooperative investigations.

Acknowledgments are also due to the engineers and employees of the United States Reclamation Service, the United States Forest

Service, and of the United States Office of Indian Affairs for assistance, suggestions, and the freest use of data gathered exclusively for them and for which they have paid. Acknowledgments are also due to the officers of the United States Weather Bureau for hydrographic and climatologic data and to the United States Bureau of Fisheries for furnishing gage heights.

The following cities, private companies, and irrigation districts have cooperated in the collection of records: Spokane Valley Land & Water Co., Similkameen Power Co., Wenatchee Valley Gas & Electric Co., and Quincy Valley Irrigation District.

DIVISION OF WORK.

The field data were collected under the supervision of G. L. Parker and W. A. Lamb, district engineers, by F. B. Storey, A. H. Tuttle, J. T. Hartson, C. O. Brown, C. G. Paulsen, I. L. Collier, B. E. Jones, and J. M. Ray, and by E. W. Kramer, district engineer for the United States Forest Service.

The field data in the Yakima River basin, exclusive of gaging stations in the Yakima Indian Reservation, and the ratings, special estimates, analyses, and computations were made in cooperation with Paul Taylor, engineer in charge of hydrometric work, United States Reclamation Service, assisted by F. E. Moxley, H. W. Humphrey, and R. S. Calland.

The ratings, special estimates, analyses, and computations for stations in Washington and Idaho were made under the direction of G. L. Parker, district engineer, assisted by A. H. Tuttle, C. O. Brown, J. T. Hartson, C. G. Paulsen, James E. Stewart, and Lasley Lee. The ratings, special estimates, analyses, and computations for stations in Montana were made under the direction of W. A. Lamb, district engineer, assisted by B. E. Jones and A. H. Tuttle.

The manuscript has been prepared by James E. Stewart and Lasley Lee.

GAGING-STATION RECORDS.

QUINAULT RIVER BASIN.

QUINAULT RIVER AT QUINAULT LAKE, WASH.

LOCATION.—In the NE. ¼ sec. 8, T. 23 N., R. 9 W., at mouth of Canoe Creek, at north end of Quinault Lake, at Quinault post office, 35 miles north of Hoquiam, Grays Harbor County.

DRAINAGE AREA.—273 square miles (measured on map of Olympia National Forest).

RECORDS AVAILABLE.—October 29, 1911, to September 30, 1915.

GAGE.—Vertical staff in two sections, on right bank of Canoe Creek 400 feet above mouth; read twice daily to hundredths by A. V. Higley. Gage read October 29, 1911, to December 31, 1912, was at Ingram Hotel on the south shore of lake, at datum 1.05 foot lower. All gage heights have been corrected to datum of present gage.

DISCHARGE MEASUREMENTS.—Made from boat or from cable half a mile below outlet of lake and about 4 miles below gage.

CHANNEL AND CONTROL.—Stream bed composed of boulders. Control practically permanent. Left bank high and wooded; not subject to overflow; right bank low and wooded; overflowed at about gage height 18 feet. Zero flow would occur at gage height −2.0 feet, as determined August 18, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.9 feet at 7 a. m. October 19 (discharge, 16,000 second-feet); minimum stage recorded, 0.10 foot at 7 a. m. and 5 p. m., September 30 (discharge, 400 second-feet).

1911–1915: Maximum stage recorded, 16.3 feet at 8 a. m. January 6, 1914 (discharge, 32,500 second-feet); minimum stage recorded September 30, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Natural storage in Quinault Lake.

ACCURACY.—Results good.

Discharge measurements of Quinault River at Quinault Lake, Wash., during the year ending Sept. 30, 1915.

[Made by A. H. Tuttle.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 28	4.82	5,220	Aug. 18	0.52	522	Sept. 23	0.22	459
Aug. 18	.52	545	Sept. 23	.22	455			

Daily discharge, in second-feet, of Quinault River at Quinault Lake, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,490	5,700	4,280	1,770	1,670	2,080	6,740	1,670	2,910	1,220	770	550
2	1,490	10,900	3,990	3,300	1,870	1,870	14,300	1,580	2,670	1,220	740	600
3	1,490	11,200	3,710	4,580	1,970	1,770	13,100	1,490	2,550	1,310	740	575
4	1,400	9,680	3,300	4,280	1,970	1,770	9,050	1,490	2,310	1,220	740	575
5	1,400	7,840	3,040	3,570	2,190	1,670	6,740	1,490	2,310	1,220	740	550
6	1,220	6,380	2,670	3,040	3,040	1,770	4,730	1,670	2,430	1,220	710	530
7	1,180	5,530	2,430	2,670	3,570	1,770	4,890	1,670	2,430	1,140	680	530
8	1,140	4,890	2,310	3,170	3,300	1,670	4,580	1,770	2,310	1,140	650	550
9	1,060	5,370	2,190	3,170	2,910	1,580	3,990	1,770	2,080	1,140	650	575
10	1,490	4,730	1,970	3,170	2,790	1,490	3,570	2,190	1,970	1,100	625	550
11	1,970	4,730	1,770	4,280	2,550	1,490	3,710	2,790	1,870	1,020	625	550
12	2,670	4,730	1,670	4,730	2,310	1,490	3,040	2,910	1,770	1,060	600	530
13	3,990	5,370	1,580	3,990	2,250	2,310	4,890	2,670	1,670	1,060	600	510
14	3,710	5,370	1,490	3,850	2,190	2,910	3,430	2,550	1,670	1,060	575	490
15	3,040	4,430	1,490	3,430	1,970	7,280	3,170	2,430	1,580	1,060	575	490
16	3,710	3,850	1,400	2,910	1,970	6,920	3,170	2,190	1,580	1,060	575	490
17	9,470	3,990	1,310	2,550	2,190	5,370	2,790	2,080	1,580	1,100	575	470
18	13,100	2,910	1,220	2,310	2,190	5,210	2,790	2,190	1,580	1,060	550	470
19	15,500	2,910	1,180	2,190	1,970	4,890	2,550	2,310	1,490	1,020	550	445
20	12,000	3,570	1,140	2,080	1,970	4,730	2,430	2,430	1,490	945	550	445
21	8,440	3,710	1,100	1,870	1,670	3,170	2,550	2,430	1,400	945	575	445
22	6,210	3,430	1,020	1,770	1,770	3,300	2,430	2,430	1,310	945	575	445
23	4,890	3,570	1,020	1,670	1,870	3,300	2,310	2,430	1,310	875	575	430
24	3,300	2,910	980	1,580	1,970	3,040	2,080	2,550	1,310	875	575	430
25	3,170	4,130	1,020	1,490	2,550	2,790	1,970	3,430	1,310	840	575	430
26	3,170	4,130	1,100	1,400	2,550	2,430	1,970	4,580	1,310	840	550	415
27	2,980	4,280	1,220	1,310	2,430	2,190	1,870	4,890	1,220	805	550	415
28	2,800	5,370	1,310	1,310	2,310	2,080	1,770	5,370	1,180	805	530	415
29	2,620	5,050	1,310	1,220	.....	2,190	1,670	5,370	1,180	805	530	400
30	2,430	4,580	1,400	1,180	.....	2,550	1,770	3,710	1,180	805	530	400
31	2,910	.....	1,670	1,310	.....	2,790	.....	3,040	.....	805	530	.....

NOTE.—Discharge ascertained from rating curve well defined between 400 and 12,000 second-feet. Recorded gage heights apparently in error Oct. 27–30; discharge estimated. Discharge interpolated, for lack of gage reading, Feb. 13.

Monthly discharge of Quinault River at Quindult Lake, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 273 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	15,500	1,060	4,050	14.8	17.06	249,000	A.
November	11,200	2,910	5,170	18.9	21.09	308,000	A.
December	4,280	980	1,850	6.78	7.82	114,000	A.
January	4,730	1,180	2,620	9.60	11.07	161,000	A.
February	3,570	1,670	2,280	8.35	8.70	127.000	A.
March	7,280	1,490	2,900	10.6	12.22	178,000	A.
April	14,300	1,670	4,140	15.2	16.96	246,000	A.
May	5,370	1,490	2,630	9.63	11.10	162,000	A.
June	2,910	1,180	1,770	6.48	7.23	105,000	A.
July	1,310	805	1,020	3.74	4.31	62,700	A.
August	770	530	610	2.23	2.57	37,500	A.
September	600	400	490	1.79	2.00	29,200	B.
The year	15,500	400	2,460	9.01	122.13	1,780,000	

PUGET SOUND BASINS.

PUYALLUP RIVER NEAR ELECTRON, WASH.

LOCATION.—In the NE. ¼ NW. ¼ sec. 3, T. 16 N., R. 6 E., 1,000 feet above intake of Puget Sound Traction, Light & Power Co.'s flume, one-fourth mile below Mowich River, and 10 miles east of Electron, in Pierce County.

DRAINAGE AREA.—91 square miles (measured on Plate IV, Water-Supply Paper 313).

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1915.

GAGE.—Friez water-stage recorder attached to downstream side of left abutment of gaging bridge, 1,000 feet above intake.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Large boulders, gravel, and sand; shifting at all stages, owing to steep gradient and large amount of glacial silt in water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.25 feet at 10 p. m. November 2 (discharge, 2,070 second-feet). Minimum discharge estimated at 112 second-feet December 24, during period of ice affect.

1909–1915: Maximum stage recorded, 4.6 feet November 10, 1910 (discharge, 3,200 second-feet). Minimum discharge on December 24, 1914.

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

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Results excellent, except for period in which ice affected stage-discharge relation.

COOPERATION.—Record of gage heights and discharge measurements furnished by Puget Sound Traction, Light & Power Co.

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Discharge measurements of Puyallup River near Electron, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	Barber and Waite	0.74	256	Mar. 22	Barber and Waite	0.96	324
22	do	.97	338	Apr. 2	do	2.93	1,730
Nov. 7	do	1.53	649	20	do	1.03	325
24	do	1.34	509	May 7	do	.97	298
Dec. 7	do	.69	207	24	do	1.04	324
29	do	.49	159	June 3	do	1.37	513
Jan. 8	do	.95	294	24	do	1.29	484
25	do	.59	177	July 7	do	1.59	671
Feb. 12	do	.61	181	25	do	1.34	517
23	do	.50	160	Aug. 6	do	1.72	751
Mar. 6	do	.57	173	24	do	2.01	936
12	do	.49	162	Sept. 6	do	1.10	304
12	Hartson and Barber	.49	163	24	do	.86	220

Daily discharge, in second-feet, of Puyallup River near Electron, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	278	622	280	249	285	173	683	218	578	681	746	424
2	322	884	262	212	218	166	1,660	222	675	808	890	338
3	259	1,540	248	231	209	161	1,320	234	545	860	789	413
4	232	1,220	231	204	188	224	882	225	508	800	588	506
5	235	1,140	225	190	266	193	621	241	576	681	650	384
6	248	954	212	196	273	185	508	276	589	810	709	288
7	252	702	207	198	244	183	520	335	538	635	582	269
8	252	563	204	285	231	175	418	359	502	709	561	374
9	259	551	198	238	244	173	378	490	373	538	584	305
10	448	496	190	246	222	175	359	436	363	445	672	242
11	428	924	183	321	207	166	378	317	359	403	681	247
12	814	862	175	262	193	161	403	266	330	434	628	278
13	648	1,530	163	248	185	161	368	255	354	429	605	210
14	557	946	154	255	180	260	321	251	363	461	673	194
15	520	661	148	244	178	445	313	231	403	445	694	244
16	591	532	141	212	178	330	340	225	418	641	661	290
17	556	450	137	198	198	300	378	320	383	749	589	345
18	629	413	133	198	193	321	398	405	359	570	610	364
19	702	492	128	207	171	273	383	340	393	576	729	359
20	520	1,200	122	212	168	258	354	330	393	725	808	334
21	413	845	124	209	171	273	288	296	383	922	833	331
22	359	661	122	201	163	313	262	292	450	791	954	296
23	327	532	113	201	163	340	241	288	508	695	922	248
24	309	502	112	196	176	313	241	335	484	699	905	239
25	293	456	124	185	193	269	234	340	398	628	835	264
26	285	440	190	180	171	244	238	378	420	582	922	278
27	281	373	183	173	171	231	248	807	468	514	800	232
28	273	340	180	173	180	248	269	1,280	413	534	748	204
29	302	317	159	173	.....	284	288	788	472	570	896	224
30	435	296	166	171	.....	280	241	595	576	635	794	281
31	344	.....	193	190	.....	248	.....	558	.....	715	479	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 12, from rating curve well defined between 200 and 900 second-feet; Nov. 13 to Aug. 29, from rating curve well defined between 135 and 1,400 second-feet; Aug. 30 to Sept. 30, from rating curve well defined between 200 and 900 second-feet. Discharge estimated because of ice Dec. 12–26, as in table.

Monthly discharge of Puyallup River near Electron, Wash., for the year ending Sept. 30 1915.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	814	232	399	4.38	5.05	24,500	A.
November	1,540	296	715	7.86	8.77	42,500	A.
December	280	112	174	1.91	2.20	10,700	C.
January	321	171	215	2.36	2.72	13,200	A.
February	285	163	201	2.21	2.30	11,200	A.
March	445	161	243	2.67	3.08	14,900	A.
April	1,660	234	451	4.96	5.53	26,800	A.
May	1,280	218	385	4.23	4.88	23,700	A.
June	675	330	452	4.97	5.54	26,900	A.
July	922	403	635	6.98	8.05	39,000	A.
August	954	479	727	7.99	9.21	44,700	A.
September	506	194	300	3.30	3.68	17,900	A.
The year	1,660	112	409	4.49	61.01	296,000	

PUYALLUP RIVER AT ALDERTON, WASH.

LOCATION.—On township line between sec. 25, R. 4 E., and sec. 30, R. 5 E., T. 20 N., at county bridge No. 78, 1¾ miles above Stuck River, 1 mile north of Alderton, in Pierce County.

DRAINAGE AREA.—410 square miles (measured on drainage map published in Water Supply Paper 313).

RECORDS AVAILABLE.—November 20, 1914, to September 30, 1915.

GAGE.—Vertical staff attached to downstream side of north pier of county bridge, right bank; read once daily to hundredths by the following observers: November 20, 1914, to August 15, 1915, E. W. MacMorran; August 16, to September 30, Mrs. E. W. MacMorran.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Composed of silt and gravel; shifting at all stages. Right bank subject to overflow at about gage height 8 feet; left bank high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 8 a. m. May 28 (discharge, 4,690 second-feet); minimum stage recorded, 1.90 feet December 22 and 24, September 29–30 (discharge, 390 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—The operation of Puget Sound Traction, Light & Power Co.'s hydroelectric plant at Electron does not materially affect the stage, pondage available is small.

ACCURACY.—Results excellent. Slight diurnal fluctuation during summer months.

COOPERATION.—Gage-height record and results of frequent discharge measurements furnished by Inter-County River Improvement Commission of King and Pierce counties.

Discharge measurements of Puyallup River at Alderton, Wash., during the years ending Sept. 30, 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913–14.		*Feet.*	*Sec.-ft.*	1914–15		*Feet.*	*Sec.-ft.*
Feb. 19	Parker and Roberts....	2.77	1,120	Dec. 18	E. I. Anderson.....	1.98	414
23	Anderson and Phillips.	3.03	1,370	Jan. 19	Anderson and Roberts.	2.60	1,010
Mar. 31	Anderson and Bullard.	2.81	1,170	Mar. 5	Parker and Anderson..	2.48	850
June 13	.....do.....	3.06	1,320	Apr. 3	Anderson and Bullard.	4.67	3,750
				9	J. T. Hartson.....	3.02	1,320
1914–15.				9	E. I. Anderson.....	3.02	1,350
Nov. 16	Anderson and Sutherland.....	3.56	1,970	28	Hartson and Murray...	2.34	732
				June 4	Murray and Tuttle.....	3.16	1,650
19	E. I. Anderson.....	3.02	1,390	30	O. G. Murray.....	2.75	1,170
30	Anderson and Sutherland.....	2.74	1,150	Aug. 17	J. T. Hartson.....	2.71	1,090
				Sept. 16	O. G. Murray.....	2.05	538
Dec. 8	E. I. Anderson.....	2.36	722				

Daily discharge, in second-feet, of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	Aug.	Sept.
1	.....	980	880	690	690	830	690	1,690	.....	780
2	.....	980	930	690	650	3,670	690	2,210	.....	690
3	.....	930	930	780	690	3,990	690	1,950	.....	690
4	.....	880	1,040	690	690	2,900	650	1,620	.....	880
5	.....	830	1,040	690	880	2,160	650	1,560	.....	830
6	.....	780	980	780	735	1,780	610	1,500	1,440	690
7	.....	780	980	780	735	1,660	735	1,440	1,320	530
8	.....	735	1,440	780	735	1,670	930	1,380	1,140	610
9	.....	650	1,620	690	735	1,360	1,040	1,320	1,200	780
10	.....	610	1,690	780	650	1,290	1,260	1,090	1,260	610
11	.....	610	1,620	780	610	1,170	1,090	1,040	1,440	530
12	.....	610	1,820	690	610	1,270	880	980	1,260	780
13	.....	530	1,560	690	610	1,280	780	980	1,140	610
14	.....	530	1,560	690	690	1,080	830	980	1,200	460
15	.....	530	1,440	610	1,200	1,080	735	1,040	1,200	460
16	.....	460	1,200	610	1,440	970	690	1,090	1,320	460
17	.....	460	1,090	610	1,200	1,020	690	1,090	1,090	570
18	.....	460	980	610	1,260	1,150	780	980	1,040	650
19	.....	425	930	610	1,090	1,090	930	980	1,140	690
20	3,510	610	930	610	980	930	980	980	1,320	780
21	2,750	650	930	610	980	890	880	980	1,440	650
22	2,210	390	830	610	980	800	880	930	1,500	610
23	1,820	425	735	610	1,200	740	880	1,090	1,440	570
24	1,560	390	735	530	1,090	710	880	1,200	1,500	460
25	1,440	425	735	690	980	750	980	980	1,440	460
26	1,560	530	690	690	830	680	1,090	980	1,320	530
27	1,440	690	570	570	735	670	1,260	930	1,320	610
28	1,320	980	610	610	690	690	4,690	1,090	1,200	460
29	1,200	735	610	.....	690	735	2,610	1,090	1,140	390
30	1,140	880	610	.....	880	780	1,950	1,090	1,560	390
31	.....	880	650	.....	880	.....	1,500	.....	1,090	.....

NOTE.—Discharge ascertained from rating curve well defined between 600 and 5,000 second-feet, except that for Apr. 4–27, which was determined by methods devised for shifting control. Discharge estimated, for lack of gage readings, by comparative hydrograph with Puyallup River at Puyallup, Wash., July 1–31, 1,380 second-feet; Aug. 1–5, 1,430 second-feet.

Monthly discharge of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
November 20-30	3,510	1,140	1,810	4.41	1.80	39,500	A.
December	980	390	657	1.60	1.84	40,400	A.
January	1,820	570	1,040	2.54	2.93	64,000	A.
February	780	530	671	1.64	1.71	37,300	A.
March	1,440	610	865	2.11	2.43	53,200	A.
April	3,990	670	1,330	3.24	3.62	79,100	C.
May	4,690	610	1,090	2.66	3.07	67,000	A.
June	2,210	930	1,210	2.95	3.29	72,000	A.
July	.....	.....	1,380	3.37	3.88	84,800	C.
August	.....	1,040	1,310	3.20	3.69	80,600	A.
September	880	390	607	1.48	1.65	36,100	A.
The period	.....	.....	.....	.....	.....	654,000	

PUYALLUP RIVER AT PUYALLUP, WASH.

LOCATION.—In sec. 21, T. 20 N., R. 4 E. Willamette meridian, 1,000 feet upstream from Puget Sound Electric Co.'s railway bridge, 1 mile north of Puyallup, 1¼ miles below mouth of Stuck River, in Pierce County.

DRAINAGE AREA.—914 square miles (measured on drainage map published in Water-Supply Paper 313).

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1915.

GAGE.—Stevens water-stage recorder, in wooden shelter, attached to pile wing wall, 1,000 feet upstream from Puget Sound Electric Co.'s railway bridge.

DISCHARGE MEASUREMENTS.—Made from cable 1,200 feet below gage.

CHANNEL AND CONTROL.—Stream bed at gage and cable composed of very light, alluvial silt; shifting at all stages. No well-defined control.

EXTREMES OF DISCHARGE.—1914–15: Maximum stage recorded, 26.60 feet, as indicated by vertical line on gage-height chart during period when clock was not running, probably on November 3, 1914, as shown on a comparative hydrograph (discharge, 9,390 second feet); minimum stage recorded, 20.90 feet at 5 a. m. December 21, 1914 (discharge, 1,040 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water for two hydroelectric plants, both owned by the Puget Sound Traction, Light & Power Co., is diverted above this station. Water for Electron plant is diverted from Puyallup River 11 miles above Electron into an equalizing basin of 185 acre-feet capacity and is returned, after use, directly to the river. Water for plant at Dieringer is taken from White River near Buckley, is stored in Lake Tapps (capacity, 51,000 acre-feet), and after use is returned to Stuck River, which now carries the natural flow of White River.

REGULATION.—See "Diversions."

ACCURACY.—Results good except for periods in which gage was not read. Diurnal fluctuation during the low-water season is due to melting glaciers and regulation for power plants.

COOPERATION.—Gage-height record and some discharge measurements furnished by Inter-County River Improvement Commission of King and Pierce counties.

Discharge measurements of Puyallup River at Puyallup, Wash., during the years ending Sept. 30, 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913–14.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
Feb. 19	Parker and Collier	23.28	2,340	Mar. 5	Parker and Anderson	22·12	1,660
May 15	Parker and Brown	25.39	5,030	Apr. 3	Hartson and Murray	26.51	8,330
July 10	I. L. Collier	23.61	2,870	27	do	22.28	1,760
31	do	22.74	2,160	May 17	Murray and Hartson	22.36	1,870
Aug. 27	J. T. Hartson	22.08	1,810	June 4	Murray and Tuttle	23.70	3,230
28	do	22.04	1,770	15	G. L. Parker	23.12	2,590
Sept. 16	Parker and Hartson	21.88	1,800	July 1	O. G. Murray	23.23	2,590
20	Parker and Tuttle	22.16	1,920	15	J. T. Hartson	22.93	2,290
1914–15.				Aug. 3	O. G. Murray	23.60	2,930
Nov. 4	Hartson and Tuttle	25.04	6,180	16	J. T. Hartson	22.52	2,040
9	Hartson and Collier	23.40	3,130	Sept. 2	do	22.12	1,680
Dec. 15	Hartson and Murray	21.72	1,490	15	O. G. Murray	21.57	1,250

Daily discharge, in second-feet, of Puyallup River at Puyallup, Wash., for the years ending Sept. 30, 1914–15.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May	June.	July.	Aug.	Sept.
1914.						1914.					
1	3,070	3,510	2,970	2.150	1,590	17	3,750	4,370	2.520	2,150	1,580
2	3,290	4,110	3,180	2,090	1,690	18	3,510	3,870	2,600	2,150	2,100
3	3,750	4,110	3,180	2,090	1,800	19	3,510	3,750	2,690	2,130	2,400
4	3,750	3,510	3,180	2,220	1,730	20	3,400	3,400	2,780	1,860	2,000
5	3,400	2,970	2,600	2,090	1,500	21	3,510	2,870	2,360	1,860	1,910
6	3,290	2,690	2,520	2,220	1,510	22	3,750	2,780	2,220	1,810	1,620
7	3,180	2,870	2,780	2.090	1,520	23	3,750	2,520	2,220	1,760	1,510
8	2,870	3,510	2,870	2,090	1,520	24	3,870	2,480	2,220	1,760	1,510
9	2,970	3,510	2,870	2,030	1,530	25	3,870	3,510	2,220	1,760	1,740
10	2,870	3,070	2,780	1,970	1,440	26	3,510	3,290	2,000	1,810	1,580
11	3,070	2,970	2,780	1,970	1,510	27	3,290	3,180	1,970	1,810	1,440
12	3,070	2,970	2,870	2,030	1,480	28	3,070	2,540	2,030	1,760	1,370
13	4,110	3,290	2,970	2,090	1,340	29	2,970	2,600	1,970	1,760	1,370
14	4,780	3,290	2,780	2,090	1,550	30	2,870	2,690	2,030	1,740	1,370
15	5,060	3,750	2,690	2,090	1,980	31	2,870	.....	2,090	1,660	.....
16	4,500	4,060	2,520	1,970	1,740						

Daily discharge, in second-feet, of Puyallup River at Puyallup, Wash., for the years ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	1,370	3,150	2,090	1,860	1,560	1,340	2,040	1,710	3,380	2,560	2,500	1,710
2	1,480	6,000	2,040	1,960	1,610	1,380	6,170	1,590	3,990	2,730	2,790	1,590
3	1,440	8,800	1,960	2,020	1,610	1,380	8,040	1,670	3,680	2,910	2,980	1,550
4	1,280	6,000	1,860	2,190	1,640	1,540	6,260	1,630	3,310	3,040	2,450	1,670
5	1,280	7,370	1,820	2,000	1,690	1,590	4,940	1,630	3,240	2,910	2,340	1,480
6	1,310	7,590	1,660	2,040	1,880	1,480	4,070	1,670	3,240	3,040	2,560	1,380
7	1,310	5,570	1,660	2,000	1,620	1,410	3,990	1,790	3,380	3,040	2,450	1,410
8	1,310	4,420	1,700	2,690	1,590	1,410	3,750	1,920	3,240	2,790	2,100	1,520
9	1,580	3,340	1,700	2,800	1,580	1,410	3,170	2,100	2,850	2,790	2,190	1,590
10	2,070	3,740	1,620	2,440	1,620	1,380	2,850	2,620	2,790	2,240	2,240	1,410
11	2,980	4,260	1,620	2,970	1,570	1,380	2,730	2,500	2,620	1,960	2,300	1,340
12	2,960	4,830	1,540	3,020	1,500	1,340	2,790	2,190	2,400	2,180	2,140	1,410
13	2,680	7,310	1,400	2,950	1,490	1,310	2,850	2,050	2,300	2,120	1,920	1,380
14	2,100	6,200	1,440	2,880	1,350	1,340	2,620	2,000	2,340	2,340	2,000	1,310
15	1,950	5,570	1,510	2,580	1,340	2,020	2,450	1,870	2,450	2,400	1,960	1,250
16	1,960	4,830	1,480	2,290	1,380	2,450	2,450	1,710	2,560	2,500	1,960	1,280
17	1,660	4,310	1,440	2,040	1,440	2,050	2,560	1,790	2,620	3,260	2,000	1,350
18	1,860	3,980	1,440	2,000	1,480	1,960	2,500	2,190	2,400	2,620	2,000	1,420
19	2,450	3,670	1,440	1,940	1,380	1,790	2,560	2,240	2,300	2,450	2,140	1,440
20	2,150	5,920	1,310	1,890	1,380	1,590	2,620	2,190	2,340	2,560	2,140	1,410
21	2,000	5,950	1,290	1,840	1,280	1,480	2,400	2,050	2,190	2,850	2,140	1,440
22	1,900	4,830	1,370	1,750	1,340	1,590	2,240	2,000	2,300	2,910	2,340	1,380
23	1,840	4,480	1,370	1,670	1,340	1,830	2,050	1,960	2,450	2,670	2,560	1,340
24	1,820	3,980	1,440	1,510	1,340	1,920	1,920	2,000	2,500	2,560	2,620	1,340
25	1,800	3,900	1,280	1,540	1,410	2,050	1,750	2,140	2,300	2,450	2,500	1,190
26	1,800	3,980	1,500	1,580	1,380	1,870	1,710	2,140	2,340	2,340	2,450	1,340
27	1,790	3,740	1,510	1,500	1,340	1,710	1,710	2,710	2,620	2,300	2,670	1,280
28	1,770	2,590	1,720	1,530	1,280	1,520	1,710	6,410	2,340	2,190	2,910	1,280
29	1,770	2,190	1,660	1,490	.....	1,630	1,870	4,760	2,340	2,340	2,670	1,250
30	2,000	2,190	1,620	1,440	.....	1,870	1,870	3,600	2,340	2,450	2,240	1,480
31	2,300	.....	1,800	1,340	.....	1,870	.....	3,240	.....	2,670	1,920	.....

NOTE.—Discharge ascertained as follows: May 1 to Aug. 28, 1914, from a rating curve well defined between 1,700 and 5,500 second-feet; Aug. 29 to Sept. 20, 1914, by methods devised for shifting control; Sept. 21, 1914, to Jan. 8, 1915, from rating curve well defined between 1,500 and 7,000 second-feet; Jan. 9, to Feb. 15, 1915, by methods devised for shifting control; Feb. 16 to Sept. 30, 1915, from a rating curve well defined between 1,200 and 18,000 second-feet; June 16, 1914, by interpolation; Oct. 13–15, Oct. 18 to Nov. 4, 1914, and Sept. 16–19, 1915, estimated by hydrographic comparison with Puyallup River near Electron and combined flow of White River and flume at Buckley.

Monthly discharge of Puyallup River at Puyallup, Wash., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
May	5,060	2,870	3,500	215,000	B.
June	4,370	2,480	3,270	195,000	B.
July	3,180	1,970	2,560	157,000	B.
August	2,220	1,660	1,970	121,000	B.
September	2,400	1,340	1,630	97,000	B.
The period	.....	.....	.....	785,000	
1914–15.					C.
October	2,980	1,280	1,870	115,000	B.
November	[a] 8,800	2,190	4,820	287,000	B.
December	2,090	1,280	1,590	97,800	B.
January	3,020	1,340	2,060	127,000	B.
February	1,880	1,280	1,480	82,200	B.
March	2,450	1,310	1,640	101,000	B.
April	8,040	1,710	3,020	180,000	B.
May	6,410	1,590	2,320	143,000	B.
June	3,990	2,190	2,700	161,000	B.
July	3,260	1,960	2,590	159,000	B.
August	2,980	1,920	2,330	143,000	B.
September	1,710	1,190	1,410	83,900	
The year	[a] 8,800	1,190	2,320	1,680,000	

[a] Determined by hydrographic comparison of records for White River at Buckley, Wash., and Puyallup River near Electron, Wash.

WHITE RIVER AT BUCKLEY, WASH.

LOCATION.—In the SE. ¼ sec. 34, T. 20 N., R. 6 E., at Northern Pacific Railway bridge about a mile northeast of Buckley, in Pierce County.

DRAINAGE AREA.—424 square miles (measured on Pl. XI, Water-Supply Paper 313).

RECORDS AVAILABLE.—April 22, 1899, to August 31, 1903 (gage-height record only January 1, 1902, to August 31, 1903); June 8, 1910, to December 31, 1911 (records June 8, to September 30, 1910, taken from observations on the gage opposite Mud Mountain about 5 miles upstream); January 18, 1913, to September 30, 1915.

GAGE.—Since January 18, 1913, Fuller water-stage recorder on left bank at downstream end of concrete wing wall protecting left abutment of railroad bridge. April 22, 1899, to December 31, 1902, wire and weight gage on guard rail of highway bridge 500 feet above railroad bridge; January 1 to August 31, 1903, various temporary gages. October 1, 1910, to December 31, 1911, inclined staff bolted to concrete wing wall about 15 feet above present gage, at a datum 0.7 foot higher.

DISCHARGE MEASUREMENTS.—Made from downstream side of railway bridge.

CHANNEL AND CONTROL.—One channel at all stages; small bowlders and gravel; shifting; steep gradient. Right bank low and flat; left bank protected by concrete wing wall.

EXTREMES OF DISCHARGE.—Maximum estimated combined discharge of river and flume during year, from water-stage recorder, 4,310 second-feet at 6 a. m. November 3; minimum discharge (river and flume) for one day, 429 second-feet September 28–29.

1899–1901; 1911; and 1913–15: Maximum discharge 14,600 second-feet, November 22, 1901; minimum discharge (including flume) 390 second-feet October 3–4, and 19–26, 1911.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—White River flume diverts from river about a mile above gage. Total monthly discharge is computed from the combined flow of river and canal.

ACCURACY.—Determination of daily discharge subject to considerable error for low-water periods, for which rating curve is not well defined. Record of combined discharge of river and flume good.

COOPERATION.—Records of gage height and some discharge measurements furnished by Puget Sound Traction, Light & Power Co.

Discharge measurements of White River at Buckley, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	Eernisse and Osgood...	6.68	1,330	July 6	Eernisse and Osgood...	6.10	768
Dec. 3	.....do.....	4.27	14.2	Aug. 14	A. H. Tuttle.....	4.50	26.6
Jan. 11	Flaherity and Eernisse.	4.42	21.6	14	.....do.....	4.50	25.9
Apr. 3	A. H. Tuttle.....	7.34	2,650	Sept. 17	Eernisse and Osgood...	4.18	11.2
May 26	Eernisse and Osgood...	5.83	515				

Daily discharge, in second-feet, of White River at Buckley, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	31	23	19	10	14	746	320	1,110	624	435	15
2	14	334	21	20	11	14	2,380	340	1,050	671	489	11
3	12	2,320	17	21	12	14	2,700	356	1,130	696	539	10
4	11	2,080	13	21	13	15	2,380	315	1,050	721	395	11
5	11	3,020	11	21	13	15	1,900	290	1,070	705	353	11
6	11	3,020	9	20	13	15	1,570	295	1,170	747	390	11
7	11	2,070	14	19	13	15	1,430	362	1,260	579	342	10
8	217	1,110	12	23	12	15	1,280	462	1,140	593	308	12
9	429	904	12	22	11	15	1,080	640	976	543	262	17
10	720	1,160	12	22	11	15	965	838	875	373	232	11
11	928	827	13	23	11	15	924	773	755	340	230	11
12	426	996	13	33	11	15	944	632	705	542	156	11
13	18	1,750	13	28	11	15	944	550	755	465	28	11
14	14	1,430	13	27	11	23	856	543	764	423	26	10
15	12	1,990	13	25	11	310	782	364	738	526	26	10
16	9	1,690	12	21	11	386	782	419	800	600	61	10
17	12	1,430	11	21	10	156	800	481	810	486	215	11
18	11	1,320	11	15	10	153	819	586	713	445	180	10
19	24	1,280	10	14	10	56	846	616	655	553	164	10
20	19	1,840	9	13	10	23	856	564	609	566	51	10
21	11	1,830	9	13	11	21	764	508	593	650	384	10
22	11	1,560	10	12	11	85	663	521	671	680	288	10
23	10	1,390	10	11	11	258	564	495	764	593	303	10
24	10	1,280	10	11	12	415	441	488	755	526	318	9
25	10	1,190	10	10	13	543	395	508	655	470	248	9
26	10	1,200	13	10	13	401	346	550	632	429	252	10
27	9	842	14	9	13	310	335	850	773	384	502	10
28	9	83	15	9	14	290	330	1,900	688	353	721	9
29	9	56	14	9	.....	330	384	1,570	598	384	442	9
30	9	34	14	9	.....	395	373	1,220	564	433	20	9
31	9	.....	17	9	.....	368	.....	1,090	.....	429	17	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 6, and July 13 to Sept. 30, from rating curve fairly well defined between 60 and 1,200 second-feet; Nov. 7 to July 12, from rating curve well defined between 500 and 3,000 second-feet.

Monthly discharge of White River at Buckley, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	928	9	97.7	6,010	D.
November	3,020	31	1,340	79,700	A.
December	23	9	12.8	787	D.
January	33	9	17.4	1,070	D.
February	14	10	11.5	639	C.
March	543	14	152	9,350	B.
April	2,700	330	986	58,700	A.
May	1,900	290	627	38,600	A.
June	1,260	564	828	49,300	A.
July	747	340	533	32,800	B.
August	721	17	270	16,600	B.
September	17	9	10.6	631	C.
The year	3,020	9	406	294,000	

Combined monthly discharge of White River and flume at Buckley, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 424 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,000	439	667	1.57	1.81	41,000	B.
November	3,570	881	1,800	4.25	4.74	107,000	B.
December	870	442	602	1.42	1.64	37,000	B.
January	793	533	659	1.55	1.79	40,500	B.
February	701	575	626	1.48	1.54	34,800	B.
March	1,260	647	873	2.06	2.38	53,700	B.
April	3,210	976	1,540	3.63	4.05	91,600	B.
May	2,560	905	1,230	2.90	3.34	75,600	B.
June	1,840	1,170	1,400	3.30	3.68	83,300	B.
July	1,390	916	1,150	2.71	3.12	70,700	B.
August	1,220	750	931	2.20	2.54	57,200	B.
September	821	429	553	1.30	1.45	32,900	B.
The year	3,570	429	1,000	2.36	32.08	725,000	

WHITE RIVER FLUME AT BUCKLEY, WASH.

LOCATION.—In sec. 35, T. 20 N., R. 6 E. Willamette meridian, a quarter of a mile below intake on left side of White River, three-eighths of a mile above Northern Pacific Railway crossing, and 1 mile northeast of Buckley, in Pierce County.

RECORDS AVAILABLE.—January 18, 1913, to September 30, 1915.

GAGE.—Fuller water-stage recorder on right side of flume, a quarter of a mile below intake.

DISCHARGE MEASUREMENTS.—Made from footbridge across flume 8 feet below gage.

CHANNEL AND CONTROL.—Formed by a long section of flume bottom below gage. Stage-discharge relation is affected by variable quantity of silt deposited near end of flume about three-fourths of a mile below gage. Zero of gage is at same elevation as bottom of flume.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 5.57 feet from 3 p. m. to 5 p. m. November 11 (discharge, 1,480 second-feet); minimum stage from recorder, 0.13 foot from 7 a. m. to 1.30 p. m. August 27 (discharge, 6 second-feet).

1913–1915: Maximum stage recorded, 5.55 feet, June 8, 1913 (discharge, 1,660 second-feet [1]); minimum stage recorded on August 27, 1915.

WINTER FLOW.—Stage-discharge relation slightly affected by ice December 11–23; flow estimated from study of fluctuations on record sheets and records of maximum and minimum temperature at Weather Bureau station at intake.

DIVERSION.—None.

REGULATION.—Gates at intake of flume are operated frequently to control flow.

ACCURACY.—Results good.

COOPERATION.—Records of gage height and some discharge measurements furnished by Puget Sound Traction, Light & Power Co.

[1] Estimated from rating curve poorly defined for high stages; probably about 12 per cent high.

Discharge measurements of White River flume at Buckley, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	Tuttle and Eerinsse....	2.83	518	Aug. 7	Tuttle and Eernisse....	3.22	595
July 6	Osgood and Eernisse...	3.34	610	7	Eernisse and Tuttle....	3.20	601
22	Eernisse and Lockridge.	3.28	610	Sept. 17	Osgood and Eernisse...	2.82	515

Daily discharge, in second-feet, of White River flume at Buckley, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	480	946	847	760	591	674	564	646	563	616	602	688
2	608	1,140	818	731	578	646	591	646	576	616	616	591
3	561	1,250	789	716	578	646	510	660	563	643	616	618
4	502	701	731	702	564	760	510	646	563	643	602	660
5	488	19	702	600	578	731	497	646	563	643	602	688
6	473	21	688	646	674	716	484	646	576	643	602	591
7	473	221	660	632	632	716	484	660	576	630	602	524
8	261	584	646	760	632	702	484	674	563	630	602	604
9	10	528	618	731	660	674	484	716	563	616	656	804
10	10	175	604	760	688	688	484	632	563	602	724	578
11	10	1,350	556	760	660	660	484	524	563	576	724	537
12	516	1,350	529	760	632	646	484	524	563	394	779	564
13	880	1,280	502	731	632	632	497	510	563	567	835	497
14	750	920	484	702	591	760	497	510	563	724	863	471
15	686	18	524	674	578	847	497	619	550	602	863	458
16	686	18	484	618	578	876	497	486	563	602	807	484
17	847	44	446	604	604	905	524	537	549	710	656	524
18	782	18	458	604	632	905	578	589	589	724	643	550
19	979	18	497	618	591	905	578	602	576	602	697	550
20	913	63	433	632	578	847	591	589	576	602	863	537
21	782	22	433	618	591	876	591	589	576	616	835	550
22	686	18	492	578	591	905	591	589	563	616	656	524
23	623	19	484	591	564	905	591	589	563	616	656	510
24	592	20	510	578	578	767	632	589	576	602	656	484
25	592	21	524	537	688	578	660	589	563	602	616	484
26	561	21	604	524	632	578	632	602	563	602	630	484
27	546	326	618	524	632	564	646	616	589	589	248	458
28	531	934	660	550	674	578	646	656	576	589	90	420
29	531	905	604	537	.....	578	660	565	587	589	453	420
30	608	847	604	524	.....	537	660	563	616	630	891	433
31	686	.....	702	537	.....	537	.....	563	.....	602	789	.....

NOTE.—Discharge ascertained from rating curves fairly well defined above 125 second-feet: Oct. 1; Oct. 2 to Nov. 12; Nov. 13 to May 15; May 16 to Aug. 30; Aug. 31 to Sept. 30. Days during which the range in stage exceeded that permissible for using the mean gage height for the day to obtain the true discharge within 2 per cent, were subdivided and the discharge was weighted according to the time interval of subdivided parts. Discharge relation affected by ice Dec. 11 to 23. Flow estimated from a study of fluctuations on record sheets and maximum and minimum temperatures at Weather Bureau station at intake.

Monthly discharge of White River flume at Buckley, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	979	10	569	35,000	B.
November	1,350	18	460	27,400	B.
December	847	433	589	36,200	B.
January	760	524	642	39,500	B.
February	688	564	614	34,100	B.
March	905	537	721	44,300	B.
April	660	484	554	33,000	B.
May	716	486	599	36,800	B.
June	616	549	570	33,900	B.
July	724	394	614	37,800	B.
August	891	90	660	40,600	B.
September	804	420	543	32,300	B.
The year	1,350	10	595	431,000	

CEDAR RIVER AT CEDAR FALLS, WASH.

LOCATION.—In sec. 4, T. 22 N., R. 8 E., below Cedar Falls, in King County, 3½ miles below Cedar Lake, and 3½ miles above Taylor Creek.

DRAINAGE AREA.—83 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 9, 1914, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed April 8, 1914, 0.7 mile below Seattle municipal power plant at Cedar Falls; referred to inclined and vertical staff on right bank. Recorder inspected by G. H. Moore.

DISCHARGE MEASUREMENTS.—Made from cable 90 feet below gage or by wading.

CHANNEL AND CONTROL.—Small bowlders and gravel; likely to shift at extremely high water. One channel at all stages. Stage of zero flow, at about gage height 3.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 6.65 feet at 8.30 p. m. April 15, 1914 (discharge, 1,160 second-feet); minimum stage, from water-stage recorder, 3.85 feet at 6.30 p. m. August 29, 1915 (discharge, approximately 3.5 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of Seattle municipal power plant.

ACCURACY.—Rating curve well defined above 35 second-feet. Daily discharge determined with discharge integrator. Results excellent except those for periods during which water-stage recorder was not operating satisfactorily.

COOPERATION.—Gage-height record and most of discharge measurements furnished by city engineer of Seattle.

Discharge measurements of Cedar River at Cedar Falls, Wash., during the years ending Sept. 30, 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
Mar. 27	Moore and Ballard	5.65	481	Dec. 3	Moore and Shinkle	5.17	255
Apr. 9	Moore and Shinkle	5.77	535	Apr. 9	Parker and Moore	5.87	612
May 21	do	5.74	524	14	G. H. Moore	4.60	94.7
June 19	do	5.32	329	May 7	do	4.43	59.6
July 14	do	5.07	198	21	do	4.26	34.7
25	do	4.83	135	June 29	C. G. Paulsen	4.53	76.7
Aug. 11	do	4.97	184	29	do	4.52	74.6
28	Shinkle and Beals	4.92	163				

Daily discharge, in second-feet, of Cedar River at Cedar Falls, Wash., for the years ending Sept. 30, 1914–15.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	.....	438	370	232	167	172	17	938	666	376	195	169	116
2	.....	300	410	228	142	178	18	810	625	338	193	178	137
3	.....	336	426	225	161	173	19	744	574	316	172	176	130
4	.....	524	426	200	178	178	20	811	546	274	196	177	101
5	.....	553	394	188	167	176	21	761	552	281	194	176	130
6	.....	549	331	206	187	145	22	700	575	276	169	174	158
7	.....	553	336	193	175	138	23	614	586	300	166	142	216
8	.....	504	458	182	165	143	24	565	550	290	185	168	187
9	554	378	484	203	132	153	25	510	558	288	187	186	190
10	598	432	466	199	155	146	26	474	536	283	150	182	164
11	625	509	437	198	170	160	27	536	498	264	159	166	94
12	608	544	454	150	173	148	28	530	450	243	164	164	135
13	690	610	454	196	172	105	29	507	408	242	162	172	116
14	808	716	410	206	172	130	30	500	348	248	156	131	129
15	990	786	411	200	174	161	31	.....	326	.....	156	166	.....
16	1,060	745	394	194	148	114							

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	137	209	244	208	204	171	226	92	98	74	93	138
2	154	229	245	218	191	166	252	99	32	77	96	134
3	110	322	248	182	198	194	347	111	32	72	93	138
4	86	332	237	222	191	226	552	91	36	73	92	130
5	96	383	239	226	209	233	797	82	33	73	93	85
6	120	368	215	211	215	232	642	66	56	76	91	90
7	121	350	237	212	189	216	642	70	141	72	93	131
8	112	350	247	214	202	213	437	70	120	76	10	185
9	100	358	239	217	197	197	366	64	160	76	42	201
10	141	384	236	205	203	176	120	60	58	78	58	188
11	82	432	238	236	188	174	116	60	52	15	53	192
12	104	584	232	228	184	172	87	54	37	50	63	172
13	48	663	208	233	192	170	92	56	33	72	62	197
14	48	678	226	228	158	152	96	51	65	91	67	209
15	77	662	233	222	176	170	110	50	26	90	60	180
16	84	598	230	209	180	182	128	46	35	89	66	186
17	86	348	226	192	196	180	116	45	30	63	64	189
18	86	270	224	199	177	175	101	46	24	23	64	185
19	94	280	220	221	163	172	113	44	32	98	70	182
20	94	252	192	220	150	176	98	41	40	102	81	195
21	94	192	218	214	129	158	136	41	24	108	88	213
22	168	188	224	215	141	196	108	45	80	100	81	208
23	171	215	216	204	158	205	99	48	82	105	82	215
24	182	218	214	170	178	208	96	36	56	99	122	205
25	186	218	194	178	209	204	97	42	76	85	163	207
26	149	194	202	173	89	202	128	36	82	89	119	177
27	190	222	195	180	186	206	249	44	80	97	124	204
28	232	218	216	182	147	167	174	150	87	101	120	216
29	225	198	214	184	.....	212	96	180	91	98	75	215
30	198	226	214	179	.....	212	92	148	75	102	131	215
31	203	.....	224	154	.....	214	.....	154	.....	96	134	.....

NOTE.—Water-stage recorder not operating satisfactorily May 30 to June 19, 21–22, Sept. 21–26, 1914, Jan. 5–11 to Mar. 3, 1915. Gage-height graph for these intervals determined by range in stage as shown by water-stage recorder and by comparison with recorder sheet for Cedar River near Landsberg, Wash.

Monthly discharge of Cedar River at Cedar Falls, Wash., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
April 9–30	1,060	474	679	29,600	A.
May	786	300	525	32,300	A.
June	484	242	356	21,200	B.
July	232	150	187	11,500	A.
August	187	131	167	10,300	A.
September	216	94	147	8,750	A.
The period				114,000	
1914–15.					
October	232	48	128	7,870	A.
November	678	188	338	20,100	A.
December	248	192	224	13,800	A.
January	236	154	204	12,500	B.
February	215	89	179	9,940	C.
March	233	152	191	11,700	A.
April	797	87	224	13,300	A.
May	180	36	71.7	4,410	A.
June	160	24	62.4	3,710	A.
July	108	15	81.3	5,000	A.
August	163	10	85.5	5,260	A.
September	216	85	179	10,700	A.
The year	797	10	164	118,000	

CEDAR RIVER NEAR LANDSBERG, WASH.

LOCATION.—In sec. 17, T. 22 N., R. 7 E., 1¾ miles above Seattle water-supply intake at Landsberg, in King County, and about 5 miles below Taylor Creek.

DRAINAGE AREA.—135 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 30, 1914, to September 30, 1915. For station at Clifford Bridge, near Ravensdale, 2 miles below present gage, July 25, 1895, to September 30, 1898; at Seattle water-supply intake, near Ravensdale, 1¾ miles below present gage, March 24, 1901, to April 30, 1912. Early records not precisely comparable with those at present site, owing to small difference in drainage area.

GAGE.—Stevens water-stage recorder, installed April 29, 1914; referred to vertical staff on left bank.

DISCHARGE MEASUREMENTS.—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Large bowlders and gravel; apparently permanent control formed by section of stream bed and by a broad riffle about 1,200 feet below gage. One channel at all stages. Stage of zero flow, at about gage height 2.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 7.47 feet at 11.30 p. m. April 4, 1915 (discharge, 1,330 second-feet); minimum stage, from water-stage recorder, 4.35 feet at 1 a. m. October 15, 1914 (discharge, 162 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of Seattle municipal power plant.

ACCURACY.—Rating curve well defined. Daily discharge determined with discharge integrator. Results excellent, except for periods in which water-stage recorder was not operating satisfactorily.

COOPERATION.—Gage-height record and most of discharge measurements furnished by city engineer of Seattle.

Discharge measurements of Cedar River near Landsberg, Wash., during the years ending Sept. 30, 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1914–15.			
Mar. 24	Moore and Shinkle	6.65	952	Jan. 5	Moore and Shinkle	5.65	464
Apr. 15	Shinkle and Ballard	7.60	1,380	Apr. 10	C. G. Paulsen	5.33	411
May 21	Moore and Shinkle	6.25	774	May 20	Moore and Beals	4.79	257
June 19	do	5.65	487	28	Paulsen and Beals	5.66	489
July 14	do	5.20	370	28	C. G. Paulsen	5.64	491
24	do	4.95	318	June 30	do	5.25	383
Aug. 28	Shinkle and Beals	5.02	294				

Daily discharge, in second-feet, of Cedar River, near Landsberg, Wash., for the years ending Sept. 30, 1914–15.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	.....	737	584	390	295	314	16	.....	992	608	339	281	279
2	.....	576	621	384	278	318	17	.....	899	588	338	292	272
3	.....	596	632	384	286	314	18	.....	843	536	330	308	304
4	.....	782	636	374	306	314	19	.....	785	496	323	308	294
5	.....	831	616	364	288	314	20	.....	746	453	331	308	280
6	.....	822	562	374	312	289	21	.....	742	482	340	312	284
7	.....	823	544	373	302	270	22	.....	764	462	308	330	302
8	.....	754	658	359	294	290	23	.....	780	470	310	293	348
9	.....	632	704	370	266	294	24	.....	760	476	327	306	320
10	.....	686	683	372	276	285	25	.....	785	469	330	328	316
11	.....	766	652	377	298	303	26	.....	774	451	295	323	302
12	.....	796	663	336	302	296	27	.....	733	434	290	310	246
13	.....	842	674	350	298	260	28	.....	680	415	301	306	270
14	.....	952	626	350	299	260	29	.....	622	400	300	314	244
15	.....	1,030	619	350	302	315	30	781	571	405	294	282	264
							31	.....	556	.....	291	304	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15												
1	272	400	486	575	532	485	558	284	432	367	329	315
2	312	514	488	562	520	482	827	293	339	362	324	311
3	253	686	485	495	526	478	958	302	331	354	321	310
4	234	688	464	524	518	528	1,070	281	326	352	316	310
5	216	814	454	506	566	528	1,240	278	329	347	306	275
6	252	804	432	494	575	506	1,020	271	330	356	309	258
7	261	707	448	500	526	493	1,040	267	454	350	305	270
8	240	665	454	576	532	477	765	266	410	354	241	369
9	226	658	446	614	527	468	716	266	456	350	233	401
10	314	652	442	565	531	430	396	270	364	346	258	376
11	262	838	438	756	517	425	380	270	348	296	249	360
12	266	993	426	780	500	416	354	262	339	314	260	355
13	226	1,170	398	720	516	408	360	256	325	354	258	372
14	186	1,110	418	696	470	421	352	262	326	434	252	382
15	216	1,040	428	661	492	480	344	258	346	400	251	350
16	216	982	413	601	500	462	366	260	334	408	250	354
17	262	698	413	550	510	446	344	261	335	481	252	358
18	271	519	414	547	505	440	328	268	320	380	244	348
19	355	544	408	566	488	425	330	269	330	408	251	350
20	335	602	376	559	479	418	316	268	352	402	252	354
21	288	488	404	540	456	403	342	261	316	392	270	374
22	344	466	412	548	464	434	314	265	360	377	270	368
23	323	484	412	536	488	447	298	284	374	366	261	368
24	356	465	401	498	496	448	297	264	348	360	294	360
25	348	464	392	508	542	438	294	274	372	349	350	358
26	316	472	417	498	360	430	292	300	378	354	300	332
27	334	474	418	506	502	426	433	348	379	352	297	349
28	379	464	498	506	466	390	393	578	365	352	306	366
29	374	455	468	507	.....	430	288	556	364	348	278	358
30	388	470	490	508	.....	446	291	486	370	346	292	362
31	372	.....	582	464	.....	442	.....	466	.....	339	309	.....

NOTE.—Water-stage recorder not operating satisfactorily May 4, 8, 9, 12; June 8, 18, 19; July 12, 13, 14; Dec. 30, 31, 1914; Jan. 4, 5; Apr. 11, 13, 25; May 2, 16; Sept. 8, 12, 1915. Gage-height graph estimated except for Apr. 25, May 2, 16, 1915, when discharge was interpolated.

Monthly discharge of Cedar River near Landsberg, Wash., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
May	1,030	556	763	46,900	B.
June	704	400	554	33,000	B.
July	390	290	340	20,900	A.
August	330	266	300	18,400	A.
September	348	244	292	17,400	A.
The period				137,000	
1914–15.					
October	388	186	290	17,800	B.
November	1,170	400	660	39,300	A.
December	582	376	440	27,100	A.
January	780	464	563	34,600	A.
February	575	360	504	28,000	A.
March	528	390	450	27,700	A.
April	1,240	288	510	30,300	A.
May	578	256	306	18,800	A.
June	456	316	358	21,300	A.
July	481	296	366	22,500	A.
August	350	233	280	17,200	A.
September	401	258	346	20,600	A.
The year	1,240	186	422	305,000	

SOUTH FORK OF SKYKOMISH RIVER NEAR INDEX, WASH.

LOCATION.—In the NE ¼ sec. 29, T. 27 N., R. 10 E., 300 feet above Sunset Falls, about 2 miles above town of Index and mouth of North Fork of Skykomish River, in Snohomish County.

DRAINAGE AREA.—351 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—October 7, 1902, to September 30, 1905; April 26, 1911, to October 21, 1912; June 14, 1913, to September 30, 1915.

GAGE.—April 19, 1914, to September 30, 1915, inclined and vertical staff at same location as gage used 1902 to 1905, but at datum 0.39 foot lower; read once a day to hundredths by M. J. Gruber. April 26, 1911, to February 25, 1914, vertical staff at same location but at datum 0.61 foot higher.

DISCHARGE MEASUREMENTS.—Made from cable 1 mile below gage.

CHANNEL AND CONTROL.—Control is Sunset Falls, 300 feet below gage; solid rock.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.25 feet at 10.45 a. m. November 3 (discharge, 11,500 second-feet); minimum stage recorded, 0.54 foot, September 30 (discharge, 262 second-feet).

1902–1905; 1911–1915: Maximum stage recorded, 17.0 feet at 10.05 a. m. January 6, 1914 (discharge, 16,700 second-feet); minimum stage recorded on September 30, 1915.

WINTERFLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS AND STORAGE.—None.

ACCURACY.—Results excellent. Stage-discharge relation unaffected by logs or ice; diurnal fluctuation not sufficient to materially affect accuracy of determinations based on one gage reading a day.

Discharge measurements of South Fork of Skykomish River near Index, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	I. L. Collier	4.37	1,890	May 12	C. G. Paulsen	4.22	1,850
Feb. 11	J. T. Hartson	2.51	894	Aug. 23	do	1.08	397
11	do	2.49	863				

Daily discharge, in second-feet, of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	764	4,680	1,950	1,180	692	728	2,540	1,340	1,730	728	492	374
2	1,400	6,860	1,800	1,180	728	692	9,760	1,280	1,590	728	524	346
3	1,230	11,400	1,660	1,000	728	692	10,700	1,400	1,460	764	524	346
4	1,040	8,690	1,460	878	728	878	6,710	1,400	1,400	728	462	346
5	918	6,860	1,400	840	764	918	4,810	1,460	1,400	692	462	346
6	840	5,360	1,280	802	878	840	3,830	1,590	1,460	764	462	320
7	764	4,060	1,180	802	840	840	3,940	1,800	1,460	728	432	285
8	656	3,500	1,040	764	802	764	4,300	2,030	1,180	692	432	333
9	622	3,400	1,000	764	878	802	2,630	1,950	1,090	692	432	492
10	1,040	2,730	918	728	918	802	2,370	2,280	1,000	622	432	432
11	2,110	6,250	878	878	878	802	2,460	1,800	1,000	588	432	360
12	2,630	4,060	840	918	802	802	3,010	1,800	1,000	692	432	374
13	1,800	4,550	764	878	840	764	3,400	1,520	918	764	402	346
14	1,520	3,720	764	802	764	2,110	2,460	1,590	1,000	802	402	360
15	1,280	3,100	764	802	692	4,300	2,280	1,460	878	802	402	346
16	1,090	2,460	764	728	692	3,010	2,630	1,230	918	840	432	346
17	2,820	2,110	728	692	692	2,110	3,100	1,340	918	878	432	346
18	4,060	1,870	692	656	918	2,630	3,010	1,520	918	764	432	333
19	5,360	2,820	692	692	840	2,110	3,010	1,660	878	692	402	333
20	4,550	4,550	622	692	764	1,800	3,100	1,660	1,000	622	402	346
21	3,500	4,550	622	692	764	2,030	2,370	1,460	878	622	402	346
22	2,460	3,830	622	656	764	2,630	1,800	1,340	840	588	402	333
23	1,950	3,400	588	656	728	3,300	1,730	1,340	802	556	402	296
24	1,660	3,200	556	622	728	3,300	1,730	1,400	802	556	402	296
25	1,280	3,010	556	622	840	2,370	1,660	1,520	764	524	374	285
26	1,280	3,830	556	588	764	1,950	1,800	1,400	918	492	374	285
27	1,180	3,200	556	556	728	1,660	1,800	2,460	918	492	374	285
28	1,090	3,010	622	556	692	1,660	1,660	3,940	802	492	374	264
29	1,000	2,630	656	524	.....	1,950	1,800	3,200	764	492	360	264
30	1,400	2,190	728	524	.....	2,280	1,520	2,110	764	492	402	264
31	2,370	.....	1,230	556	.....	1,880	.....	1,800	.....	492	374	.....

NOTE.—Discharge ascertained from a rating curve well defined between 300 and 13,000 second-feet. Oct. 21, gage not read; discharge interpolated.

Monthly discharge of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 351 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	5,360	622	1,800	5.13	5.91	111,000	A.
November	11,400	1,870	4,200	12.0	13.39	250,000	A.
December	1,950	556	919	2.62	3.02	56,500	A.
January	1,180	524	749	2.13	2.46	46,100	A.
February	918	692	780	2.22	2.31	43,300	A.
March	4,300	692	1,720	4.90	5.65	106,000	A.
April	10,700	1,520	3,260	9.29	10.36	194,000	A.
May	3,940	1,230	1,740	4.96	5.72	107,000	A.
June	1,730	764	1,050	2.99	3.34	62,500	A.
July	878	492	657	1.87	2.16	40,400	A.
August	524	360	421	1.20	1.38	25,900	A.
September	492	264	334	0.952	1.06	19,900	A.
The year	11,400	264	1,470	4.19	56.76	1,060,000	

MILLER CREEK NEAR BERLIN, WASH.

LOCATION.—In the NE. ¼ sec. 33, T. 26 N., R. 11 E., 1¼ miles south of Berlin, and mouth of the creek, in King County.

DRAINAGE AREA.—44.2 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 24, 1911, to September 30, 1915 (fragmentary).

GAGE.—Since August 27, 1914, inclined staff on left bank; read once daily to hundredths by E. J. Moore. May 24, 1911, to August 26, 1914, vertical staff 10 feet upstream from present gage at same datum.

DISCHARGE MEASUREMENTS.—Made from a cable 900 feet above the gage or by wading.

CHANNEL AND CONTROL.—Large boulders and gravel; practically permanent. A log jam 500 feet below gage, at a water-surface elevation about 5 feet lower than at gage, may affect stage-discharge relation at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.3 feet at 1.30 p. m. November 3 (discharge, 1,590 second-feet); minimum stage recorded, 0.07 foot August 31 (discharge, 24 second-feet).

1911–1915: Maximum stage recorded 5.5 feet November 18–19, 1911 (discharge 4,740 second-feet); minimum stage recorded, August 31, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

REGULATION.—None.

DIVERSIONS.—None.

ACCURACY.—Results excellent when gage-height record is unbroken. Considerable diurnal fluctuation during summer low-water period.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Miller Creek near Berlin, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 10	J. T. Hartson	0.89	132
May 13	C. G. Paulsen	1.36	249
Aug. 24	....do	.11	25.9

Daily discharge, in second-feet, of Miller Creek near Berlin, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	93	.....	120	186	83	93	875	153	278	95	43	25
2	295	.....	116	180	89	92	1,280	295	245	92	43	26
3	215	1,590	112	106	92	90	.....	295	230	87	42	25
4	186	.....	108	106	87	144	.....	245	230	79	42	25
5	156	.....	105	92	92	146	565	260	230	75	40	25
6	127	.....	101	86	87	128	460	278	222	74	40	25
7	98	.....	97	75	90	126	565	295	215	74	40	25
8	.....	.....	93	76	87	124	230	312	215	73	40	58
9	.....	.....	92	79	104	126	392	330	144	72	40	80
10	.....	312	91	76	126	124	295	370	137	72	39	53
11	.....	625	90	80	106	126	378	295	133	.....	37	42
12	538	625	89	92	96	116	460	295	124	.....	35	44
13	370	625	88	93	93	118	510	245	122	200	33	47
14	260	510	87	84	84	392	330	245	124	144	32	47
15	205	.....	86	82	76	1,000	295	200	124	124	31	43
16	150	.....	86	74	76	485	370	172	122	155	31	40
17	665	.....	84	69	87	330	485	230	120	132	31	39
18	1,180	.....	82	65	141	460	485	295	126	128	30	38
19	.....	186	80	76	110	330	460	295	128	93	29	35
20	.....	1,230	77	87	93	295	392	295	186	89	28	30
21	350	312	75	84	96	370	295	230	144	71	28	28
22	312	375	74	76	93	510	230	215	122	66	27	27
23	266	438	70	84	90	625	222	200	124	65	27	26
24	219	392	66	69	100	565	215	295	126	64	27	26
25	172	510	64	59	120	392	230	295	98	64	26	26
26	126	760	65	57	104	295	260	295	155	63	25	25
27	.....	370	68	59	93	230	260	595	167	60	25	25
28	.....	323	153	57	92	260	245	798	144	54	25	25
29	.....	277	169	54	.....	392	245	760	104	49	25	25
30	.....	230	184	52	.....	392	200	295	98	47	25	25
31	.....	.....	200	62	.....	295	.....	295	.....	47	24	.....

NOTE.—Discharge ascertained from rating curve well defined below 2,000 second-feet. Flat estimates computed from hydrographic comparison with record of South Fork of Skykomish River near Index, Oct. 8–11, 19–20, and 27–31, Nov. 1–2, 4–9, 15–18, Apr. 3–4, July 11–12, used in computing monthly discharge; discharge interpolated Oct. 4–6, 15, 17, 23–25, Nov. 12, 22, and 28–29, Dec. 3–7, 10–13, 18–20, and 29–30, Apr. 11 and 23, June 6, July 7–9, 18, and 25.

Monthly discharge of Miller Creek, near Berlin, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 44.2 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	.....	.....	333	7.53	8.68	20,500	B.
November	1,590	.....	581	13.1	14.62	34,600	B.
December	200	64	99.1	2.24	2.58	6,090	B.
January	186	52	83.1	1.88	2.17	5,110	A.
February	141	76	96.0	2.17	2.26	5,330	A.
March	1,000	90	296	6.70	7.72	18,200	A.
April	.....	200	449	10.2	11.38	26,700	A.
May	798	153	312	7.06	8.14	19,200	A.
June	278	98	158	3.57	3.98	9,400	A.
July	200	47	89.0	2.01	2.32	5,470	B.
August	43	24	32.6	.738	.85	2,000	B.
September	80	25	34.3	.776	.87	2,040	B.
The year	1,590	24	214	4.84	65.57	155,000	

NORTH FORK OF SKYKOMISH RIVER AT INDEX, WASH.

LOCATION.—In the SE. ¼ sec. 17, T. 27 N., R. 10 E., at Index, in Snohomish County, 1¾ miles above mouth of river.

DRAINAGE AREA.—143 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—August 24, 1910, to September 30, 1915.

GAGE.—Vertical staff since November 27, 1911, on wing dam on right bank directly back of observer's house about one-third mile above highway bridge; read once each day to quarter-tenths by Lee Pickett. Original gage a vertical staff on left bank about 100 feet above the tramway bridge; used August 24 to September 2, 1910, and destroyed in the course of improvements to channel. Vertical staff on right bank about one-fourth mile above highway bridge at lower end of wing dam and about 300 feet below present gage, used October 26, 1910, to November 26, 1911.

DISCHARGE MEASUREMENTS.—Made from a cable 600 feet below the gage or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and large boulders; right bank high, protected by pile and timber wing dam, not subject to overflow; left bank slopes back gradually; zero flow would occur at gage height −1.2 feet ±0.3 foot, as determined August 22, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at 9 p. m. November 2 (discharge, 9,100 second-feet); minimum stage recorded, 0.45 foot at 1 p. m. September 29 (discharge, 97 second-feet).

1911–1915: Maximum stage recorded, 9.3 feet at 11 a. m. January 6, 1914 (discharge, 10,500 second-feet); minimum stage recorded September 29, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Rating curve well defined between 100 and 8,000 second-feet; control practically permanent; slight diurnal fluctuation during summer months; gage-height record reliable. Results excellent.

Discharge measurements of North Fork of Skykomish River at Index, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	I. L. Collier	2.56	903	May 12	C. G. Paulsen	2.40	862
Feb. 11	J. T. Hartson	1.48	403	Aug. 22	.....do	.77	164

Daily discharge, in second-feet, of North Fork of Skykomish River at Index, Wash., for the years ending Sept. 30, 1912–1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	270	144	1,130	365	1,200	404	775	1,000	1,420	1,270	531	1,200
2	270	144	940	365	1,000	365	830	885	1,580	1,130	445	885
3	270	224	885	365	885	365	885	885	1,740	1,740	404	725
4	224	270	830	346	830	328	885	885	3,510	1,580	346	1,060
5	224	550	830	328	775	328	775	940	3,120	1,580	293	466
6	224	550	775	310	725	310	725	940	3,250	1,270	276	404
7	224	3,260	885	293	775	310	775	2,010	3,780	1,270	260	445
8	182	1,840	1,000	310	775	293	775	2,310	3,250	1,340	260	487
9	182	1,300	1,740	328	1,130	293	885	2,110	2,420	1,270	531	424
10	182	830	1,420	404	1,740	276	1,270	1,740	2,310	1,270	466	445
11	182	755	1,580	384	1,200	276	1,130	2,110	2,310	1,500	365	365
12	182	615	1,130	404	675	276	940	2,310	2,530	1,580	365	384
13	182	1,060	1,000	1,130	1,130	276	885	3,250	2,010	1,270	328	365
14	830	2,040	885	3,000	1,420	260	830	3,510	1,920	1,000	346	346
15	685	2,680	1,000	2,110	1,580	293	775	3,780	1,920	1,000	328	328
16	550	1,140	1,130	1,500	2,110	293	775	2,310	1,580	940	487	293
17	375	5,420	775	1,200	1,920	293	725	2,210	1,740	940	830	276
18	320	8,880	675	1,000	1,660	293	725	2,110	2,640	885	577	260
19	270	9,440	725	775	1,420	276	675	3,000	3,780	885	487	260
20	270	9,720	625	885	1,060	276	675	3,780	2,760	775	404	212
21	224	5,290	675	885	885	260	625	3,120	2,420	725	384	228
22	270	2,350	675	885	780	293	577	1,920	1,830	675	365	197
23	270	1,220	1,420	940	675	328	675	2,110	2,010	625	365	197
24	270	685	1,060	1,740	675	328	675	2,110	2,310	625	365	197
25	270	3,260	775	2,310	675	365	675	1,740	2,420	625	310	197
26	270	2,240	625	1,500	675	509	675	1,740	2,010	601	260	197
27	224	1,340	577	885	531	725	675	1,920	1,740	554	260	197
28	182	1,340	531	1,580	466	775	830	1,920	1,500	487	228	183
29	182	1,130	487	2,010	445	675	1,270	1,920	1,200	466	212	169
30	144	1,130	445	1,830	.....	675	1,200	1,660	1,060	445	197	156
31	144	.....	404	1,420	.....	625	.....	1,580	.....	487	885	.....

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.									
1	260	404	.....	546	963	3,830	2,440	1,090	293
2	554	404	.....	594	848	5,060	2,220	1,240	276
3	487	404	.....	546	848	5,380	1,920	1,090	692
4	487	.....	.....	570	742	3,970	1,820	963	5,060
5	384	.....	.....	594	692	3,280	2,780	904	2,220
6	276	.....	.....	642	1,240	3,280	2,660	848	1,310
7	328	.....	.....	642	1,920	3,690	3,020	848	1,090
8	675	.....	.....	642	2,660	3,550	2,440	794	794
9	487	.....	.....	642	3,020	3,020	2,660	742	848
10	404	.....	.....	692	2,550	2,780	3,280	692	963
11	404	.....	.....	1,240	2,330	2,780	2,120	692	742
12	328	.....	.....	1,920	2,660	2,780	1,920	642	742
13	260	.....	.....	1,730	2,120	3,020	1,920	570	642
14	244	.....	.....	1,920	2,020	2,330	1,920	546	618
15	310	.....	.....	1,550	1,730	2,330	1,550	642	500
16	1,130	.....	.....	1,390	1,640	2,550	1,550	642	477
17	725	.....	.....	1,240	1,640	2,440	1,550	642	454
18	675	.....	.....	1,640	1,640	2,550	1,730	594	454
19	675	.....	.....	2,020	1,730	2,900	2,780	594	410
20	675	.....	642	1,920	1,730	2,780	2,330	546	389
21	675	.....	594	2,330	2,330	2,780	2,780	523	410
22	625	.....	546	2,120	2,780	2,780	2,780	500	389
23	577	.....	454	1,920	3,020	3,550	2,120	500	410
24	830	.....	432	1,730	3,550	2,330	2,120	477	454
25	885	.....	410	1,090	2,780	2,330	1,920	410	432
26	830	.....	368	1,550	3,020	2,220	1,730	410	432
27	725	.....	368	1,920	2,780	2,330	1,550	389	410
28	487	.....	368	1,240	2,330	2,440	1,240	368	368
29	509	.....	618	963	2,330	2,120	1,390	368	368
30	466	.....	594	904	2,900	2,440	1,240	368	329
31	404	.....	570	.....	3,280	.....	1,020	368	.....

Daily discharge, in second-feet, of North Fork of Skykomish River at Index, Wash., for the years ending Sept. 30, 1911–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	329	546	1,020	329	546	1,550	546	904	2,330	1,730	368	172
2	311	477	963	293	546	1,390	570	2,330	2,550	1,550	368	172
3	311	454	794	293	500	1,090	642	2,780	2,020	1,550	368	172
4	329	477	794	3,830	454	963	1,240	2,120	1,730	1,470	329	160
5	311	742	742	5,060	410	794	1,920	1,640	1,390	1,090	329	148
6	276	963	692	9,820	368	848	1,730	1,640	1,090	963	329	148
7	500	963	642	4,900	368	904	1,550	1,730	963	963	329	144
8	546	1,090	642	3,020	348	904	1,550	1,730	1,730	963	329	198
9	742	1,090	594	1,920	311	848	1,640	1,730	1,390	904	311	293
10	742	1,310	546	1,550	329	794	1,730	1,730	1,240	963	311	212
11	8,200	904	594	1,310	311	794	1,640	1,820	1,390	963	293	227
12	5,380	642	594	1,020	329	963	1,470	1,920	1,550	963	293	227
13	3,020	618	594	904	329	1,090	1,820	2,550	1,550	963	293	227
14	2,120	618	642	848	368	2,550	2,660	3,020	2,220	848	293	904
15	1,730	594	594	848	348	1,820	3,690	3,020	2,660	794	293	1,730
16	1,240	5,720	546	848	348	2,120	2,780	2,660	2,440	742	276	963
17	1,090	2,660	500	794	368	1,920	1,640	2,220	2,120	742	259	794
18	963	1,550	523	692	348	1,920	1,550	1,920	1,730	742	243	1,390
19	963	1,390	432	642	410	1,820	3,020	1,920	1,550	742	227	2,020
20	1,020	1,160	410	594	642	1,730	2,660	2,440	1,470	642	243	1,730
21	1,090	1,090	410	546	848	2,020	1,820	2,330	1,470	500	243	1,160
22	963	963	389	594	848	2,120	1,550	2,900	1,550	454	227	1,090
23	963	1,730	368	523	848	2,330	1,470	2,550	1,390	454	227	848
24	904	3,830	410	477	848	2,440	1,240	2,120	1,240	454	212	794
25	904	2,120	368	477	2,780	1,240	1,160	2,020	1,240	454	212	742
26	742	1,920	348	546	1,550	963	1,240	1,920	1,240	432	212	742
27	692	1,640	368	500	1,390	848	1,310	1,820	1,390	368	198	742
28	546	1,470	329	477	1,550	692	1,090	1,550	1,390	348	198	642
29	642	1,240	311	454	.....	642	1,020	1,390	1,390	368	198	1,090
30	500	1,240	311	546	.....	618	1,090	1,390	1,820	368	212	477
31	523	.....	311	546	.....	594	.....	1,730	.....	368	198	.....
1914–15.												
1	432	2,020	848	570	368	329	3,150	642	848	389	198	137
2	904	6,060	794	500	348	311	6,400	642	794	368	198	130
3	692	5,380	742	477	368	293	4,120	742	794	368	198	130
4	570	5,720	742	410	348	348	2,440	742	848	368	185	130
5	546	2,780	642	410	389	389	2,120	742	794	368	172	126
6	454	2,330	570	368	432	368	1,730	904	794	329	172	116
7	432	2,020	500	368	500	368	1,820	963	692	329	172	106
8	410	1,550	500	368	500	368	1,550	963	594	329	172	227
9	368	1,730	454	368	454	368	1,240	963	570	311	172	198
10	546	2,330	410	368	454	432	1,240	963	500	243	172	172
11	848	2,780	368	454	454	410	1,240	963	477	243	172	160
12	1,240	1,820	348	454	410	594	1,470	848	454	243	172	137
13	963	1,920	293	410	368	1,090	1,390	794	454	410	172	126
14	848	1,470	329	368	368	1,240	1,640	848	454	523	172	137
15	848	1,240	311	368	329	2,330	1,550	692	454	477	172	137
16	1,160	1,090	293	329	311	1,550	1,550	692	454	410	172	137
17	1,390	904	293	293	293	1,090	1,640	848	454	368	172	130
18	2,120	742	293	259	329	1,310	1,550	742	454	368	172	126
19	2,020	742	259	276	329	1,020	1,550	794	570	329	172	122
20	1,920	2,220	259	293	348	963	1,390	794	500	329	172	116
21	1,550	1,730	259	311	329	1,090	1,020	692	477	293	172	116
22	1,090	1,390	259	293	329	1,390	1,020	692	454	293	172	110
23	963	1,390	227	276	348	1,550	904	642	410	293	172	110
24	848	1,470	227	259	348	1,550	848	692	410	259	160	126
25	848	1,310	227	259	368	1,020	848	794	368	259	148	116
26	742	1,640	311	243	329	848	848	794	389	259	148	110
27	692	1,550	293	227	329	794	848	1,310	477	259	144	106
28	642	1,390	293	227	329	848	848	2,020	454	227	137	102
29	594	1,240	293	227	.....	963	848	1,310	410	227	137	97
30	848	963	293	227	.....	963	848	963	410	227	148	1,090
31	1,240	.....	.....	329	.....	904	.....	848	.....	227	137	.....

Monthly discharge of North Fork of Skykomish River at Index, Wash., for the years ending Sept. 30, 1912–1915.

[Drainage area, 143 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1911–12.							
October	830	144	276	1.93	2.22	17,000	A.
November	9,720	144	2,360	16.5	18.41	140,000	A.
December	1,740	404	891	6.23	7.18	54,800	B.
January	3,000	293	1,030	7.20	8.30	63,300	B.
February	2,110	445	1,030	7.20	7.76	59,200	B.
March	775	260	376	2.63	3.03	23,100	B.
April	1,270	577	820	5.73	6.39	48,800	B.
May	3,780	885	2,060	14.4	16.60	127,000	B.
June	3,780	1,060	2,270	15.9	17.74	135,000	B.
July	1,740	445	994	6.95	8.01	61,100	B.
August	885	197	392	2.74	3.16	24,100	B.
September	1,200	156	385	2.69	3.00	22,900	B.
The year	9,720	144	1,070	7.48	101.80	776,000	
1912–13.							
October	1,130	244	541	3.78	4.36	33,300	B.
Nov. 1–3	404	404	404	2.83	.32	2,400	B.
Mar. 20–31	642	368	497	3.48	1.55	11,800	A.
April	2,330	546	1,280	8.95	9.99	76,200	A.
May	3,550	692	2,120	14.8	17.06	130,000	A.
June	5,380	2,120	2,990	20.9	23.32	178,000	A.
July	3,280	1,020	2,080	14.5	16.72	128,000	A.
August	1,240	368	645	4.51	5.20	39,700	A.
September	5,060	276	766	5.36	5.98	45,600	A.
1913–14.							
October	8,200	276	1,240	8.67	10.00	76,200	A.
November	5,720	454	1,370	9.58	10.69	81,500	A.
December	1,020	311	541	3.78	4.36	33,300	A.
January	9,820	293	1,460	10.2	11.76	89,800	A.
February	2,780	311	666	4.66	4.85	37,000	A.
March	2,550	594	1,330	9.30	10.72	81,800	A.
April	3,690	546	1,630	11.4	12.72	97,000	A.
May	3,020	904	2,050	14.3	16.49	126,000	A.
June	2,660	963	1,640	11.5	12.83	97,600	A.
July	1,730	348	802	5.61	6.47	49,300	A.
August	368	198	272	1.90	2.19	16,700	A.
September	2,020	144	679	4.75	5.30	40,400	A.
The year	9,820	144	1,140	7.97	108.38	827,000	
1914–15.							
October	2,120	368	928	6.49	7.48	57,100	A.
November	6,060	742	2,030	14.2	15.84	121,000	A.
December	848	227	394	2.76	3.18	24,200	A.
January	570	227	342	2.39	2.76	21,000	A.
February	500	293	372	2.60	2.71	20,700	A.
March	2,330	293	874	6.11	7.04	53,700	A.
April	6,400	848	1,660	11.6	12.94	98,800	A.
May	2,020	642	872	6.10	7.03	53,600	A.
June	848	368	540	3.78	4.22	32,100	A.
July	523	227	320	2.24	2.58	19,700	A.
August	198	137	168	1.17	1.35	10,300	A.
September	1,090	97	163	1.14	1.27	9,700	A.
The year	6,400	97	720	5.03	68.40	522,000	

MIDDLE FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In the NE. ¼ SE. ¼ sec. 10, T. 23 N., R. 8 E., a mile southeast of North Bend, in King County, and 2¾ miles above junction with the North Fork.

DRAINAGE AREA.—184 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 10, 1907, to February 29, 1908; August 25, 1908, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed August 7, 1915, referred to inclined staff on left bank 1 mile southeast of North Bend. Prior to August 7, 1915, at highway bridge 2¼ miles below present site as follows: August 10, 1907, to February 29, 1908, two vertical staffs at same datum; location and datum in respect to subsequent gages unknown; August 25, 1909, to November 30, 1909, when gage washed out, vertical staff on right bank 300 feet above bridge; December 21, 1909, to November 21, 1910, when gage washed out, vertical staff on piling of wing wall on left bank about 100 feet below bridge at same datum as previous gage; December 5, 1910, to March 14, 1911, two temporary vertical staffs at datum 0.60 foot higher than previous gage. March 15, 1911, to September 1, 1912, vertical staff on left side about 200 feet above bridge at datum 1 foot lower than previous temporary gages and 0.40 foot lower than gages in use August 25, 1908, to November 21, 1910. All readings August 25, 1908, to March 14, 1911, corrected to datum of this gage; September 2, 1912, to August 6, 1915, Fuller water-stage recorder installed on left bridge support, referred to vertical staff, 0.50 foot higher in datum than previous gage. Readings to tenths every second day August 10, 1907, to February 29, 1908, and daily August 25, 1908, to September 1, 1912, by M. H. Norman. Water-stage recorders inspected once or twice a week by employees Puget Sound Traction Light & Power Co.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at original location of gage.

CHANNEL AND CONTROL.—Channel at new location composed of large boulders; slightly curved above and below station. Control not likely to shift. Left bank high; right bank low, heavily wooded. Channel at original location composed of silt and fine gravel; shifting at high stages. Banks high; one channel at all stages. Stage of zero flow, gage height −0.05 foot, as measured September 10, 1911; at −1.2 feet, August 20, 1914; and at −0.9 foot, July 27, 1915.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.2 feet November 2 (discharge, 8,100 second-feet); minimum stage from recorder, 1.50 feet at 1 p. m. September 30 (discharge, 146 second-feet).

1907–1915: Maximum stage recorded, 13.4 feet, estimated by observer when water was above gage, November 23 and 29, 1909 (discharge not determined); stage may have been higher November 18, 1911, when water was above gage (discharge estimated by hydrographic comparison with the North and South forks at 18,000 second-feet); minimum stage recorded, September 30, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record prior to installation of water-stage recorder not very reliable. Results for that period are only fair. Results for 1913 are only fair on account of poorly defined rating curve (used to Feb. 16, 1913) and breaks in record. Results after May 31, 1915, excellent. Results for remainder of period good.

COOPERATION.—Gage-height record and most of discharge measurements furnished by the Puget Sound Traction, Light & Power Co.

Discharge measurements of Middle Fork of Snoqualmie River near North Bend, Wash., during 1907–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1907.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
Aug. 10	A. S. Kalenborn	0.75	312	May 9	R. C. Pierce	4.15	2,400
Oct. 29	do	.42	218	July 30	Weller Rose	2.20	372
31	do	.86	338	1913.			
1908.				Jan. 27	Rose and Evertson	2.69	1,280
Sept. 11	M. T. Crawford	1.80	248	June 7	Ernisse and Wenzell	3.88	3,160
Nov. 11	do	1.98	377	7	do	4.08	3,520
1909.				July 23	G. L. Parker	2.90	1,560
				23	Tuttle and Rose	2.90	1,600
Aug. 27	A. T. Harris	2.50	535	Sept. 19	Rose and Hodges	1.62	451
1910.				1914.			
Mar. 18	do	5.20	3,100	Jan. 6	Rose and Beery	6.12	7,900
June 30	Crawford and Easter	2.60	698	May 11	Weller Rose	2.75	1,620
Sept. 21	R. R. Easter	1.00	188	Aug. 20	Collier and Rose	.56	218
1911.				1915.			
Mar. 17	do	2.85	740	Jan. 13	McFadden and Brown	1.55	734
Sept. 10	Parker and Crawford	2.46	606	Mar. 18	Hartson and McFadden	2.20	1,270
Oct. 11	R. R. Easter	2.10	359	Apr. 3	McFadden and Wilbur	4.76	4,760
1912.				July 14	McFadden and Wicklund	1.22	637
Feb. 20	Weller Rose	3.32	1,220	27	J. T. Hartson	2.10	334
Mar. 29	do	2.90	885	Aug. 6	Hartson and McFadden	1.93	272
Apr. 24	do	2.65	708	Sept. 4	McFadden and Norman	1.59	163

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1907.			1907.			1907.		
1	.....	266	11	297	504	21	256	424
2	.....	276	12	286	504	22	246	377
3	.....	286	13	286	504	23	266	330
4	.....	276	14	286	.....	24	286	330
5	.....	266	15	276	.....	25	381	330
6	.....	371	16	266	.....	26	476	330
7	.....	476	17	266	1,130	27	463	330
8	.....	476	18	266	.....	28	450	319
9	.....	476	19	266	.....	29	491	308
10	308	490	20	266	.....	30	532	308
						31	399	.....

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Aug.	Sept.
1907–8.							
1	308	417	.....	691	412	.....	338
2	319	504	.....	504	400	.....	276
3	330	504	.....	504	400	.....	276
4	319	504	.....	504	400	.....	276
5	308	440	562	504	481	.....	248
6	308	376	562	504	562	.....	248
7	308	376	562	599	506	.....	248
8	297	376	547	694	450	.....	446
9	286	364	532	694	450	.....	372
10	286	352	613	694	450	.....	306
11	286	352	694	714	450	.....	276
12	266	352	694	734	450	.....	248
13	246	364	694	679	437	.....	248
14	256	376	736	624	424	.....	222
15	266	400	778	608	464	.....	222
16	266	424	701	592	504	.....	222
17	266	437	624	643	619	.....	222
18	266	450	564	694	734	.....	198
19	266	463	504	714	648	.....	198
20	266	476	548	734	562	.....	176
21	266	519	592	679	533	.....	176
22	266	562	861	624	504	.....	176
23	266	547	1,130	593	504	.....	176
24	266	532	1,480	562	504	.....	176
25	266	547	1,840	533	490	306	176
26	256	562	1,480	504	476	276	176
27	246	.....	1,130	477	567	248	154
28	236	.....	954	450	658	248	154
29	226	.....	778	450	658	408	154
30	266	.....	828	450	.....	584	154
31	330	.....	878	424	.....	488	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	222	1,950	446	1,480	488	696	1,140	1,390	5,460	1,390	488	248
2	372	1,480	198	1,660	534	638	828	1,480	4,940	1,300	488	222
3	372	1,220	222	4,030	760	638	696	2,050	3,410	1,220	446	222
4	372	1,220	176	2,370	488	638	638	2,260	2,590	1,220	446	222
5	372	696	222	1,480	488	696	638	1,480	2,370	1,140	408	222
6	372	488	338	1,480	488	638	638	1,300	2,050	1,300	408	222
7	338	488	446	1,570	488	534	638	1,140	1,950	1,950	372	198
8	372	446	534	1,060	534	534	760	1,140	1,950	1,480	372	198
9	408	446	534	696	488	696	828	1,140	1,950	1,390	338	198
10	446	372	638	446	446	638	828	1,220	2,810	1,390	446	222
11	446	338	638	446	446	534	760	1,390	3,170	1,950	338	248
12	446	306	696	446	408	534	760	1,060	1,850	1,300	306	198
13	696	276	1,570	446	372	534	1,060	1,060	1,750	975	306	176
14	900	248	1,140	446	372	534	1,060	1,060	1,660	696	276	176
15	900	248	1,140	446	760	534	1,060	1,060	1,660	638	276	176
16	900	306	1,060	638	1,300	534	900	1,060	1,570	584	248	176
17	696	828	975	828	3,050	584	696	1,220	1,480	584	248	222
18	534	5,590	900	2,700	2,260	638	696	1,220	1,480	584	222	222
19	584	1,950	696	2,590	1,570	534	638	1,300	1,570	534	222	222
20	638	1,480	534	4,550	1,140	534	638	1,140	1,480	534	198	638
21	534	1,660	534	3,410	900	534	584	1,140	1,480	534	176	900
22	446	2,050	488	1,660	760	534	584	900	1,390	534	176	828
23	408	1,570	638	1,390	760	638	696	900	1,480	534	176	584
24	408	2,260	638	1,140	828	696	828	1,220	1,390	534	176	446
25	446	1,060	2,370	900	900	696	2,370	1,390	1,390	534	176	408
26	446	760	1,480	760	900	760	2,930	1,950	1,480	488	372	338
27	446	638	2,480	696	975	760	1,660	3,170	1,480	488	372	306
28	446	534	1,850	760	760	760	1,660	2,050	1,390	488	222	584
29	975	534	1,850	638	.....	760	1,390	2,050	1,300	488	198	584
30	3,170	488	1,750	638	.....	760	1,300	2,700	1,300	488	176	584
31	3,170	.....	1,750	534	.....	828	.....	3,050	.....	488	176	.....

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	584	.....	.....	602	2,110	5,490	1,080	1,080	1,810	648	372	222
2	584	.....	.....	516	1,330	5,230	1,000	1,080	1,240	602	314	222
3	975	.....	.....	516	1,000	4,580	1,000	1,080	1,240	602	288	222
4	900	.....	.....	516	804	3,340	1,080	1,240	1,000	648	288	188
5	760	.....	.....	516	748	2,540	1,160	1,330	1,000	602	288	188
6	696	.....	.....	476	748	1,910	1,420	1,420	1,160	602	288	222
7	900	.....	.....	476	648	1,520	1,520	2,010	1,160	602	288	222
8	828	.....	.....	476	602	1,330	1,520	2,010	1,080	602	288	222
9	584	.....	.....	476	558	1,160	1,810	2,010	1,080	602	288	222
10	534	.....	.....	476	558	1,080	1,610	4,840	1,080	748	288	222
11	534	.....	.....	438	516	1,520	1,520	4,320	3,220	748	288	222
12	488	.....	.....	438	516	2,110	1,520	3,100	1,610	748	264	188
13	446	.....	.....	404	602	2,320	1,420	2,210	1,160	748	264	174
14	408	.....	.....	372	602	2,760	1,330	1,910	1,160	696	242	174
15	372	.....	.....	372	558	2,870	1,240	1,520	1,160	696	242	188
16	372	.....	.....	342	516	2,540	1,080	1,240	1,080	648	242	188
17	338	.....	.....	342	516	3,220	1,080	1,710	1,080	602	242	222
18	338	.....	.....	1,000	476	3,100	1,240	1,710	930	558	242	222
19	338	.....	.....	804	476	3,580	2,430	1,610	696	476	242	222
20	338	.....	.....	648	476	3,100	3,100	1,160	1,080	476	242	188
21	408	.....	930	602	476	2,650	2,110	1,330	930	476	222	188
22	584	.....	602	4,320	438	2,430	1,910	1,610	804	476	222	188
23	488	.....	602	4,320	438	2,320	2,010	2,010	696	438	222	188
24	900	.....	602	4,450	1,000	1,910	3,220	2,210	696	404	222	188
25	488	.....	602	3,340	1,420	1,420	3,340	3,100	696	404	222	188
26	446	.....	602	1,610	1,160	1,240	3,100	1,810	748	404	222	188
27	446	.....	558	1,420	1,520	1,080	2,110	1,610	696	404	222	188
28	408	.....	516	1,610	2,760	1,080	1,810	1,240	648	404	222	188
29	408	.....	602	1,160	.....	1,000	1,520	1,420	648	372	222	204
30	584	.....	602	2,210	.....	1,000	1,080	1,610	648	372	222	558
31	638	.....	864	2,110	.....	1,240	.....	1,610	.....	372	222	.....
1910–11.												
1	2,430	930	.....	.....	.....	.....	760	975	2,370	1,080	476	372
2	2,010	864	.....	.....	.....	.....	828	1,300	1,300	1,080	438	372
3	7,960	1,160	.....	.....	.....	.....	760	1,570	1,300	1,000	438	438
4	4,580	864	.....	.....	.....	.....	638	2,260	1,220	1,240	438	476
5	4,320	648	.....	.....	.....	.....	584	2,260	975	1,160	438	602
6	2,110	2,210	.....	.....	.....	.....	534	1,480	975	1,330	404	648
7	4,710	5,620	.....	.....	.....	.....	488	1,390	1,060	1,160	404	602
8	2,210	2,210	.....	.....	.....	.....	584	1,480	975	1,000	404	558
9	1,810	1,330	.....	.....	.....	.....	534	1,140	1,220	930	404	558
10	1,240	8,350	.....	.....	.....	.....	760	1,060	1,480	864	404	648
11	1,080	3,220	.....	.....	.....	.....	638	1,060	2,700	804	404	516
12	930	2,430	.....	.....	.....	.....	584	975	2,980	748	404	558
13	696	2,010	.....	.....	.....	.....	534	1,140	2,870	748	404	2,320
14	602	1,710	.....	.....	.....	.....	534	1,060	1,710	804	404	2,150
15	1,080	1,330	.....	.....	.....	.....	534	1,060	1,710	804	372	2,050
16	864	1,160	.....	.....	.....	638	584	975	1,610	804	372	1,570
17	2,870	930	.....	.....	.....	760	534	1,480	1,240	804	372	975
18	2,430	804	.....	.....	.....	760	638	2,150	1,000	748	372	696
19	1,610	864	.....	.....	.....	900	638	1,950	930	748	372	584
20	558	2,110	.....	.....	.....	900	638	1,570	1,000	748	476	584
21	804	.....	.....	.....	.....	900	696	1,390	930	696	476	534
22	696	.....	.....	.....	.....	975	760	1,220	1,080	602	438	488
23	696	.....	.....	.....	.....	1,060	760	1,140	864	602	404	488
24	804	.....	.....	.....	.....	1,140	1,140	1,140	864	602	372	488
25	2,870	.....	.....	.....	.....	900	1,140	1,140	864	602	372	446
26	1,610	.....	.....	.....	.....	828	1,060	1,140	864	558	372	446
27	1,080	.....	.....	.....	.....	696	1,060	1,140	1,240	558	372	408
28	804	.....	.....	.....	.....	696	900	1,220	1,160	516	372	408
29	602	.....	.....	.....	.....	638	828	1,480	930	476	372	408
30	558	.....	.....	.....	.....	975	900	1,750	930	476	372	408
31	516	.....	.....	.....	.....	760	.....	2,260	.....	476	372	.....

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River, near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	372	276	1,600	635	1,600	565	875	1,060	1,480	1,850	370	3,270
2	338	276	1,480	635	1,260	430	965	965	1,370	790	370	1,500
3	338	276	1,260	635	1,160	430	875	875	1,370	790	310	1,730
4	338	276	1,260	635	1,060	370	1,060	875	1,370	790	310	901
5	306	338	1,160	635	965	370	1,160	790	1,720	965	255	735
6	306	900	1,160	565	875	370	790	875	1,370	965	255	632
7	306	5,070	1,260	635	1,160	370	790	1,260	2,590	1,600	255	928
8	306	1,850	1,990	565	1,370	310	875	2,430	2,280	875	255	1,730
9	276	1,060	2,280	635	1,600	310	875	2,280	1,480	710	255	1,170
10	372	760	2,280	965	2,280	255	1,370	1,990	1,480	710	255	874
11	372	696	1,990	875	1,850	255	1,060	1,990	1,370	975	430	727
12	372	696	2,130	1,060	1,600	255	965	1,990	1,480	875	310	632
13	372	900	1,720	2,590	1,260	200	1,160	3,450	1,480	790	310	566
14	1,140	2,480	1,260	8,130	1,600	200	875	3,450	2,430	790	310	524
15	696	1,390	1,260	2,920	1,260	200	790	3,450	1,370	790	255	458
16	446	1,140	1,600	2,750	3,090	255	790	1,990	1,370	710	370	421
17	372	5,980	1,370	1,600	2,430	370	710	1,600	1,370	710	1,060	397
18	372	.....	1,260	1,480	2,130	495	710	1,600	1,600	710	635	385
19	372	.....	1,160	1,260	1,600	430	710	1,600	1,990	710	495	368
20	338	8,880	1,160	1,260	1,320	430	710	4,440	2,130	565	430	358
21	338	6,670	1,060	2,590	1,060	430	635	3,830	2,280	565	370	341
22	306	2,750	1,060	1,370	965	430	635	2,430	1,480	565	370	330
23	306	1,990	1,990	1,260	1,160	430	635	1,990	1,370	635	310	324
24	306	1,720	1,370	1,540	965	430	710	1,370	1,160	635	310	319
25	306	1,600	1,370	3,450	875	430	710	1,720	1,600	635	310	314
26	306	4,030	1,160	2,130	875	565	635	2,280	1,480	565	310	308
27	306	2,430	1,060	1,720	875	635	635	2,430	1,370	430	310	297
28	306	1,850	965	2,750	710	710	710	1,990	1,370	370	255	292
29	306	1,720	965	3,640	635	875	875	1,600	1,160	370	255	308
30	276	1,600	790	4,030	.....	790	1,370	1,260	1,850	370	255	341
31	276	.....	710	2,130	.....	710	.....	965	.....	370	495	.....
1912–13.												
1	391	595	778	.....	719	730	1,060	.....	4,300	2,480	838	300
2	452	580	892	.....	663	737	935	.....	4,500	1,880	820	.....
3	552	580	2,390	.....	648	808	912	.....	4,500	1,580	804	.....
4	663	655	1,980	.....	625	868	966	.....	.....	1,580	795	3,360
5	538	1,210	1,340	1,290	545	1,010	1,160	.....	.....	1,940	.....	2,150
6	445	1,340	1,070	1,290	510	1,030	1,120	.....	2,620	2,140	.....	1,120
7	403	1,390	892	1,220	458	1,050	1,070	.....	2,860	1,880	.....	838
8	1,080	1,790	874	986	421	1,160	998	.....	.....	1,940	.....	605
9	865	2,250	760	752	445	1,100	1,010	.....	.....	2,340	.....	880
10	640	1,920	711	679	497	1,120	1,200	.....	.....	1,880	549	715
11	531	1,980	744	610	545	1,070	1,890	.....	2,140	1,700	.....	.....
12	471	2,250	719	602	580	1,010	2,010	.....	.....	1,640	.....	.....
13	433	3,420	744	580	655	935	1,890	.....	.....	1,640	.....	487
14	415	2,250	847	538	919	905	.....	.....	.....	1,700	.....	435
15	397	1,500	735	510	2,540	875	.....	.....	1,880	1,360	.....	387
16	439	1,190	847	458	3,500	1,030	.....	.....	1,880	1,310	.....	381
17	928	3,330	1,160	445	3,920	1,290	.....	.....	1,820	1,420	442	375
18	919	3,590	1,250	421	2,140	1,520	.....	.....	2,000	1,580	577	423
19	982	2,320	1,000	391	1,570	1,290	.....	.....	2,700	1,700	485	448
20	.....	1,730	874	385	1,290	1,090	2,010	.....	2,780	1,820	393	411
21	.....	1,440	812	380	1,160	974	.....	.....	2,560	1,820	405	468
22	.....	1,390	760	368	1,120	845	.....	.....	2,480	1,820	.....	1,020
23	.....	1,440	946	358	1,030	822	.....	.....	2,560	1,700	.....	715
24	.....	1,290	1,000	735	905	786	1,420	.....	2,560	1,520	423	549
25	.....	1,190	883	640	875	730	1,470	.....	2,410	1,360	411	448
26	.....	1,050	812	1,670	822	730	1,840	.....	2,270	1,090	405	411
27	820	910	847	1,190	800	765	1,670	.....	2,200	1,050	387	364
28	752	820	928	1,040	772	815	.....	2,550	2,070	1,060	353	353
29	735	760	1,290	982	.....	1,380	.....	.....	1,700	934	358	353
30	735	744	.....	892	.....	1,470	.....	.....	2,410	779	370	320
31	671	.....	.....	803	.....	1,120	.....	3,370	.....	804	335	.....

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River, near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	310	744	1,570	618	1,200	2,270	612	1,670	1,950	1,130	295	182
2	270	698	1,340	606	875	1,470	600	2,140	1,950	1,120	292	176
3	320	636	1,160	950	672	1,200	672	2,200	1,620	1,060	290	174
4	348	679	1,050	4,800	800	1,160	1,380	1,620	1,200	998	288	171
5	348	1,200	990	8,100	730	974	1,720	1,420	1,050	822	285	169
6	348	2,200	950	7,600	600	890	2,270	1,420	860	808	284	183
7	655	1,340	920	5,190	550	905	1,890	1,470	838	672	283	202
8	916	1,160	860	2,780	503	1,040	1,380	1,470	2,080	654	282	218
9	1,470	1,290	800	2,120	488	1,120	1,380	1,470	1,670	660	278	256
10	8,170	1,470	751	1,470	493	1,120	1,420	1,620	1,290	654	262	250
11	8,100	1,160	765	1,290	545	898	1,420	1,620	1,200	606	250	236
12	3,550	1,020	860	1,010	572	860	1,380	1,720	1,290	612	250	234
13	3,820	912	800	966	578	1,120	2,010	2,140	1,290	618	250	228
14	2,700	868	875	890	578	2,410	2,410	2,700	1,290	589	250	285
15	2,080	815	950	890	567	2,270	3,550	2,480	1,520	550	239	838
16	1,890	2,140	838	950	550	2,860	2,340	1,890	1,620	508	234	618
17	1,720	1,420	800	868	545	2,270	1,670	1,670	1,670	514	231	561
18	1,620	1,420	744	786	540	1,780	1,520	1,520	1,520	519	225	905
19	1,520	1,470	704	698	550	1,670	2,200	1,470	1,290	480	220	966
20	1,470	1,470	660	606	654	1,620	2,410	1,670	1,100	442	212	1,380
21	1,380	1,470	666	982	920	1,470	1,620	1,950	1,240	403	220	1,110
22	1,200	1,470	654	1,670	1,520	1,340	1,340	1,950	1,070	364	220	642
23	1,080	1,840	642	1,120	1,670	1,120	1,240	1,840	868	368	212	524
24	1,340	3,190	630	838	1,470	1,030	1,110	1,670	1,030	366	207	460
25	1,290	2,010	606	830	1,290	966	982	1,670	1,420	364	205	406
26	1,020	1,780	595	800	982	830	1,080	1,520	1,200	360	200	406
27	1,030	1,670	600	698	2,080	765	1,290	1,340	1,160	356	200	724
28	935	1,670	589	612	1,160	717	1,200	1,200	1,150	352	200	514
29	830	1,620	508	606	.....	698	1,080	1,010	1,140	306	202	415
30	786	1,570	550	737	.....	679	1,200	1,120	1,140	295	196	356
31	704	.....	606	875	.....	654	.....	1,470	.....	295	189	.....

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	328	1,160	727	898	564	423	2,440	495	935	447	313	180
2	630	7,200	689	765	596	406	6,790	467	853	442	309	182
3	717	7,680	665	647	554	394	5,610	569	762	438	305	170
4	567	3,840	641	586	533	462	3,490	543	713	424	297	163
5	493	3,580	619	524	575	653	2,100	554	719	420	289	170
6	428	2,780	495	462	739	538	1,600	596	762	398	273	163
7	389	2,000	485	458	714	504	1,550	727	743	406	254	156
8	360	1,040	458	436	689	485	1,410	720	660	415	245	245
9	340	940	432	504	671	458	1,020	689	589	424	236	451
10	612	850	406	564	647	449	876	883	579	398	232	300
11	1,670	4,110	375	689	619	462	942	799	558	363	229	229
12	1,420	2,830	367	779	569	454	1,190	695	518	346	229	200
13	1,290	2,230	355	733	528	440	1,410	596	480	506	223	198
14	890	1,650	330	714	499	803	1,140	559	489	655	217	206
15	704	1,390	325	689	458	1,800	935	538	484	568	217	226
16	606	1,140	320	602	440	1,460	1,000	504	499	632	217	236
17	1,240	980	320	595	476	996	1,230	472	518	833	220	217
18	2,780	806	316	588	653	1,140	1,230	659	518	677	214	200
19	2,940	869	323	581	538	965	1,190	855	538	589	209	184
20	2,010	2,700	320	575	467	826	1,140	958	725	528	212	182
21	1,290	2,100	337	564	462	1,140	876	733	677	475	209	174
22	1,030	1,520	334	509	454	1,460	695	641	573	415	209	170
23	765	1,410	323	467	436	1,650	602	602	518	398	206	167
24	692	1,250	313	440	427	1,360	569	647	499	376	203	165
25	666	1,160	310	398	499	1,030	607	785	452	363	200	163
26	600	1,300	306	375	499	869	630	806	558	351	192	159
27	540	1,210	306	359	449	683	602	1,420	579	334	190	163
28	474	1,060	533	359	432	765	602	3,360	528	318	184	161
29	450	942	485	359	.....	1,020	641	2,060	475	318	182	152
30	514	862	509	355	.....	1,060	580	1,410	452	318	184	150
31	730	.....	585	406	.....	935	.....	1,080	.....	318	182	.....

NOTE.—Discharge determined as follows: 1907–8—Aug. 10, 1907, to Feb. 29, 1908, from poorly defined rating curve; interpolated for days on which gage was not read; estimated from hydrographs of the North, Middle, and South forks for the following periods: Sept. 14–16, 795 second-feet; Sept. 18–20, 825 second-feet; Nov. 27, 1907, to Dec. 4, 1907, 3,250 second-feet. Gage heights Dec. 11, 1907, to Feb. 29, 1908, reduced to datum of original gage. Aug. 25 to Sept. 30, 1908, from rating curve fairly well defined below 1,000 second-feet.

1908–9—Aug. 25, 1908, to Sept. 30, 1908, from rating curve fairly well defined below 1,000 second-feet.

1909–10—Oct. 1–31, 1909, from rating curve fairly well defined below 1,000 second-feet. Discharge for November, 1909, not ascertained, as water was over gage Nov. 2, 3, 18, 19, 23, 24, 29, and 30, and extension of rating curve for high water is uncertain; Dec. 21, 1909, to Sept. 30, 1910, from rating curve fairly well defined below 3,500 second-feet. No record Dec. 1–20, 1909.

1910–11—Oct. 1 to Nov. 20, 1910, from rating curve fairly well defined below 3,500 second-feet; Nov. 21, 1910, to Mar. 15, 1911, discharge not ascertained as no discharge measurements are available to indicate the amount of scour caused by high water in November. The hydrographic comparison shows that there was considerable scour followed by filling early in March. Mar. 16 to June 11, 1911, and Sept. 14–30, 1911, from rating curve fairly well defined below 1,000 second-feet; June 12 to Sept. 13, 1911, from rating curve fairly well defined below 3,500 second-feet. Gage heights, Aug. 25, 1908, to Nov. 20, 1910, reduced to datum of gage installed Mar. 15, 1911.

1911–12—Oct. 1 to Nov. 17, 1911, from rating curve fairly well defined below 1,000 second-feet; Nov. 18–19, water over gage, discharge estimated from hydrographs at 18,000 second-feet and 13,500 second-feet, respectively; Nov. 20, 1911, to Sept. 1, 1912, from rating curve well defined below 3,000 second-feet; Sept. 2–30, 1912, from poorly defined rating curve. Gage height Sept. 2, 1912, reduced to datum of water-stage recorder installed Sept. 3.

1912–13—Oct. 1, 1912, to Feb. 16, 1913, from poorly defined rating curve; Feb. 17 to June 8, 1913, from rating curve fairly well defined throughout; June 9 to Sept. 30, 1913, from rating curve fairly well defined below 2,000 second-feet. Discharge estimated from hydrographs as follows: Oct. 20–26, 1912, 856 second-feet; Dec. 30–31, 1912, 1,640 second-feet; Jan. 1–4, 1913, 3,000 second-feet; Apr. 14–19, 1,340 second-feet; Apr. 21–23, 1,940 second-feet; Apr. 28–30, 1,230 second-feet; June 4–5, 3,390 second-feet; June 8–10, 2,870 second-feet; June 12–14, 2,320 second-feet; Aug. 5–9, 672 second-feet; Aug. 11–16, 496 second-feet; Aug. 19, interpolated; Aug. 22–23, 414 second-feet; Sept. 2–3, 335 second-feet; Sept. 11–12, 580 second-feet.

1913–14—Oct. 1–10, 1913, from rating curve fairly well defined below 2,000 second-feet; Oct. 11, 1913, to Sept. 30, 1914, from rating curve fairly well defined throughout. No record, discharge interpolated, for following days, all 1914: Jan. 7, 9, June 28–30, July 1, 3, 19–21, 24, Aug. 2–4, 6, 7, 30, 31, and Sept. 1, 3, 4.

1914–15—Oct. 1 to Nov. 2, 1914, from rating curve fairly well defined throughout; Nov. 3, 1914, to May 28, 1915, from rating curve fairly well defined below 5,000 second-feet; May 29 to Aug. 6, 1915, from rating curve well defined below 1,000 second-feet; Aug. 7 to Sept. 30, 1915 (at new site), from well defined rating curve. Stage-discharge relation affected by ice, discharge estimated, Dec. 15–16, 1914.

Monthly discharge of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1907.							
August 10–31	532	246	332	1.80	1.47	14,500	D.
September	1,130	266	485	2.64	2.94	28,900	D.
1907–8.							
October	330	226	278	1.51	1.74	17,100	D.
November	.....	352	819	4.45	4.96	48,700	D.
December	.....	504	1,120	6.09	7.02	68,900	D.
January	734	424	593	3.22	3.71	36,500	D.
February	734	400	507	2.76	2.98	29,200	D.
August 25–31	584	248	365	1.98	.52	5,070	C.
September	446	154	231	1.26	1.41	13,700	C.
1908–9.							
October	3,170	222	686	3.73	4.30	42,200	C.
November	5,590	248	1,060	5.76	6.43	63,100	D.
December	2,480	176	933	5.07	5.84	57,400	C.
January	4,550	446	1,370	7.45	8.59	84,200	D.
February	3,050	372	845	4.59	4.78	46,900	C.
March	828	534	631	3.43	3.95	38,800	C.
April	2,930	584	997	5.42	6.05	59,300	C.
May	3,170	900	1,510	8.21	9.46	92,800	D.
June	5,460	1,300	2,040	11.1	12.38	121,000	D.
July	1,950	488	895	4.86	5.60	55,000	C.
August	488	176	298	1.62	1.87	18,300	C.
September	900	176	340	1.85	2.06	20,200	C.
The year	5,590	176	966	5.25	71.31	699,000	
1909–10.							
October	975	338	552	3.00	3.46	33,900	C.
December 21–31	930	516	644	3.50	1.43	14,100	C.
January	4,450	342	1,210	6.58	7.59	74,400	C.
February	2,760	438	842	4.57	4.76	46,800	C.
March	5,490	1,000	2,340	12.7	14.64	144,000	C.
April	3,340	1,000	1,710	9.29	10.36	102,000	C.
May	4,840	1,080	1,880	10.2	11.76	116,000	C.
June	3,220	648	1,070	5.82	6.49	63,700	C.
July	748	372	554	3.01	3.47	34,100	C.
August	372	222	256	1.39	1.60	15,700	C.
September	558	174	214	1.16	1.29	12,700	C.
1910–11.							
October	7,960	516	1,840	10.0	11.53	113,000	C.
November 1–20	8,350	648	2,040	11.1	8.25	80,900	C.
March 16–31	1,140	638	845	4.59	2.73	26,800	C.
April	1,140	488	719	3.91	4.36	42,800	C.
May	2,260	975	1,400	7.61	8.77	86,100	D.
June	2,980	864	1,350	7.34	8.19	80,300	D.
July	1,330	476	799	4.34	5.00	49,100	C.
August	476	372	403	2.19	2.52	24,800	C.
September	2,320	372	727	3.95	4.41	43,300	C.
1911–12.							
October	1,140	276	369	2.01	2.32	22,700	C.
November	.....	276	3,040	16.5	18.41	181,000	D.
December	2,280	710	1,390	7.55	8.70	85,500	C.
January	8,130	565	1,840	10.0	11.53	113,000	C.
February	3,090	635	1,370	7.45	8.04	78,800	C.
March	875	200	429	2.33	2.69	26,400	C.
April	1,370	635	856	4.65	5.19	50,900	C.
May	4,440	790	1,960	10.7	12.34	121,000	C.
June	2,590	1,160	1,610	8.75	9.76	95,800	C.
July	1,850	370	745	4.05	4.67	45,800	C.
August	1,060	255	356	1.93	2.22	21,900	C.
September	3,270	292	716	3.89	4.34	42,600	D.
The year	.....	200	1,220	6.63	90.21	885,000	

Monthly discharge of Middle Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1912–13.							
October	1,080	391	685	3.72	4.29	42,100	D.
November	3,590	580	1,560	8.48	9.46	92,800	D.
December	2,390	711	1,040	5.65	6.51	64,000	D.
January	.....	358	1,040	5.65	6.51	64,000	D.
February	3,920	421	1,100	5.98	6.23	61,100	D.
March	1,520	730	1,000	5.43	6.26	61,500	C.
April	.....	912	1,410	7.66	8.55	83,900	C.
May	.....	.....	.....	.....	.....	.....	.....
June	4,500	1,700	2,650	14.4	16.07	158,000	C.
July	2,480	779	1,600	8.70	10.03	98,400	B.
August	838	335	526	2.86	3.30	32,300	C.
September	3,360	300	672	3.65	4.07	40,000	B.
1913–14.							
October	8,170	270	1,720	9.35	10.78	106,000	B.
November	3,190	636	1,410	7.66	8.55	83,900	B.
December	1,570	508	808	4.39	5.06	49,700	B.
January	8,100	606	1,710	9.29	10.71	105,000	B.
February	2,080	488	846	4.60	4.79	47,000	B.
March	2,860	654	1,300	7.07	8.15	79,900	B.
April	3,550	600	1,550	8.42	9.39	92,200	B.
May	2,700	1,010	1,680	9.13	10.53	103,000	B.
June	2,080	838	1,320	7.17	8.00	78,600	B.
July	1,130	295	576	3.13	3.61	35,400	B.
August	295	189	240	1.30	1.50	14,800	B.
September	1,380	169	460	2.50	2.79	27,400	B.
The year	8,170	169	1,140	6.20	83.86	823,000	
1914–15.							
October	2,940	328	909	4.94	5.70	55,900	B.
November	7,680	806	2,090	11.4	12.72	124,000	B.
December	727	306	429	2.33	2.69	26,400	B.
January	898	355	548	2.98	3.44	33,700	B.
February	739	427	542	2.95	3.07	30,100	B.
March	1,800	394	842	4.58	5.28	51,800	B.
April	6,790	569	1,490	8.10	9.04	88,700	B.
May	3,360	467	852	4.63	5.34	52,400	B.
June	935	452	598	3.25	3.63	35,600	A.
July	833	318	448	2.43	2.80	27,500	A.
August	313	182	228	1.24	1.43	14,000	A.
September	451	150	196	1.07	1.19	11,700	A.
The year	7,680	150	762	4.14	56.33	552,000	

SNOQUALMIE RIVER NEAR SNOQUALMIE, WASH.

LOCATION.—In the NE. ¼ sec. 33, T. 24 N., R. 8 E., 300 feet below mouth of the South Fork, 4 miles above mouth of Tokul Creek, and 2 miles east of Snoqualmie, in King County.

DRAINAGE AREA.—371 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—Revised data for following periods published in this report: May 1, 1898, to July 12, 1899; January 1 to July 16, 1900; and September 14, 1902, to July 31, 1904. Gage heights for 1902–1906 published in Water-Supply Papers 85, 100, 135, 178, and 214. Data insufficient for ascertaining discharge after July 31, 1904.

GAGE.—May 1, 1898, to July 16, 1900, staff gage at dam site just above Snoqualmie Falls; gage-height record continued until December 31, 1901, but data insufficient for ascertaining discharge after July 16, 1900. September 14, 1902, staff gage just below Tokul Creek, three-fourths mile below Snoqualmie Falls; destroyed December 1, 1902. November 3, 1902, staff gage on left bank 300 feet below South Fork 3¼ miles above Snoqualmie Falls, and 2 miles east of Snoqualmie, destroyed

January 3, 1903. January 7, 1903, staff gage in two sections installed at same site; datum raised 0.06 foot; read until September 30, 1905. Gage at Snoqualmie Falls used in November and December, 1906. Gage read to hundredths daily from November 3, 1902, to September 30, 1905, by E. C. Reinig.

DISCHARGE MEASUREMENTS.—In 1898–99 made by floats from cable half a mile above the falls and from bridge. In September and October, 1902, from cable just above Tokul Creek. From November, 1902, to December, 1903, from cable 300 feet below South Fork.

CHANNEL AND CONTROL.—Channel composed of gravel; did not shift during periods covered by records. Flashboards placed on the dam at Snoqualmie Falls at low water affected stage-discharge relation at station above falls.

EXTREMES OF DISCHARGE.—1898–1900, 1902–1904: Maximum stage recorded, 19.6 feet January 3, 1903 (discharge, 24,400 second-feet); minimum stage recorded, 3.55 feet September 4, 1903 (discharge, 388 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curves well defined, except for September and October, 1902, and August 15 to October 6, 1903. Results excellent, except for short periods for which rating curves were not well defined or were extended for high water.

Discharge measurements of Snoqualmie River near Snoqualmie, Wash., during 1898–1903.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1898.		*Feet.*	*Sec.-ft.*	1902.		*Feet.*	*Sec.-ft.*
Sept. 7	B. E. Grant	[a] 53.90	492	Sept. 20	T. A. Noble	[c] 1.15	727
Oct. 4	do	[a] 55.70	1,290	Oct. 14	do	[c] 1.04	641
Nov. 23	do	[b] 57.32	3,340	Nov. 3	do	[d] 5.04	3,230
24	do	57.04	2,860	Dec. 14	do	3.37	1,890
26	do	56.40	2,210	17	do	2.76	1,380
29	do	56.92	2,560				
29	do	56.95	2,530	1903.			
Dec. 6	do	56.02	1,730	Jan. 29	T. A. Noble	3.86	2,040
8	do	55.74	1,510	Apr. 30	do	4.10	2,470
9	do	55.62	1,400	May 10	H. W. Quinan	5.70	4,050
10	do	55.48	1,250	30	do	7.56	6,420
15	do	55.05	1,040	June 5	do	8.70	8,280
19	do	57.00	2,870	6	do	6.49	5,210
27	do	63.60	14,100	9	do	5.32	3,680
				Aug. 26	do	3.97	693
1899.				28	do	3.94	637
Jan. 18	B. E. Grant	62.30	12,900	Dec. 29	G. H. Bliss	3.13	1,690
19	do	60.30	8,690	29	do	3.13	1,600
Feb. 18	do	59.60	6,500				

[a] Made by weighted rod floats.
[b] This and following measurements made in 1898–9 made with a Haskell meter.
[c] Referred to gage below Snoqualmie Falls.
[d] This and following measurements referred to gage above Snoqualmie Falls.

Daily discharge, in second-feet, of Snoqualmie River near Snoqualmie, Wash., for the years ending Sept. 30, 1898, 1899, 1900, 1902, 1903, and 1904.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1898.						1898.					
1	3,590	3,890	2,760	1,090	520	16	6,590	5,870	1,680	588	468
2	3,890	4,040	3,160	1,090	520	17	6,950	3,890	2,060	588	468
3	4,850	4,040	3,300	915	520	18	5,360	4,850	3,020	588	468
4	5,530	4,680	3,300	860	520	19	4,200	6,590	2,280	588	468
5	5,190	5,530	3,020	860	520	20	3,590	5,530	1,680	588	670
6	4,200	6,230	2,510	860	520	21	3,300	4,850	1,510	552	1,160
7	3,440	6,590	2,170	860	492	22	4,520	3,890	1,360	552	2,760
8	2,890	6,230	2,170	860	468	23	3,590	3,590	1,360	520	3,300
9	3,300	5,870	2,390	860	492	24	3,020	4,850	1,360	520	1,960
10	4,850	6,590	2,280	810	492	25	3,590	4,200	1,510	520	1,220
11	4,520	6,050	2,510	810	492	26	5,870	3,590	1,430	520	970
12	4,800	4,200	2,630	760	492	27	4,850	3,300	1,290	520	970
13	5,080	4,200	2,280	714	492	28	4,200	3,020	1,220	520	1,590
14	5,360	5,190	1,770	670	492	29	4,520	2,760	1,160	520	3,160
15	6,050	4,850	1,680	628	492	30	3,890	2,280	1,160	552	3,890
						31	3,300	.....	1,090	552	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1898-99.										
1	3,300	5,530	2,760	2,760	3,740	3,440	1,220	2,510	5,870	5,870
2	2,510	5,700	2,510	2,060	2,890	2,760	1,360	2,280	6,950	6,950
3	1,770	5,020	2,060	1,860	2,280	2,510	1,510	2,060	6,950	8,030
4	1,430	7,670	2,170	1,680	2,060	2,510	2,280	2,060	7,310	7,670
5	1,220	6,230	1,860	1,590	1,860	2,280	1,860	2,280	8,410	6,950
6	1,090	5,700	1,680	1,430	1,770	2,170	1,770	3,020	6,230	6,230
7	1,030	4,680	1,510	1,360	1,770	2,280	1,860	3,300	5,020	6,050
8	915	3,590	1,430	1,290	2,280	2,510	2,060	6,230	5,190	6,230
9	915	2,760	1,360	1,360	4,200	2,390	3,300	11,300	6,590	6,230
10	1,960	2,390	1,220	1,510	6,950	2,170	3,300	7,490	8,410	5,530
11	2,760	2,280	1,220	1,510	4,040	2,060	4,520	9,170	10,300	5,530
12	2,510	1,860	1,090	1,510	3,300	2,060	9,170	6,950	10,700	6,590
13	1,860	1,680	1,090	1,430	4,680	2,060	5,190	5,190	7,670	.....
14	6,050	1,770	1,030	1,360	5,530	1,860	3,590	4,200	6,230	.....
15	5,700	1,860	970	2,390	19,000	1,680	3,020	3,440	6,230	.....
16	3,440	1,960	970	9,930	9,740	1,590	3,890	3,300	7,670	.....
17	2,510	6,590	1,090	8,790	8,410	1,510	3,590	3,590	8,790	.....
18	2,170	6,590	1,290	12,100	6,950	1,510	3,020	3,740	8,410	.....
19	1,860	4,850	2,760	8,220	8,220	1,430	3,020	4,200	8,030	.....
20	1,590	3,440	2,510	10,300	6,230	1,430	2,760	4,200	7,310	.....
21	1,360	2,760	1,770	20,100	5,020	1,430	2,760	4,040	5,870	.....
22	1,290	2,510	1,770	15,700	3,890	1,360	2,510	4,850	5,530	.....
23	1,220	3,160	2,510	6,770	3,300	1,290	2,280	7,310	6,230	.....
24	1,220	2,760	2,390	6,230	3,300	1,290	2,170	7,670	6,950	.....
25	1,220	2,280	2,280	8,600	3,590	1,220	2,510	7,310	6,230	.....
26	1,360	2,060	13,600	7,850	3,160	1,160	3,020	6,950	5,870	.....
27	2,280	2,280	14,800	5,870	3,300	1,160	3,300	7,310	6,590	.....
28	3,890	2,890	13,600	4,850	3,020	1,160	2,630	6,950	5,870	.....
29	2,390	2,630	6,770	4,200	.....	1,160	2,510	5,870	5,530	.....
30	1,860	2,760	4,520	4,200	.....	1,220	3,020	5,190	5,020	.....
31	4,040	.....	3,300	4,520	.....	1,220	.....	4,680	.....	.....

Daily discharge, in second-feet, of Snoqualmie River near Snoqualmie, Wash., for the years ending Sept. 30, 1898, 1899, 1900, 1902, 1903, and 1904—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1900.							
1	2,280	1,510	2,170	3,440	2,760	2,060	3,020
2	2,280	1,510	1,960	5,020	2,760	2,060	2,760
3	2,060	2,630	1,860	3,740	3,300	2,060	2,510
4	1,960	1,960	1,960	2,890	3,890	2,060	2,510
5	1,680	1,770	1,960	2,630	4,200	6,410	2,630
6	2,060	2,760	1,960	6,230	3,440	3,590	2,510
7	2,060	2,060	3,020	5,530	3,440	2,630	2,280
8	3,590	2,060	4,200	3,890	4,680	2,630	2,060
9	2,630	2,060	5,020	3,020	3,440	2,170	1,860
10	4,680	3,300	5,700	2,390	3,160	2,060	1,680
11	4,520	6,770	17,900	2,060	3,160	2,060	1,680
12	20,100	4,040	9,550	1,960	3,440	1,960	2,170
13	9,550	3,020	6,050	3,160	3,160	1,960	2,060
14	5,870	2,390	4,500	2,510	3,300	1,960	1,680
15	4,200	1,960	4,200	2,280	2,630	1,860	1,510
16	4,680	1,680	4,040	2,060	4,360	1,960	1,360
17	4,200	1,770	3,890	2,170	3,300	2,280	.....
18	4,360	1,960	3,590	2,630	2,760	1,860	.....
19	4,200	1,960	3,300	2,170	2,510	3,590	.....
20	4,200	2,060	3,020	1,960	2,280	4,040	.....
21	4,200	6,050	2,890	1,770	2,060	5,020	.....
22	3,300	5,020	3,890	1,860	2,890	4,850	.....
23	3,160	3,740	2,760	1,590	2,280	3,160	.....
24	2,630	3,160	2,390	1,510	2,060	2,890	.....
25	2,390	2,760	2,630	1,510	2,170	3,590	.....
26	2,280	2,390	3,020	1,360	3,890	3,440	.....
27	1,860	2,060	2,510	1,290	4,040	2,760	.....
28	1,860	2,760	2,170	1,220	3,020	2,390	.....
29	1,680	.....	2,060	1,220	2,170	2,510	.....
30	1,590	.....	2,280	2,170	2,170	2,510	.....
31	1,510	.....	2,060	.....	2,060	.....	.....

Day.	Sept.	Day.	Sept.	Day.	Sept.
1902.		1902.		1902.	
1	.....	11	.....	21	685
2	.....	12	.....	22	650
3	.....	13	.....	23	650
4	.....	14	650	24	650
5	.....	15	615	25	820
6	.....	16	615	26	880
7	.....	17	615	27	4,070
8	.....	18	615	28	1,980
9	.....	19	880	29	1,270
10	.....	20	725	30	1,270

Daily discharge, in second-feet, of Snoqualmie River near Snoqualmie, Wash., for the years ending Sept. 30, 1898, 1899, 1900, 1902, 1903, and 1904—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1902–3.												
1	1,100	1,710	17,500	3,210	1,760	1,050	2,520	2,340	6,710	3,110	1,050	520
2	950	4,470	6,290	3,760	1,550	995	2,080	2,160	5,630	3,760	995	485
3	880	3,540	3,990	24,400	1,410	995	1,920	2,610	4,230	3,210	945	420
4	820	2,520	5,110	24,000	1,280	895	1,840	3,430	3,540	2,910	895	388
5	820	1,690	3,650	10,000	1,220	850	1,690	3,870	3,650	3,110	895	394
6	725	1,690	2,810	6,000	1,160	850	1,550	4,590	5,110	3,210	895	625
7	725	2,250	2,250	4,720	1,160	995	1,840	3,760	6,570	2,910	895	6,940
8	770	4,850	2,080	4,350	1,160	945	2,250	3,760	8,390	3,010	850	4,210
9	770	3,210	6,150	4,590	1,410	895	1,760	5,240	8,530	2,910	850	1,820
10	725	3,760	3,540	3,990	2,710	1,280	1,550	4,350	8,390	2,810	850	7,080
11	725	4,720	2,610	3,210	1,840	3,110	1,480	3,430	8,250	2,710	850	5,260
12	725	4,470	2,160	2,710	1,550	1,920	1,280	4,230	7,690	2,520	805	3,820
13	685	3,010	2,160	2,340	1,340	1,410	1,220	5,500	5,760	2,250	805	3,460
14	650	2,250	1,920	2,250	1,220	1,340	1,220	6,020	6,020	2,520	805	1,630
15	685	1,920	1,690	2,250	1,160	1,220	1,220	5,240	5,630	2,160	.....	1,270
16	725	2,910	1,550	2,080	1,050	1,100	1,160	4,980	5,110	2,160	.....	1,060
17	770	3,990	1,410	1,920	1,050	1,050	1,220	4,350	4,980	2,160	.....	855
18	725	4,720	1,340	2,080	995	995	1,340	3,430	4,110	2,080	.....	815
19	685	3,210	1,220	2,340	995	945	1,340	3,990	4,350	2,080	555	775
20	685	2,430	1,410	2,520	995	945	1,340	3,430	4,590	2,080	590	895
21	685	2,000	1,480	7,270	1,050	945	1,690	3,210	4,350	2,080	555	6,100
22	725	2,080	1,550	5,760	1,100	945	2,520	3,010	3,760	1,760	520	3,460
23	725	2,160	1,410	3,650	1,220	995	2,520	3,010	4,110	1,760	590	1,920
24	685	1,690	1,840	6,710	1,220	1,050	2,250	3,110	3,760	1,620	625	1,920
25	650	1,920	10,600	6,850	1,160	1,410	2,710	3,650	4,110	1,480	662	5,260
26	650	1,620	9,100	4,230	1,160	1,410	4,110	6,290	3,430	1,220	700	4,210
27	615	1,690	4,980	3,320	1,160	1,410	3,460	4,230	4,980	1,220	662	1,450
28	950	1,620	3,430	2,610	1,100	2,430	2,810	4,050	6,020	1,220	662	1,450
29	1,020	1,550	2,710	2,250	.....	3,990	2,520	3,870	3,870	1,160	625	2,650
30	1,710	1,690	3,430	2,080	.....	3,760	2,340	6,570	3,110	1,100	625	2,020
31	2,280	.....	4,230	1,920	.....	3,110	.....	6,710	.....	1,100	625	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1903–4.										
1	1,180	1,410	8,110	1,840	1,410	1,160	1,690	3,010	3,540	3,990
2	1,020	1,410	9,100	1,840	1,280	1,050	1,690	2,710	3,320	3,990
3	1,180	1,840	5,110	1,690	1,280	1,100	1,690	2,710	3,540	3,540
4	1,270	2,340	3,650	2,000	1,410	1,280	1,620	2,710	3,870	2,910
5	4,470	2,810	3,650	1,690	1,690	1,840	2,080	2,610	4,470	2,610
6	6,520	7,970	2,520	1,620	1,620	3,540	3,540	2,430	4,720	2,430
7	6,150	5,110	2,000	2,340	1,480	7,550	2,340	2,340	4,110	2,340
8	3,540	3,320	1,760	3,010	1,410	5,500	2,520	2,340	2,710	2,080
9	2,520	3,210	1,690	2,910	1,280	3,650	2,610	2,000	2,710	2,000
10	2,810	2,810	1,690	2,710	1,160	2,910	3,210	2,080	2,910	2,000
11	3,760	2,520	1,760	2,610	1,160	2,340	3,320	2,160	3,110	1,690
12	4,720	2,250	1,840	10,900	1,160	2,080	7,690	2,520	3,110	1,410
13	3,990	2,000	2,910	11,200	1,160	1,840	9,700	3,210	3,540	1,340
14	2,520	1,840	3,010	13,600	1,160	1,760	9,250	4,230	3,760	1,340
15	2,080	1,690	3,990	3,990	1,100	1,550	7,830	3,540	3,760	1,340
16	1,690	1,620	4,590	4,980	1,160	1,480	6,150	2,710	3,760	1,690
17	1,550	1,410	4,720	4,470	1,050	1,480	4,470	3,110	4,980	1,690
18	1,410	1,340	3,320	3,540	1,050	1,410	4,230	3,320	4,980	1,480
19	1,340	1,280	2,810	2,520	995	1,480	4,590	4,230	4,590	1,410
20	1,160	1,410	4,110	2,340	995	1,480	4,720	3,870	4,720	1,410
21	1,100	1,220	4,350	2,340	995	1,340	5,630	4,720	3,760	1,410
22	1,050	3,110	4,230	2,430	2,810	1,280	4,470	4,590	3,320	1,410
23	995	3,110	3,650	2,520	2,430	1,160	3,540	4,470	2,910	1,410
24	945	3,010	2,810	2,250	1,840	1,100	2,910	3,990	2,250	1,280
25	945	3,010	2,430	2,160	1,620	1,050	2,810	3,320	2,340	1,160
26	850	3,320	2,000	1,920	1,410	995	2,910	3,540	2,710	1,100
27	850	6,430	1,840	1,760	1,340	945	3,760	4,110	3,110	1,050
28	1,160	8,250	1,760	1,620	1,280	1,280	5,240	4,110	3,430	945
29	3,110	5,500	1,760	1,550	1,280	1,840	5,760	3,990	3,760	945
30	2,160	11,000	1,620	1,410	.....	1,760	4,470	3,990	3,990	895
31	1,410	.....	1,690	1,410	.....	1,690	.....	3,760	.....	895

NOTE.—Discharge determined as follows: May 1, 1898, to July 16, 1900, from rating curve well defined below and fairly well defined above 5,000 second-feet; May 12, 13, 1898, and July 2, 1900, interpolated; Sept. 14 to Nov. 2, 1902, from poorly defined rating curve; Nov. 3, 1902, to Aug. 14, 1903, and Oct. 7, 1903, to July 31, 1904, from rating curve well defined between 1,000 and 10,000 second-feet; Aug. 15, 1903, to Oct. 6, 1903, from poorly defined rating curve. Jan. 4–6, 1903, gage washed out; discharge estimated from records of Cedar and South Fork of Skykomish rivers at 24,000, 10,000, and 6,000 second-feet, respectively. Aug. 15, 1903, false work on dam raised 4 feet; 4 days, Aug. 15–18, allowed for erecting false work; discharge estimated at 680 second-feet.

Monthly discharge of Snoqualmie River near Snoqualmie, Wash., for the years ending Sept. 30, 1898–1904.

[Drainage area, 371 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1898.							
May	6,950	2,890	4,480	12.1	13.95	275,000	B.
June	6,590	2,280	4,710	12.7	14.17	280,000	B.
July	3,300	1,090	2,040	5.50	6.34	125,000	A.
August	1,090	520	691	1.86	2.14	42,500	A.
September	3,890	468	1,030	2.78	3.10	61,300	A.
The period						784,000	
1898–99.							
October	6,050	915	2,220	5.98	6.89	136,000	A.
November	7,670	1,680	3,610	9.73	10.86	215,000	A.
December	14,800	970	3,220	8.68	10.01	198,000	A.
January	20,100	1,290	5,270	14.2	16.37	324,000	C.
February	19,000	1,770	4,800	12.9	13.43	267,000	B.
March	3,440	1,160	1,800	4.85	5.59	111,000	A.
April	9,170	1,220	2,970	8.01	8.94	177,000	A.
May	11,300	2,060	5,120	13.8	15.91	315,000	B.
June	10,700	5,020	6,930	18.7	20.86	412,000	B.
July 1–12	8,030	5,530	6,490	17.5	7.81	154,000	B.
The period						2,310,000	
1900.							
January	20,100	1,510	3,790	10.2	11.76	233,000	A.
February	6,770	1,510	2,760	7.44	7.75	153,000	A.
March	17,900	1,860	3,820	10.3	11.87	235,000	B.
April	6,230	1,220	2,570	6.93	7.73	153,000	A.
May	4,680	2,060	3,060	8.25	9.51	188,000	A.
June	6,410	1,860	2,810	7.57	8.45	167,000	A.
July 1–16	3,020	1,360	2,140	5.77	3.43	67,900	A.
The period						1,200,000	
1902.							
September 14–30	4,070	615	1,040	2.80	1.77	35,100	D.
1902–3.							
October	2,280	615	840	2.26	2.61	51,600	D.
November	4,850	1,550	2,710	7.30	8.14	161,000	A.
December	17,500	1,220	3,730	10.1	11.64	229,000	A.
January	24,400	1,920	5,140	13.9	16.03	316,000	C.
February	2,710	995	1,290	3.48	3.62	71,600	A.
March	3,990	850	1,460	3.94	4.54	89,800	A.
April	4,110	1,160	1,960	5.28	5.89	117,000	A.
May	6,710	2,160	4,140	11.2	12.91	255,000	A.
June	8,530	3,110	5,290	14.3	15.95	315,000	A.
July	3,760	1,100	2,240	6.04	6.96	138,000	A.
August	1,050	520	745	2.01	2.32	45,800	C.
September	7,080	388	2,440	6.58	7.34	145,000	D.
The year	24,400	388	2,670	7.20	97.95	1,930,000	
1903–4.							
October	6,520	850	2,240	6.04	6.96	138,000	C.
November	11,000	1,220	3,250	8.76	9.77	193,000	A.
December	9,100	1,620	3,240	8.73	10.06	199,000	A.
January	13,600	1,410	3,330	8.98	10.35	205,000	B.
February	2,810	995	1,380	3.72	4.01	79,400	A.
March	7,550	945	1,970	5.31	6.12	121,000	A.
April	9,700	1,620	4,210	11.3	12.61	251,000	A.
May	4,720	2,000	3,300	8.89	10.25	203,000	A.
June	4,980	2,250	3,590	9.68	10.80	214,000	A.
July	3,990	895	1,780	4.80	5.53	109,000	A.
The period						1,710,000	

NORTH FORK OF SNOQUALMIE RIVER AT CABLE BRIDGE, NEAR NORTH BEND, WASH.

LOCATION.—In the NE. ¼ NE. ¼ sec. 13, T. 24 N., R. 8 E., 300 feet below Hancock Creek, 600 feet above the cable bridge, 6 miles above the mouth, and 6 miles northeast of North Bend, in King County.

DRAINAGE AREA.—80 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—November 7, 1913, to October 17, 1915, when station was discontinued.

GAGE.—Since November 7, 1913, Friez water-stage recorder on left bank 600 feet above cable bridge; before that date, a vertical staff attached to overhanging tree, at same location as present gage but at datum 0.23 foot higher, read once a week to tenths. Record prior to November 7, 1913, unreliable; not published.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Large boulders, and gravel; permanent; one channel at all stages; gradient very steep; both banks high and wooded.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.7 feet at 11 p. m. April 2 (discharge, 3,280 second-feet); minimum stage recorded, 0.59 foot September 5–7 (discharge, 74 second-feet).

1913–1915: Maximum stage recorded, 6.4 feet at 2 a. m. January 5, 1914 (discharge, 3,840 second-feet); minimum stage recorded, 0.54 foot August 29 to September 2, 1914 (discharge, 67 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Puget Sound Traction, Light & Power Co.

Discharge measurements of North Fork of Snoqualmie River at cable bridge, near North Bend, Wash., during 1908–1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1908.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
Sept. 23	M. T. Crawford	0.40	64	May 10	Weller Rose	2.38	848
1909.				Aug. 19	Collier and Rose	.59	70
Aug. 24	M. T. Crawford	.50	65	1915.			
1910.				Mar. 21	McFadden and Hartson	1.97	612
June 30	M. T. Crawford	1.12	254	Aug. 25	R. C. McFadden	.57	74
1911.				1916.			
Sept. 11	G. L. Parker	.88	155	Apr. 3	Hartson and McFadden	2.21	722
1913.				3	McFadden and Hartson	2.20	743
June 5	Rose and Ernisse	2.60	1,120	Aug. 10	J. T. Hartson	1.41	315
July 24	Tuttle and Rose	1.85	582				

Daily discharge, in second-feet, of North Fork of Snoqualmie River at cable bridge, near North Bend, Wash., for the period Nov. 7, 1913, to Oct. 17, 1915.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.											
1	.....	800	257	460	1,320	287	752	788	532	107	67
2	.....	668	269	385	860	300	892	776	500	105	67
3	.....	576	300	346	668	521	958	680	475	100	68
4	.....	521	1,600	365	626	830	758	532	440	98	68
5	.....	480	3,200	332	543	990	626	475	360	96	70
6	.....	485	2,880	291	510	710	609	425	327	94	70
7	587	500	2,090	273	554	632	650	425	309	102	70
8	510	455	1,360	261	668	638	650	1,420	291	107	71
9	495	405	958	250	632	692	650	1,120	278	96	87
10	576	370	716	265	548	740	830	860	261	94	89
11	490	420	644	336	516	662	788	764	250	92	87
12	440	505	582	355	554	644	776	770	242	89	100
13	380	445	532	400	860	925	892	722	242	85	111
14	341	465	490	390	1,740	1,060	1,020	680	238	82	115
15	370	543	495	370	1,150	1,670	892	758	246	78	485
16	2,020	460	543	375	1,460	1,060	764	752	198	77	425
17	1,880	400	500	365	1,090	830	680	686	176	78	415
18	770	360	450	355	925	830	638	609	176	78	614
19	548	332	400	390	860	1,150	604	510	180	77	638
20	543	300	360	435	860	1,090	662	460	173	75	800
21	495	273	370	538	782	752	758	592	164	74	620
22	587	257	609	830	692	626	758	565	150	72	390
23	680	242	495	716	565	582	740	465	148	72	287
24	1,420	226	440	734	532	526	644	565	142	72	226
25	892	216	435	638	485	495	716	686	137	71	192
26	800	212	455	526	430	543	704	554	132	70	212
27	788	216	405	1,280	380	644	680	560	127	70	405
28	728	253	351	860	351	582	656	543	123	68	322
29	800	226	336	.....	341	538	548	532	120	67	257
30	830	206	370	.....	318	592	548	532	115	67	216
31	.....	226	415	.....	304	.....	668	.....	109	67	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1914-15.													
1	198	892	470	728	445	295	1,310	304	582	230	156	78	130
2	430	1,420	430	656	440	273	2,760	295	538	212	148	80	1,600
3	435	1,640	400	543	385	257	2,210	385	490	198	142	80	1,250
4	332	1,280	370	480	341	400	1,450	380	465	183	135	77	668
5	265	1,390	341	420	380	440	990	400	455	173	127	74	465
6	226	1,150	313	370	505	395	800	440	440	170	123	74	351
7	195	860	291	351	450	390	830	480	405	170	115	74	278
8	176	794	269	410	420	360	734	450	351	170	111	98	230
9	156	764	250	440	460	341	609	470	313	176	111	148	206
10	410	620	234	415	445	336	576	576	300	164	109	130	212
11	990	1,460	220	650	390	336	626	565	291	159	107	109	209
12	860	1,060	209	644	346	313	782	485	278	189	102	100	341
13	680	1,390	195	532	332	309	958	440	269	410	98	98	526
14	470	925	186	516	304	653	752	450	261	505	96	98	1,530
15	370	722	183	475	282	1,220	656	405	246	415	92	113	764
16	332	609	180	420	273	794	692	360	242	505	92	123	548
17	770	538	173	380	341	626	734	385	238	576	92	111	455
18	1,250	480	170	355	526	782	680	500	230	460	92	100	.....
19	1,320	576	167	395	400	604	638	592	304	380	90	94	.....
20	1,020	1,500	159	410	346	548	604	604	475	318	89	89	.....
21	710	958	153	395	327	632	485	516	380	273	87	85	.....
22	548	728	150	365	309	782	420	505	309	246	85	82	.....
23	470	716	142	327	291	830	385	470	278	220	85	78	.....
24	420	644	140	304	287	746	390	543	250	206	84	78	.....
25	395	604	140	278	385	598	380	644	246	189	80	77	.....
26	346	830	170	257	346	485	410	698	385	180	78	75	.....
27	300	650	195	241	304	435	395	1,230	370	173	77	78	.....
28	261	609	313	234	295	450	400	1,890	318	167	75	78	.....
29	234	565	261	226	.....	668	420	1,130	273	161	75	77	.....
30	313	516	304	226	.....	728	360	830	250	161	75	77	.....
31	465	.....	722	261	.....	592	.....	668	.....	159	75	.....	.....

NOTE.—Discharge ascertained from a rating curve well defined between 60 and 1,200 second-feet. Discharge computed by subdivided days Mar. 14–15, Apr. 1–5, and May 27–29, 1915.

Monthly discharge of North Fork of Snoqualmie River at cable bridge, near North Bend, Wash., for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913–14.					
November 7–30	2,020	341	749	35,700	A.
December	800	206	388	23,900	A.
January	3,200	257	752	46,200	A.
February	1,280	250	469	26,000	A.
March	1,740	304	714	43,900	A.
April	1,670	287	738	43,900	A.
May	1,020	548	726	44,600	A.
June	1,420	425	660	39,300	A.
July	532	109	237	14,600	A.
August	107	67	83.2	5,120	A.
September	800	67	255	15,200	A.
The period				338,000	
1914–15.					
October	1,320	156	495	30,400	A.
November	1,640	480	896	53,300	A.
December	722	140	255	15,700	A.
January	728	226	410	25,200	A.
February	526	273	370	20,500	A.
March	1,220	257	536	33,000	A.
April	2,760	360	781	46,500	A.
May	1,890	295	584	35,900	A.
June	582	230	341	20,300	A.
July	576	159	255	15,700	A.
August	156	75	100	6,150	A.
September	148	74	91.1	5,420	A.
The year	2,760	74	425	308,000	

NOTE.—Oct. 1–17, 1915, mean discharge, 574 second-feet; total run-off, 19,400 acre-feet.

NORTH FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In sec. 34, T. 24 N., R. 8 E., at highway bridge one-eighth mile above mouth and 2 miles north of North Bend, in King County.

DRAINAGE AREA.—102 square miles (measured on topographic and county maps).

RECORDS AVAILABLE.—July 4, 1907, to September 30, 1915.

GAGE.—Since September 2, 1912, Fuller water-stage recorder on left abutment of highway bridge; before that date, a vertical staff at same location and datum, read once every second day, to tenths, July 21, 1907, to February 29, 1908, and once each day, to tenths, July 1, 1908, to September 2, 1912, by M. H. Norman.

DISCHARGE MEASUREMENTS.—Made from a cable or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifting at high stages. Banks fairly high, not subject to overflow. One channel at all stages. Backwater from the Middle Fork probably reaches station when that stream is high.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1915, from water-stage recorder, 7.65 feet at 8 p. m. April 2 (discharge, 4,270 second-feet); minimum stage recorded, 1.82 feet September 30 (discharge, 71 second-feet).

1907–1915: Maximum stage recorded, 14.5 feet (by levels to high-water mark) November 18, 1911 (discharge, 11,100 second-feet). Water above gage November 18, 19, 23, 24, 29, and 30, 1909, and stage may have exceeded that in 1911. Minimum stage recorded, 2.16 feet September 5–7, 1914 (discharge, 59 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results for periods previous to installation of water-stage recorder, fair; since that time, good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Puget Sound Traction, Light & Power Co.

Discharge measurements of North Fork of Snoqualmie River near North Bend, Wash., during 1907–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1907.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
July 4	A. S. Kalenborn	3.02	763	Apr. 25	Weller Rose	2.85	409
Aug. 8	....do	1.60	221	May 9	....do	4.34	1,230
Sept. 17	....do	3.30	901	9	H. C. Hanson	4.34	1,220
1908.				July 29	Weller Rose	1.82	196
Sept. 24	M. T. Crawford	1.09	144	1913.			
1909.				Jan. 4	Eernisse and Rose	4.41	1,450
Aug. 25	A. T. Harris	1.15	143	28	L. M. Severtson	3.56	790
1910.				June 4	J. G. Eernisse	4.52	1,520
Mar. 17	....do	5.05	2,270	July 23	Tuttle and Rose	3.15	616
June 30	Crawford and Easter	2.18	294	Sept. 18	Rose and Mason	1.58	193
Sept. 21	R. R. Easter	1.20	77	Oct. 11	Hartson and Beery	8.15	4,620
21	....do	1.20	80	1914.			
Oct. 19	M. T. Crawford	3.58	827	May 7	Weller Rose	3.98	875
1911.				Aug. 20	Collier and Rose	2.26	77
Mar. 15	R. R. Easter	2.20	255	1915.			
Sept. 10	M. T. Crawford	2.04	234	Jan. 12	McFadden and Brown	3.74	853
10	G. L. Parker	2.04	243	12	Brown and McFadden	3.71	831
Oct. 10	R. R. Easter	1.90	198	Mar. 18	McFadden and Hartson	3.94	969
1912.				19	....do	3.60	736
Jan. 9	Weller Rose	2.90	336	Apr. 4	McFadden and Wilbur	5.19	1,990
Feb. 21	....do	3.30	669	July 7	R. C. McFadden	2.40	216
Mar. 28	....do	2.60	333	Aug. 12	....do	2.06	115
				Sept. 2	....do	1.89	82

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1907.				1907.				1907.			
1	.....	153	202	11	.....	192	183	21	183	160	328
2	.....	153	212	12	.....	202	175	22	175	167	300
3	.....	150	223	13	.....	212	167	23	167	167	271
4	750	147	223	14	.....	223	.....	24	167	167	271
5	.....	144	223	15	.....	223	.....	25	167	264	271
6	.....	141	212	16	.....	223	.....	26	167	360	258
7	750	182	202	17	.....	223	913	27	167	281	246
8	.....	223	192	18	.....	223	832	28	167	202	224
9	.....	203	183	19	.....	188	750	29	167	202	202
10	.....	183	183	20	.....	153	539	30	160	202	202
								31	153	202	.....

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	July.	Aug.	Sept.
1907–8.								
1	202	208	.....	412	258	750	202	246
2	236	223	.....	430	246	803	183	202
3	271	276	.....	412	234	750	183	183
4	271	328	.....	394	223	699	183	167
5	271	300	699	522	308	699	183	167
6	236	271	.....	649	394	555	183	153
7	202	271	.....	649	361	555	167	153
8	212	271	.....	649	328	601	167	246
9	223	227	.....	602	300	649	167	202
10	203	183	.....	555	271	555	167	183
11	183	175	555	555	271	601	167	167
12	183	167	627	555	271	649	167	153
13	183	175	699	512	271	649	167	153
14	203	183	564	469	271	555	167	153
15	223	272	430	432	300	555	167	153
16	195	360	379	394	328	555	167	153
17	167	377	328	474	442	511	153	153
18	160	394	328	555	555	511	153	153
19	153	522	328	602	474	511	153	141
20	153	649	442	649	394	511	153	141
21	153	753	555	559	377	271	153	141
22	153	857	734	469	360	271	153	141
23	153	885	913	432	344	271	153	141
24	153	913	858	394	328	246	153	141
25	153	913	803	361	398	246	141	131
26	150	913	679	328	469	202	141	131
27	147	.....	555	313	469	202	141	131
28	147	.....	512	298	469	223	141	131
29	147	.....	469	284	511	223	246	131
30	175	.....	432	271	.....	202	298	131
31	192	.....	394	271	.....	202	271	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	153	971	298	803	328	511	750	857	4,770	803	271	183
2	153	750	153	1,090	360	469	555	971	5,170	803	298	167
3	153	649	430	2,900	555	469	469	1,380	1,960	750	271	153
4	131	469	394	1,460	469	469	430	1,620	1,620	750	271	153
5	167	360	394	1,090	430	469	430	857	1,460	699	271	153
6	167	360	360	971	430	469	430	803	1,220	699	246	153
7	167	360	394	971	430	394	469	803	1,160	649	246	141
8	167	298	430	601	394	394	511	750	1,220	803	202	141
9	183	298	430	469	360	469	511	857	1,300	803	202	141
10	202	298	555	394	328	394	469	857	1,460	750	183	153
11	223	271	699	360	328	360	511	913	1,620	1,300	183	153
12	246	246	750	328	298	360	511	750	1,300	859	183	131
13	298	246	857	328	271	360	555	750	1,090	699	183	131
14	360	202	649	328	271	360	699	750	1,090	511	183	131
15	469	183	511	328	430	360	699	750	1,160	430	183	131
16	469	202	469	699	1,300	328	649	803	1,030	430	183	131
17	469	601	394	750	1,460	360	511	803	971	394	183	153
18	328	3,180	360	1,960	1,380	394	511	803	913	394	167	153
19	360	1,160	328	2,800	1,090	360	394	857	971	328	167	153
20	430	1,030	328	1,880	803	360	394	803	913	328	153	430
21	328	1,090	298	1,880	750	360	394	699	913	328	153	555
22	328	1,160	298	971	469	394	394	649	857	298	141	511
23	298	1,380	430	857	555	394	430	601	750	298	141	328
24	328	1,300	430	750	555	394	649	857	750	298	131	298
25	328	649	803	649	649	430	1,620	913	857	298	147	246
26	328	601	601	601	649	469	1,790	1,220	857	271	167	223
27	328	511	1,090	511	699	469	1,030	1,620	857	271	167	246
28	328	394	1,220	511	601	469	1,030	1,160	803	271	167	202
29	601	360	1,300	430	.....	469	1,160	1,090	803	271	153	511
30	1,220	328	1,160	430	.....	511	750	1,300	857	271	131	511
31	1,380	.....	1,030	328	.....	555	.....	1,880	.....	271	131	.....

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	511	.....	3,180	469	1,300	1,960	857	803	1,110	300	108	78
2	511	.....	2,900	430	971	3,470	803	803	641	268	92	78
3	699	.....	2,800	430	803	3,280	750	803	543	268	92	78
4	601	.....	1,540	430	699	2,320	803	803	543	239	92	78
5	555	.....	1,090	430	555	1,880	913	857	591	239	92	78
6	511	.....	913	430	555	1,380	1,160	913	591	239	92	78
7	649	.....	857	430	511	1,160	1,220	1,220	641	239	78	108
8	511	.....	750	430	469	1,090	1,220	1,220	591	239	78	92
9	430	.....	750	430	469	971	1,300	1,220	591	239	78	78
10	328	.....	699	430	469	1,090	1,300	3,970	591	268	78	78
11	328	.....	699	328	430	1,220	1,300	3,210	1,810	268	78	78
12	328	.....	3,180	328	430	1,540	1,220	2,070	1,050	268	78	78
13	328	.....	2,700	328	430	1,700	1,160	1,480	641	268	78	78
14	298	.....	2,140	328	469	1,880	1,030	1,110	641	239	78	66
15	271	.....	2,050	328	469	1,960	971	982	641	239	78	66
16	246	.....	1,160	328	430	1,790	913	802	591	239	78	66
17	246	.....	1,300	328	430	2,230	913	860	497	213	78	78
18	223	.....	750	430	394	2,230	1,030	982	411	168	78	92
19	223	.....	649	430	394	2,520	1,620	860	335	146	78	92
20	223	.....	649	360	360	2,050	2,050	693	591	146	78	78
21	246	.....	601	360	360	1,880	1,220	693	497	146	78	78
22	394	.....	555	2,050	360	1,790	2,050	920	411	146	78	78
23	298	.....	511	2,990	360	1,700	1,700	1,050	411	146	78	66
24	328	.....	511	3,080	469	1,220	1,700	1,320	300	146	78	66
25	328	.....	469	2,140	803	1,090	2,050	1,480	300	146	78	66
26	298	.....	469	971	913	1,030	2,050	860	411	146	78	56
27	271	.....	430	971	1,460	857	1,300	920	372	146	78	56
28	246	.....	430	971	1,880	857	971	747	335	126	78	56
29	298	.....	430	750	.....	803	913	802	335	126	78	66
30	394	.....	555	913	.....	803	750	860	300	126	78	300
31	430	.....	649	913	.....	971	.....	920	.....	126	78	.....
1910–11.												
1	2,070	531	488	488	318	176	624	576	1,640	576	155	98
2	1,480	488	780	488	318	176	531	726	954	624	155	98
3	3,310	836	836	411	292	176	377	1,020	894	531	134	98
4	2,110	624	780	531	267	179	346	1,720	726	624	115	83
5	1,080	488	836	780	267	198	346	1,570	531	531	115	83
6	1,020	1,570	1,020	1,080	267	198	318	1,020	531	624	98	243
7	2,650	3,020	1,080	1,570	243	243	292	894	624	576	98	267
8	1,280	1,280	894	1,210	243	292	292	954	576	531	98	267
9	1,020	836	894	1,080	243	292	318	780	726	488	98	292
10	780	5,580	674	780	243	267	488	726	836	448	98	232
11	531	2,030	576	674	292	292	411	674	1,350	411	98	292
12	488	1,500	488	531	243	243	377	674	1,500	411	98	292
13	411	1,080	411	448	243	220	377	954	1,500	411	98	1,350
14	377	954	377	346	243	220	346	726	1,080	448	98	1,350
15	346	726	346	346	243	267	318	674	1,080	448	83	1,280
16	292	531	448	346	220	346	318	674	954	448	83	1,210
17	1,800	488	448	346	220	377	346	1,150	624	448	83	726
18	1,640	448	411	377	243	411	411	1,570	576	346	83	531
19	836	488	377	411	243	411	377	1,500	576	346	83	411
20	624	1,640	377	346	243	531	377	1,020	531	318	176	411
21	726	6,580	411	346	220	531	411	954	531	267	176	377
22	448	2,200	346	318	220	631	448	780	531	220	155	346
23	377	1,950	2,200	318	220	894	488	780	411	220	115	318
24	448	1,210	1,500	318	220	894	674	780	411	220	115	318
25	1,280	894	894	292	198	726	726	780	411	220	115	292
26	836	726	726	267	198	488	576	836	448	198	115	267
27	531	624	836	267	198	411	674	836	531	176	98	243
28	411	576	674	267	176	377	576	836	726	176	98	220
29	346	576	624	267	.....	377	488	954	624	155	98	220
30	318	531	726	243	.....	448	488	1,080	624	155	98	220
31	292	.....	624	346	.....	488	.....	1,350	.....	155	98	.....

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.												
1	198	134	875	377	1,030	268	407	677	915	789	207	1,840
2	198	134	749	337	967	243	489	533	635	683	193	985
3	176	134	688	337	730	243	489	533	635	545	193	762
4	176	134	629	337	627	243	533	533	683	503	193	545
5	176	243	572	337	677	243	489	533	789	503	180	428
6	155	267	572	337	845	243	447	489	734	503	180	368
7	155	2,830	629	300	906	221	447	533	1,060	683	180	476
8	155	1,080	1,500	265	1,030	221	489	786	985	589	180	1,060
9	134	674	1,290	357	1,100	221	533	1,230	683	464	193	708
10	198	576	1,430	421	1,300	221	627	1,030	683	464	207	499
11	220	488	1,430	377	1,100	221	627	1,030	635	464	238	401
12	198	488	1,430	572	845	183	533	1,030	683	428	222	344
13	198	836	1,220	629	730	167	489	1,440	734	362	207	307
14	576	1,640	518	3,280	906	167	447	1,520	1,130	332	207	279
15	448	954	468	1,660	730	167	447	1,520	683	332	207	253
16	267	836	518	1,520	1,980	183	407	906	635	304	238	238
17	243	3,490	812	1,230	1,230	243	407	967	683	304	503	230
18	220	11,100	572	1,030	1,160	183	407	967	683	279	464	219
19	220	7,800	518	967	845	183	407	967	789	279	428	212
20	198	4,580	629	786	677	183	407	2,310	849	238	394	207
21	198	2,290	629	786	627	183	331	2,000	985	238	304	197
22	176	1,650	572	730	533	183	331	1,430	683	238	279	193
23	176	1,360	1,080	677	677	167	368	1,130	635	257	257	190
24	176	1,220	749	1,740	579	183	407	849	589	257	238	188
25	176	1,360	749	2,750	489	183	427	1,060	635	238	238	185
26	176	2,130	572	1,230	447	221	368	1,130	635	238	238	181
27	155	1,360	518	1,030	368	268	331	1,130	635	222	222	179
28	155	1,150	468	1,590	368	331	407	1,130	635	222	207	178
29	134	1,080	421	1,900	368	331	579	789	545	207	207	174
30	134	940	377	1,980	.....	331	906	734	734	207	207	174
31	134	.....	377	1,160	.....	297	.....	635	.....	207	238	.....
1912-13.												
1	180	344	.....	.....	510	279	.....	.....	1,880	1,360	284	144
2	238	304	.....	.....	464	279	.....	.....	2,050	915	277	148
3	213	318	.....	.....	464	294	.....	.....	1,880	789	261	225
4	394	332	.....	.....	435	347	.....	.....	1,670	762	246	1,880
5	304	612	.....	.....	411	401	.....	.....	1,240	1,020	219	2,990
6	289	.....	.....	.....	388	464	.....	.....	1,170	1,020	210	849
7	286	.....	464	.....	356	.....	.....	.....	1,430	985	208	520
8	284	.....	468	.....	329	.....	.....	.....	1,550	789	220	390
9	284	1,630	464	.....	304	347	.....	.....	1,060	789	210	318
10	282	1,390	.....	.....	292	.....	.....	.....	882	915	201	279
11	279	.....	.....	.....	275	.....	.....	.....	915	734	193	242
12	275	.....	.....	.....	264	.....	.....	.....	1,020	635	188	227
13	255	.....	.....	.....	257	.....	.....	.....	1,200	950	185	210
14	238	.....	589	.....	.....	.....	.....	.....	1,090	915	183	200
15	228	.....	476	.....	.....	.....	.....	.....	849	789	188	194
16	244	789	511	.....	1,840	.....	.....	.....	882	635	180	184
17	460	.....	683	.....	.....	.....	.....	.....	819	683	185	178
18	442	.....	.....	.....	.....	.....	.....	.....	849	734	196	178
19	503	2,450	.....	.....	.....	.....	.....	.....	1,200	762	185	196
20	.....	1,550	.....	.....	.....	.....	1,090	.....	1,320	762	179	183
21	.....	950	394	.....	.....	.....	1,360	.....	1,130	734	168	201
22	.....	1,090	.....	.....	620	.....	532	.....	1,200	708	158	428
23	.....	985	.....	.....	435	.....	341	.....	1,510	612	157	318
24	.....	849	.....	.....	394	.....	289	.....	1,280	545	156	238
25	.....	.....	.....	.....	368	.....	289	.....	1,430	468	155	214
26	.....	.....	.....	1,320	353	.....	432	.....	1,320	394	152	199
27	.....	.....	.....	915	329	.....	503	.....	1,090	341	152	192
28	460	.....	.....	.....	299	.....	.....	1,240	950	347	148	203
29	439	.....	.....	.....	.....	.....	.....	1,130	882	408	146	200
30	464	372	.....	.....	.....	.....	.....	1,240	1,200	335	144	192
31	404	.....	.....	.....	.....	.....	.....	1,510	.....	284	144	.....

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	184	321	955	524	729	1,800	513	1,060	955	603	118	62
2	183	277	698	470	686	1,340	558	1,200	890	569	116	66
3	200	219	580	470	569	1,060	799	1,260	806	552	110	61
4	199	237	470	524	603	988	1,090	1,060	632	481	108	61
5	197	729	418	1,300	615	858	1,340	890	574	428	103	59
6	193	1,520	444	3,300	586	792	1,020	825	519	378	98	59
7	589	858	444	3,100	502	812	890	890	508	344	100	59
8	589	729	368	2,090	470	955	890	890	1,600	330	103	62
9	635	825	321	1,450	449	922	955	890	1,450	312	103	106
10	1,020	1,060	277	1,160	460	806	1,020	1,060	1,090	308	98	126
11	4,700	668	277	1,090	546	735	988	1,060	922	295	90	103
12	2,350	524	393	1,020	569	792	988	988	922	295	84	113
13	2,260	418	321	922	621	988	988	1,160	858	295	79	118
14	1,760	344	344	818	615	1,760	1,490	1,300	806	295	81	116
15	1,380	321	470	792	609	1,490	1,680	1,160	890	326	84	465
16	1,260	2,180	344	858	609	1,880	1,450	955	922	308	88	552
17	890	1,450	257	799	609	1,490	1,160	825	858	265	98	513
18	858	1,020	219	.....	592	1,300	1,120	799	773	245	100	686
19	955	792	185	.....	626	1,230	1,520	735	674	226	100	825
20	858	760	154	.....	710	1,200	1,450	825	603	219	84	988
21	729	609	140	.....	890	1,090	1,090	955	704	208	70	890
22	638	638	140	.....	1,260	1,020	890	955	735	188	68	546
23	580	1,020	126	.....	1,120	988	858	922	574	169	68	449
24	552	1,920	113	735	1,160	922	773	799	644	160	66	378
25	524	1,200	100	.....	1,060	858	686	858	922	157	66	223
26	470	1,060	100	.....	858	825	704	858	735	154	64	249
27	524	1,060	88	.....	1,640	812	812	818	662	146	66	470
28	444	825	113	615	1,340	704	799	812	662	137	68	359
29	368	922	169	.....	.....	650	741	680	621	132	68	286
30	321	955	237	.....	.....	586	806	650	603	126	70	245
31	277	.....	418	656	.....	563	.....	806	.....	124	66	.....

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	223	470	601	833	493	388	1,810	401	704	274	178	81
2	408	825	541	833	582	388	3,660	405	641	256	171	79
3	524	2,400	531	641	502	388	2,900	474	598	242	164	78
4	378	1,500	493	556	461	456	2,110	456	541	229	158	78
5	321	1,700	448	488	488	526	1,460	456	502	222	153	78
6	273	1,820	422	448	592	536	1,140	465	493	216	148	81
7	249	1,220	401	426	566	465	1,070	488	465	209	142	86
8	223	860	376	448	521	456	965	493	409	209	128	89
9	205	800	352	521	531	434	764	516	380	204	124	123
10	378	770	340	587	561	426	715	635	364	199	120	150
11	1,400	1,900	321	758	493	413	674	652	356	194	117	128
12	892	1,460	310	801	465	405	833	571	344	194	115	102
13	1,180	1,780	292	669	448	413	1,070	516	333	396	112	102
14	680	1,220	281	630	413	764	898	521	314	608	109	104
15	460	965	285	603	392	1,480	715	483	296	479	106	108
16	403	782	267	571	372	1,000	758	456	296	521	104	119
17	932	686	260	516	405	833	801	448	296	630	102	106
18	1,420	608	260	483	692	833	776	536	310	502	100	98
19	1,640	806	253	502	502	727	758	663	352	438	98	95
20	1,340	1,820	253	526	439	613	727	710	526	374	95	91
21	922	1,260	242	516	422	715	603	603	443	310	93	88
22	674	965	253	470	401	898	531	582	372	288	89	82
23	546	930	232	413	388	1,000	502	561	325	266	89	79
24	449	833	226	392	380	930	483	587	310	244	88	79
25	413	776	236	376	470	745	474	727	288	222	86	78
26	388	1,040	239	356	443	619	483	782	396	216	84	78
27	326	833	267	356	405	526	479	1,270	413	209	82	78
28	303	782	376	348	388	526	488	1,880	372	200	79	74
29	273	721	344	340	.....	776	483	1,260	337	190	78	73
30	303	661	372	348	.....	865	456	965	303	187	74	71
31	492	.....	828	356	.....	745	.....	795	.....	178	78	.....

NOTE.—Daily discharge determined as follows: 1907–8—July 4, 1907, to Sept. 30, 1908, from rating curve well defined between 100 and 3,000 second-feet; estimated by hydrographic comparison with records of South and Middle forks, as follows: Sept. 14–16, 1907, 473 second-feet; Nov. 27–30, 2,270 second-feet; Dec. 1–4, 2,270 second-feet; Dec. 6–10, 499 second-feet; interpolated for other days on which gage was not read.

1908–9—Oct. 1, 1908, to Sept. 30, 1909, from rating curve well defined between 100 and 3,000 second-feet. interpolated for days on which gage was not read.

1909–10—Oct. 1, 1909, to May 10, 1910, from rating curve well defined between 100 and 3,000 second-feet; May 11 to Sept. 30, 1910, from rating curve well defined between 50 and 500 second-feet. Not estimated Nov. 1–30, 1909, because of uncertainty as to the rating curve for flood stages.

1910–11—Oct. 1–3, 1910, from rating curve well defined between 50 and 500 second-feet; Oct. 4, 1910, to Sept. 30, 1911, from rating curve fairly well defined between 150 and 1,200 second-feet.

1911–12—Oct. 1 to Nov. 18, 1911, from rating curve fairly well defined between 150 and 1,200 second-feet; Nov. 19, 1911, to Jan. 14, 1912, rating curve not well defined; Jan. 15 to May 20, 1912, from rating curve well defined between 200 and 1,500 second-feet; May 21 to Sept. 30, 1912, from rating curve fairly well defined between 125 and 2,000 second-feet.

1912–13—Oct., 1912, to Sept. 30, 1913, from rating curve fairly well defined between 125 and 2,000 second-feet; estimated by hydrographic comparison with records of South and Middle forks as follows: Oct. 20–27, 1912, 529 second-feet; Nov. 6–8, 970 second-feet; Nov. 11–15, 1,470 second-feet; Nov. 17–18, 800 second-feet; Nov. 25–29, 501 second-feet; Feb. 14–15, 1913, 510 second-feet; Feb. 17–21, 1,160 second-feet; estimated, Sept. 7–8, by hydrographic comparison with record of North Fork of Snoqualmie River at cable bridge, as in table.

1913–14—Oct. 1–10, 1913, from rating curve fairly well defined between 125 and 2,000 second-feet; Oct. 11, 1913, to Sept. 30, 1914, from rating curve fairly well defined between 60 and 4,700 second-feet; estimated by hydrograpahic comparison with records of South and Middle forks, as follows: Jan. 18–23, 1914, 722 second-feet; Jan. 25–27, 698 second-feet; Jan. 29–30, 615 second-feet.

1914–15—Oct. 1 to Nov. 3, 1914, from rating curve fairly well defined between 60 and 4,700 second-feet; Nov. 4, 1914, to Sept. 30, 1915, from rating curve well defined between 80 and 2,500 second-feet; interpolated for lack of gage readings July 9–10, 19–20, 22–24, Aug. 2–3, 5–6, 9–10, and 13–14, 1915. Nov. 8–19, 1914, and Nov. 29 to Dec. 1, estimated by hydrographic comparison with records of North Fork of Snoqualmie River at cable bridge, as in table.

Monthly discharge of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1907.							
July 21–31	183	153	167	1.64	0.67	3,640	C.
August	360	141	197	1.93	2.22	12,100	C.
September			320	3.14	3.50	19,000	C.
The period						34,700	
1907–8.							
October	271	147	189	1.85	2.13	11,600	C.
November		167	672	6.59	7.35	40,000	C.
December			770	7.55	8.70	47,300	C.
January	649	271	466	4.57	5.27	28,700	C.
February	555	223	353	3.46	3.73	20,300	C.
July	803	202	477	4.68	5.40	29,300	C.
August	298	141	174	1.71	1.97	10,700	C.
September	246	131	159	1.56	1.74	9,460	C.
1908–9.							
October	1,380	131	358	3.51	4.05	22,000	C.
November	3,180	183	664	6.51	7.26	39,500	C.
December	1,300	153	576	5.65	6.51	35,400	C.
January	2,900	328	917	8.99	10.36	56,400	C.
February	1,460	271	594	5.82	6.06	33,000	C.
March	555	328	420	4.12	4.75	25,800	C.
April	1,790	394	657	6.44	7.18	39,100	C.
May	1,880	601	959	9.40	10.84	59,000	C.
June	5,170	750	1,360	13.3	14.84	80,900	C.
July	1,300	271	527	5.17	5.96	32,400	C.
August	298	131	189	1.85	2.13	11,600	C.
September	555	131	229	2.25	2.51	13,600	C.
The year	5,170	131	619	6.07	82.45	449,000	
1909–10.							
October	699	223	373	3.66	4.22	22,900	C.
December	3,180	430	1,170	11.5	13.26	71,900	C.
January	3,080	328	773	7.58	8.74	47,500	C.
February	1,880	360	630	6.18	6.44	35,000	C.
March	3,470	803	1,640	16.1	18.56	101,000	C.
April	2,050	750	1,240	12.2	13.61	73,800	C.
May	3,970	693	1,170	11.5	13.26	71,900	D.
June	1,810	300	577	5.66	6.32	34,300	C.
July	300	126	202	1.98	2.28	12,400	C.
August	108	78	81.2	.796	.92	4,990	C.
September	300	56	82.8	.812	.91	4,930	C.
1910–11.							
October	3,310	292	973	9.54	11.00	59,800	C.
November	6,580	448	1,370	13.4	14.95	81,500	D.
December	2,200	346	713	6.99	8.06	43,800	C.
January	1,570	243	511	5.01	5.78	31,400	C.
February	318	176	242	2.37	2.47	13,400	C.
March	894	176	377	3.70	4.27	23,200	C.
April	726	292	438	4.29	4.79	26,100	C.
May	1,720	576	954	9.35	10.78	58,700	C.
June	1,640	411	769	7.54	8.41	45,800	C.
July	624	155	379	3.72	4.29	23,300	C.
August	176	83	111	1.09	1.26	6,820	C.
September	1,350	83	414	4.06	4.53	24,600	C.
The year	6,580	83	605	5.93	80.59	438,000	

Monthly discharge of North Fork of Snoqualmie River near North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1911–12.							
October	576	134	203	1.99	2.29	12,500	C.
November	11,100	134	1,770	17.4	19.41	105,000	D.
December	1,500	377	760	7.45	8.59	46,700	D.
January	3,280	265	1,000	9.80	11.30	61,500	D.
February	1,980	368	823	8.07	8.70	47,300	C.
March	331	167	223	2.19	2.52	13,700	C.
April	906	331	466	4.57	5.10	27,700	C.
May	2,310	489	1,020	10.00	11.53	62,700	C.
June	1,130	545	734	7.20	8.03	43,700	C.
July	789	207	374	3.67	4.23	23,000	C.
August	503	180	247	2.42	2.79	15,200	C.
September	1,840	174	407	3.99	4.45	24,200	B.
The year	11,100	134	667	6.54	88.94	484,000	
1912–13.							
October	.....	180	377	3.70	4.27	23,200	C.
November	.....	304	944	9.25	10.32	56,200	D.
February	.....	257	575	5.64	5.87	31,900	C.
June	2,050	819	1,230	12.1	13.50	73,200	B.
July	1,360	284	714	7.00	8.07	43,900	B.
August	284	144	189	1.85	2.13	11,600	B.
September	2,990	144	404	3.96	4.42	24,000	B.
1913–14.							
October	4,700	183	861	8.44	9.73	52,900	B.
November	2,180	219	849	8.32	9.28	50,500	B.
December	955	88	312	3.06	3.53	19,200	B.
January	3,300	470	979	9.60	11.07	60,200	B.
February	1,640	449	754	7.39	7.70	41,900	B.
March	1,880	563	1,040	10.2	11.76	64,000	B.
April	1,680	513	1,000	9.80	10.93	59,500	B.
May	1,300	650	934	9.16	10.56	57,400	B.
June	1,600	508	804	7.88	8.79	47,800	B.
July	603	124	283	2.77	3.19	17,400	B.
August	118	64	86.6	.849	.98	5,320	B.
September	988	59	310	3.04	3.39	18,400	B.
The year	4,700	59	683	6.70	90.91	495,000	
1914–15.							
October	1,640	205	601	5.89	6.79	37,000	B.
November	2,400	470	1,110	10.9	12.16	66,000	B.
December	823	226	352	3.45	3.98	21,600	A.
January	833	340	520	5.10	5.88	32,000	A.
February	692	372	472	4.63	4.82	26,200	A.
March	1,480	388	655	6.42	7.40	40,300	A.
April	3,660	456	986	9.67	10.79	58,700	B.
May	1,880	401	657	6.44	7.42	40,400	A.
June	704	288	403	3.95	4.41	24,000	A.
July	630	178	294	2.88	3.32	18,100	B.
August	178	74	112	1.10	1.27	6,890	B.
September	150	71	91.9	.901	1.01	5,470	B.
The year	3 660	71	520	5.10	69.25	377,000	

SOUTH FORK OF SNOQUALMIE RIVER NEAR GARCIA, WASH.

LOCATION.—In the SW. ¼ sec. 6, T. 22 N., R. 10 E., at Bide-a-wee ranch, 150 feet below Alice Creek, a quarter of a mile above Fifteenmile bridge, 1¼ miles southeast of Garcia, in King County.

DRAINAGE AREA.—45 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 4, 1910, to October 15, 1915, when station was discontinued.

GAGE.—Friez water-stage recorder on left bank, 150 feet below mouth of Alice Creek, installed November 6, 1913. Original gage vertical staff on right bank opposite present gage, read to tenths daily by C. P. Beard. Datum of original gage 1.54 feet lower than present datum.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

CHANNEL AND CONTROL.—Channel at gage composed of gravel and sand. Control composed of boulders and gravel, shifting at high stages. Zero flow would occur at gage height 2.1 feet, as measured September 22, 1910, and at 0.1 foot, new datum, as measured August 29, 1914.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.7 feet at 1 a. m. April 2 (discharge, 3,020 second-feet); minimum stage from recorder, 0.68 foot September 5 and 6 (discharge, 28 second-feet).

1910–1915: Maximum stage recorded, 9.6 feet November 19, 1911 (discharge, 4,370 second-feet). High-water mark of this flood found by leveling to be about 11.5 feet. Minimum stage recorded, 2.3 feet in August and September, 1910, and September, 1911 (discharge, 21 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curves well defined for low stages; extensions for high water uncertain. Results prior to November, 1913, fair except for periods when observer's record is apparently in error; results for remainder of period excellent for low stages and good for medium stages.

COOPERATION.—Gage-height record and some discharge measurements furnished by the Puget Sound Traction, Light & Power Co.

Discharge measurements of South Fork of Snoqualmie River near Garcia, Wash., during 1910–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1914.		*Feet.*	*Sec.-ft.*
Aug. 12	Crawford and Easter	2.44	40.1	May 29	Weller Rose [a]	1.49	293
				Aug. 14	do [b]	.73	40.9
1911.				29	I. L. Collier [c]	.68	33.2
Apr. 19	M. T. Crawford	3.06	236				
June 4	R. R. Easter	3.48	447	1915.			
Aug. 26	M. T. Crawford	2.39	35.9	Mar. 20	Hartson and McFadden	1.48	270
Sept. 22	G. L. Parker	2.95	185	July 30	do	.90	64
				Sept. 6	R. C. McFadden	.70	30.1
1912.							
May 13	H. C. Hanson	4.26	1,110				
1913.							
July 25	Tuttle and Rose	2.95	201				
Sept. 16	G. L. Parker	2.45	55				

[a] This measurement and all following referred to new gage. Old gage read 3.03 feet.
[b] Old gage read 2.27 feet.
[c] Old gage read 2.22 feet.

Daily discharge, in second-feet, of South Fork of Snoqualmie River near Garcia, Wash. from Aug. 4, 1910, to Oct. 15, 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1910.			1910.			1910.		
1	.....	21	11	36	36	21	36	36
2	.....	21	12	36	21	22	36	36
3	.....	21	13	36	21	23	36	36
4	54	21	14	36	21	24	36	21
5	54	21	15	54	21	25	36	21
6	54	36	16	36	21	26	21	21
7	36	36	17	36	36	27	21	21
8	36	21	18	36	36	28	21	21
9	36	21	19	36	21	29	36	102
10	36	36	20	36	21	30	36	76
						31	36	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River near Garcia, Wash., from Aug. 4, 1910, to Oct. 15, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	300	208	168	168	102	54	350	518	1,060	168	54	36
2	402	208	168	168	76	54	350	582	582	208	54	36
3	2,770	402	168	168	76	54	300	650	582	300	54	21
4	2,120	300	133	208	76	54	252	885	458	252	54	21
5	885	300	102	208	76	76	208	970	402	208	54	36
6	650	350	133	350	76	76	168	582	402	252	54	133
7	1,580	402	133	1,060	76	76	168	402	458	168	54	133
8	582	350	133	458	76	76	133	518	518	168	54	76
9	402	402	168	402	76	76	133	458	458	168	36	76
10	300	2,030	168	252	76	76	168	402	650	168	36	102
11	168	1,850	168	208	76	54	168	350	970	168	36	76
12	133	1,240	133	208	76	54	208	350	805	168	36	102
13	102	725	133	168	76	54	208	402	458	168	36	252
14	76	208	133	168	76	54	168	350	438	133	36	168
15	54	208	133	168	76	76	168	350	418	133	36	168
16	36	208	102	133	76	76	168	725	399	133	36	650
17	650	208	102	133	76	76	168	725	379	102	36	402
18	970	252	102	133	76	133	208	970	359	102	36	252
19	402	252	133	168	76	133	234	725	340	102	36	168
20	300	402	133	168	76	133	252	650	320	102	54	168
21	208	3,770	102	168	76	133	300	582	300	102	36	133
22	168	2,030	208	168	54	133	300	458	300	102	36	188
23	208	1,060	208	133	54	168	350	458	252	76	36	133
24	252	650	402	133	54	168	518	402	252	76	36	133
25	970	350	252	133	54	168	805	402	208	76	36	102
26	402	300	252	133	54	133	402	350	252	76	34	102
27	300	252	252	102	54	133	350	458	350	76	36	102
28	252	208	208	133	54	133	350	582	300	76	36	102
29	208	208	208	133	.....	168	350	725	208	54	36	76
30	168	168	208	102	.....	252	458	805	252	54	36	76
31	133	.....	168	133	.....	350	.....	885	.....	54	36	.....
1911–12.												
1	76	54	504	64	440	45	115	440	572	225	54	249
2	54	54	380	64	273	45	147	273	504	183	45	183
3	54	54	273	64	147	30	273	273	440	183	54	147
4	54	76	183	45	115	30	325	273	440	183	54	131
5	54	133	273	45	115	30	225	325	572	147	54	115
6	54	208	325	45	88	30	225	440	504	115	45	115
7	54	885	380	45	64	30	225	800	720	147	45	183
8	54	582	504	45	88	30	273	885	720	147	45	225
9	54	300	504	64	147	30	325	800	644	147	64	147
10	102	252	440	76	504	30	504	720	504	115	64	147
11	76	168	440	64	572	30	380	720	504	115	54	115
12	76	133	380	88	225	45	380	1,320	572	115	45	115
13	76	133	325	504	225	45	273	1,230	380	115	45	88
14	133	582	273	970	325	45	225	1,060	504	131	45	88
15	168	458	225	504	440	64	273	644	225	115	64	88
16	102	650	225	225	885	88	273	644	325	115	147	76
17	102	2,670	225	183	1,140	115	325	644	440	115	273	76
18	76	3,970	183	147	720	147	273	720	440	88	115	64
19	76	4,370	183	147	225	147	225	1,060	504	88	88	64
20	76	2,920	147	115	147	88	225	1,320	572	88	76	64
21	76	2,720	147	115	115	64	183	1,230	440	88	76	64
22	76	644	147	115	88	64	183	440	273	88	64	54
23	54	440	115	88	88	64	225	504	273	88	54	54
24	54	380	115	115	64	64	225	504	380	64	54	54
25	76	644	88	504	64	64	183	800	380	88	54	54
26	76	970	88	147	64	64	183	885	325	64	45	54
27	54	720	88	380	45	64	183	885	273	64	45	54
28	54	644	88	572	45	88	225	720	183	64	45	45
29	54	644	64	1,060	45	115	440	644	165	54	64	45
30	54	572	64	1,320	.....	115	440	440	225	54	88	45
31	54	.....	64	720	.....	115	.....	440	.....	54	225	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River near Garcia, Wash., from Aug. 4, 1910, to Oct. 15, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	64	131	165	842	183	64	225	225	1,320	440	115	38
2	54	131	225	1,320	183	64	147	225	1,230	440	102	88
3	54	115	800	2,220	183	76	115	183	1,140	380	102	504
4	102	147	440	970	147	88	88	183	1,140	440	102	225
5	76	225	325	720	147	88	76	225	885	504	88	131
6	64	273	225	440	88	88	64	504	800	440	88	88
7	54	273	204	225	76	88	64	720	1,060	380	76	88
8	165	380	183	183	64	88	64	800	.....	325	102	76
9	131	572	183	165	64	88	76	885	.....	325	76	76
10	115	572	183	165	64	88	88	800	.....	225	76	76
11	88	572	165	165	54	76	147	800	.....	147	64	64
12	88	720	131	147	54	76	325	720	.....	115	64	64
13	76	1,140	88	147	54	64	325	572	.....	325	64	54
14	64	504	64	147	88	54	440	504	.....	325	76	54
15	64	380	64	147	440	54	325	440	504	273	88	54
16	88	273	64	147	1,320	64	225	440	504	299	102	54
17	249	225	88	147	1,950	88	147	440	504	225	102	54
18	131	885	115	115	970	225	225	440	572	273	88	54
19	183	1,320	147	88	720	147	380	440	720	299	76	54
20	147	800	147	76	504	88	885	504	644	299	64	45
21	115	380	147	45	325	76	720	504	572	299	64	64
22	147	352	147	54	225	64	644	1,060	644	273	64	147
23	147	325	154	64	183	64	572	1,230	800	273	54	102
24	165	325	154	225	147	64	504	1,230	800	204	54	102
25	225	273	154	720	115	54	440	1,230	644	176	45	64
26	147	225	154	440	88	45	600	1,230	644	147	45	54
27	147	204	131	380	76	64	273	1,320	572	147	45	54
28	147	183	115	273	76	64	273	885	572	131	45	54
29	147	183	147	225	.....	225	273	800	440	131	45	54
30	131	183	225	225	.....	380	225	885	504	115	38	54
31	131	.....	325	225	.....	504	.....	970	.....	115	33	.....
1913-14.												
1	49	130	331	93	203	443	179	617	617	226	55	32
2	45	114	283	93	163	336	203	896	564	212	55	31
3	45	114	244	104	152	293	278	922	437	203	55	31
4	54	114	221	273	163	273	499	590	326	179	51	30
5	45	166	203	1,920	146	234	703	492	288	152	50	30
6	54	395	187	2,260	128	221	506	506	248	146	51	31
7	88	309	179	2,090	113	244	480	570	248	142	51	31
8	147	263	163	930	107	288	512	538	437	132	50	36
9	165	283	152	570	101	293	564	538	377	128	47	55
10	1,590	342	142	419	96	273	617	590	331	122	47	42
11	2,720	273	142	336	93	258	525	603	342	116	45	40
12	964	234	142	293	93	268	480	710	365	119	45	47
13	1,050	212	142	258	98	342	788	930	353	116	43	42
14	650	195	149	239	101	696	820	1,180	383	107	42	69
15	650	187	163	226	98	733	1,270	983	437	122	40	125
16	448	659	149	226	93	896	710	703	425	104	40	104
17	386	449	142	212	90	740	499	596	383	96	40	101
18	448	336	135	195	88	688	473	558	326	90	39	142
19	417	314	128	175	90	645	772	538	273	86	37	122
20	386	283	122	163	98	631	710	631	253	86	37	183
21	330	244	116	160	146	590	461	718	278	78	37	167
22	278	234	113	216	258	506	383	703	253	78	37	110
23	254	314	110	175	258	443	359	638	216	76	37	86
24	386	486	104	160	314	395	342	518	298	73	36	73
25	254	389	101	149	268	348	342	480	331	69	36	63
26	230	365	101	149	234	298	383	437	268	67	35	63
27	230	377	98	138	570	258	437	377	248	65	36	73
28	186	331	96	132	413	226	371	331	230	63	36	65
29	147	353	93	135	.....	216	342	320	230	61	36	57
30	147	353	90	171	.....	203	407	371	226	59	35	55
31	130	.....	90	195	.....	195	.....	499	.....	57	33	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River near Garcia, Wash., from Aug. 4, 1910, to Oct. 15, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1914-15.													
1	55	314	197	92	63	100	1,320	161	197	65	61	33	59
2	156	1,410	180	87	59	97	2,480	147	177	59	59	33	1,060
3	146	1,900	165	79	59	97	1,930	161	161	53	57	30	829
4	116	1,150	165	72	63	137	1,070	161	150	51	53	29	262
5	98	1,150	154	70	70	137	704	184	150	49	51	28	169
6	83	845	140	65	84	124	580	214	140	51	47	28	127
7	78	601	134	63	79	124	616	227	130	53	45	30	103
8	69	498	124	65	82	124	492	210	117	53	44	72	95
9	65	498	117	65	97	127	386	222	109	53	44	111	87
10	181	392	111	65	103	134	369	222	109	51	42	57	92
11	334	1,170	106	67	100	140	404	184	100	47	42	45	82
12	309	726	97	67	97	130	472	169	95	47	40	40	167
13	244	704	95	65	92	130	498	154	92	74	39	40	264
14	183	492	89	63	82	299	369	150	87	103	40	42	588
15	146	369	89	61	77	609	351	137	84	103	40	44	312
16	138	307	84	59	74	410	435	124	82	150	40	40	.....
17	273	270	79	59	82	334	492	143	82	227	42	36	.....
18	544	241	70	57	95	375	479	165	77	150	39	33	.....
19	772	246	65	55	82	296	441	184	84	114	38	32	.....
20	480	623	63	55	79	280	380	184	111	95	36	32	.....
21	326	472	63	51	89	375	280	154	92	84	36	30	.....
22	253	351	63	47	89	525	241	147	82	77	34	30	.....
23	212	363	63	44	89	601	222	140	74	70	33	30	.....
24	191	346	59	44	100	479	222	177	72	65	32	30	.....
25	175	318	57	44	127	340	236	184	65	61	32	30	.....
26	152	369	55	44	111	275	236	188	89	61	30	30	.....
27	142	323	57	42	103	251	227	398	97	63	30	33	.....
28	128	280	67	42	100	265	227	674	84	63	29	32	.....
29	119	246	61	44	100	340	236	351	74	63	29	30	.....
30	149	214	65	44	.....	357	184	260	70	65	29	32	.....
31	175	.....	92	47	.....	296	.....	218	.....	63	32	.....	.....

NOTE.—Discharge ascertained from rating curves as follows: Aug. 4, 1910, to Nov. 19, 1911, well defined below 700 second-feet; Nov. 20, 1911, to Oct. 11, 1913, well defined below 1,500 second-feet; Oct. 12 to Nov. 5, 1913, well defined below 400 second-feet; Nov. 6, 1913, to Nov. 2, 1914, and Nov. 3, 1914, to Oct. 15, 1913, well defined below 350 second-feet. Many gage heights prior to November, 1913, corrected for apparent errors in reading gage after hydrographic comparison with records of North, Middle, and South forks of Snoqualmie River near North Bend. Gage readings June 14–20, 1911, probably erroneous; discharge interpolated. June 8–14, 1913, no record; discharge estimated from hydrograph at 613 second-feet.

Monthly discharge of South Fork of Snoqualmie River near Garcia, Wash., for the years ending Sept. 30, 1910–1915.

[Drainage area, 45 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1910.							
August 4–31	54	21	37.0	0.822	0.86	2,050	C.
September	102	21	30.0	.667	.74	1,790	C.
The period						3,840	
1910–11.							
October	2,770	36	521	11.6	13.37	32,000	D.
November	3,770	168	650	14.4	16.07	38,700	D.
December	402	102	168	3.73	4.30	10,300	C.
January	1,060	102	212	4.71	5.43	13,000	C.
February	102	54	71.4	1.59	1.66	3,970	C.
March	350	54	111	2.47	2.85	6,820	C.
April	805	133	279	6.20	6.92	16,600	D.
May	970	350	570	12.7	14.64	35,000	D.
June	1,060	208	438	9.73	10.86	26,100	D.
July	300	54	135	3.00	3.46	8,300	C.
August	54	36	41.2	.916	1.06	2,530	C.
September	650	21	141	3.13	3.49	8,390	D.
The year	3,770	21	279	6.20	84.11	202,000	
1911–12.							
October	168	54	72.7	1.62	1.87	4,470	C.
November	4,370	54	901	20.0	22.31	53,600	D.
December	504	64	240	5.33	6.14	14,800	C.
January	1,320	45	279	6.20	7.15	17,200	C.
February	1,140	45	259	5.76	6.21	14,900	C.
March	147	30	65.3	1.45	1.67	4,020	C.
April	504	115	265	5.89	6.57	15,800	D.
May	1,320	273	712	15.8	18.22	43,800	D.
June	720	165	433	9.62	10.73	25,800	D.
July	225	54	111	2.47	2.85	6,820	C.
August	273	45	73.9	1.64	1.89	4,540	C.
September	249	45	100	2.22	2.48	5,950	C.
The year	4,370	30	291	6.47	88.09	212,000	
1912–13.							
October	249	54	120	2.67	3.08	7,380	C.
November	1,320	115	409	9.09	10.14	24,300	C.
December	800	64	189	4.20	4.84	11,600	C.
January	2,220	45	369	8.20	9.45	22,700	C.
February	1,950	54	307	6.82	7.10	17,000	C.
March	504	45	108	2.40	2.77	6,640	C.
April	885	64	298	6.62	7.39	17,700	C.
May	1,320	183	690	15.3	17.64	42,400	D.
June		440	717	15.9	17.74	42,700	D.
July	504	115	274	6.09	7.02	16,800	D.
August	115	33	72.5	1.61	1.86	4,460	C.
September	504	38	89.7	1.99	2.22	5,340	C.
The year	2,200	33	303	6.73	91.25	219,000	
1913–14.							
October	2,720	45	418	9.29	10.71	25,700	C.
November	659	114	294	6.53	7.29	17,500	A.
December	331	90	149	3.31	3.82	9,160	A.
January	2,260	93	415	9.22	10.63	25,500	B.
February	570	88	171	3.80	3.96	9,500	A.
March	896	195	402	8.93	10.30	24,700	B.
April	1,270	179	514	11.4	12.72	30,600	B.
May	1,180	320	616	13.7	15.79	37,900	B.
June	617	216	333	7.40	8.26	19,800	A.
July	226	57	111	2.47	2.85	6,820	A.
August	55	33	42.4	.942	1.09	2,610	A.
September	183	30	71.2	1.58	1.76	4,240	A.
The year	2,720	30	296	6.58	89.18	214,000	

Monthly discharge of South Fork of Snoqualmie River near Garcia, Wash., for the years ending Sept. 30, 1910–1915—Continued.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1914–15.							
October	772	55	209	4.64	5.35	12,900	A.
November	1,900	214	573	12.7	14.17	34,100	B.
December	197	55	97.6	2.17	2.50	6,000	A.
January	92	42	58.8	1.31	1.51	3,620	A.
February	127	59	90.2	2.00	2.08	5,010	A.
March	609	97	268	5.96	6.87	16,500	A.
April	2,480	184	553	12.3	13.72	32,900	B.
May	674	124	206	4.58	5.28	12,700	A.
June	197	70	104	2.31	2.58	6,190	A.
July	227	47	76.9	1.71	1.97	4,730	A.
August	61	29	40.2	.893	1.03	2,470	A.
September	111	28	38.1	.847	.94	2,270	A.
The year	2,480	28	192	4.27	58.00	139,000	

NOTE.—Oct. 1–15, 1915, mean discharge, 286 second-feet; total run-off, 8,510 acre-feet.

SOUTH FORK OF SNOQUALMIE RIVER AT NORTH BEND, WASH.

LOCATION.—In the NW. ¼ sec. 9, T. 23 N., R. 8 E., at Northern Pacific Railway bridge at North Bend, in King County, 2½ miles above mouth.

DRAINAGE AREA.—84 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 21, 1907, to February 29, 1908, and June 26, 1908, to September 30, 1915.

GAGE.—Fuller water-stage recorder on right end of bridge, installed September 1, 1912. Vertical staff installed July 6, 1907, at same location and datum, read to half-tenths every second day from July 21, 1907, to February 29, 1908, and daily from June 26, 1908, to October 30, 1910, by Charles Rachor, and daily to half-tenths from November 1, 1910, to August 31, 1912, by Mrs. Alice Rachor.

DISCHARGE MEASUREMENTS.—By wading or from cable installed 600 feet below bridge March 17, 1911; prior to that date from bridge.

CHANNEL AND CONTROL.—Channel composed of small gravel; shifting at high stages. Stage of zero flow, gage height —0.7 foot, as measured September 11, 1911, —0.2 foot, August 18, 1914, and at —0.1 foot September 2, 1915.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 4.8 feet at 7 a. m. November 3 (discharge, 2,670 second-feet); minimum stage, from recorder, 0.66 foot at 8 p. m. September 30 (discharge, 73 second-feet).

1907–1915: Maximum stage recorded, "Water over gage" November 3, 4, 19, 23, and 29, 1909 (gage height and discharge not determined); minimum stage recorded, 0.70 foot October 10, 11, 1908 (discharge, 68 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record prior to November, 1910, not very reliable; results for that period only fair. Record November, 1910, to August, 1912, reliable. For remainder of period results excellent except October, 1912, to May, 1913, when recorder was not working properly, and August to October, 1914, when stage-discharge relation was affected by backwater from temporary dam and from débris.

COOPERATION.—Gage-height record and some discharge measurements furnished by the Puget Sound Traction, Light & Power Co.

Discharge measurements of South Fork of Snoqualmie River at North Bend, Wash., during 1907–1915.

Date.	Made by—	Gage height.	Discharge.
1907.		*Feet.*	*Sec.-ft.*
July 6	A. S. Kalenborn	1.63	343
Aug. 8	Baum and Kalenborn	1.13	166
Oct. 29	A. S. Kalenborn	.93	101
1908.			
Sept. 24	M. T. Crawford	.75	76
1909.			
Aug. 26	M. T. Crawford	.98	135
1910.			
Mar. 17	A. T. Harris	3.80	1,570
Aug. 25	Crawford and Easter	.30	79
1911.			
Mar. 17	R. R. Easter	1.75	371
June 7	Crawford and Easter	2.23	582
Sept. 11	G. L. Parker	.83	156
Oct. 10	R. R. Easter	.80	151
1912.			
Jan. 11	Weller Rose	1.45	268
Feb. 21	do	1.90	602
Mar. 30	do	1.55	392
Apr. 25	do	1.50	371
May 10	Pierce and Hanson	2.40	901
July 29	Weller Rose	.90	144
1913.		*Feet.*	*Sec.-ft.*
Jan. 28	L. M. Severtson	1.90	620
June 4	J. G. Eernisse	3.07	1,310
July 22	Tuttle and Rose	1.40	380
22	G. L. Parker	1.40	370
Aug. 17	J. T. Hartson	.78	154
Sept. 15	Weller Rose	.74	137
Oct. 11	do	4.20	2,260
1914.			
May 7	Rose and Kurtz	2.08	685
Aug. 18	Collier and Rose	.81	100
1915.			
Jan. 13	Brown and McFadden	1.36	336
13	McFadden and Brown	1.36	346
Mar. 18	McFadden and Hartson	1.83	595
Apr. 3	R. C. McFadden	4.39	2,230
July 7	McFadden and Wiswell	.99	151
10	R. C. McFadden	.97	156
Aug. 2	Hartson and McFadden	.90	139
Sept. 2	R. C. McFadden	.77	98

Daily discharge in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1907.				1907.				1907.			
1	.....	140	128	11	.....	140	152	21	166	140	212
2	.....	128	154	12	.....	128	152	22	159	152	182
3	.....	128	180	13	.....	208	152	23	152	152	152
4	.....	128	154	14	.....	288	210	24	152	152	152
5	.....	128	128	15	.....	268	265	25	152	182	152
6	352	128	128	16	.....	248	320	26	152	212	140
7	.....	144	128	17	.....	239	374	27	152	212	128
8	.....	160	128	18	.....	230	330	28	152	212	128
9	.....	156	128	19	.....	179	212	29	152	170	128
10	.....	152	140	20	.....	128	212	30	152	128	128
								31	152	128	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	June.	July.	Aug.	Sept.
1907-8.									
1	128	214	.....	430	204	.....	890	212	140
2	128	288	.....	418	196	.....	775	212	140
3	128	309	.....	396	188	.....	830	212	140
4	128	330	.....	374	180	.....	665	212	128
5	128	330	374	419	224	.....	638	196	128
6	128	330	352	464	268	.....	585	196	128
7	128	320	330	487	268	.....	610	196	128
8	128	309	289	510	268	.....	610	180	128
9	128	309	248	487	258	.....	560	180	128
10	122	309	333	464	248	.....	560	180	128
11	117	309	418	452	230	.....	510	180	117
12	117	309	514	441	212	.....	560	166	117
13	117	244	610	408	212	.....	585	166	117
14	117	180	548	374	212	.....	510	166	114
15	117	188	487	352	250	.....	560	166	110
16	117	196	420	330	288	.....	638	166	106
17	117	222	352	330	388	.....	560	140	103
18	116	248	310	330	487	.....	464	140	99
19	115	289	268	363	420	.....	441	140	95
20	116	330	299	396	352	.....	418	128	92
21	117	352	330	374	320	.....	418	128	88
22	117	374	498	352	288	.....	396	128	84
23	117	374	665	320	278	.....	374	128	81
24	116	374	902	288	268	.....	874	117	77
25	115	374	1,140	268	354	.....	330	117	82
26	115	374	985	248	441	775	309	117	87
27	115	.....	830	239	513	775	288	128	92
28	114	.....	708	230	585	665	268	180	97
29	113	.....	585	221	418	610	248	288	102
30	140	.....	513	212	.....	665	230	196	107
31	140	.....	441	212	.....	.....	212	152	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908-9.												
1	112	1,420	309	418	309	418	464	665	1,960	487	152	86
2	117	830	288	418	309	396	464	638	1,490	464	140	86
3	128	720	288	950	330	418	441	1,010	1,210	487	140	86
4	117	638	268	775	330	418	374	1,210	1,070	510	140	86
5	117	610	248	610	330	374	352	830	950	487	128	77
6	96	585	248	487	330	330	330	720	890	374	128	77
7	86	464	230	441	309	352	330	585	890	464	117	77
8	77	418	230	418	288	374	352	560	830	396	117	77
9	77	374	248	374	288	374	418	665	1,210	374	117	77
10	68	330	.....	352	288	352	510	638	950	374	106	86
11	68	288	.....	330	268	352	464	610	950	535	106	86
12	77	248	585	309	248	352	418	560	950	418	106	77
13	106	212	720	288	248	330	510	535	720	330	106	77
14	248	180	510	268	248	330	510	510	720	330	106	77
15	268	152	418	288	330	330	464	510	830	309	106	77
16	309	212	374	288	510	330	441	510	720	309	106	77
17	288	418	330	487	950	396	418	560	720	288	96	77
18	268	1,350	309	585	890	374	396	560	665	268	96	77
19	268	720	288	1,140	720	374	374	585	665	248	96	77
20	309	585	268	1,210	585	374	374	535	638	230	96	374
21	248	665	248	950	510	374	396	487	638	212	96	830
22	230	775	248	775	464	352	396	487	610	212	96	330
23	212	720	248	610	441	352	396	510	560	196	86	248
24	212	560	309	510	464	330	374	610	510	196	86	196
25	196	464	510	464	487	352	950	720	487	180	86	180
26	196	418	560	441	464	396	830	950	487	180	124	166
27	230	396	950	418	464	418	775	1,210	487	166	115	140
28	230	374	1,070	396	441	418	665	950	464	166	106	128
29	248	352	720	374	.....	464	560	830	464	166	106	196
30	665	309	585	352	.....	441	510	890	487	152	96	248
31	950	.....	510	330	.....	487	.....	1,210	.....	152	86	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909–10.												
1	196	.....	1,730	209	515	2,290	492	426	515	169	95	79
2	180	.....	960	198	386	2,710	492	406	426	160	95	79
3	180	.....	670	188	350	2,290	470	426	318	160	95	79
4	180	.....	565	178	304	1,490	426	470	290	160	95	79
5	180	.....	515	169	290	1,280	426	448	318	152	89	79
6	212	.....	426	169	278	780	515	470	350	152	89	79
7	212	.....	386	178	266	780	540	670	290	144	89	79
8	212	.....	350	178	242	615	615	725	266	144	89	79
9	212	.....	334	169	231	565	670	780	266	144	89	79
10	212	.....	318	160	220	515	590	1,350	290	144	89	79
11	196	.....	368	152	209	615	590	1,730	426	144	89	79
12	180	.....	1,730	152	188	840	670	1,020	386	144	89	75
13	180	.....	1,280	152	209	1,080	615	725	290	144	84	75
14	180	.....	780	144	198	1,350	565	670	304	136	84	75
15	166	.....	615	144	188	1,420	492	565	266	136	84	75
16	152	.....	540	152	178	1,280	492	565	254	128	84	71
17	152	.....	448	152	178	1,570	470	515	231	128	84	71
18	140	.....	368	350	178	1,650	670	670	220	121	84	71
19	152	.....	350	242	169	1,810	1,020	515	220	114	84	71
20	152	.....	318	198	169	1,570	1,020	470	231	114	79	71
21	166	.....	290	209	160	1,420	960	426	231	108	79	71
22	166	.....	266	642	152	1,210	725	470	209	108	79	71
23	166	.....	242	1,020	144	1,020	900	492	209	114	79	71
24	180	.....	242	1,210	198	900	1,420	642	198	101	79	71
25	180	.....	242	670	266	642	1,570	515	198	101	79	71
26	180	.....	231	540	515	565	1,490	492	209	101	79	71
27	196	.....	220	470	780	515	900	426	198	101	79	71
28	196	.....	290	386	900	492	670	386	178	101	79	71
29	212	.....	198	350	.....	448	565	426	160	101	79	75
30	212	.....	242	840	.....	406	470	470	160	101	79	136
31	230	.....	220	615	.....	515	.....	515	.....	101	79	.....
1910–11.												
1	160	220	426	426	304	178	406	615	1,080	304	121	89
2	304	242	470	386	266	178	406	670	900	290	114	89
3	2,890	470	470	350	242	169	426	780	670	318	114	89
4	1,350	266	492	386	242	178	386	1,020	565	318	108	101
5	840	242	565	426	231	198	334	960	470	304	108	101
6	670	670	590	470	220	198	318	725	515	304	114	128
7	1,570	840	615	1,140	220	231	290	725	590	318	114	160
8	1,350	1,140	492	840	220	242	290	670	515	304	114	136
9	492	725	590	725	220	242	350	615	565	266	114	178
10	426	3,160	540	565	220	242	386	590	615	242	114	152
11	318	2,370	470	470	220	242	350	565	960	242	108	144
12	278	1,080	406	426	220	220	318	515	960	220	108	152
13	231	780	386	386	220	209	290	615	840	220	101	386
14	198	565	350	350	220	220	266	590	670	220	101	290
15	198	492	334	318	209	242	266	565	670	220	101	386
16	178	406	318	318	198	318	290	565	590	220	101	960
17	780	350	290	290	198	368	304	725	515	198	101	565
18	470	350	266	318	209	386	406	780	470	188	101	406
19	386	350	266	350	209	386	368	1,080	406	178	101	304
20	334	780	266	318	209	470	350	900	386	169	101	254
21	290	4,440	254	290	198	515	426	780	386	160	114	231
22	254	2,050	242	278	188	515	448	780	448	160	108	266
23	242	1,420	426	266	188	725	448	725	350	152	101	266
24	540	1,020	840	242	188	725	670	565	304	144	95	242
25	1,020	780	565	254	178	615	900	565	278	144	95	209
26	590	670	565	242	178	515	615	565	368	144	95	188
27	406	590	615	220	178	448	515	565	386	136	89	178
28	290	515	515	220	178	386	492	615	318	128	89	178
29	266	448	515	220	.....	368	492	670	304	128	89	169
30	242	448	515	220	.....	386	540	840	290	128	89	160
31	231	.....	492	318	.....	470	.....	1,020	.....	121	89	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	144	114	492	290	830	378	428	535	650	354	118	454
2	144	114	426	290	770	378	480	480	710	330	118	317
3	144	114	386	290	650	354	480	480	562	286	107	274
4	144	128	386	278	590	330	590	480	562	286	131	235
5	136	178	368	266	535	330	480	480	650	286	131	208
6	136	368	368	266	508	308	454	480	770	286	131	194
7	128	960	368	266	508	286	428	650	830	286	118	219
8	128	780	515	266	535	286	454	950	830	286	144	308
9	121	515	642	266	770	286	480	1,130	710	266	144	282
10	144	386	615	290	950	286	590	950	590	246	144	242
11	144	318	615	290	830	286	562	770	590	246	144	216
12	136	318	565	350	770	286	508	890	590	246	144	188
13	128	368	492	780	620	266	480	1,130	562	246	131	174
14	160	780	470	2,450	650	266	454	1,410	620	246	118	171
15	242	*670*	448	1,690	710	286	428	1,410	508	246	144	165
16	220	540	515	1,130	1,270	286	428	890	428	227	227	153
17	178	1,970	470	890	1,270	286	428	710	480	208	330	144
18	160	4,150	426	770	1,070	308	428	770	535	208	191	141
19	160	4,740	426	650	890	286	428	890	590	191	174	139
20	152	*2,890*	386	650	710	286	378	1,550	650	174	174	139
21	144	1,570	350	620	620	286	378	1,270	590	174	159	134
22	136	1,020	426	590	590	266	354	890	454	174	144	123
23	136	780	492	590	620	266	378	710	428	174	144	118
24	144	642	426	710	535	286	378	650	454	174	131	118
25	136	*615*	386	1,070	480	286	378	770	480	174	131	118
26	128	1,490	386	770	480	308	378	890	454	159	131	116
27	128	780	350	830	428	330	378	950	403	159	131	114
28	121	670	350	950	428	378	403	890	330	144	118	118
29	121	670	318	1,550	403	428	480	770	286	144	118	118
30	114	565	318	1,690	.....	378	620	620	286	144	131	118
31	114	.....	318	1,130	.....	378	.....	650	.....	131	286	.....
1912–13.												
1	134	216	384	.....	511	332	.....	.....	1,360	615	218	117
2	134	208	395	.....	463	401	.....	.....	1,520	565	205	126
3	134	201	835	.....	458	401	.....	.....	1,440	490	199	215
4	134	212	952	.....	435	401	.....	.....	1,260	515	196	580
5	144	312	629	.....	417	401	.....	.....	930	520	192	411
6	139	428	521	.....	395	401	.....	.....	900	565	186	299
7	128	502	473	.....	373	401	.....	.....	1,150	555	186	218
8	227	692	.....	.....	352	401	.....	.....	1,290	510	180	192
9	250	980	.....	.....	331	456	.....	.....	870	515	172	186
10	194	964	.....	.....	367	429	.....	.....	736	505	166	172
11	165	964	.....	.....	367	411	.....	.....	780	475	157	152
12	150	964	.....	.....	367	366	.....	.....	810	447	157	149
13	139	964	.....	.....	367	380	.....	.....	792	465	155	147
14	136	964	.....	.....	367	388	.....	.....	676	465	149	147
15	134	964	.....	.....	367	393	.....	.....	615	447	144	144
16	139	562	.....	.....	1,020	375	.....	.....	600	371	149	136
17	238	524	.....	.....	1,040	398	.....	.....	590	384	157	131
18	223	668	.....	.....	1,040	411	.....	.....	626	384	172	131
19	246	1,400	.....	.....	1,040	371	.....	.....	780	393	157	129
20	253	1,010	.....	.....	1,040	354	1,020	.....	747	402	152	126
21	253	722	.....	.....	1,040	332	1,120	.....	714	393	149	126
22	253	613	.....	.....	465	341	900	.....	736	380	144	136
23	253	571	.....	.....	370	336	670	.....	840	358	139	180
24	253	536	.....	253	370	407	605	.....	786	304	134	131
25	253	464	.....	1,170	370	407	626	.....	780	287	131	172
26	253	464	.....	982	370	407	747	.....	703	276	131	149
27	286	464	.....	662	370	407	725	.....	648	264	126	139
28	254	391	.....	608	370	407	.....	900	615	250	122	136
29	254	373	.....	571	.....	407	.....	840	575	239	120	126
30	254	373	.....	551	.....	407	.....	930	615	222	117	142
31	235	.....	.....	536	.....	407	.....	1,110	.....	218	117	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	134	291	595	218	505	870	452	725	670	380	183	104
2	126	276	555	218	480	780	456	900	670	375	183	110
3	126	268	500	218	465	698	605	1,020	632	375	157	88
4	126	283	465	420	515	659	670	840	515	354	163	88
5	126	388	434	2,100	555	610	870	698	456	328	147	88
6	152	698	393	2,250	475	555	752	659	411	316	129	96
7	228	605	375	2,450	438	535	698	698	398	299	129	98
8	253	485	371	1,440	434	570	725	698	615	276	131	102
9	295	456	349	990	406	585	725	670	620	283	129	120
10	972	510	312	840	402	555	780	698	555	276	126	113
11	2,450	452	312	725	397	520	752	670	525	272	124	104
12	1,400	411	312	664	397	575	698	752	535	268	110	104
13	1,260	371	303	615	397	725	960	900	535	268	108	115
14	960	345	320	570	397	930	1,020	1,080	540	261	106	120
15	725	336	332	555	384	1,020	1,360	960	575	264	104	202
16	595	555	328	535	380	1,080	1,150	810	570	268	102	196
17	515	752	312	535	366	1,020	870	698	555	253	100	186
18	535	575	295	515	354	900	840	642	515	246	100	232
19	560	535	291	475	336	870	870	626	460	239	100	225
20	540	515	276	456	336	840	1,020	637	429	232	100	253
21	500	465	272	424	406	840	1,080	725	460	225	100	358
22	442	456	253	725	540	752	698	726	456	218	100	280
23	411	525	246	659	585	670	654	725	460	215	99	225
24	475	752	236	555	632	642	595	648	434	189	99	208
25	420	670	218	550	659	626	555	605	525	192	98	192
26	384	626	218	515	565	605	565	590	456	189	98	192
27	366	600	218	510	698	565	648	560	420	189	98	192
28	358	555	218	470	810	490	642	515	411	189	99	180
29	324	595	218	456	.....	485	570	475	384	186	100	169
30	299	626	218	510	.....	475	595	500	380	183	101	157
31	291	.....	218	515	.....	442	.....	560	.....	180	103	.....

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	120	365	417	360	242	276	701	326	392	182	136	93
2	161	932	399	348	261	268	2,030	309	360	168	133	98
3	221	2,020	382	335	264	261	2,050	313	334	165	136	93
4	194	1,260	365	315	272	299	1,250	317	317	159	130	93
5	173	1,330	348	291	283	331	923	330	309	152	127	93
6	161	1,260	339	280	327	315	770	351	309	152	122	93
7	148	922	327	264	323	307	770	343	288	159	116	93
8	142	750	299	272	323	299	741	334	272	159	119	108
9	132	461	291	295	319	303	629	343	256	159	113	226
10	181	464	280	291	319	303	540	382	253	155	113	192
11	406	1,270	276	323	315	303	540	347	245	159	111	139
12	385	1,040	264	365	315	295	592	321	241	159	110	122
13	360	1,010	257	356	307	287	629	309	233	159	109	113
14	290	806	246	352	299	365	566	296	230	207	108	113
15	253	667	232	348	287	694	495	292	226	211	108	119
16	238	571	236	315	283	645	510	268	218	268	108	108
17	308	516	225	303	287	521	581	268	215	351	111	100
18	500	463	218	276	311	561	592	292	207	280	113	95
19	952	440	212	276	307	511	566	301	207	253	108	93
20	778	722	208	276	291	463	535	326	222	218	105	100
21	561	722	208	272	276	487	447	301	204	190	103	100
22	458	613	205	253	276	577	400	292	193	179	103	98
23	382	566	202	250	272	694	378	284	196	165	103	93
24	365	561	205	246	268	656	360	292	193	161	103	95
25	339	521	205	242	295	536	369	321	190	158	100	83
26	323	536	215	236	299	468	369	330	193	155	100	83
27	295	551	225	232	276	417	364	410	222	152	95	91
28	280	506	276	228	272	408	360	861	204	149	93	93
29	257	497	253	222	.....	454	364	629	193	149	93	93
30	272	463	253	218	.....	492	351	476	186	143	93	81
31	311	.....	348	218	.....	463	.....	419	.....	136	93	.....

NOTE.—Discharge determined as follows: 1907–8—July 21, 1907, to Sept. 30, 1908, from rating curve well defined below 500 second-feet; interpolated for days on which gage was not read except Nov. 27 to Dec. 4, 1907, which was estimated from hydrographs of the North, Middle, and South forks at 1,180 second-feet. Gage readings probably erroneous Sept. 14–23 and 25–30; discharge interpolated.

1908–9—Oct. 2, 1908, to Sept. 30, 1909, from rating curve well defined below 500 second-feet; interpolated Oct. 1, 1908, as gage reading was probably erroneous; estimated from hydrograph Dec. 10, 1908, 330 second-feet, and Dec. 11, 1908, 435 second-feet.

1909–10—Oct. 1–31, 1909, from rating curve well defined below 500 second-feet; not ascertained for November, 1909, as water was over gage Nov. 2, 3, 19, 23, and 29, and extension of rating curves for high water is uncertain; Dec. 1, 1909, to Sept. 30, 1910, from rating curve well defined below 2,200 second-feet.

1910–11—Oct. 1, 1910, to Sept. 30, 1911, from rating curve well defined below 2,200 second-feet.

1911–12—Oct. 1, 1911, to Jan. 14, 1912, from rating curve well defined below 2,200 second-feet; Jan. 15 to Sept. 30, 1912, from rating curve well defined below 1,200 second-feet.

1912–13—Oct. 1 to Nov. 18, 1912, from rating curve well defined below 1,200 second-feet; Nov. 19, 1912, to Sept. 30, 1913, from rating curve well defined below 2,500 second-feet; estimated from hydrographs of 4 stations on the Snoqualmie Oct. 1–4, 1912, 134 second-feet; Oct. 20–26, 253 second-feet, Nov. 10–15, 964 second-feet; Nov. 25–27, 464 second-feet; Feb. 10–15, 1913, 367 second-feet; Feb. 17–21, 1,040 second-feet; Feb. 23–28, 370 second-feet; Mar. 2–8, 401 second-feet; Mar. 24–31, 407 second-feet.

1913–14—Oct. 1, 1913, to Sept. 30, 1914, from rating curve well defined below 2,500 second-feet except Aug. 3 to Sept. 30, when temporary dam on control and débris from repairing of bridge caused backwater; discharge for this period ascertained by method devised for shifting control.

1914–15—Oct. 1–19, 1914, by indirect method for shifting control, as temporary dam on control and debris from repairs to bridge caused backwater at the gage; Oct. 20, 1914, to Apr. 3, 1915, from curve well defined below 2,500 second-feet; Apr. 4 to Sept. 30, 1915, from rating curve well defined below 2,500 second-feet; interpolated July 24–27 and Aug. 12–14, as gage record was lacking.

Monthly discharge of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1907.							
July 21–31	166	152	154	1.83	0.75	3,360	C.
August	288	128	171	2.04	2.35	10,500	C.
September	374	128	176	2.10	2.34	10,500	C.
The period						24,400	
1907–8.							
October	140	113	121	1.44	1.66	7,440	C.
November		180	417	4.96	5.53	24,800	C.
December		248	596	7.10	8.19	36,600	C.
January	510	212	361	4.30	4.96	22,200	C.
February	585	180	304	3.62	3.90	17,500	C.
July	890	212	497	5.92	6.82	30,600	C.
August	288	117	168	2.00	2.31	10,300	C.
September	140	77	109	1.30	1.45	6,490	C.
1908–9.							
October	950	68	220	2.62	3.02	13,500	C.
November	1,420	152	526	6.26	6.98	31,300	C.
December	1,070	230	416	4.95	5.71	25,600	C.
January	1,210	268	518	6.17	7.11	31,900	C.
February	950	248	423	5.04	5.25	23,500	C.
March	487	330	378	4.50	5.19	23,200	C.
April	950	330	475	5.66	6.32	28,300	C.
May	1,210	487	705	8.39	9.67	43,300	C.
June	1,960	464	807	9.61	10.72	48,000	C.
July	535	152	312	3.72	4.29	19,200	C.
August	152	86	109	1.30	1.50	6,700	C.
September	830	77	152	1.81	2.02	9,040	C.
The year	1,960	68	419	4.99	67.78	304,000	
1909–10.							
October	230	140	184	2.19	2.52	11,300	C.
December	1,730	198	508	6.05	6.98	31,200	C.
January	1,210	144	341	4.06	4.68	21,000	C.
February	900	144	288	3.43	3.57	16,000	C.
March	2,710	406	1,120	13.3	15.33	68,900	C.
April	1,570	426	717	8.54	9.53	42,700	C.
May	1,730	386	609	7.25	8.36	37,400	C.
June	515	160	270	3.21	3.58	16,100	C.
July	169	101	128	1.52	1.75	7,870	C.
August	95	79	84.8	1.01	1.16	5,210	C.
September	136	71	76.8	.914	1.02	4,570	C.
1910–11.							
October	2,890	160	574	6.83	7.87	35,300	C.
November	4,440	220	929	11.1	12.38	55,300	B.
December	840	242	456	5.43	6.26	28,000	A.
January	1,140	220	388	4.62	5.33	23,900	A.
February	304	178	213	2.54	2.64	11,800	A.
March	725	169	348	4.14	4.77	21,400	A.
April	900	266	412	4.90	5.47	24,500	A.
May	1,080	515	708	8.43	9.72	43,500	A.
June	1,080	278	546	6.50	7.25	32,500	A.
July	318	121	213	2.54	2.93	13,100	A.
August	121	89	104	1.24	1.43	6,400	A.
September	960	89	239	2.85	3.18	14,200	A.
The year	4,440	89	428	5.10	69.23	310,000	

Monthly discharge of South Fork of Snoqualmie River at North Bend, Wash., for the years ending Sept. 30, 1907–1915—Continued.

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1911–12.							
October	242	114	144	1.72	1.98	8,850	A.
November	4,740	114	973	11.6	12.94	57,900	B.
December	642	318	435	5.18	5.97	26,700	A.
January	2,450	266	739	8.80	10.14	45,400	B.
February	1,270	403	690	8.21	8.86	39,700	A.
March	428	266	311	3.70	4.27	19,100	A.
April	620	354	450	5.36	5.98	26,800	A.
May	1,550	480	842	10.0	11.53	51,800	A.
June	830	286	553	6.58	7.34	32,900	A.
July	354	131	223	2.65	3.06	13,700	A.
August	330	107	151	1.80	2.08	9,280	A.
September	454	114	185	2.20	2.46	11,000	A.
The year	4,740	107	473	5.63	76.61	343,000	
1912–13.							
October	.....	.....	201	2.39	2.76	12,400	C.
November	.....	201	622	7.40	8.26	37,000	C.
February	.....	.....	530	6.31	6.57	29,400	C.
March	.....	.....	391	4.65	5.36	24,000	C.
June	1,520	575	849	10.1	11.27	50,500	A.
July	615	218	412	4.90	5.65	25,300	A.
August	218	117	157	1.87	2.16	9,650	A.
September	580	117	178	2.12	2.36	10,600	A.
1913–14.							
October	2,450	126	527	6.27	7.23	32,400	A.
November	752	268	499	5.94	6.63	29,700	A.
December	595	218	321	3.82	4.40	19,700	A.
January	2,450	218	732	8.71	10.04	45,000	A.
February	810	336	476	5.67	5.90	26,400	A.
March	1,080	442	693	8.25	9.51	42,600	A.
April	1,360	452	762	9.07	10.12	45,300	A.
May	1,080	475	710	8.45	9.74	43,700	A.
June	670	380	506	6.02	6.72	30,100	A.
July	380	180	258	3.07	3.54	15,900	A.
August	183	98	117	1.39	1.60	7,190	C.
September	358	88	163	1.94	2.16	9,700	C.
The year	2,450	88	480	5.71	77.59	348,000	
1914–15.							
October	952	120	321	3.82	4.40	19,700	B.
November	2,020	365	760	9.05	10.10	45,200	A.
December	417	202	271	3.23	3.72	16,700	A.
January	365	218	286	3.40	3.92	17,600	A.
February	327	242	292	3.48	3.62	16,200	A.
March	694	261	428	5.10	5.88	26,300	A.
April	2,050	351	659	7.85	8.76	39,200	A.
May	861	268	354	4.21	4.85	21,800	A.
June	392	186	244	2.90	3.24	14,500	A.
July	351	136	181	2.15	2.48	11,100	A.
August	136	93	110	1.31	1.51	6,760	A.
September	226	81	106	1.26	1.41	6,310	A.
The year	2,050	81	334	3.98	53.89	241,000	

TOKUL CREEK NEAR SNOQUALMIE, WASH.

LOCATION.—In the NE. ¼ NW. ¼ sec. 20, T. 24 N., R. 8 E., 600 feet below dam site, 600 feet above bridge, 1¾ miles above junction with Snoqualmie River, 2 miles north of Snoqualmie, in King County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 21, 1907, to February 29, 1908; June 26, 1908, to October 31, 1914.

GAGE.—Vertical staff on left bank 600 feet above bridge, read to tenths every second day July, 1907, to February, 1908, by Lydia Carlton and W. B. Neighbors, and daily, except Sunday, thereafter by George Richards and J. A. Isaminger.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Early measurements made from foot log near gage.

CHANNEL AND CONTROL.—Channel composed of small gravel and light alluvial material; shifting at high stages; banks low and wooded; one channel at all stages.

EXTREMES OF DISCHARGE.—1907-1914: Maximum stage probably occurred in November, 1909. Stage reported higher than gage, 7.0 feet, in November, 1909, February, March, and November, 1910. Minimum stage recorded, 1.5 feet September 16–20. 1909 (discharge, 13 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record prior to 1913 not very reliable. Rating curves fairly well defined at low water and uncertain at high water. Results fair except for high stages.

COOPERATION.—Gage-height record and some discharge measurements furnished by the Puget Sound Traction, Light & Power Co.

Discharge measurements of Tokul Creek near Snoqualmie, Wash., during 1907-1914.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1907.		*Feet.*	*Sec.-ft.*	1912.		*Feet.*	*Sec.-ft.*
July 21	A. S. Kalenborn	1.52	22.0	May 10	H. C. Hanson	2.20	78
Sept. 17	do	1.78	32.3	Sept. 6	E. S. Fuller	2.43	86
1908.				1913.			
Sept. 24	M. T. Crawford	1.52	19.4	June 6	Rose and Eernisse	1.92	49.0
1909.				July 22	Parker, Rose, and Tuttle	1.91	46.6
Apr. 30	M. T. Crawford	3.35	102	1914.			
Aug. 27	A. T. Harris	1.70	19.4	Mar. 9	Rose and Dorfner	2.66	105
1910.				Apr. 10	do	2.10	67
Sept. 21	R. R. Easter	1.42	16.8	Aug. 18	Collier and Rose	1.50	25.9
1911.							
Sept. 14	G. L. Parker	2.25	52				

Daily discharge, in second-feet, of Tokul Creek near Snoqualmie, Wash., from July 21, 1907, to Oct. 31, 1914.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1907.				1907.				1907.			
1		22	22	11		25	25	21	22	20	25
2		22	26	12		25	24	22	22	22	24
3		23	29	13		25	22	23	22	22	22
4		24	27	14		25	25	24	22	22	22
5		24	25	15		22	28	25	22	28	22
6		24	25	16		19	30	26	22	33	24
7		24	25	17		19	33	27	22	31	25
8		25	24	18		19	32	28	22	29	25
9		25	22	19		19	31	29	22	26	25
10		25	24	20		19	28	30	22	22	24
								31	22	22	

Daily discharge, in second-feet, of Tokul Creek, near Snoqualmie, Wash., from July 21, 1807, to Oct. 31, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	June.	July.	Aug.	Sept.
1907-8.									
1	24	35	.....	.....	64	.....	44	27	23
2	26	41	.....	.....	61	.....	44	27	23
3	29	37	.....	.....	58	.....	44	27	23
4	28	33	.....	.....	56	.....	44	27	23
5	27	32	84	.....	76	.....	42	27	23
6	26	31	81	.....	96	.....	39	27	23
7	25	32	78	.....	108	.....	39	27	23
8	27	33	72	.....	120	.....	35	27	23
9	29	32	66	.....	108	.....	35	25	23
10	26	31	84	.....	96	.....	35	23	23
11	22	30	102	.....	96	.....	35	23	23
12	22	29	111	.....	96	.....	35	23	23
13	22	30	120	.....	96	.....	35	23	23
14	23	31	114	.....	96	.....	35	23	23
15	24	32	108	.....	108	.....	35	23	23
16	23	33	102	.....	120	.....	39	23	23
17	22	34	96	.....	150	.....	35	23	23
18	22	35	80	120	179	.....	35	23	19
19	22	38	64	117	168	.....	33	23	19
20	22	41	74	114	158	.....	31	23	19
21	22	62	84	114	145	.....	31	23	19
22	22	84	.....	114	132	.....	31	23	19
23	22	84	.....	117	120	.....	31	23	19
24	22	84	.....	120	108	.....	31	23	19
25	22	84	.....	120	120	.....	31	23	19
26	23	84	.....	120	132	49	29	23	19
27	24	.....	.....	102	148	49	27	23	19
28	24	.....	.....	84	165	49	27	27	19
29	25	.....	.....	78	144	49	27	35	19
30	27	.....	.....	72	.....	44	27	31	19
31	29	.....	.....	66	.....	.....	27	27	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908-9.												
1	27	35	76	200	259	210	112	100	64	23	16	16
2	23	39	76	221	252	217	106	97	64	19	16	16
3	23	39	76	218	252	217	100	94	64	19	16	16
4	23	39	76	214	252	224	103	106	59	19	16	16
5	23	39	76	193	259	217	106	106	59	19	16	16
6	23	39	76	179	266	217	100	100	56	23	16	16
7	23	39	76	179	266	214	94	94	54	27	16	16
8	23	39	82	179	266	210	94	88	54	27	16	16
9	23	39	82	172	259	210	94	103	49	23	16	16
10	23	39	82	165	259	203	94	118	44	23	16	16
11	23	39	82	158	252	189	91	112	44	23	16	16
12	23	39	82	158	238	182	88	106	44	23	16	16
13	27	35	82	158	231	182	82	100	42	19	16	16
14	27	35	82	158	180	182	76	94	39	19	16	16
15	27	40	82	158	130	182	94	94	39	19	16	16
16	27	44	82	172	196	175	94	91	35	19	16	13
17	27	49	82	186	210	175	88	88	31	19	16	13
18	27	144	82	200	196	175	94	82	27	19	16	13
19	27	106	82	270	217	175	100	82	27	19	16	13
20	27	118	82	312	217	175	94	82	27	19	16	13
21	27	130	82	280	214	172	88	76	27	19	16	31
22	27	140	82	280	210	168	82	76	27	19	16	27
23	27	151	82	259	217	161	94	76	27	19	16	23
24	27	130	144	256	217	154	94	76	27	19	16	23
25	27	112	158	252	210	142	94	70	27	18	16	23
26	27	100	193	238	203	130	94	70	23	16	18	21
27	27	88	204	238	210	124	100	70	23	16	19	19
28	27	82	214	231	210	115	118	70	23	19	16	19
29	27	82	207	224	.....	106	112	70	23	19	18	23
30	27	82	207	224	.....	112	106	70	23	16	17	23
31	31	.....	200	.....	.....	118	.....	70	.....	16	16	.....

Daily discharge, in second-feet, of Tokul Creek near Snoqualmie, Wash., from July 21, 1907, to Oct. 31, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1909-10.												
1	23	130	326	179	263	.....	228	112	88	54	23	23
2	19	130	368	168	256	.....	228	112	82	49	23	23
3	19	217	277	158	249	.....	221	106	70	44	23	23
4	19	154	277	144	242	.....	214	100	70	39	23	23
5	23	130	274	130	235	.....	214	100	64	31	19	23
6	23	130	270	124	228	.....	214	88	59	31	19	23
7	23	118	263	118	221	333	221	88	59	27	19	23
8	23	106	249	112	214	305	277	85	54	27	19	23
9	23	106	249	112	207	277	277	82	49	27	19	19
10	23	130	242	112	200	270	277	144	49	25	19	19
11	23	130	235	112	193	263	277	137	44	23	19	19
12	23	142	274	112	186	256	277	94	42	23	19	19
13	23	142	312	106	172	252	256	130	39	23	19	19
14	23	139	256	106	158	249	235	124	35	23	19	19
15	23	136	256	106	151	242	221	118	35	23	19	19
16	23	136	242	106	144	249	207	112	31	23	19	19
17	21	168	228	106	144	263	196	112	31	23	19	44
18	19	259	214	124	151	263	186	100	31	23	19	36
19	19	.....	200	137	151	270	172	100	40	23	19	27
20	27	.....	186	130	148	270	165	94	49	23	19	23
21	23	.....	172	130	144	270	165	88	44	23	19	19
22	19	.....	165	130	137	270	158	82	39	23	19	19
23	27	.....	158	204	137	277	151	76	39	23	19	19
24	27	.....	158	277	151	277	148	82	39	23	19	19
25	27	.....	165	256	277	270	144	88	39	23	19	18
26	23	.....	172	242	.....	270	137	94	37	23	19	16
27	23	.....	179	242	.....	260	130	94	35	23	19	16
28	23	.....	172	242	.....	249	118	88	35	23	21	19
29	27	.....	165	235	.....	242	112	91	35	23	23	19
30	23	.....	172	252	.....	235	112	94	39	23	23	19
31	.....	.....	193	270	.....	228	.....	88	.....	.....	23	.....
1910-11.												
1	39	112	200	151	193	124	106	44	112	39	27	16
2	98	112	193	151	179	124	106	44	106	39	27	16
3	158	118	193	158	172	118	106	70	100	39	27	24
4	151	118	204	172	172	118	100	76	91	39	27	31
5	137	118	214	200	162	124	94	88	82	39	23	31
6	118	142	228	214	151	130	88	82	82	39	23	31
7	235	165	235	214	130	172	88	110	76	35	23	27
8	228	172	256	232	124	172	88	137	70	35	23	31
9	186	.....	249	249	124	165	100	130	64	35	23	35
10	144	.....	235	235	124	151	112	124	64	35	23	35
11	137	.....	224	228	124	144	94	112	54	35	19	35
12	144	.....	214	221	152	140	88	242	44	35	19	39
13	137	.....	200	200	179	137	88	347	39	35	19	39
14	130	298	193	186	179	130	82	319	35	31	19	59
15	130	256	186	179	172	130	82	291	35	31	19	106
16	137	214	179	172	165	130	79	207	35	31	19	144
17	144	207	172	172	158	124	76	228	35	31	19	116
18	137	193	158	200	172	124	106	249	35	31	19	88
19	130	221	144	221	179	124	112	291	35	31	23	64
20	118	.....	137	256	186	124	100	256	35	31	21	49
21	112	.....	130	249	172	118	94	232	35	31	19	44
22	106	.....	130	242	165	112	94	207	35	31	19	44
23	118	.....	144	235	158	112	85	165	35	29	19	35
24	130	.....	172	235	151	112	76	158	35	27	19	35
25	124	.....	176	207	151	130	70	207	37	27	19	35
26	112	298	179	179	144	127	64	186	39	27	19	31
27	106	260	179	172	137	124	59	172	54	27	19	31
28	94	221	165	172	130	118	54	158	49	27	19	31
29	94	214	165	165	.....	112	49	144	49	27	16	31
30	100	200	158	158	.....	106	46	130	44	27	16	31
31	106	.....	151	158	.....	106	.....	124	.....	27	16	.....

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Daily discharge, in second-feet, of Tokul Creek near Snoqualmie, Wash., from July 21, 1907, to Oct. 31, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911-12.												
1	29	27	182	140	224	110	74	92	68	104	47	101
2	27	27	182	140	217	104	74	92	65	98	47	140
3	27	27	172	134	210	101	74	92	62	92	47	128
4	27	27	161	128	206	98	74	92	62	86	45	104
5	27	31	161	122	203	98	80	86	62	80	43	92
6	27	35	168	110	189	92	80	80	62	74	43	86
7	27	82	182	107	182	92	80	80	57	74	43	86
8	27	88	189	104	168	92	80	74	57	74	43	89
9	27	82	203	110	189	86	80	74	57	74	62	92
10	27	76	220	122	182	83	80	74	57	68	57	92
11	27	70	238	128	178	80	110	68	57	62	54	86
12	27	79	231	140	175	80	110	68	57	62	52	86
13	27	88	217	154	161	74	104	68	57	62	47	80
14	27	82	245	164	154	74	101	62	62	62	47	80
15	29	76	217	175	154	74	98	62	68	62	57	77
16	31	70	231	182	154	80	98	62	62	57	68	74
17	31	70	231	182	154	83	98	62	57	57	147	68
18	31	214	231	175	158	86	98	62	57	57	122	68
19	31	228	238	154	161	80	92	68	57	57	98	62
20	31	242	238	140	154	80	92	74	62	57	86	62
21	31	259	224	144	154	74	92	74	68	54	80	57
22	31	238	224	147	147	74	92	80	68	52	74	57
23	31	231	217	140	147	74	92	80	65	52	68	57
24	31	224	210	154	134	74	92	80	62	52	68	57
25	31	245	203	182	128	74	86	86	57	52	65	57
26	27	228	189	196	122	68	86	83	57	52	62	57
27	27	210	182	224	122	68	86	80	57	52	62	57
28	27	203	168	231	116	68	86	74	57	50	57	57
29	27	189	161	238	116	74	86	68	57	47	57	57
30	27	182	147	238	.....	74	92	68	80	47	57	57
31	27	.....	.....	231	.....	74	.....	68	.....	47	62	.....
1912-13.												
1	57	86	98	287	168	86	147	57	54	74	42	33
2	57	86	92	252	168	86	134	57	52	68	42	33
3	57	89	110	364	168	86	116	57	52	62	42	52
4	57	92	203	336	168	104	122	54	52	62	42	52
5	62	98	196	.....	154	104	140	52	47	62	42	52
6	65	110	182	.....	140	98	137	52	47	62	37	47
7	68	203	161	.....	128	98	134	52	47	62	37	47
8	74	245	142	224	116	92	122	62	47	57	37	47
9	74	336	122	217	113	92	116	74	47	57	37	47
10	74	315	110	189	110	92	104	74	47	57	37	47
11	74	294	98	175	104	92	98	74	47	52	37	47
12	68	280	98	.....	98	98	98	74	47	52	37	47
13	65	308	92	.....	98	98	98	68	47	57	37	42
14	62	301	104	.....	104	98	98	68	47	62	37	42
15	62	273	110	.....	104	92	98	68	47	57	37	42
16	62	259	116	.....	157	116	92	134	47	57	37	42
17	62	238	110	.....	210	140	86	122	47	57	37	42
18	62	217	128	.....	231	168	80	98	47	52	37	42
19	92	294	116	.....	217	182	74	74	52	52	37	42
20	92	287	110	98	196	161	71	68	52	50	37	37
21	92	252	116	98	168	134	68	62	52	47	37	40
22	92	224	113	92	154	116	68	62	54	47	37	42
23	104	203	110	92	141	110	62	57	57	47	37	42
24	116	182	116	140	128	104	62	57	68	47	35	42
25	140	161	116	400	122	98	62	57	68	47	33	37
26	140	140	116	350	110	92	62	57	68	47	33	37
27	125	122	110	308	98	110	62	62	62	47	33	37
28	110	116	116	266	92	147	62	62	62	47	33	40
29	104	110	216	217	.....	182	62	62	62	47	33	42
30	98	104	315	196	.....	175	57	57	62	47	33	42
31	86	.....	315	182	.....	168	.....	57	.....	42	33	.....

Daily discharge, in second-feet, of Tokul Creek near Snoqualmie, Wash., from July 21, 1907, to Oct. 31, 1914—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1913–14.													
1	37	74	217	86	168	164	86	84	44	49	30	24	28
2	37	71	203	86	161	189	80	84	44	49	28	24	28
3	37	68	189	80	154	175	80	80	39	44	26	24	28
4	42	68	175	120	182	161	74	75	39	44	26	24	28
5	42	134	154	273	175	140	72	69	39	44	26	24	28
6	42	175	147	329	154	128	71	66	39	44	26	24	30
7	98	161	138	350	147	116	71	63	48	39	26	24	30
8	92	147	128	329	140	110	71	60	57	39	26	26	32
9	98	144	122	280	134	104	68	60	84	39	26	30	32
10	110	140	110	245	128	98	68	60	78	39	26	26	36
11	189	122	110	224	134	98	68	60	69	39	26	26	49
12	182	116	98	203	147	92	70	57	63	36	26	26	44
13	175	104	92	189	161	92	71	54	57	34	26	26	44
14	217	98	95	182	161	92	80	52	54	34	26	26	42
15	189	92	98	189	154	95	110	52	52	34	26	30	42
16	175	120	86	196	147	98	122	49	49	34	26	32	39
17	147	147	80	196	134	86	122	49	49	34	26	30	60
18	128	161	86	186	122	86	189	49	49	34	26	34	63
19	116	154	80	175	116	86	148	44	49	34	26	42	108
20	104	175	80	161	110	80	108	44	49	34	26	37	108
21	98	182	74	161	104	77	96	44	52	34	26	32	84
22	92	182	68	294	113	77	84	44	54	34	26	30	75
23	86	200	68	308	122	77	84	44	49	30	26	30	66
24	92	217	62	266	134	77	75	44	52	30	26	28	49
25	98	217	62	248	140	80	72	44	69	30	26	28	57
26	95	224	62	231	131	86	81	44	60	30	26	28	54
27	92	210	57	217	137	80	90	49	57	30	26	29	54
28	86	189	62	203	140	80	120	57	56	30	24	30	49
29	86	203	68	182	.....	80	108	49	54	30	24	28	46
30	80	210	62	182	.....	80	96	46	52	30	24	28	57
31	74	.....	74	175	.....	80	.....	.....	.....	30	24	.....	54

NOTE.—Discharge ascertained from six rating curves fairly well defined below 100 second-feet and applicable as follows: July 21, 1907, to Feb. 29, 1908; June 26, 1908, to Jan. 20, 1909, and Dec. 1, 1909, to Nov. 20, 1911; Jan. 21 to Nov. 18, 1909; Nov. 21, 1911, to Jan. 25, 1913, and Jan. 8, 1914, to Apr. 18, 1914; Jan. 26, 1913, to Jan. 7, 1914; and Apr. 19 to Oct. 31, 1914. July 21 to Dec. 21, 1907, and Jan. 18 to Feb. 1908, discharge interpolated when gage was not read except for Nov. 27–30, and Dec. 1–4, which was estimated from hydrographs of this and three stations on Snoqualmie River at 280 and 240 second-feet, respectively. Nov. 19–31, 1909, water over gage, discharge not estimated. Feb. 26–28, Mar. 1–6, Nov. 9–13, and 20–25, 1910, water over gage, daily discharge for periods estimated from hydrographs at 565, 755, 585, and 645 second-feet, respectively. Jan. 5–7, and 12–19, 1913, snow so deep that gage could not be read; discharge estimated from hydrographs at 265 and 135 second-feet, respectively. Jan. 25, 1913, water over gage; discharge 25 and 26 estimated from hydrographs at 400 and 350 second-feet, respectively. Jan. 4, 1914, discharge estimated from hydrographs at 120 second-feet. Discharge interpolated on Sundays and a few other days on which gage was not read.

Monthly discharge of Tokul Creek near Snoqualmie, Wash., for the years ending Sept. 30, 1907–1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1907.					
July 21–31	22	22	22.0	480	C.
August	33	19	23.6	1,450	C.
September	33	22	25.5	1,520	C.
The period	.....	.....	.....	3,450	
1907–8.					
October	29	22	24.3	1,490	C.
November	.....	29	75.7	4,500	C.
February	179	56	115.	6,620	C.
July	44	27	34.5	2,120	C.
August	35	23	25.0	1,540	C.
September	23	19	21.3	1,270	D.
1908–9.					
October	31	23	25.7	1,580	C.
November	151	35	71.1	4,230	C.
December	214	76	109	6,700	C.
January	312	158	204	12,500	D.
February	266	130	227	12,600	D.
March	224	106	175	10,800	D.
April	118	76	96.2	5,720	C.
May	118	70	88.1	5,420	C.
June	64	23	39.1	2,330	C.
July	27	16	19.9	1,220	D.
August	19	16	16.3	1,000	D.
September	31	13	17.9	1,070	D.
The year	312	13	90.0	65,200	
1909–10.					
October	27	19	22.1	1,360	D.
December	368	158	228	14,000	D.
January	277	106	161	9,900	D.
February	.....	137	230	12,800	D.
March	.....	228	359	22,100	D.
April	277	112	198	11,800	D.
May	144	76	100	6,150	C.
June	88	31	46.7	2,780	C.
July	54	23	26.3	1,620	D.
August	23	19	20.0	1,230	D.
September	44	16	21.6	1,290	C.
1910–11.					
October	235	39	130	7,990	C.
November	.....	112	348	20,700	D.
December	256	130	186	11,400	D.
January	256	151	199	12,200	D.
February	193	124	157	8,720	D.
March	172	106	128	7,870	C.
April	112	46	86.2	5,130	C.
May	347	44	172	10,600	D.
June	112	35	54.7	3,250	C.
July	39	27	32.4	1,990	C.
August	27	16	20.7	1,270	D.
September	144	16	45.5	2,710	C.
The year	.....	16	130	93,800	
1911–12.					
October	31	27	28.1	1,730	C.
November	259	27	131	7,800	C.
December	245	147	196	12,100	D.
January	238	104	159	9,780	D.
February	224	116	164	9,430	D.
March	110	68	82.0	5,040	C.
April	110	74	88.9	5,290	C.
May	92	62	75.3	4,630	C.
June	80	57	61.1	3,640	C.
July	104	47	63.7	3,920	C.
August	147	43	63.5	3,900	C.
September	140	57	77.4	4,610	C.
The year	259	27	98.9	71,900	

Monthly discharge of Tokul Creek near Snoqualmie, Wash., for the years ending Sept 30, 1907–1914—Continued.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1912–13.					
October	140	57	82.4	5,070	C.
November	336	86	201	12,000	C.
December	315	92	137	8,420	C.
January	.....	92	205	12,600	D.
February	231	92	142	7,890	D.
March	182	86	117	7,190	C.
April	147	57	93.1	5,540	C.
May	134	52	67.5	4,150	C.
June	68	47	52.9	3,150	C.
July	74	42	54.3	3,340	C.
August	42	33	36.8	2,260	C.
September	52	33	42.8	2,550	C.
The year	.....	33	102	74,200	
1913–14.					
October	217	37	104	6,400	C.
November	224	68	150	8,930	D.
December	217	57	103	6,330	C.
January	350	80	211	13,000	D.
February	182	104	141	7,830	C.
March	189	77	102	6,270	C.
April	189	68	91.2	5,430	C.
May	84	44	54.1	3,330	C.
June	84	39	53.5	3,180	C.
July	49	30	36.0	2,210	C.
August	30	24	25.9	1,590	C.
September	42	24	28.3	1,680	C.
The year	350	24	91.5	66,200	

NOTE.—Mean discharge October, 1914, 49.8 second-feet; run-off, 3,060 acre-feet.

SOUTH FORK OF STILAGUAMISH RIVER NEAR SILVERTON, WASH.

LOCATION.—In the SW. ¼ sec. 23, T. 30 N., R. 9 E., one-eighth mile above the Silverton ranger station, about one-fourth mile below Martin Creek, 2½ miles below Silverton, in Snohomish County, and about 5 miles above Gold Basin.

DRAINAGE AREA.—45.4 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 1, 1910, to September 30, 1915 (fragmentary).

GAGE.—Vertical staff spiked to overhanging hemlock on right bank.

DISCHARGE MEASUREMENTS.—Made from a cable 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Right bank fairly high; not subject to overflow; left bank slopes back gradually and is covered by dense growth of alder. Control 100 feet below gage, composed of large boulders; may shift during floods. Stage of zero flow, determined October 30, 1913, gage height —0.5 foot ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 5 p. m., April 2 (discharge, 3,450 second-feet); minimum stage recorded, 0.70 foot, September 7, 23, 25, 26, 29–30 (discharge, 29 second-feet).

1910–1915: Maximum stage recorded, 7 feet November 20, 1910 (discharge, 5,720 second-feet, revised); minimum stage recorded September 7, 23, 25–26, 29–30, 1915.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Determinations of discharge below 2,000 second-feet, excellent. Small diurnal fluctuation during summer months.

COOPERATION.—Gage height record furnished by United States Forest Service.

Discharge measurements of South Fork of Stilaguamish River near Silverton, Wash., during the year ending Sept. 30, 1915.

Date	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 3	J. T. Hartson	1.34	125
June 10	C. G. Paulsen	1.34	136
Sept. 5	....do	.71	29.6

Daily discharge, in second-feet, of South Fork of Stilaguamish River near Silverton, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	170	485	308	485	285	154	1,520	140	262	112	59	31
2	154	2,520	262	308	222	140	3,450	125	308	99	59	31
3	154	1,340	222	389	186	137	1,610	140	186	99	47	31
4	154	1,610	222	308	170	204	1,170	154	222	99	49	31
5	125	1,170	222	222	308	186	1,000	222	222	88	49	30
6	140	732	186	186	360	170	1,000	154	222	76	47	30
7	131	550	154	170	262	186	389	186	262	68	47	29
8	99	485	154	204	242	170	360	186	262	99	45	154
9	99	425	154	186	308	154	360	262	186	99	45	76
10	425	360	125	186	262	170	308	262	137	99	42	76
11	425	620	99	518	222	154	425	222	140	99	42	59
12	520	695	99	334	186	154	770	222	125	99	42	59
13	390	845	76	222	170	154	485	186	125	112	42	45
14	280	518	99	204	154	1,170	360	222	125	112	42	50
15	222	360	99	170	140	1,000	383	154	112	308	39	55
16	222	308	99	154	140	389	372	154	112	360	39	49
17	658	262	76	154	334	485	334	186	112	222	37	40
18	1,800	308	76	140	285	550	262	222	125	222	37	37
19	2,000	360	76	140	222	389	262	262	122	222	37	37
20	845	1,080	76	154	222	425	262	222	118	154	35	36
21	360	550	76	140	186	485	262	186	115	99	35	34
22	308	485	59	140	170	550	262	186	112	76	33	33
23	308	695	59	125	170	518	242	222	112	76	33	29
24	262	425	47	112	170	360	222	262	112	59	33	29
25	222	620	37	112	204	334	222	308	125	59	33	29
26	215	550	76	99	170	262	222	308	125	59	31	29
27	186	550	99	88	154	242	222	1,000	112	59	31	37
28	186	518	99	76	154	242	186	845	112	88	31	37
29	170	425	99	88	.....	308	170	425	112	59	31	29
30	254	425	154	99	.....	360	154	308	112	59	31	29
31	334	.....	308	154	.....	770	.....	262	.....	59	31	.....

NOTE.—Discharge ascertained from a rating curve well defined below 2,000 second-feet. Discharge estimated, for lack of gage readings, by hydrographic comparison with record of South Fork of Stilaguamish River at Granite Falls, Oct. 12–14, June 19–21, Sept. 12–15, 17, 20, 21, and 24.

Monthly discharge of South Fork of Stilaguamish River near Silverton, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 45.4 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	2,000	99	381	8.39	9.67	23,400	A.
November	2,520	262	676	14.9	16.62	40,200	A.
December	308	37	129	2.84	3.27	7,930	A.
January	518	76	196	4.32	4.98	12,100	A.
February	360	140	216	4.76	4.96	12,000	A.
March	1,170	137	354	7.80	8.99	21,800	A.
April	3,450	154	575	12.7	14.17	34,200	A.
May	1,000	125	264	5.81	6.70	16,200	A.
June	308	112	154	3.39	3.78	9,160	A.
July	360	59	116	2.56	2.95	7,130	A.
August	59	31	39.8	.877	1.01	2,450	A.
September	154	29	43.4	.956	1.07	2,580	A.
The year	3,450	29	261	5.75	78.17	189,000	

SOUTH FORK OF STILAGUAMISH RIVER AT GRANITE FALLS, WASH.

LOCATION.—In the SE. ¼ sec. 12, T. 30 N., R. 6 E., at highway bridge 400 feet below Canyon Creek and about a mile north of Granite Falls, in Snohomish County.

DRAINAGE AREA.—182 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19 to October 31, 1911. September 13, 1913, to October 31, 1915, when station was discontinued.

GAGE.—Chain gage attached to upstream handrail of highway bridge; read once daily to hundredths by Miss Elsie Wilson.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Boulders and gravel; shifting at high stages; one channel at all stages. Left bank high; right bank low and wooded.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1914, to October 31, 1915, 7.8 feet October 31, 1915 (discharge, 6,700 second-feet); minimum stage recorded, 1.25 feet September 28 (discharge, 64 second-feet).

1911; 1913–1915; maximum stage recorded, 11.05 feet January 6, 1914 (discharge, 11,700 second-feet); minimum stage recorded on September 28, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent between limits of well-defined rating curves. Some diurnal fluctuation June to September.

Discharge measurements of South Fork of Stilaguamish River at Granite Falls, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 15	I. L. Collier	3.96	1,500	June 9	C. G. Paulsen	2.44	401
Mar. 5	J. T. Hartson	3.28	966	11	....do	2.43	396
16	....do	4.54	2,100	Sept. 4	....do	1.54	116
16	....do	4.37	1,890				

Daily discharge, in second-feet, of South Fork of Stilaguamish River at Granite Falls, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	563	1,720	980	1,820	1,280	536	2,910	382	798	268	192	157	95
2	875	3,860	840	1,440	742	396	5,120	405	700	268	152	134	3,130
3	775	3,170	808	2,400	1,360	486	3,400	452	611	268	206	80	1,280
4	679	4,000	710	1,620	775	679	1,630	452	502	252	221	97	428
5	536	4,560	840	1,120	2,040	840	1,540	476	582	152	129	152	382
6	418	2,280	710	1,050	2,040	563	1,280	528	528	152	108	129	221
7	396	2,040	536	1,050	1,360	875	1,630	555	555	236	152	147	268
8	440	1,620	536	1,280	1,200	679	1,280	452	476	555	206	1,040	252
9	396	1,930	536	1,280	1,360	648	1,040	502	405	321	129	340	206
10	742	2,280	486	1,050	1,120	910	798	700	405	221	102	236	206
11	1,930	3,040	536	3,170	910	710	798	611	405	152	80	206	192
12	3,860	1,720	440	2,280	775	563	900	452	382	165	80	206	1,360
13	1,360	3,440	440	1,530	742	536	798	405	361	340	86	155	2,740
14	980	2,280	315	1,360	648	4,280	830	502	252	476	102	178	1,630
15	840	1,530	188	1,280	710	4,280	765	502	321	1,730	129	221	865
16	742	1,200	216	910	679	2,040	732	582	302	1,730	147	160	502
17	1,820	980	279	875	1,820	1,200	865	611	321	970	152	152	428
18	5,360	536	315	808	910	1,930	970	670	363	640	157	178	528
19	3,860	1,050	396	840	563	1,280	900	900	405	476	93	165	670
20	2,520	2,400	354	875	486	563	798	798	382	361	108	157	582
21	1,440	1,930	279	840	486	1,200	670	582	361	321	118	108	528
22	1,200	1,360	375	648	463	1,440	528	582	361	268	108	152	765
23	1,050	1,720	334	536	648	1,440	640	502	340	302	100	108	1,730
24	875	1,440	315	440	710	1,280	582	970	285	252	80	80	2,260
25	775	1,200	354	476	980	1,120	502	1,280	285	285	114	69	2,500
26	710	3,170	396	511	775	910	382	1,280	268	321	136	89	2,260
27	590	1,820	563	536	590	910	340	1,450	302	236	72	80	2,380
28	486	2,160	1,530	536	775	910	285	1,730	206	252	123	64	4,120
29	463	1,720	840	463	.....	1,280	428	1,540	206	206	152	72	1,540
30	840	1,050	980	536	.....	1,120	405	1,360	252	221	72	68	1,360
31	1,530	.....	2,160	910	.....	840	.....	830	.....	221	72	.....	6,700

NOTE.—Discharge Oct. 1 to Apr. 2 ascertained from rating curve well defined below 3,000 second-feet Apr. 3 to Oct. 31, from rating curve well defined below 700 second-feet and fairly well defined between 700 and 1,500 second-feet. Gage not read Jan. 25 and June 18; discharge interpolated.

Monthly discharge of South Fork of Stilaguamish River at Granite Falls, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 182 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	5,360	396	1,260	6.92	7.98	77,500	A.
November	4,560	536	2,110	11.6	12.94	126,000	A.
December	2,160	188	600	3.30	3.80	36,900	A.
January	3,170	440	1,110	6.10	7.03	68,200	A.
February	2,040	463	962	5.29	5.51	53,400	A.
March	4,280	396	1,180	6.48	7.47	72,600	A.
April	5,120	285	1,120	6.15	6.86	66,600	B.
May	1,730	382	743	4.08	4.70	45,700	B.
June	798	206	397	2.18	2.43	23,600	A.
July	1,730	152	407	2.24	2.58	25,000	A.
August	221	72	125	.687	.79	7,690	B.
September	1,040	64	173	.951	1.06	10,300	B.
The year	5,360	64	847	4.65	63.15	613,000	

NOTE.—Mean discharge for October, 1915, 1,360 second-feet; discharge per square mile, 7.47 second-feet; depth in inches on drainage area, 8.61; run-off in acre-feet, 83,600 acre-feet.

SKAGIT RIVER AT REFLECTOR BAR, NEAR MARBLEMOUNT, WASH.

LOCATION.—In sec. 8, T. 37 N., R. 13 E. Willamette meridian (unsurveyed), just below mouth of Canyon Diablo, at Reflector Bar ranger station, three-fourths mile above Stetattle Creek, 1½ miles below Thunder Creek, and 23 miles, by trail, northeast of Marblemount, in Whatcom County.

DRAINAGE AREA.—Nor measured.

RECORDS AVAILABLE.—December 1, 1913, to September 30, 1915.

GAGE.—Since April 13, 1914, Stevens water-stage recorder, on right bank, 75 feet below mouth of Canyon Diablo; inspected by Henry Soll. Prior to April 13, 1914, inclined staff at same location, but at datum 2.00 feet higher.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage.

CHANNEL AND CONTROL.—One channel at all stages. Banks not subject to overflow. Control 200 feet below gage, composed of large boulders near right bank, clean gravel in center, and sand near left bank; may shift during floods. Stage of zero flow, gage height 0.0±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.52 feet at 4 a. m., April 3 (discharge, 11,800 second-feet); minimum stage, from recorder, 1.74 feet from 1 a. m. to 10 a. m., January 28 (discharge, 707 second-feet).

1913–1915: Maximum stage, from water-stage recorder, 7.28 feet at 6.30 a. m. May 15, 1914 (discharge, 14,700 second-feet); minimum stage, from recorder, January 28, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent.

COOPERATION—Gage-height record furnished by United States Forest Service. Equipment furnished and installed by Stone & Webster Engineering Corporation.

Discharge measurements of Skagit River at Reflector Bar, near Marblemount, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 19	J. T. Hartson	1.84	806	July 20	C. G. Paulsen	3.55	3,160
20	.....do	1.83	776	Sept. 10	.....do	2.32	1,310

Daily discharge, in second-feet, of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,810	4,340	3,500	1,070	764	832	3,020	3,800	4,120	4,340	4,120	2,390
2	1,600	5,340	3,200	1,060	747	824	8,880	3,500	3,900	4,700	4,230	2,220
3	1,510	5,190	3,020	1,110	747	832	10,700	3,500	3,700	4,940	3,900	2,480
4	1,370	5,630	2,830	1,070	755	869	7,800	3,600	4,070	5,060	3,300	3,740
5	1,320	5,450	2,650	1,030	764	878	6,120	3,900	5,060	4,700	3,310	2,250
6	1,240	4,580	2,480	1,020	764	878	5,600	4,630	5,840	4,230	3,600	1,760
7	1,260	3,900	2,390	991	747	850	5,200	5,710	5,840	3,700	3,360	1,470
8	1,370	3,600	2,220	991	739	824	5,000	6,260	4,820	4,010	3,300	1,540
9	1,600	3,700	2,060	972	739	840	4,600	6,260	4,120	3,500	3,300	1,390
10	1,540	3,400	1,900	952	755	856	4,300	5,980	3,700	2,920	3,300	1,250
11	1,440	4,030	1,750	982	755	873	4,300	5,060	3,600	2,650	3,300	1,200
12	1,540	3,800	1,640	972	755	889	4,300	4,580	3,800	2,740	3,020	1,080
13	1,900	3,800	1,540	952	772	905	4,580	4,340	3,900	2,650	3,220	991
14	1,880	3,300	1,490	943	747	991	4,340	4,340	4,120	2,560	3,500	962
15	1,900	3,020	1,520	924	747	1,680	4,230	4,340	4,340	2,830	3,600	1,060
16	2,100	2,830	1,410	896	747	1,640	4,580	4,340	4,460	3,020	3,600	1,280
17	2,960	2,650	1,370	878	772	1,580	5,580	4,340	4,120	2,740	3,480	1,470
18	2,650	2,560	1,350	878	807	1,610	6,400	4,340	3,800	2,740	3,200	1,580
19	3,020	2,560	1,330	869	798	1,720	6,680	4,340	3,400	3,020	3,400	1,610
20	2,560	3,100	1,260	850	781	1,870	6,680	4,340	3,200	3,500	3,700	1,470
21	2,220	3,500	1,250	824	772	1,900	5,450	4,340	3,300	4,010	4,010	1,540
22	2,060	3,300	1,250	747	772	2,390	4,700	4,580	3,700	3,800	4,120	1,570
23	1,860	3,300	1,240	815	781	2,920	4,230	4,340	4,910	3,600	3,980	1,530
24	1,780	3,300	1,220	772	781	2,920	4,120	4,230	4,010	3,700	3,900	1,370
25	1,740	3,800	1,180	755	798	2,650	3,900	4,120	3,500	3,800	3,500	1,310
26	1,720	4,580	1,140	755	807	2,390	4,230	3,900	2,920	3,500	3,200	1,250
27	1,720	4,580	1,140	739	815	2,220	4,120	4,370	2,650	3,500	3,110	1,140
28	1,720	4,460	1,120	747	815	2,140	4,010	5,710	2,740	3,400	3,070	982
29	1,760	4,010	1,090	772	.....	2,220	4,340	4,940	3,200	3,400	3,330	1,030
30	3,000	3,700	1,060	764	.....	2,220	4,120	4,230	3,800	3,900	3,400	1,130
31	3,200	.....	1,080	764	.....	2,220	.....	4,010	.....	4,120	2,650	.....

NOTE.—Discharge ascertained from well-defined rating curve. Gage heights not available for following periods: Mar. 9–12, discharge interpolated; Apr. 6–12, discharge estimated by comparison of hydrograph based on flow of Skagit River at Sedro Woolley less that of Baker River below Anderson Creek near Concrete and Sauk River at Darrington; May 13–21, mean discharge estimated at 4,340 second-feet.

Monthly discharge of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3,200	1,240	1,910	117,000	A.
November	5,630	2,560	3,840	228,000	A.
December	3,500	1,060	1,730	106,000	A.
January	1,110	739	899	55,300	A.
February	815	739	769	42,700	A.
March	2,920	824	1,560	95,900	A.
April	10,700	3,020	5,200	309,000	A.
May	6,260	3,500	4,520	278,000	A.
June	5,840	2,650	3,920	233,000	A.
July	5,060	2,560	3,590	221,000	A.
August	4,230	2,650	3,480	214,000	A.
September	2,740	962	1,500	89,300	A.
The year	10,700	739	2,750	1,990,000	

SKAGIT RIVER NEAR SEDRO WOOLLEY, WASH.

LOCATION.—In the NW. ¼ sec. 36, T. 35 N., R. 4 E., at Northern Pacific Railway bridge three-fourths mile below intake of Beatty's slough, 1½ miles south of Sedro Woolley, in Skagit County, 21 miles above mouth, and 32 miles below Baker River. Elevation of low water about 25 feet above tide.

DRAINAGE AREA.—2,930 square miles (measured on General Land Office map).

RECORDS AVAILABLE.—May 1, 1908, to September 30, 1915.

GAGE.—Vertical staff on cribbing 100 feet above draw-span pier of Northern Pacific Railway bridge. Datum, extreme low tide in Puget Sound. Temporary gage installed September 25, on downstream side of group of piles, 50 feet above third concrete pier (from left bank) of railway bridge; used September 26–30. Gage read to half-tenths daily, and in addition crest gage heights observed or estimated by E. J. Woods.

DISCHARGE MEASUREMENTS.—Made from highway bridge one-third mile above gage. Beatty's slough measured from highway bridge.

CHANNEL AND CONTROL.—Gravel; shifts at high stages. Banks not subject to overflow except during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 45.4 feet at 11 a. m., April 3 (discharge, 58,100 second-feet); minimum stage recorded, 32.3 feet at 7 a. m., September 29–30 (discharge, 2,740 second-feet).

1908–1915: Maximum stage recorded, 56.1 feet November 30, 1909 (discharge, 96,100 second-feet); minimum stage recorded, 32.3 feet September 29–30, 1915 (discharge, 2,740 second-feet).

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

DIVERSION.—Beatty's slough carries from 1.5 per cent of total flow at low stages to 8 per cent at high stages. Amount determined each visit and added to flow measured in river proper.

REGULATION.—None.

ACCURACY.—Discharge relation changed during high water in November. Practically no diurnal fluctuation. Results excellent December to August; good before and after.

Discharge measurements of Skagit River near Sedro Woolley, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 11	I. L. Collier	34.76	9,100	June 14	C. G. Paulsen	35.14	10,900
Feb. 26	J. T. Hartson	33.41	5,820	July 22	do	35.40	12,300
27	do	33.32	5,440	Sept. 8	do	32.77	4,780
				14	do	32.30	3,570

Daily discharge, in second-feet, of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,770	13,000	15,600	6,760	5,570	5,570	9,340	11,000	14,200	11,000	10,400	7,280
2	7,770	35,900	14,900	9,670	6,020	5,570	34,300	10,400	13,800	13,100	10,400	7,020
3	8,070	38,300	13,800	10,000	5,790	5,360	57,600	10,000	12,800	13,800	11,000	6,260
4	7,480	29,500	13,100	10,000	5,790	5,570	41,700	10,400	11,700	14,500	9,670	6,760
5	6,910	33,300	11,700	8,410	5,790	6,020	28,100	11,000	13,100	14,200	8,710	7,020
6	6,370	30,000	10,700	7,550	7,280	5,790	22,600	12,400	15,600	12,800	8,410	6,260
7	6,110	23,000	10,400	7,280	7,550	5,790	20,000	14,200	17,600	12,400	9,020	5,360
8	6,110	19,200	10,000	7,550	6,760	5,570	19,600	16,800	15,600	10,400	8,710	4,560
9	6,110	20,400	9,340	7,830	6,510	5,570	16,800	16,000	13,100	12,400	8,410	4,750
10	6,110	18,400	9,020	7,280	7,020	5,570	14,900	17,600	11,400	10,000	8,410	4,370
11	7,190	17,600	8,410	9,020	6,510	5,570	14,500	16,400	10,700	9,020	9,020	4,190
12	7,190	21,700	7,830	11,000	6,260	5,570	15,200	13,800	10,400	7,550	8,710	4,020
13	10,600	20,000	7,550	9,340	6,260	5,360	17,200	13,100	10,400	7,830	7,830	3,860
14	8,990	20,000	7,280	8,410	6,020	6,020	17,600	12,400	10,700	7,830	8,710	3,860
15	8,070	16,800	7,280	8,410	5,790	16,800	14,500	12,800	11,000	7,550	9,670	3,710
16	7,770	14,900	7,020	7,280	5,360	16,800	14,500	11,000	12,400	11,700	9,340	3,860
17	10,600	13,400	6,760	7,020	5,360	12,400	16,800	10,400	13,100	11,000	9,670	3,710
18	16,900	12,400	6,510	6,510	7,280	11,700	18,400	11,000	11,700	9,340	9,020	3,860
19	28,500	11,000	6,260	6,510	6,510	11,400	19,200	13,100	10,700	8,410	8,410	3,860
20	21,800	14,900	6,260	6,510	6,260	8,410	20,000	14,200	10,000	9,020	9,340	3,860
21	15,100	20,800	6,260	6,510	5,790	8,710	18,000	13,400	9,670	10,000	10,000	3,860
22	12,000	17,600	6,020	6,260	5,790	11,000	15,200	12,800	9,670	11,700	10,700	3,860
23	9,940	17,600	5,790	6,020	5,790	14,500	13,400	12,400	10,700	10,400	11,000	3,860
24	8,990	17,600	5,790	6,020	5,570	14,500	12,800	11,700	11,400	9,670	10,000	4,020
25	8,680	17,600	5,360	5,790	6,020	13,100	12,400	12,800	11,000	10,000	10,000	3,860
26	8,370	20,800	5,570	5,790	5,790	10,700	12,000	11,700	9,670	10,000	9,020	3,420
27	8,070	23,900	5,570	5,570	5,570	9,670	12,400	11,000	8,710	9,670	8,710	3,420
28	7,770	21,700	5,570	5,360	5,570	8,710	11,700	23,500	8,410	9,020	8,410	2,960
29	7,480	19,600	5,570	5,360	.....	9,020	11,700	20,800	8,410	9,020	8,120	2,740
30	7,480	17,600	5,570	5,150	.....	10,400	12,800	15,600	9,670	8,710	9,020	2,740
31	13,300	.....	7,020	5,150	.....	10,000	.....	13,100	.....	10,000	8,710	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 3, from rating curve fairly well defined between 5,000 and 40,000 second-feet; Nov. 4 to Sept. 25, from rating curve well defined between 3,000 and 20,000 second-feet; Sept. 26–30, from rating curve well defined between 3,500 and 18,000 second-feet. Gage heights Sept. 8–25 slightly doubtful, as water was standing in pools at gage; determinations of discharge based on measurements Sept. 8 and 14 and corrections to gage heights found applicable on those dates.

Monthly discharge of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 2,930 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	28,500	6,110	9,790	3.34	3.85	602,000	B.
November	38,300	11,000	20,600	7.03	7.84	1,230,000	B.
December	15,600	5,360	8,190	2.80	3.23	504,000	A.
January	11,000	5,150	7,270	2.48	2.86	447,000	A.
February	7,550	5,360	6,130	2.09	2.18	340,000	A.
March	16,800	5,360	8,930	3.05	3.52	549,000	A.
April	57,600	9,340	18,800	6.42	7.16	1,120,000	A.
May	23,500	10,000	13,400	4.57	5.27	824,000	A.
June	17,600	8,410	11,600	3.96	4.42	690,000	A.
July	14,500	7,550	10,400	3.55	4.09	640,000	A.
August	11,000	7,830	9,240	3.15	3.63	568,000	A.
September	7,280	2,740	4,440	1.52	1.70	264,000	B.
The year	57,600	2,740	10,700	3.65	49.75	7,780,000	

STETATTLE CREEK NEAR MARBLEMOUNT, WASH.

LOCATION.—In sec. 6, T. 37 N., R. 13 E. Willamette meridian (unsurveyed), above Skagit trail bridge, a quarter of a mile above mouth, and 22½ miles by trail northeast of Marblemount, in Whatcom County; below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 19, 1913, to November 14, 1915.

GAGE.—Vertical staff on left bank, 600 feet above Skagit trail bridge; read to hundredths once each day, for which record is published, by Henry Soll.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—One channel at all stages. Banks not subject to overflow. Control, 75 feet below gage, composed of large boulders; probably permanent. Stage of zero flow, gage height −0.2 foot ±0.2 foot, as determined February 20, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded, October 1, 1914, to November 14, 1915, 4.50 feet at 4.40 p. m. April 2 (discharge, 1,470 second-feet); minimum stage recorded, 1.02 feet January 28–29 (discharge, 26 second-feet).

1913–1915: Maximum stage recorded, 5.4 feet at 8 a. m. January 6, 1914 (discharge, 1,800 second-feet); minimum stage recorded 1.01 feet at 8 a. m. February 11–12, 1914 (discharge, 23.6 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Considerable diurnal fluctuation April to June. Results good, but record is too fragmentary for monthly estimates, except December to April.

Discharge measurements of Stetattle Creek near Marblemount, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 20	J. T. Hartson	1.35	47.8	July 20	C. G. Paulsen	1.95	130
20	do	1.35	47.3	Sept. 10	do	1.21	35.0

Daily discharge, in second-feet, of Stetattle Creek near Marblemount, Wash., from Oct. 7, 1914, to Nov. 14, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1		945	250	33	33	43	523	86			122	
2			190	36	28	43	1,470	75	137		119	
3		428	140	60	29	42	602	137	182		114	64
4		945	110	44	30	57	305	158	288		114	63
5			80	41	35	53	254	238	305		89	
6		254	63	36	44	51	224				102	
7	48		60	36	41	50	209				75	
8		224	55	37	27	49	196				86	44
9			51	39	46	50	123		128			
10	63		47	41	48	52	130				97	36
11		270	44	50	44	51	160		128		89	34
12			44	70	42	49	240		209		94	32
13			45	51	42	46	209		148		96	30
14		148	45	44	40	126	158			121	102	
15			40	42	36	238	137			238	100	30
16		100	34	36	36	182	384		158	148	89	31
17			34	35	52	158	238		182	119		
18		78	34	35	55	148	270		121	117	88	44
19	288		33	34	50	123	288					
20			33	34	46	137	209		132	128		
21			32	32	44	182	163			137		
22		182	31	31	42	238	117	158		119		
23			30	30	41	224	119	132	170	119		
24			29	30	41	158	148	133	148	119	89	
25	89		30	30	46	123	158	126	102	119	79	
26			30	28	44	102	137	116		110		
27			30	28	42	121	117	305		114		
28			30	26	44	92	170	288		86		
29			30	26		110	182	170		130		
30			30	27		114	134	126		133		
31			30	30		82		170		117		

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1915.			1915.			1915.		
1		451	11	57	68	21	137	
2		238	12	63	69	22	126	
3		209	13	305		23	119	
4		254	14	109	54	24	428	
5		209	15	75		25	123	
6	44		16	53		26	523	
7	41	121	17	57		27	498	
8	38	100	18	324		28	575	
9	36		19	343		29	324	
10	34	76	20	575		30	196	
						31	815	

NOTE.—Discharge ascertained from a rating curve well defined between 30 and 600 second-feet. Discharge estimated, for lack of gage readings, by hydrographic comparison with record of Skagit River at Reflector Bar, near Marblemount, Dec. 1–5 and Apr. 10–12.

Monthly discharge of Stetattle Creek near Marblemount, Wash., for the period Dec. 1, 1914, to Apr. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
December	250	29	56.9	3,500	C.
January	70	26	37.2	2,290	A.
February	55	28	41.0	2,280	A.
March	238	42	106	6,520	A.
April	1,470	117	259	15,400	B.
The period				30,000	

SAUK RIVER AT DARRINGTON, WASH.

LOCATION.—In the SE. ¼ sec. 24, T. 32 N., R. 9 E., 700 feet above suspension footbridge half a mile southeast of Darrington, in Snohomish County, 2½ miles below Clear Creek, and 23 miles above its mouth.

DRAINAGE AREA.—293 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 15, 1914, to September 30, 1915.

GAGE.—Vertical staff on left bank, attached to log crib, 700 feet above suspension bridge; read once daily to half tenths by Paul Schmidt.

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

CHANNEL AND CONTROL.—Channel composed of gravel and large boulders, practically permanent; left bank high and not subject to overflow; right bank flat and subject to overflow at extremely high stages. Stage of zero flow, gage height of −1.7 feet, ±0.5 foot, as determined September 7, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and the period 1914–15, 8.47 feet at 4.30 p. m. April 2 (discharge, 20,400 second-feet); minimum stage recorded, 0.78 foot September 28–29, 1915 (discharge, 340 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

REGULATION.—None.

ACCURACY.—Results excellent except for periods of extremely high and low water. Diurnal fluctuation practically negligible.

Discharge measurements of Sauk River at Darrington, Wash., during 1913–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913.		*Feet.*	*Sec.-ft.*	1913.		*Feet.*	*Sec.-ft.*
Oct. 26	James E. Stewart	2.78	1,420	Mar. 2	J. T. Hartson	1.41	585
1914.				Apr. 15	do	3.09	1,660
May 12	G. L. Parker	4.02	2,760	16	do	3.25	1,780
Sept. 25	I. L. Collier	2.39	1,110	June 13	C. G. Paulsen	2.46	1,160
1915.				Sept. 6	do	1.07	402
Mar. 1	J. T. Hartson	1.42	599	7	do	1.02	389

Daily discharge, in second-feet, of Sauk River at Darrington, Wash., from June 15, 1914, to Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1914.					1914.				
1		4,420	1,180	564	16	4,540	1,890	850	850
2		4,160	1,110	534	17	4,100	1,780	850	975
3		3,670	1,110	501	18	3,670	1,690	740	1,420
4		2,870	1,110	470	19	3,360	1,600	850	3,240
5		2,540	1,180	487	20	3,050	1,520	850	3,240
6		2,120	1,110	504	21	3,450	1,430	790	2,120
7		2,390	975	521	22	2,250	1,340	740	1,420
8		2,250	975	538	23	2,400	1,260	690	1,260
9		2,250	910	555	24	2,540	1,420	740	1,110
10		2,390	850	572	25	2,390	1,340	690	1,110
11		2,540	975	618	26	2,250	1,180	690	1,500
12		2,540	975	530	27	2,180	1,180	690	1,420
13		2,390	975	490	28	2,120	1,110	740	1,110
14		1,890	975	490	29	2,870	1,040	690	975
15	4,970	1,890	910	572	30	3,670	1,180	648	975
					31		1,180	595	

Daily discharge, in second-feet, of Sauk River at Darrington, Wash., from June 15, 1914, to Sept. 30, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	850	5,560	1,680	1,340	910	550	4,690	1,180	1,590	1,340	1,110	550
2	975	9,460	1,590	1,340	740	550	20,600	1,180	1,420	1,420	1,110	520
3	1,110	11,600	1,420	975	690	530	11,100	1,180	1,260	1,420	910	490
4	975	11,600	1,260	910	640	690	5,260	1,180	1,420	1,260	690	640
5	850	7,210	1,260	790	850	640	3,050	1,260	1,780	1,260	975	510
6	740	3,910	1,110	740	975	595	2,540	1,590	2,250	1,110	850	418
7	740	3,050	975	690	910	595	2,870	1,780	1,780	1,260	740	400
8	740	2,700	975	740	910	572	2,250	1,780	1,420	1,260	790	640
9	690	2,700	910	740	910	572	1,890	2,000	1,260	975	740	530
10	1,110	2,250	850	975	850	572	1,680	2,000	1,110	790	850	452
11	1,500	4,160	790	1,340	790	550	1,780	1,780	1,040	740	790	418
12	2,000	3,670	740	1,040	740	530	2,120	1,590	1,040	740	850	400
13	1,420	3,910	740	910	690	975	2,540	1,420	1,110	850	850	400
14	1,110	3,910	740	790	640	2,250	1,780	1,420	1,110	740	850	385
15	1,040	2,120	690	740	595	3,450	1,680	1,260	1,260	1,040	850	435
16	1,110	1,890	640	690	595	1,890	1,890	1,110	1,260	1,340	850	470
17	2,120	1,590	640	640	975	1,500	2,250	1,260	1,180	1,110	740	452
18	5,560	1,420	640	640	850	1,680	2,250	1,420	1,110	790	740	435
19	4,970	1,590	618	640	740	1,340	2,120	1,590	975	910	910	435
20	2,870	4,160	618	640	640	1,260	2,000	1,420	975	1,040	910	435
21	2,120	2,870	618	640	640	1,340	1,780	1,340	1,040	1,260	1,040	435
22	1,780	2,390	595	595	640	1,680	1,590	1,260	1,110	975	1,040	435
23	1,500	2,700	572	595	640	1,890	1,420	1,180	1,260	850	975	510
24	1,340	2,250	550	572	640	1,780	1,420	1,340	1,110	975	850	435
25	1,260	2,700	550	550	690	1,420	1,420	1,420	975	975	690	435
26	1,260	3,910	572	530	640	1,260	1,420	1,260	850	850	740	385
27	1,110	2,700	595	510	595	1,110	1,420	1,590	850	850	850	370
28	1,110	2,540	640	510	572	1,180	1,420	2,870	850	850	740	340
29	1,110	2,250	618	510	.....	1,340	1,500	2,000	975	790	850	340
30	1,890	1,890	850	510	.....	1,340	1,260	1,590	1,110	850	740	370
31	1,680	.....	1,040	572	.....	1,180	.....	1,590	.....	910	530	.....

NOTE.—Discharge ascertained from a rating curve well defined between 500 and 5,000 second-feet. Discharge June 16, 17, 19, 23, 27, July 15, 18–21, Sept. 1–3, and 5–9, 1914, and Sept. 2, 1915, interpolated; that for Sept. 4, 1914, computed from an estimated gage height during period when water had receded from gage.

Monthly discharge of Sauk River at Darrington, Wash., for the years ending Sept. 30, 1914–15.

[Drainage area, 293 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1914.							
June 15–30	4,970	2,120	3,110	10.6	6.31	98,700	A.
July	4,420	1,040	2,010	6.86	7.91	124,000	A.
August	1,180	595	876	2.99	3.45	53,900	A.
September	3,240	470	1,020	3.48	3.88	60,700	A.
The period	.....	.....	.....	.....	.....	337,000	
1914-15.							
October	5,560	690	1,570	5.36	6.18	96,500	A.
November	11,600	1,420	3,820	13.0	14.50	227,000	B.
December	1,680	550	841	2.87	3.31	51,700	A.
January	1,340	510	755	2.58	2.97	46,400	A.
February	975	572	739	2.52	2.62	41,000	A.
March	3,450	530	1,190	4.06	4.68	73,200	A.
April	20,600	1,260	3,030	10.3	11.49	180,000	B.
May	2,870	1,110	1,510	5.15	5.94	92,800	A.
June	2,250	850	1,220	4.16	4.64	72,600	A.
July	1,420	740	1,020	3.48	4.01	62,700	A.
August	1,110	530	844	2.88	3.32	51,900	A.
September	640	340	449	1.53	1.71	26,700	B.
The year	20,600	340	1,410	4.81	65.37	1,020,000	

BAKER LAKE NEAR CONCRETE, WASH.

LOCATION.—At United States fish hatchery at Baker Lake, 14 miles northeast of Concrete, in Whatcom County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 2, 1910, to October 31, 1915, when station was discontinued.

GAGE.—Vertical staff fastened to pile at boathouse: read to tenths daily by C. D. Ryan.

EXTREMES OF STAGE.—Maximum stage recorded during October 1, 1914, to October 31, 1915, 10.9 feet, October 27, 1915; minimum stage recorded, 1.5 feet September 9–11.

1910–1915: Maximum stage recorded, 14.0 feet January 6, 1914; minimum stage recorded, 0.6 foot February 3–28, 1914.

WINTER FLOW.—Ice occasionally forms on lake.

REGULATION.—None.

COOPERATION.—Record furnished by the United States Bureau of Fisheries.

Daily gage height, in feet, of Baker Lake near Concrete, Wash., for the period Oct. 1, 1914, to Oct. 31, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	5.0	8.0	4.0	2.2	1.9	2.0	3.9	3.1	5.5	4.2	3.6	2.2	2.0
2	4.5	10.0	3.8	2.4	1.9	2.0	10.0	3.0	5.0	4.4	3.7	2.1	1.9
3	4.0	8.8	3.5	2.5	1.9	2.0	10.5	2.7	4.4	4.5	3.7	2.0	1.9
4	3.8	8.0	3.0	2.7	1.9	2.0	7.0	2.6	3.9	4.5	3.7	1.9	1.9
5	3.6	7.0	3.0	2.9	1.9	2.0	5.0	2.5	4.0	4.4	3.6	1.9	2.2
6	3.5	7.0	3.0	3.0	1.9	2.1	4.0	2.5	4.5	4.1	3.5	1.9	2.4
7	3.4	6.8	3.0	3.5	2.0	2.1	4.3	2.5	5.0	3.8	3.2	1.9	2.8
8	3.3	7.0	3.0	3.4	2.2	2.1	4.5	3.0	4.0	3.5	3.0	1.8	3.0
9	3.3	7.5	2.8	3.2	2.3	2.1	4.5	3.5	.....	3.8	2.8	1.5	3.5
10	3.3	8.0	2.7	3.0	2.3	2.1	4.5	3.8	.....	3.2	2.6	1.5	4.0
11	3.4	8.0	2.5	3.0	2.3	2.1	4.3	4.0	.....	3.0	2.6	1.5	4.1
12	5.0	7.0	2.3	3.0	2.2	2.1	4.1	4.2	.....	2.8	2.6	1.6	4.1
13	4.8	6.0	2.1	3.0	2.4	2.1	3.8	4.2	.....	2.8	2.6	1.7	4.0
14	4.5	6.0	2.0	2.9	2.3	3.0	3.5	4.2	.....	2.9	2.6	1.7	4.0
15	4.3	5.6	1.9	2.8	2.3	5.0	3.5	4.4	.....	3.1	2.4	1.7	3.9
16	4.5	5.0	1.9	2.8	2.3	4.5	3.5	.....	3.9	4.2	2.3	1.7	3.8
17	5.0	5.0	1.8	2.8	2.5	4.2	3.5	.....	3.8	3.5	2.1	1.7	3.5
18	6.0	5.0	1.7	2.8	2.7	4.0	3.9	.....	3.5	3.2	2.0	1.7	3.4
19	7.5	4.5	1.7	2.8	3.0	3.8	4.3	.....	3.3	3.3	2.0	1.9	3.6
20	7.0	4.3	1.7	2.8	3.0	3.6	4.8	4.5	.....	3.4	2.0	1.9	3.8
21	7.0	3.0	1.7	2.8	2.8	4.0	4.5	4.0	3.3	3.7	2.0	1.9	4.0
22	6.5	3.8	1.7	2.8	2.7	4.5	4.3	3.8	3.4	3.7	2.0	1.9	4.5
23	5.0	4.0	1.7	2.8	2.5	5.0	4.0	3.5	3.8	3.5	2.0	1.9	6.0
24	5.0	4.5	1.7	2.0	2.3	5.0	3.8	3.4	3.6	3.5	2.0	1.9	5.5
25	5.0	5.0	1.7	2.0	2.3	4.5	3.5	3.2	3.2	3.5	2.0	1.9	6.0
26	4.9	5.2	1.7	1.9	2.3	4.3	3.5	3.0	3.0	3.5	2.1	1.9	7.5
27	4.7	5.5	1.7	1.9	2.2	4.0	3.5	3.0	3.2	3.5	2.3	2.0	10.9
28	4.5	5.4	1.8	1.9	2.0	3.7	3.5	3.0	3.5	3.5	2.3	2.2	9.0
29	4.5	4.8	1.8	1.9	.....	3.5	3.5	3.0	3.9	3.5	2.3	2.0	7.3
30	6.0	4.5	1.9	1.9	.....	4.0	3.5	4.0	4.0	3.5	2.3	2.0	5.0
31	6.5	.....	2.0	1.9	.....	4.2	.....	6.0	.....	3.4	2.3	.....	5.2

NOTE.—Mean height for year ending Sept. 30, 1915, 3.44 feet.

BAKER RIVER BELOW ANDERSON CREEK, NEAR CONCRETE, WASH.

LOCATION.—In the SE. ¼ sec. 30, T. 37 N., R. 9 E., 350 feet below Anderson Creek, one-fourth mile above the Baker River ranger station, and 11 miles above Concrete, in Skagit County.

DRAINAGE AREA.—184 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 10, 1910, to September 30, 1915.

GAGE.—Since September 24, 1915, Stevens water-stage recorder on left bank, 350 feet below Anderson Creek. From September 10 to November 19, 1910, vertical staff at trail bridge one-eighth mile above Anderson Creek. Readings on this gage have been reduced to datum of gage installed October 22, 1910, by means of a relation curve. October 22, 1910, to September 4, 1913, vertical and inclined staff gage on left bank, 30 feet above present gage. September 21, 1913, to September 23, 1915, an inclined and two vertical sections at practically the same site as gages previously used but at different datum. Water-stage recorder is referred to datum of the staff gage last used, but the slight change in location materially affected the rating.

DISCHARGE MEASUREMENTS.—Made from a cable 300 feet above the gage.

CHANNEL AND CONTROL.—Stream bed composed of boulders and gravel over bedrock; not likely to shift except during extreme floods. Right bank high and rocky; left bank fairly high and wooded, subject to overflow at about gage height 11 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.6 feet at 5 p. m. April 2 (discharge, 17,700 second-feet); minimum stage recorded, 2.63 feet at 5 p. m. January 29 (discharge, 554 second-feet).

1910–1915: Maximum stage recorded 12.6 feet [1] 3 p. m. January 6, 1914 (discharge, 30,200 second-feet); minimum stage recorded, 2.6 feet February 27 and March 1, 1911 (discharge, 410 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

ACCURACY.—Results good. Considerable diurnal fluctuation June to September. Frequent gaps in gage-height record.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Baker River below Anderson Creek, near Concrete, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 7	I. L. Collier	3.24	924	June 16	C. G. Paulsen	4.46	1,880
8	do	3.56	1,150	July 17	Parker and Paulsen	4.18	1,560
Feb. 24	J. T. Hartson	3.03	786	18	Paulsen and Parker	3.97	1,400
25	do	3.15	814	Sept. 13	C. G. Paulsen	2.72	584
June 15	C. G. Paulsen	4.42	1,820	24	do	3.02	735

[1] Gage height 11.1 feet used for computing discharge, 1.5 feet being difference between gage readings by observer at 12.0 feet, and stage determined from gage rated by meter measurements; supersedes maximum published in Water-Supply Paper 392.

Daily discharge, in second-feet, of Baker River below Anderson Creek, near Concrete, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,270	8,120	1,520	1,040	910	730	5,180	1,120	2,370	2,500	1,710	1,420
2	1,350	6,260	1,400	1,740	780	676	17,200	1,160	2,130	2,640	1,620	1,480
3	1,270	4,700	1,280	1,530	780	676	14,300	1,190	1,910	2,640	1,520	1,550
4	1,220	5,440	1,160	1,190	780	847	4,480	1,520	2,250	2,500	1,440	1,620
5	1,180	3,900	1,040	975	785	804	2,950	1,910	2,950	2,250	1,810	1,040
6	1,130	2,370	1,040	910	1,040	762	2,370	2,200	2,660	2,130	1,810	847
7	1,090	2,250	1,040	847	910	719	2,500	2,500	2,370	2,020	1,620	847
8	1,040	2,250	944	1,120	847	676	2,020	2,370	1,910	2,130	1,620	847
9	997	2,640	847	975	1,040	676	1,620	2,250	1,520	1,810	1,350	847
10	953	2,130	787	975	975	730	1,520	2,500	1,620	1,440	1,710	730
11	910	3,480	730	1,440	926	676	2,010	1,910	1,520	1,270	1,620	676
12	2,950	2,370	730	1,270	877	676	2,500	1,910	1,520	1,270	1,520	730
13	1,710	2,250	676	1,040	828	676	2,370	1,620	1,520	1,190	1,810	601
14	1,510	2,250	676	975	779	1,990	1,910	1,810	1,810	1,190	1,910	577
15	1,510	1,620	676	910	730	3,300	1,910	1,620	1,810	1,710	1,860	625
16	1,730	1,350	650	787	730	2,130	2,250	1,440	1,910	1,810	1,810	787
17	3,300	1,350	650	730	1,190	1,710	2,130	1,440	1,810	1,620	1,810	910
18	3,950	1,440	625	730	1,040	1,710	2,790	1,910	1,710	1,520	1,440	1,040
19	4,700	1,440	601	730	975	1,440	2,640	2,130	1,440	1,810	2,250	847
20	3,120	2,020	601	730	910	1,710	2,130	2,130	1,490	2,020	2,500	910
21	2,130	2,370	589	676	847	1,810	1,810	1,900	1,550	1,960	2,250	910
22	1,820	2,020	577	676	787	1,910	1,440	1,670	1,600	1,910	2,500	910
23	1,520	2,250	554	676	730	2,250	1,440	1,440	1,660	2,350	2,250	910
24	1,440	2,790	554	625	730	1,910	1,350	1,710	1,710	2,790	2,130	852
25	1,440	2,520	554	601	847	1,520	1,350	1,710	1,440	1,810	2,020	825
26	1,440	3,300	554	577	730	1,270	1,440	2,500	1,350	1,810	1,910	745
27	1,440	2,640	577	577	730	1,230	1,350	3,300	1,270	1,810	2,020	695
28	1,350	2,500	577	577	730	1,190	1,440	4,480	1,190	1,710	1,820	670
29	1,350	2,130	577	554	.....	1,350	1,440	2,250	1,810	1,710	1,620	670
30	3,860	1,710	625	554	.....	1,350	1,270	1,910	2,250	1,710	1,480	670
31	1,450	.....	676	676	.....	1,270	.....	2,250	.....	1,810	1,350	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Sept. 23, from a rating curve well defined between 700 and 8,000 second-feet, applicable to readings on staff gage; Sept. 23 to 30, from a rating curve well defined throughout, applicable to readings from water-stage recorder; Mar. 5–7, 14, 27, Apr. 11, May 2, 6, 15, 21, 22, 26, June 6, 17, 20–23, 27, July 21, 23, Aug. 1, 2, 11, 28, 30, Sept. 1–3, and 7–8, by interpolation. Discharge estimated by hydrographic comparison with record of Baker River at Concrete, Oct. 4–7, 9–10, 14–16, 18, 22, 25, 31, Nov. 5, 14, 25, Dec. 2–4, 8, 14, 21, Jan. 2–3, 30, Feb. 1–5, 11–14, 28.

Monthly discharge of Baker River below Anderson Creek, Concrete, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	4,700	910	1,810	9.84	11.34	111,000	B.
November	8,120	1,350	2,800	15.2	16.96	167,000	B.
December	1,520	554	777	4.22	4.86	47,800	B.
January	1,740	554	884	4.80	5.53	54,400	B.
February	1,190	730	856	4.65	4.84	47,500	B.
March	3,300	676	1,300	7.07	8.15	79,900	B.
April	17,200	1,270	3,040	16.5	18.41	181,000	B.
May	4,480	1,120	1,990	10.8	12.45	122,000	B.
June	2,950	1,190	1,800	9.78	10.91	107,000	B.
July	2,790	1,190	1,900	10.3	11.87	117,000	B.
August	2,500	1,350	1,810	9.84	11.34	111,000	B.
September	1,620	597	893	4.85	5.41	53,100	B.
The year	17,200	554	1,660	9.02	122.07	1,200,000	

BAKER RIVER AT CONCRETE, WASH.

LOCATION.—In the NW. ¼ sec. 11, T. 35 N., R. 8 E., at highway bridge at Concrete, in Skagit County, one-fourth mile above mouth.

DRAINAGE AREA.—270 square miles (measured on topographic map).

RECORDS AVAILABLE.—September 11, 1910, to March 4, 1915, when station was discontinued.

GAGE.—Inclined and vertical staff on left bank, 150 feet below the bridge; read once daily to hundredths by Isaac Kvarno.

DISCHARGE MEASUREMENTS.—Made from highway bridge or from cable 300 feet above the bridge.

CHANNEL AND CONTROL.—Loose sand, gravel, and small boulders; shifting frequently. Banks high; not subject to overflow. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1914, to March 4, 1915, 6.4 feet at 1.30 p. m. November 1 (discharge, 8,950 second-feet); minimum stage recorded, 1.67 feet at 1.30 p. m. December 24 (discharge, 652 second-feet).

1910–1915: Maximum stage recorded, 11.5 feet at 1 p. m. January 6, 1914 (discharge, 24,500 second-feet), observer failed to get peak about 6 p. m. (discharge about 31,000 second-feet); minimum stage recorded, 2.18 feet at 1 p. m. January 22–23, 1913 (discharge, 634 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

REGULATION.—Natural storage in Baker Lake.

ACCURACY.—Results good. Conditions for measurement fair. Diurnal fluctuation small.

Discharge measurements of Baker River at Concrete, Wash., during the period Oct. 1, 1914, to Mar. 4, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Jan. 9	I. L. Collier	2.61	1,580
Feb. 22	J. T. Hartson	2.18	1,060
23	.....do	2.10	983

Daily discharge, in second-feet, of Baker River at Concrete, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	1,560	8,950	2,380	1,260	1,170	910	16	2,010	1,780	830	1,170	910	.....
2	1,890	6,990	1,780	2,130	894	870	17	3,890	1,670	750	1,080	1,560	.....
3	1,560	5,150	1,670	2,010	910	838	18	5,150	1,360	750	1,080	1,360	.....
4	1,360	6,430	1,560	1,560	910	1,170	19	6,430	1,670	712	990	1,260	.....
5	1,260	5,150	1,460	1,460	910	.....	20	4,070	2,780	675	950	1,080	.....
6	1,260	3,710	1,360	1,460	990	.....	21	2,780	2,640	675	910	1,080	.....
7	1,260	2,780	1,260	1,460	1,080	.....	22	2,250	2,640	675	870	1,040	.....
8	1,170	2,640	1,260	1,670	1,080	.....	23	1,890	2,510	675	830	990	.....
9	1,260	3,220	1,170	1,460	1,360	.....	24	1,780	2,510	652	830	910	.....
10	1,260	2,510	1,170	1,560	1,260	.....	25	1,670	2,640	701	790	990	.....
11	1,260	2,780	1,080	1,890	1,260	.....	26	1,670	3,380	750	750	950	.....
12	3,380	2,510	990	1,890	1,170	.....	27	1,670	3,220	750	750	910	.....
13	2,250	3,070	910	1,890	1,040	.....	28	1,670	3,070	750	750	910	.....
14	1,780	3,070	830	2,130	990	.....	29	1,560	3,070	750	750	.....	.....
15	1,780	1,780	830	1,780	910	.....	30	3,070	2,250	750	720	.....	.....
							31	2,010	.....	830	790	.....	.....

NOTE.—Discharge ascertained from a rating curve well defined between 900 and 3,000 second-feet. Dec. 25, gage not read; discharge interpolated.

Monthly discharge of Baker River at Concrete, Wash., for the period Oct. 1, 1914, to Mar. 4, 1915.

[Drainage area, 270 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	6,430	1,170	2,190	8.11	9.35	135,000	B.
November	8,950	1,360	3,260	12.1	13.50	194,000	B.
December	2,380	652	1,010	3.74	4.31	62,100	B.
January	2,130	720	1,280	4.74	5.46	78,700	B.
February	1,560	894	1,070	3.96	4.12	59,400	B.
March 1–4	1,170	838	947	3.51	.52	7,510	B.
The period						537,000	

UPPER COLUMBIA RIVER BASIN.

KOOTENAI RIVER AT LIBBY, MONT.

LOCATION.—In sec. 3, T. 30 N., R. 31 W., at highway bridge opposite Great Northern Railway station at Libby, in Lincoln County.

DRAINAGE AREA.—11,000 square miles.

RECORDS AVAILABLE.—October 13, 1910, to September 30, 1915.

GAGE.—Chain gage in left span of highway bridge; prior to completion of bridge a temporary staff gage fastened to an old stump, on the right bank at the lower side of the bridge. In February, 1913, gage datum was lowered 2 feet; all readings prior to change reduced to new datum.

DISCHARGE MEASUREMENTS.—Made from bridge; before erection of bridge, from ferry cable.

CHANNEL AND CONTROL.—Channel permanent; broken by two piers. Bed of stream composed of small rocks; current fairly swift and uniformly distributed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet June 27–28 (discharge, 34,000 second-feet); minimum discharge, January 26, 1915, estimated at 2,500 second-feet.

1910–1915: Maximum stage recorded, 14.3 feet June 4, 1913 (discharge, 77,300 second-feet); minimum stage recorded, 1.4 feet February 7, 1914 (discharge, 1,690 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Flow estimated from records of precipitation and temperature and hydrographic comparison with other streams.

DIVERSIONS.—None of importance.

ACCURACY.—Results excellent except for periods in which stage-discharge relation was affected by ice.

COOPERATION.—Gage-height record furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8,570	8,130	6,280	.....	2,530	2,730	4,530	16,800	19,800	28,800	15,900	8,920
2	8,230	8,570	5,970	.....	2,620	2,780	4,800	20,800	19,200	27,600	15,900	8,570
3	8,230	12,800	5,970	.....	2,970	2,620	5,370	21,900	20,300	27,000	15,900	8,230
4	8,400	12,000	5,670	.....	3,060	2,620	6,590	20,300	20,300	24,700	15,400	7,890
5	8,570	11,600	5,670	.....	3,060	2,650	6,910	18,700	19,800	28,800	15,000	7,560
6	8,230	12,000	5,370	.....	3,000	2,680	7,230	17,300	20,800	24,900	14,600	7,560
7	7,890	12,400	5,370	.....	3,060	2,650	7,560	16,800	20,300	23,000	13,700	7,560
8	7,560	11,200	4,800	4,000	2,890	2,730	7,560	17,300	20,800	23,000	12,800	7,560
9	7,560	10,000	5,080	3,700	2,840	2,650	7,230	20,800	21,300	22,400	12,800	7,560
10	7,560	9,280	3,780	3,420	2,940	2,650	7,230	24,100	20,800	21,300	12,400	7,560
11	7,560	8,920	3,550	3,660	2,940	2,620	7,230	27,600	19,200	20,300	12,400	7,230
12	7,560	9,280	3,780	3,550	2,840	2,680	7,230	26,400	17,300	19,800	12,000	6,910
13	7,560	9,650	.....	3,230	2,890	2,780	8,230	24,100	15,900	17,800	11,600	6,910
14	7,560	9,650	.....	3,360	2,730	2,920	9,650	21,900	15,900	16,800	11,200	6,590
15	7,560	8,570	.....	3,360	2,580	3,060	10,400	21,900	16,400	16,800	11,200	6,590
16	7,560	8,230	.....	3,280	2,620	3,330	11,200	20,800	17,800	17,800	11,200	6,280
17	7,890	6,590	.....	3,140	2,530	3,550	12,400	19,800	18,200	19,800	10,800	6,280
18	8,570	6,280	.....	3,000	2,650	3,550	14,600	17,800	19,800	20,800	10,800	5,970
19	8,570	6,280	.....	3,000	2,780	3,780	17,300	17,300	20,800	20,800	10,400	5,970
20	9,280	6,910	.....	3,120	2,840	3,780	19,800	16,400	20,600	20,300	10,400	5,970
21	9,650	6,910	.....	3,060	2,810	4,020	20,800	16,400	20,300	19,800	10,400	5,970
22	9,280	6,910	.....	2,840	2,650	4,020	19,800	15,900	19,800	18,700	10,200	5,970
23	8,570	6,910	.....	2,620	2,730	4,530	17,800	16,400	19,800	18,700	10,000	5,970
24	7,890	6,910	.....	2,730	2,840	5,080	15,900	17,800	19,800	18,200	10,000	5,970
25	7,720	6,910	.....	2,620	2,620	5,370	14,100	18,700	20,300	18,200	10,000	6,280
26	7,560	6,910	.....	2,500	2,650	5,080	13,700	16,400	22,400	16,800	9,650	6,280
27	7,560	6,910	.....	2,650	2,780	4,800	13,300	18,700	34,000	16,800	9,280	6,280
28	7,230	6,910	.....	2,650	2,760	4,530	13,700	18,200	34,000	16,800	9,280	6,280
29	7,230	6,910	.....	2,680	.....	4,530	13,300	18,700	30,100	17,300	9,280	6,280
30	7,230	6,590	.....	2,650	.....	4,530	14,600	19,800	28,800	17,800	8,920	6,280
31	7,680	.....	.....	2,580	.....	4,530	.....	20,300	.....	17,300	8,920	.....

NOTE.—Discharge Oct. 1 to Dec. 12, and Mar. 16 to Sept. 30, determined from a rating curve well defined between 3,400 and 25,000 second-feet, and fairly well defined above 25,000 second-feet. Discharge relation affected by ice Dec. 13 to Jan. 7; discharge estimated as follows, from climatic records and by comparison of hydrographs, November to March, for this station and the stations on Clark Fork at St. Regis, and near Plains, and on Flathead River near Polson Dec. 13–20, 3,500 second-feet; Dec. 21–25, 3,800 second-feet; Dec. 26 to Jan. 7, 4,000 second-feet. Discharge Jan. 8 to Mar. 15 determined from readings on lower gage, where discharge relation was not affected by ice, by means of curve of relation obtained during open water. Discharge interpolated, for lack of gage readings, Oct. 4, 25, 31; Nov. 1, 8, 26; June 20, July 6, Aug. 22, and Sept. 19.

Monthly discharge of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9,650	7,230	8,000	492,000	A.
November	12,800	6,280	8,570	510,000	A.
December	6,280	.....	4,270	263,000	D.
January	.....	2,500	3,270	201,000	C.
February	3,060	2,530	2,790	155,000	C.
March	5,370	2,620	3,540	218,000	B.
April	20,800	4,530	11,300	672,000	A.
May	27,600	15,900	19,600	1,210,000	A.
June	34,000	15,900	21,200	1,260,000	A.
July	28,800	16,800	20,600	1,270,000	A.
August	15,900	8,920	11,700	719,000	A.
September	8,920	5,970	6,840	407,000	A.
The year	34,000	.....	10,200	7,380,000	

CALLAHAN CREEK AT TROY, MONT.

LOCATION.—In sec. 13, T. 31 N., R. 34 W., at highway bridge one-fourth mile southeast of Troy, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 11, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to the right abutment of bridge; read at irregular intervals by H. L. Baker, an employee of the United States Forest Service. On May 24, 1913, gage was washed out and not replaced until October 12, 1913, when datum was lowered 1.60 feet to avoid minus-sign readings.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed of stream composed of small rocks and gravel; may shift at high stages. Banks are low but not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet at 10 a. m. April 17; minimum stage recorded, 0.30 foot October 2, 1914, August 20 and 27, September 7, 14, and 25, 1915.

1911–1915: Maximum stage recorded, 3.7 feet May 9 and 15, 1912 (discharge, 1,300 second-feet); minimum discharge, October 29–31, 1911, estimated at 12 second-feet. Records fragmentary.

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

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Gage-height record furnished by United States Forest Service.

No discharge measurements made during the year, and sufficient measurements have not been obtained to develop a rating curve.

Daily gage height, in feet, of Callahan Creek near Troy, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.35				1.40				0.45	
2	.30	1.10								
3					1.90		1.30	0.80		
4										
5							1.25			
6		1.90						.80		
7								.75	.35	0.30
8							1.10			
9		1.60			1.65	1.80	1.15			
10		1.55				1.90		.75		
11							1.00			
12						1.80		.70		
13	.50							.70		
14							.90			.30
15								65		
16	.45	1.30				1.55				
17					2.28	1.60				
18							.80			
19							.75		.30	
20										
21							.70	.60		
22	.55									
23	.85							.50		
24										
25				1.45			.65			.30
26										
27	.75					1.40	1.20	.50	.30	
28						1.55				
29							1.00	.50		
30			1.30							.30
31										

YAAK RIVER NEAR TROY, MONT.

LOCATION.—Near north line of T. 32 N., R. 34 W., at highway bridge near mouth of the stream, about 10 miles northwest of Troy.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 2, 1914, to September 30, 1915, at present site; October 15, 1910, to May 6, 1912, staff gage on right bank half a mile above Yaak Falls, near south line of sec. 33, T. 34 N., R. 33 W.; May 8, 1912, to June 17, 1912, staff gage at Fritz Lang's ranch near Sylvanite, 4 miles upstream; June 18, 1912, to March 2, 1914, staff gage 300 feet farther downstream and at a different datum.

GAGE.—Vertical staff on downstream side of left abutment at highway bridge; read occasionally by R. E. Clay.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—1910–1915: Maximum stage recorded, 3.69 feet May 15, 1912 (discharge 4,240 second-feet); minimum stage recorded, 2.88 feet March 22, 1913 (discharge, 193 second-feet). Discharge not ascertained in 1914–15.

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

DIVERSIONS.—None.

No discharge measurements made during the year. Data insufficient for estimates of discharge.

Daily gage height, in feet, of Yaak River near Troy, Mont., for the year ending Sept. 30, 1915.

Date.	Gage height.	Date.	Gage height.	Date.	Gage height.
Oct. 1	1.4	Oct. 24	1.6	Apr. 14	3.5
3	1.45	Dec. 1	1.85	15	3.0
5	1.55	5	1.7	22	2.95
15	1.9	Feb. 26	1.3	23	2.8
20	1.8	Mar. 30	1.9	24	2.7
21	1.75	Apr. 4	2.7	Aug. 15	1.3

MOYIE RIVER AT SNYDER, IDAHO.

LOCATION.—In sec. 23, T. 64 N., R. 2 E. Boise meridian, at Snyder ranger station, a quarter of a mile west of Snyder station on Spokane & International Railway, 3½ miles below Round Prairie Creek, 12 miles above mouth, in Bonner County.

DRAINAGE AREA.—717 square miles (revised; measured on Cranbrook sheet of British Columbia map and on map of Priest Lake quadrangle).

RECORDS AVAILABLE.—February 21, 1912, to September 30, 1915, at present location. From March 10, 1911, to February 20, 1912, at railway bridge 1 mile downstream.

GAGE.—Since February 21, 1912, vertical and inclined staff on left bank, 150 feet west of Snyder ranger station; read to hundredths twice daily by J. E. Ryan. From March 10, 1911, to February 20, 1912, vertical staff attached to left abutment of railway bridge 1 mile below present gage.

DISCHARGE MEASUREMENTS.—Made by wading at gage or from highway bridge a quarter of a mile downstream.

CHANNEL AND CONTROL.—Stream bed composed of small boulders and gravel with steep gradient; straight above and below gage. Banks high and not subject to overflow. Riffle control 500 feet below gage; shifting at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.2 feet at 6 p. m. April 19 (discharge, 2,700 second-feet); minimum stage recorded, 3.00 feet, February 20–21 (discharge, 100 second-feet).

1911–1915: Maximum stage recorded, 9.3 feet May 31 and June 1–2, 1913 (discharge, 8,020 second-feet); minimum stage recorded, 2.90 feet March 9–10, 12–13, 1912 (discharge, 91 second-feet).

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

ACCURACY.—Observer's record reliable, but frequent gaps occur due to his absence. When ice is not present and when record is continuous, results are good. When stage-discharge relation is affected by ice, results are poor.

COOPERATION.—Gage-height record furnished by the United States Forest Service.

Discharge measurements of Moyie River at Snyder, Idaho, during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 14	5.38	1,700
15	5.90	2,280

Daily discharge, in second-feet, of Moyie River at Snyder, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	154	386	412	187	154	125	440	1,860	1,440	665	310	120
2	167	740	359	187	154	127	595	1,970	1,340	665	310	120
3	170	900	359	187	154	129	900	1,970	1,340	665	288	120
4	187	900	359	187	148	131	1,070	1,750	1,160	665	288	120
5	191	1,030	359	187	125	133	1,030	1,750	1,160	630	265	120
6	187	1,160	310	187	125	134	1,030	1,750	1,160	595	265	120
7	187	985	310	183	125	136	985	1,640	1,160	562	244	120
8	187	900	288	178	125	138	985	1,750	1,160	530	244	120
9	187	860	224	174	125	140	942	1,750	1,070	530	244	120
10	187	860	217	170	125	140	900	1,750	985	530	224	125
11	187	820	206	170	125	140	900	1,750	985	530	217	154
12	187	780	198	170	125	140	1,160	1,750	942	530	206	154
13	187	740	194	170	125	154	1,540	1,750	820	530	187	154
14	174	740	187	164	120	154	1,750	1,750	801	469	187	154
15	154	665	180	164	112	161	1,750	2,320	782	412	187	154
16	154	630	167	164	125	187	1,750	2,200	764	440	187	140
17	170	595	161	154	140	232	1,970	2,090	745	440	170	140
18	217	595	154	154	140	244	2,440	1,980	726	440	170	125
19	232	595	161	154	131	265	2,570	1,860	708	440	154	125
20	261	562	161	154	100	265	2,200	1,860	689	412	154	125
21	265	530	161	140	100	265	2,080	1,860	670	412	154	125
22	265	500	164	140	120	288	1,970	1,860	651	386	148	125
23	265	469	164	140	125	359	1,860	1,860	632	359	148	125
24	265	469	164	140	125	595	1,750	1,860	614	359	146	140
25	265	469	164	140	125	562	1,540	1,750	595	334	144	140
26	265	440	170	140	125	440	1,540	1,750	740	334	142	140
27	257	412	174	140	125	440	1,540	1,750	900	334	140	154
28	257	412	174	148	125	440	1,540	1,640	900	334	140	161
29	257	412	180	157	.....	440	1,540	1,640	740	359	140	161
30	261	412	187	154	.....	440	1,540	1,540	665	346	125	170
31	265	.....	187	154	.....	440	.....	1,540	.....	334	125	.....

NOTE.—Discharge ascertained as follows: Oct. 1–Sept. 30, from a rating curve fairly well defined between 200 and 3,000 second-feet. Oct. 9–11, Jan. 7–9, Mar. 2–8, and 29–31, May 16–18, June 14–24, July 1–3, 9, and 30, Aug. 24–26, Sept. 4, gage not read, discharge interpolated. Discharge estimated, because of ice, from observer's notes and records of precipitation and temperature, Dec. 10 to Jan. 3, and Jan. 28–30.

Monthly discharge of Moyie River at Snyder, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 717 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	265	154	213	0.297	0.34	13,100	B.
November	1,160	386	666	.929	1.04	39,600	B.
December	412	.....	221	.308	.36	13,600	C.
January	187	140	163	.227	.26	10,000	C.
February	154	100	128	.179	.19	7,110	B.
March	595	125	258	.360	.42	15,900	C.
April	2,570	440	1,460	2.04	2.28	86,900	B.
May	2,320	1,540	1,820	2.54	2.93	112,000	B.
June	1,440	595	901	1.26	1.41	53,600	C.
July	665	334	470	.656	.76	28,900	B.
August	310	125	195	.272	.31	12,000	B.
September	170	120	136	.190	.21	8,090	B.
The year	2,570	.....	553	.771	10.51	401,000	

CLARK FORK AT ST. REGIS, MONT.

LOCATION.—In sec. 19, T. 18 N., R. 27 W., at McLeod's ferry at St. Regis, Mineral County, about half a mile below mouth of St. Regis River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 26, 1910, to September 30, 1915.

GAGE.—Vertical staff in four sections on left bank at old ferry landing; read once a day by Archie McLeod.

DISCHARGE MEASUREMENTS.—Made from ferry cable at gage.

CHANNEL AND CONTROL.—Channel permanent both above and below the station. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet June 21 (discharge, 17,300 second-feet); minimum stage recorded, 3.3 feet February 3 (discharge, 2,780 second-feet).

1910–1915: Maximum stage recorded, 19.1 feet May 30–31, 1913 (discharge, 62,800 second-feet); minimum stage recorded, 2.9 feet January 4, 1912 (dischrge, 1,710 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice except during short periods in extremely cold weather.

DIVERSIONS.—Water diverted from several of the tributaries to irrigate lands in the vicinity of Missoula in Bitterroot Valley.

REGULATION.—None.

ACCURACY.—Results excellent except when stage-discharge relation was affected by ice.

No discharge measurements made during 1914–15.

Daily discharge, in second-feet, of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,100	4,610	4,230	3,100	2,240	2,780	3,890	9,450	12,300	11,100	6,340	3,100
2	3,100	4,610	4,060	3,100	2,410	2,700	3,890	9,970	12,600	10,500	6,340	2,980
3	3,100	5,030	3,550	3,230	2,200	2,700	4,230	9,700	13,800	9,970	6,340	3,380
4	3,100	5,900	3,720	2,880	2,780	2,780	4,610	9,450	13,500	9,700	5,900	3,720
5	3,380	5,680	3,720	2,880	2,880	2,980	5,240	8,950	14,200	9,200	5,680	3,890
6	3,890	5,240	3,550	3,100	2,880	2,700	5,460	8,450	15,600	8,950	5,240	3,720
7	3,720	4,420	3,230	2,980	2,780	2,700	5,460	7,960	16,600	8,700	5,030	3,550
8	3,720	4,230	2,980	2,780	2,780	2,700	5,460	7,720	16,600	8,950	4,820	3,380
9	3,550	4,230	2,780	2,620	2,700	2,700	5,460	7,720	15,900	10,200	4,820	3,550
10	3,720	4,610	2,700	2,780	2,780	2,700	5,240	8,200	15,200	10,800	4,610	3,550
11	3,720	5,030	2,700	2,700	2,780	2,620	5,460	8,700	14,500	11,400	4,420	3,720
12	3,550	5,240	2,550	2,550	2,980	2,780	5,680	9,200	14,500	10,800	4,230	3,890
13	3,720	6,120	2,550	2,620	2,700	2,700	5,900	8,950	15,900	9,700	4,060	4,060
14	3,720	6,120	2,480	2,550	2,780	2,780	6,340	8,950	17,000	9,200	4,060	4,230
15	3,720	5,680	2,480	2,550	2,780	2,780	6,780	9,450	16,600	9,200	4,060	4,230
16	3,720	5,680	2,410	2,620	2,700	3,100	7,000	10,200	16,200	9,200	3,890	4,230
17	4,060	5,460	2,480	2,550	2,700	2,780	7,240	9,700	16,600	8,950	3,890	4,060
18	4,230	5,460	2,480	2,480	2,700	3,230	7,720	9,450	17,000	9,200	4,060	4,060
19	4,820	5,240	2,480	2,480	2,700	3,380	8,700	10,200	16,600	9,450	3,890	3,890
20	5,030	5,030	2,620	2,480	2,700	3,550	9,450	12,000	17,000	8,950	3,890	3,890
21	5,030	4,820	2,620	2,410	2,780	3,550	9,970	12,900	17,300	8,200	3,890	3,890
22	5,240	4,610	2,780	2,410	2,780	3,550	10,500	13,500	16,200	7,720	3,720	3,720
23	5,240	4,610	2,880	2,350	2,780	3,380	10,200	14,200	14,800	7,240	3,720	3,720
24	5,030	4,420	2,980	2,240	2,700	4,060	9,450	13,800	13,500	6,780	3,720	3,550
25	4,820	4,420	2,880	2,290	2,780	4,420	8,700	13,500	12,900	6,560	3,550	3,550
26	4,820	4,420	2,980	2,350	2,700	4,230	8,200	13,200	13,500	6,340	3,380	3,720
27	4,610	4,420	3,100	2,240	2,700	3,890	8,200	12,900	15,200	5,900	3,320	3,890
28	4,610	4,420	3,100	2,290	2,700	3,550	8,200	12,600	14,500	5,900	3,230	3,890
29	4,610	4,420	3,100	2,240	.....	3,550	8,450	12,300	12,900	6,120	3,230	4,060
30	4,420	4,230	3,100	2,200	.....	3,550	8,950	12,600	11,700	6,560	3,100	4,060
31	4,420	.....	3,100	2,240	.....	3,890	.....	12,600	.....	6,560	3,100	.....

NOTE.—Discharge ascertained from a well-defined rating curve. Stage-discharge relation probably somewhat affected by ice Dec. 8, 9, 13, 14, and 17.

Monthly discharge of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5,240	3,100	4,110	253,000	A.
November	6,120	4,230	4,950	295,000	A.
December	4,230	2,410	2,980	183,000	B.
January	3,230	2,200	2,590	159,000	B.
February	2,980	2,200	2,710	151,000	C.
March	4,420	2,620	3,190	196,000	C.
April	10,500	3,890	7,000	417,000	B.
May	14,200	7,720	10,600	652,000	A.
June	17,300	11,700	15,000	893,000	A.
July	11,400	5,900	8,650	532,000	A.
August	6,340	3,100	4,300	264,000	A.
September	4,230	2,980	3,770	224,000	A.
The year	17,300	2,220	5,830	4,220,000	

CLARK FORK NEAR PLAINS, MONT.

LOCATION.—In lot 7, sec. 1, T. 19 N., R. 26 W., at Cooper's ferry, 2½ miles above Plains, in Sanders County, and 6 miles below mouth of Flathead River.

DRAINAGE AREA.—19,900 square miles.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1915.

GAGE.—Barrett & Lawrence water-stage recorder installed November 28, 1911, 50 feet below an overhanging chain gage on right bank, 150 feet below the point where the old ferry crossed. Datum is that of chain gage which was read before the installation of the recorder.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Plains, 2½ miles below gage. The station was rated by measurements from a ferry cable 150 feet above the gage. This cable has since been removed.

CHANNEL AND CONTROL.—River is deep; current only moderately swift even at flood stages. Banks are fairly high and not subject to overflow. No definite point of control; channel practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.76 feet at 11 p. m. June 7 (discharge, 37,900 second-feet); minimum stage from recorder, 4.0 feet March 10–17 (discharge, 6, 850 second-feet).

1910–1915: Maximum stage recorded, 17.9 feet June 5, 1913 (discharge, 115,000 second-feet); minimum stage recorded, 3.6 feet March 9–10, 1912 (discharge, 5,290 second-feet).

WINTER FLOW.—Stage-discharge relation slightly affected by ice. Open-channel rating curve usually applicable, but during coldest weather the discharge is ascertained from gage heights at Thompson, Mont.

DIVERSIONS.—A number of small ditches take water for irrigation from tributaries of Flathead River and headwaters of Clark Fork.

REGULATION.—Flathead Lake furnishes a natural but uncontrolled regulation.

ACCURACY.—Results excellent except for winter months and periods when gage at Plains was not read.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	8,420	11,100	11,900	9,100	8,050	7,090	7,860	27,100	32,800	32,800	18,800	10,400
2.....	8,420	11,100	11,900	8,950	7,900	7,090	7,860	27,100	32,800	32,100	18,800	10,400
3.....	8,420	11,500	11,900	8,950	7,900	7,090	8,130	27,100	34,400	32,100	18,800	10,700
4.....	8,420	13,200	11,900	8,650	7,900	7,090	8,130	27,800	34,400	31,400	17,700	10,700
5.....	8,420	13,600	11,500	7,900	8,050	7,090	8,420	27,100	34,400	30,600	17,100	10,400
6.....	8,420	13,600	11,500	7,750	7,500	70,90	9,030	27,100	35,900	29,900	16,600	10,000
7.....	8,420	13,600	10,700	8,500	7,200	7,090	9,030	27,100	37,400	29,200	17,100	10,000
8.....	8,720	13,600	10,000	8,500	7,100	7,090	9,030	26,400	37,400	29,200	16,600	9,680
9.....	8,420	13,600	9,680	8,500	7,500	7,090	9,030	26,400	37,400	29,900	16,600	10,000
10.....	8,420	13,600	9,350	8,050	7,500	6,850	9,030	27,800	35,900	30,600	16,600	10,000
11.....	8,420	14,100	8,720	7,300	7,300	6,850	9,350	29,200	35,900	30,600	16,000	10,000
12.....	8,720	14,600	8,130	7,900	7,300	6,850	10,100	29,200	35,900	29,900	15,500	9,680
13.....	8,420	15,500	7,860	7,750	7,200	6,850	11,900	29,900	35,900	28,500	15,500	9,680
14.....	8,420	16,600	8,420	7,750	7,100	6,850	13,200	30,600	37,400	27,100	15,000	9,680
15.....	8,130	16,000	7,860	7,750	7,500	6,850	14,600	31,400	36,700	27,100	15,500	9,350
16.....	8,720	16,600	7,860	7,750	7,300	6,850	15,500	32,100	36,700	27,100	15,000	9,680
17.....	9,350	16,600	8,420	7,750	7,100	6,850	16,000	32,100	36,700	27,800	15,000	9,680
18.....	10,000	15,500	8,130	7,300	7,200	7,090	16,600	32,100	36,700	27,800	15,000	9,680
19.....	11,100	15,500	8,130	7,900	7,200	7,090	18,200	32,800	36,700	26,400	15,500	9,680
20.....	11,100	15,000	8,420	7,300	7,100	7,340	20,000	34,400	36,700	25,100	12,700	9,680
21.....	11,500	15,000	8,720	7,400	7,100	7,340	21,800	35,900	37,400	23,800	12,700	10,000
22.....	11,500	14,600	8,720	7,500	7,200	7,340	23,100	35,900	36,700	23,100	11,900	9,680
23.....	11,900	14,600	9,350	7,200	7,100	7,340	23,800	35,900	34,400	22,500	11,900	9,680
24.....	11,900	14,600	9,680	7,500	7,200	7,600	23,800	35,900	33,600	22,500	10,700	9,680
25.....	11,900	14,100	9,030	7,900	7,100	7,600	23,100	35,100	32,800	21,800	10,400	9,680
26.....	11,500	14,100	9,030	8,500	7,100	7,600	23,100	34,400	32,800	20,600	10,400	9,680
27.....	11,500	13,600	9,680	7,900	7,100	7,600	23,100	34,400	34,400	20,600	10,400	10,000
28.....	11,500	13,600	10,000	7,750	7,090	7,340	23,100	33,600	34,400	21,200	10,700	10,400
29.....	11,500	13,600	9,680	7,750	.....	7,340	23,800	32,800	33,600	21,200	10,700	10,400
30.....	11,500	13,200	9,350	8,500	.....	7,600	24,400	33,600	32,800	20,600	10,700	10,400
31.....	11,500	.....	9,250	7,900	.....	7,600	.....	33,600	.....	19,400	10,400	.....

NOTE.—Discharge ascertained from gage heights at Plains and a well-defined rating curve except as follows: Nov. 1–30 and Apr. 13–30, water-stage recorder at Plains out of order; gage heights for the station obtained from lower gage at Thompson by means of a relation curve developed for the two gages. Dec. 31 to Feb. 27, stage-discharge relation probably affected by ice; discharge ascertained from gage heights and a fairly well-defined rating curve for the station at Thompson. Discharge interpolated, for lack of gage readings, Apr. 12 and Aug. 19–20.

Monthly discharge of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	11,900	8,130	9,830	604,000	A.
November	16,600	11,100	14,200	845,000	B.
December	11,900	7,860	9,510	585,000	A.
January	9,100	7,200	7,970	490,000	B.
February	8,050	7,090	7,350	408,000	B.
March	7,600	6,850	7,180	441,000	B.
April	24,400	7,860	15,500	922,000	B.
May	35,900	26,400	31,200	1,920,000	A.
June	37,400	32,800	35,400	2,110,000	A.
July	32,800	19,400	26,500	1,630,000	A.
August	18,800	10,400	14,400	885,000	A.
September	10,700	9,350	9,960	593,000	A.
The year	37,400	6,850	15,800	11,400,000	

PEND OREILLE LAKE AT SANDPOINT, IDAHO.

LOCATION.—In sec. 23, T. 57 N., R. 2 W. Boise meridian, on west side of lake, at municipal wharf at Sandpoint, in Bonner County.

DRAINAGE AREA. 23,100 square miles (measured on General Land Office maps).

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1915.

GAGE.—Vertical staff in two sections on pile at municipal wharf; read to half-tenths by J. A. Fitzwater, W. M. Laybourn, Miss V. L. Chattin, and Miss Alice Small.

EXTREMES OF STAGE.—Maximum stage recorded during the year, 12.05 feet June 5–21; minimum stage recorded, 5.05 feet March 3–13.

1914–15: Maximum stage recorded, 17.5 feet May 28–29, and June 6, 7, 1914; minimum stage recorded March 3–13, 1915.

WINTER FLOW.—Lake frozen over. Record discontinued.

DIVERSIONS.—Considerable diversions from tributaries of Clear Fork for irrigation.

REGULATION.—None.

COOPERATION.—Record furnished by United States Forest Service.

Daily gage height, in feet, of Pend Oreille Lake at Sandpoint, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.6	.....	.....	.....	5.1	5.8	9.6	11.95	11.6	9.4	6.7
2	.....	.....	.....	.....	5.1	5.8	.....	12.0	11.55	9.35	.....
3	5.6	.....	.....	.....	5.05	5.85	9.8	12.0	11.5	.....	6.6
4	5.6	.....	.....	.....	5.05	5.95	9.9	12.0	11.4	.....	6.55
5	5.6	.....	.....	.....	5.05	6.1	9.95	12.05	11.3	.....	.....
6	5.6	.....	.....	.....	5.05	.....	10.05	12.05	.....	8.95	6.45
7	5.6	.....	.....	.....	5.05	.....	10.15	12.05	11.05	8.95	6.4
8	.....	.....	.....	.....	5.05	.....	10.25	12.05	11.0	8.7	6.35
9	.....	7.1	.....	.....	5.05	.....	10.35	12.05	10.98	8.65	6.33
10	5.7	.....	6.6	.....	5.05	6.5	10.4	12.05	10.95	8.6	.....
11	.....	7.2	.....	.....	5.05	6 6	10.45	12.05	10.85	8.5	6.2
12	5.8	7.2	.....	.....	5.05	6.7	10.5	12.05	10.8	8.4	.....
13	.....	7.3	6.6	.....	5.05	6.85	.....	12.05	10.75	8.3	6.15
14	.....	.....	.....	.....	.....	6.9	.....	12.05	10.7	8.2	6.10
15	.....	.....	.....	.....	5.1	7.05	10.8	12.05	10.65	8.1	6.11
16	.....	.....	.....	.....	5.15	7.2	10.9	12.05	10.6	8.0	6.12
17	.....	.....	.....	.....	5.2	7.35	11.0	12.05	10.57	7.9	6.12
18	.....	7.5	.....	.....	5.2	7.6	11.05	12.05	10.55	7.8	6.13
19	.....	7.6	.....	.....	5.25	7.8	11.15	12.05	10.5	7.7	.....
20	.....	.....	.....	.....	5.3	8.0	11.25	12.05	10.4	.....	6.00
21	.....	7.7	.....	.....	.....	8.15	11.35	12.05	.....	7.5	6.00
22	.....	.....	.....	.....	5.3	8.3	11.45	.....	10.25	7.4	5.98
23	.....	.....	.....	.....	.....	8.6	11.5	11.95	10.2	7.35	5.98
24	.....	.....	.....	.....	.....	8.8	11.6	.....	10.15	7.3	5.97
25	.....	.....	.....	.....	.....	8.8	.....	11.85	10.0	.....	5.98
26	6.2	.....	.....	5.1	.....	9.0	11.8	11.8	9.9	7.15	.....
27	.....	7.7	.....	5.1	5.6	9.1	11.9	.....	9.8	.....	6.00
28	.....	.....	.....	5.1	.....	9.25	11.9	11.75	9.7	7.0	6.00
29	.....	.....	.....	.....	5.65	9.3	11.95	11.7	9.6	.....	5.95
30	.....	.....	.....	.....	5.7	.....	.....	11.65	9.55	6.85	5.95
31	.....	.....	.....	.....	5.75	.....	.....	.....	9.5	6.8	.....

CLARK FORK AT METALINE FALLS, WASH.

LOCATION.—In the E. ½ sec. 21, T. 39 N., R. 43 E. Willamette meridian, just below Sullivan Creek, 500 feet above Metaline Falls, opposite the town of Metaline Falls, 11 miles above the international boundary, in Pend Oreille County. Elevation of water surface at medium low stage, 1,970 feet above sea level.

DRAINAGE AREA.—25,600 square miles (measured on General Land Office maps).

RECORDS AVAILABLE.—November 4, 1908, to September 4, 1910 (gage heights only, data inadequate for determination of discharge); October 1, 1912, to September 30, 1915.

GAGE.—Vertical and inclined staff, in five sections, 0 to 54 feet, installed February 12, 1914, on right bank 50 feet below Sullivan Creek. Gages previously used as follows: November 4, 1908, to September 4, 1910, vertical staff in two sections, reading from −10 to +32 feet, on right bank, three-fourths mile above present gage; relation of datum to present gage uncertain but probably 8.35 feet higher; October 1 to December 27, 1912, vertical staff at present location but with datum 7.07 feet higher than that of present gage; January 16, 1913, to January 24, 1914, vertical staff at same location but with datum 5 feet higher than that of present gage; January 25 to February 2, 1914, temporary gage set by observer at different datum than previous gage but readings were reported to a datum 5.00 feet higher than present gage datum. All readings October 1, 1912, to February 2, 1914, have been reduced to datum of present gage. Gage read once a day to tenths by J. H. Lambright, October 1 to August 14, and by W. A. Snure, August 15 to September 30.

DISCHARGE MEASUREMENTS.—Made from a boat or through ice.

CHANNEL AND CONTROL.—Banks high and not subject to overflow. One channel at all stages. A very sensitive and permanent control is formed by Metaline Falls, where water surface drops 20 feet in a distance of 1,200 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 19.8 feet May 29 and 30, and June 1 (discharge, 44,000 second-feet); minimum stage recorded, 4.85 feet at 12.30 p. m. January 27 (discharge, 8,760 second-feet).

1912–1915: Maximum stage recorded, 41.2 feet June 16, 1913 (discharge, 139,000 second-feet, revised value); minimum stage recorded, 4.1 feet February 7, 1913 (discharge, 7,720 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Numerous small diversions from upper tributaries for irrigation.

ACCURACY.—Results excellent.

COOPERATION.—Maintained in cooperation with British Columbia Hydrometric Survey. Gage-height record and some discharge measurements furnished by Hugh L. Cooper Co.

Discharge measurements of Clark Fork at Metaline Falls, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 4	C. O. Brown	10.59	21,000	June 21	Brown and Kornfeldt	19.29	42,700
4	do	10.59	20,600	Sept. 10	Parker and Richardson	7.67	13,900
Mar. 11	do	5.30	9,730	10	Richardson and Parker	7.65	13,700
June 19	do	19.35	42,600	11	Lacy and Parker	7.68	13,900

Daily discharge, in second-feet, of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,800	15,400	21,300	13,700	9,500	9,670	13,900	31,300	44,000	40,400	29,900	16,300
2	10,800	15,700	21,300	13,700	9,850	9,500	14,600	31,800	44,000	40,200	29,400	15,800
3	10,800	15,400	21,100	13,200	10,200	9,500	15,000	33,300	43,400	39,900	29,100	15,600
4	10,800	15,900	20,900	13,000	10,200	9,670	15,000	33,000	43,200	39,900	28,400	15,400
5	10,900	16,800	20,900	12,800	9,670	9,670	15,200	33,000	43,200	39,600	28,200	15,100
6	10,900	17,200	20,400	12,800	9,670	9,500	15,700	33,600	43,200	39,100	28,200	14,700
7	10,800	17,900	20,400	12,800	9,850	9,670	16,100	33,600	42,900	38,600	27,500	14,300
8	10,900	18,400	20,200	12,600	9,850	9,670	16,300	33,600	42,900	38,600	27,000	13,600
9	11,100	18,800	20,000	12,400	9,850	9,670	16,100	31,600	42,600	37,800	26,500	14,000
10	11,300	18,800	19,500	12,200	9,850	9,670	16,800	32,300	42,600	37,200	26,000	14,000
11	11,300	19,300	18,800	11,900	9,670	9,500	17,000	32,600	43,200	36,900	25,500	14,000
12	11,700	19,300	18,400	11,700	9,670	9,500	17,400	32,800	43,200	36,400	25,100	13,600
13	11,900	19,700	17,200	11,500	9,670	9,670	18,100	32,800	43,200	36,400	24,600	13,400
14	12,200	19,700	17,000	11,700	9,500	9,670	18,600	33,800	43,400	36,100	24,100	13,000
15	12,200	20,200	15,400	11,700	9,330	9,850	19,500	36,900	43,200	36,100	23,600	12,800
16	12,400	20,600	14,300	11,300	9,500	10,400	19,500	36,900	42,900	36,100	23,100	12,800
17	12,400	21,300	14,600	11,100	9,670	10,800	20,400	37,500	42,900	35,900	22,900	12,800
18	12,600	21,300	14,800	11,100	9,500	11,100	21,300	38,600	42,900	35,600	21,900	12,800
19	12,800	21,600	15,000	11,100	9,500	10,900	21,800	39,600	42,900	34,800	21,500	12,800
20	13,200	21,800	14,100	11,100	9,500	11,300	23,200	39,600	42,600	34,300	20,700	12,600
21	13,200	21,800	13,000	10,900	9,500	11,700	23,400	39,600	42,600	34,300	20,700	12,600
22	13,500	21,800	12,800	10,800	9,500	11,500	24,600	40,200	42,300	33,800	20,300	12,600
23	13,700	21,800	12,400	10,200	9,670	11,900	25,500	41,000	42,600	33,600	19,800	12,400
24	14,100	21,800	12,600	10,400	9,670	11,900	26,300	41,500	42,600	33,300	19,500	12,400
25	12,800	21,600	12,600	10,600	9,670	12,600	27,000	42,300	42,100	32,800	19,100	12,400
26	13,000	21,800	13,500	10,000	9,670	13,000	28,400	42,900	42,100	32,600	18,600	12,400
27	12,800	21,800	13,200	8,690	9,670	13,200	28,400	42,900	41,800	32,300	18,100	12,400
28	13,000	21,600	12,400	8,840	9,670	13,000	28,900	43,700	41,500	32,000	17,900	12,400
29	15,400	21,600	12,600	9,000	.....	13,200	28,900	44,000	41,000	31,100	17,400	12,200
30	17,200	21,300	12,600	9,160	.....	13,500	30,800	44,000	40,700	30,800	17,000	12,200
31	18,400	.....	13,000	9,330	.....	13,200	.....	44,000	.....	30,300	16,700	.....

NOTE.—Discharge ascertained from rating curve well defined between 9,000 and 80,000 second-feet. Oct. 9–10, gage not read, discharge interpolated.

Monthly discharge of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	18,400	10,800	12,500	769,000	A.
November	21,800	15,400	19,700	1,170,000	A.
December	21,300	12,400	16,300	1,000,000	A.
January	13,700	8,760	11,300	695,000	A.
February	10,200	9,330	9,680	538,000	A.
March	13,500	9,500	10,900	670,000	A.
April	30,800	13,900	20,800	1,240,000	A.
May	44,000	31,300	37,200	2,290,000	A.
June	44,000	40,700	42,700	2,540,000	A.
July	40,400	30,300	35,700	2,200,000	A.
August	29,900	16,700	23,200	1,430,000	A.
September	16,300	12,200	13,400	797,000	A.
The year	44,000	8,760	21,200	15,300,000	

RACETRACK CREEK NEAR ANACONDA, MONT.

LOCATION.—In sec. 13, T. 6 N., R. 11 W., opposite Racetrack Creek ranger station near Anaconda, in Powell County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25, 1914, to September 30, 1915. From July 11, 1911, to Nov. 9, 1912, station maintained in sec. 15, T. 6 N., R. 11 W., above the falls.

GAGE.—Vertical staff on right bank, opposite Racetrack Creek ranger station; read twice a day by W. E. Jackson. From July 11, 1911, to June 17, 1912, vertical staff on left bank, 2 miles above present gage. From June 18 to November 9, 1912, vertical staff on left bank, 300 feet above previous gage and at different datum.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and sand; slightly shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.40 feet June 19; minimum stage recorded, 1.20 feet March 19.

1911–12 and 1914–15: Maximum stage recorded, 6.8 feet June 10–14, 1912 (discharge, 515 second-feet); minimum stage recorded, 2.85 feet February 22, 24, and 26, 1912 (discharge, 16 second-feet).

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

DIVERSIONS.—One small diversion during the irrigation season.

REGULATION.—None.

COOPERATION.—Gage-height record furnished by United States Forest Service.

No discharge measurements were made during the year. Data inadequate for determination of discharge.

Daily gage height, in feet, of Racetrack Creek near Anaconda, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	.....	1.23	.....	.....	2.68	2.02	1.69
2	.....	1.38	.....	1.28	.....	.....	2.68	2.00	1.76
3	.....	1.38	.....	1.30	.....	.....	2.68	1.99	1.70
4	1.41	1.38	.....	1.30	1.68	.....	2.60	1.96	.....
5	1.44	1.36	.....	1.28	1.64	3.10	2.57	1.96	.....
6	1.49	1.34	.....	1.29	1.62	2.85	2.72	1.90	.....
7	1.48	1.34	.....	1.28	1.64	2.84	2.87	1.90	.....
8	1.44	1.32	.....	1.29	1.68	2.94	2.84	.....	.....
9	1.42	.....	.....	.....	1.80	2.92	2.94	1.81	1.72
10	1.40	.....	.....	.....	1.90	2.75	2.92	1.80	1.70
11	1.40	.....	.....	.....	1.80	2.88	.....	1.80	.....
12	1.40	.....	.....	1.30	1.80	2.84	2.49	1.90	.....
13	1.42	.....	.....	1.36	1.90	2.78	2.50	1.89	.....
14	1.47	.....	.....	1.35	2.20	2.69	2.48	1.90	.....
15	1.48	.....	1.21	1.32	2.04	.....	2.48	.....	.....
16	1.50	.....	1.22	1.35	1.93	2.92	2.50	.....	.....
17	1.50	.....	1.22	.....	.....	2.98	2.50	.....	.....
18	1.50	.....	1.22	.....	.....	3.05	2.38	.....	.....
19	1.49	.....	1.20	1.50	.....	3.40	2.26	.....	.....
20	1.50	.....	1.22	1.52	2.28	.....	2.20	1.80	.....
21	1.48	.....	1.22	1.59	2.22	.....	.....	1.81	.....
22	1.48	.....	1.23	1.50	2.30	.....	.....	1.80	.....
23	1.47	.....	1.22	1.46	2.26	.....	2.04	1.80	.....
24	1.47	1.32	1.26	1.46	2.26	2.92	2.00	1.79	.....
25	1.40	1.33	1.27	1.49	2.28	3.19	2.00	1.80	.....
26	1.40	1.34	1.30	1.50	2.22	3.20	.....	.....	.....
27	1.40	1.33	1.22	1.59	2.14	.....	2.22	.....	.....
28	1.40	1.32	.....	1.65	2.25	.....	2.30	.....	.....
29	1.40	.....	1.21	.....	2.41	2.64	.....	.....	.....
30	.....	.....	1.22	.....	.....	2.68	.....	1.69	.....
31	.....	.....	1.22	.....	.....	.....	.....	1.68	.....

LITTLE BLACKFOOT RIVER NEAR ELLISTON, MONT.

LOCATION.—In the SE. ¼ SE. ¼ sec. 30, T. 9 N., R. 6 W., about 500 feet below the Little Blackfoot ranger station, in the Helena National Forest, about 5 miles southeast of Elliston, in Powell County.

DRAINAGE AREA.—59 square miles.

RECORDS AVAILABLE.—September 29, 1910, to September 30, 1915.

GAGE.—Vertical staff, nailed to tree on left bank, 500 feet below the ranger station; read at irregular intervals by the forest ranger, M. D. Mizner.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from a highway bridge one-fourth mile above gage.

CHANNEL AND CONTROL.—Gravel and small rocks; clean and probably permanent. Current fairly swift at all stages. Banks are high and not subject to overflow.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.0 feet June 8; minimum stage recorded, 1.4 feet October 1–4.

1910–1915: Maximum stage recorded, 5.0 feet May 21–22, 1912; May 28, 1913, and June 8, 1915; minimum stage recorded, 1.08 feet October 1, 1910.

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

DIVERSIONS.—Water is diverted for irrigation about half a mile above ranger station.

REGULATION.—None. The melting snow in the mountains causes a small diurnal fluctuation during the spring months.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements were made during the year. Data inadequate for determination of discharge.

Daily gage height, in feet, of Little Blackfoot River near Elliston, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.4	1.9	1.7	3.2	.....	2.7	.....	.....
2	1.4	1.9	.....	3.2	.....	2.64	2.2	.....
3	1.4	.....	.....	.....	.....	2.6	2.1	.....
4	1.4	.....	.....	.....	4.1	.....	.....	.....
5	.....	.....	1.8	.....	4.8	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....
7	.....	.....	1.9	.....	.....	.....	.....	.....
8	.....	.....	2.1	.....	5.0	.....	.....	.....
9	.....	.....	2.3	.....	.....	.....	.....	.....
10	.....	.....	.....	.....	.....	2.4	.....	.....
11	1.42	.....	.....	.....	.....	.....	1.9	1.9
12	1.42	.....	.....	.....	4.0	.....	.....	1.9
13	1.42	.....	2.6	.....	4.0	.....	.....	.....
14	1.44	.....	2.6	.....	.....	.....	.....	.....
15	1.46	.....	2.6	.....	.....	.....	.....	.....
16	1.48	.....	2.5	.....	.....	2.4	.....	.....
17	1.54	.....	2.5	.....	3.8	2.4	.....	.....
18	1.6	.....	2.2	.....	3.6	.....	.....	.....
19	1.8	.....	2.0	.....	3.7	.....	.....	.....
20	2.1	.....	2.0	.....	3.7	.....	.....	.....
21	1.9	.....	2.3	.....	3.7	.....	.....	.....
22	1.9	.....	2.4	.....	3.8	.....	.....	.....
23	1.9	.....	2.6	.....	3.8	.....	.....	.....
24	1.9	.....	2.8	.....	.....	2.4	.....	.....
25	1.9	.....	2.8	.....	3.0	2.5	.....	.....
26	.....	.....	2.9	.....	2.8	.....	.....	.....
27	.....	.....	3.0	.....	2.7	.....	.....	2.0
28	.....	.....	3.1	.....	2.7	.....	.....	2.0
29	.....	.....	3.2	.....	2.7	.....	.....	.....
30	.....	.....	3.2	.....	2.7	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....

WEST FORK OF BITTERROOT RIVER NEAR DARBY, MONT.

LOCATION.—In sec. 27, T. 2 N., R. 21 W., 500 feet downstream from the Trapper Creek ranger station, half a mile below mouth of Trapper Creek and 10 miles south of Darby, in Ravalli County.

DRAINAGE AREA.—572 square miles.

RECORDS AVAILABLE.—September 19, 1910, to September 30, 1915.

GAGE.—Overhanging chain gage on left bank; read daily by N. E. Wilkerson and C. Matteson, forest rangers.

DISCHARGE MEASUREMENTS.—Made by wading or from cable near gage.

CHANNEL AND CONTROL.—Small rock; uniform; probably permanent. Banks are high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet May 22 (discharge, 1,580 second-feet); minimum stage recorded, 1.9 feet March 15 (discharge, 120 second-feet).

1910–1915: Maximum stage recorded, 7.4 feet May 27, 1913 (discharge, 6,420 second-feet); minimum stage recorded, 1.85 feet August 28 to September 7, 1914 (discharge, 106 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results fair.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of West Fork of Bitterroot River near Darby, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	July.	Aug.	Sept.
1	150					975	370	150
2	150					938	370	216
3	182					975	330	216
4	166					926	330	182
5	216					878	290	
6	216					830	290	
7	216					900	290	
8	199			370		938	290	
9	199					975	290	
10	199					830	252	
11	182					798	252	
12	182					765	252	
13	208					765	252	
14	234					700	252	
15	268		120			640	252	
16	302					580	216	
17	336					580	252	
18	370	182				520	252	
19	330					520	252	
20	350	216				492	252	
21	330					465	252	
22	330		150		1,580	465	216	
23	290					415	216	
24	271		290		1,390	415	216	
25	262					415	216	
26	252					370	216	
27			216			370	216	
28						370	182	
29			216			415	182	
30			216			415	150	
31						415	150	

NOTE.—Discharge ascertained from a fairly well-defined rating curve. Discharge interpolated, for lack of gage readings, Oct. 13, 15–17, 25, July 4–5, 8, 11, 20 and 30; mean monthly discharge for July, 647 second-feet, August, 252 second-feet. Monthly run-off in acre-feet for July, 39,800 acre-feet; for August, 15,500 acre-feet.

EAST FORK OF BITTERROOT RIVER NEAR DARBY, MONT.

LOCATION.—In the SE. ¼ sec. 21, T. 2 N., R. 20 W., at Joe Olsen's bridge, in front of the Medicine Tree ranger station, 10 miles from Darby and 3 miles above junction of East and West forks, in Ravalli County.

DRAINAGE AREA.—340 square miles.

RECORDS AVAILABLE.—October 20, 1910, to September 30, 1915 (fragmentary).

GAGE.—Vertical staff on downstream end of left abutment of the bridge; read occasionally by N. E. Wilkerson and C. W. Shockley.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Large rocks; irregular and probably permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet May 24–25 (discharge, 711 second-feet); minimum stage recorded, 2.3 feet March 13 (discharge, 69 second-feet).

1910–1915: Maximum stage recorded, 7.0 feet May 31, 1913 (discharge, 2,230 second-feet); minimum stage recorded, 2.0 feet December 10–11, 1910 (discharge, 50 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Rating curve fairly well defined. Results fair.

COOPERATION.—Field data furnished by United States Forest Service.

The following discharge measurement was made by E. W. Kramer: November 27, 1914: Gage height, 2.50 feet; discharge, 102 second-feet.

Daily discharge, in second-feet, of East Fork of Bitterroot River near Darby, Mont., for the year ending Sept. 30, 1915.

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
Mar. 2	102	Apr. 14	186	Aug. 4	238
6	85	26	238	10	186
8	69	27	238	13	174
9	85	28	265	16	174
13	69	May 2	292	23	174
15	85	4	320	27	151
22	85	24	711	Sept. 14	174
28	102	25	711	17	162
Apr. 9	120	Aug. 3	265		

NOTE.—Discharge ascertained from a rating curve fairly well defined above 69 second-feet.

LOLO CREEK NEAR LOLO, MONT.

LOCATION.—In sec. 34, T. 12 N., R. 21 W., at the highway bridge at Anderson's ranch, 7 miles upstream from Lolo and the junction with the Bitterroot, in Missoula County.

DRAINAGE AREA.—249 square miles.

RECORDS AVAILABLE.—April 25, 1911, to September 30, 1915, for station at present site. October 18, 1910, to March 9, 1911, gage-height record at station 1 mile below Anderson's ranch. Milk Creek enters between the two stations.

GAGE.—Vertical staff fastened to bridge abutment; read at irregular intervals by A. N. Thayer.

DISCHARGE MEASUREMENTS.—Made by wading from the bridge.

CHANNEL AND CONTROL.—Gravel and boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet June 25 (discharge, 840 second-feet); minimum stage recorded, 1.82 feet March 20 (discharge, 60 second-feet).

1911–1915: Maximum stage recorded, 5.2 feet May 28, 1913 (discharge, 2,500 second-feet); minimum stage recorded, 1.64 feet March 20, 1912 (discharge, 36 second-feet).

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

DIVERSIONS.—Water diverted above station for irrigation on small ranches, below station for irrigation on the land adjoining this creek and Bitterroot River.

REGULATION.—None.

ACCURACY.—Results poor owing to uncertainty of stage-discharge relation and lack of current-meter measurements since 1912 and irregular gage readings.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements made during year.

Daily discharge, in second-feet, of Lolo Creek near Lolo, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	108	183	142	.....	196	315	567	479	144	107
2	110	187	135	.....	254	315	621	416	140	110
3	112	191	128	.....	264	315	675	353	136	113
4	114	195	122	.....	274	315	695	290	132	115
5	116	176	122	.....	284	315	715	227	128	117
6	119	156	122	.....	294	322	701	164	125	119
7	122	153	.....	.....	304	330	688	156	122	122
8	126	150	.....	.....	315	338	675	148	117	124
9	130	147	.....	.....	329	346	638	148	111	126
10	131	145	.....	.....	343	354	614	162	105	128
11	133	143	.....	.....	357	362	590	176	99	130
12	135	141	.....	.....	371	370	566	190	95	130
13	137	139	.....	.....	385	378	542	204	91	130
14	137	137	.....	.....	399	387	518	218	88	130
15	137	137	.....	.....	413	396	494	206	85	130
16	137	137	.....	.....	427	405	471	195	85	130
17	137	143	.....	.....	441	414	484	186	86	130
18	141	149	.....	.....	456	428	497	176	87	126
19	146	156	.....	.....	471	442	511	176	89	122
20	151	158	.....	60	448	457	525	164	91	118
21	156	161	.....	68	425	472	539	153	93	114
22	156	164	.....	76	403	487	553	142	95	110
23	156	162	.....	85	381	502	567	138	97	106
24	159	160	.....	86	359	486	704	134	99	102
25	162	158	.....	87	337	471	840	130	95	98
26	165	156	.....	88	315	495	798	139	91	94
27	168	156	.....	89	315	519	734	148	93	91
28	171	156	.....	90	315	543	670	156	95	88
29	174	156	.....	91	315	567	606	153	98	85
30	177	149	.....	114	315	567	542	150	101	82
31	180	.....	.....	137	.....	567	.....	148	104	.....

NOTE.—Daily discharge ascertained from a rating curve fairly well defined for 1912, but with no open water measurements since. Gage heights were reported for the following days: Oct. 7, 9, 13, 17, 21, 23; Nov. 4, 6, 14, 16, 19, 22, 26, 29; Dec. 4, 6; Mar. 20, 23, 29, 31; Apr. 2, 8, 19, 26, 29; May 5, 11, 17, 23, 25, 29; June 1, 3, 5, 8, 9, 16, 23, 25, 26; July 6, 8, 9, 14, 16, 18, 19, 22, 25, 28, 31; Aug. 7, 8, 11, 12, 15, 16, 24, 26; Sept. 3, 7, 11, 17. Daily discharge interpolated for periods intervening between gage heights.

Monthly discharge of Lolo Creek near Lolo, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	180	108	142	8,730	D.
November	195	137	157	9,340	D.
December 1–6	142	122	128	1,520	D.
March 20–31	137	60	89.2	2,120	D.
April	471	196	350	20,800	D.
May	567	315	419	25,800	D.
June	840	471	611	36,400	D.
July	479	130	194	11,900	D.
August	144	85	104	6,400	D.
September	130	82	114	6,780	D.

ST. REGIS RIVER NEAR ST. REGIS, MONT.

LOCATION.—In the NE. ¼ sec. 28, T. 18 N., R. 28 W., at the St. Regis ranger station, about 3 miles above the town of St. Regis and the junction with Clark Fork, in Missoula County.

DRAINAGE AREA.—278 square miles.

RECORDS AVAILABLE.—September 17, 1910, to September 30, 1915.

GAGE.—Vertical staff on left bank 100 feet below suspension bridge at the ranger station; read daily by E. P. Mizell.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Small rock; shallow and probably permanent. Banks fairly high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.6 feet April 16 (discharge, 1,900 second-feet); minimum stage recorded, 1.75 feet August 30 to September 2 (discharge, 85 second-feet).

1910–1915: Maximum stage recorded, 7.7 feet May 28, 1913 (discharge, 6,220 second-feet); minimum stage recorded, August 30 to September 2, 1915.

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

DIVERSIONS.—A small amount of water is diverted.

REGULATION.—None. The snow melting in the mountains causes a small amount of diurnal fluctuation during the spring months.

ACCURACY.—Results fair.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of St. Regis River near St. Regis, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	150	220	290	.....	900	830	640	220	120	85
2	150	290	290	.....	970	765	580	220	120	85
3	150	580	272	.....	1,040	732	552	220	120	95
4	150	640	255	.....	1,040	700	470	220	120	95
5	150	640	255	.....	1,040	700	470	220	120	95
6	150	700	.....	.....	970	670	420	255	120	95
7	150	765	.....	.....	970	765	420	255	120	120
8	150	765	.....	.....	900	830	420	238	120	120
9	168	1,040	.....	.....	830	765	420	220	120	135
10	168	1,040	.....	.....	765	700	375	220	120	150
11	168	1,040	.....	.....	830	640	375	220	120	120
12	185	970	.....	.....	830	670	375	220	120	.....
13	185	765	.....	.....	1,010	640	375	220	120	.....
14	185	700	.....	.....	1,210	580	375	220	120	.....
15	185	700	.....	185	1,790	580	420	220	120	.....
16	185	640	.....	238	1,900	640	470	220	120	.....
17	185	640	.....	255	1,590	580	420	220	120	.....
18	185	640	.....	290	1,300	640	375	220	120	.....
19	185	580	.....	330	1,210	700	375	185	120	.....
20	185	498	.....	420	1,170	640	375	185	108	.....
21	185	470	.....	470	1,120	670	330	150	95	.....
22	185	470	.....	525	1,120	700	330	150	95	.....
23	185	420	.....	580	1,210	640	310	150	95	.....
24	185	420	.....	525	1,300	670	290	150	95	.....
25	185	420	.....	470	1,300	640	330	150	95	.....
26	185	375	.....	470	1,210	640	290	135	95	.....
27	185	352	.....	470	1,120	580	290	120	95	.....
28	185	330	.....	445	1,120	580	290	120	95	.....
29	185	310	.....	470	1,040	610	255	120	95	.....
30	185	290	.....	498	970	640	220	120	85	.....
31	202	.....	185	525	.....	670	.....	120	85	.....

NOTE.—Discharge ascertained from a rating curve fairly well defined above and poorly defined below 1,000 second-feet. Discharge interpolated, for lack of gage readings, Aug. 1–14 and 22–28.

Monthly discharge of St. Regis River near St. Regis, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	202	150	175	10,800	C.
November	1,040	220	590	35,100	C.
March 15–31	580	185	422	14,200	C.
April	1,900	765	1,130	67,200	B.
May	830	580	671	41,300	C.
June	640	220	388	23,100	C.
July	255	120	190	11,700	C.
August	120	85	110	6,760	C.
September 1–11	150	85	109	2,380	C.

FLATHEAD RIVER NEAR COLUMBIA FALLS, MONT.

LOCATION.—In sec. 7, T. 31 N., R. 19 W., at Potter's ranch, three-fourths of a mile above the junction with the Middle Fork and about 10 miles northeast of Columbia Falls, in Flathead County.

DRAINAGE AREA.—1,620 square miles.

RECORDS AVAILABLE.—September 22, 1910, to September 30, 1915.

GAGE.—Vertical staff on right bank near Potter's ranch buildings; read twice a day by J. F. Potter.

DISCHARGE MEASUREMENTS.—Made from cable about three-fourths of a mile above gage.

CHANNEL AND CONTROL.—Rocky, clean, and practically permanent. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet June 27, 1915 (discharge, 8,200 second-feet); minimum stage recorded, 1.2 feet March 9–14 (discharge, 640 second-feet).

1910–1915: Maximum stage recorded, 8.7 feet June 2, 1913 (discharge 23,800 second-feet); minimum stage recorded, 0.7 foot November 10, 1911, and February 5–6, 1914 (discharge, 350 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice. Open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent except for short periods during the winter.

The following discharge measurement was made by W. A. Lamb:

September 10, 1914: Gage height, 2.00 feet; discharge, 1,260 second-feet.

Daily discharge, in second-feet, of Flathead River near Columbia Falls, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,560	2,040	1,560	1,140	960	710	1,140	6,700	4,620	6,220	2,330	1,240
2	1,620	2,970	1,560	1,140	960	710	1,240	7,000	4,840	5,740	2,330	1,240
3	1,730	4,400	1,560	960	960	710	1,560	7,000	5,060	5,280	2,180	1,240
4	1,790	4,400	1,450	960	960	710	1,790	6,220	5,060	4,840	2,180	1,240
5	1,910	4,620	1,450	960	870	710	1,910	5,740	5,060	4,840	2,040	1,240
6	1,910	4,840	1,450	960	870	710	2,040	5,280	4,840	4,400	1,910	1,240
7	1,790	4,400	1,450	960	870	710	2,040	4,840	4,840	4,220	1,910	1,240
8	1,670	4,040	1,340	960	870	710	2,040	5,280	4,840	4,220	1,910	1,190
9	1,670	3,680	1,340	960	870	640	2,040	6,460	4,840	4,040	1,790	1,140
10	1,670	3,500	1,140	960	870	640	1,910	7,300	4,840	4,040	1,790	1,340
11	1,670	3,320	960	960	830	640	1,910	7,600	4,400	3,860	1,670	1,240
12	1,790	3,680	960	960	790	640	2,040	6,700	4,040	3,680	1,670	1,240
13	1,790	3,680	960	960	790	640	2,640	6,220	4,040	3,320	1,670	1,140
14	1,790	3,320	960	960	790	640	4,040	5,980	4,040	3,140	1,790	1,140
15	1,790	2,970	960	960	710	675	4,400	5,980	4,400	2,970	1,790	1,140
16	2,480	2,640	960	960	790	710	4,620	5,740	4,620	2,970	1,670	1,140
17	2,970	2,480	960	960	790	710	5,060	4,840	4,840	3,320	1,670	1,140
18	3,320	2,480	960	960	790	710	5,980	4,620	4,840	3,320	1,560	1,140
19	3,680	2,330	960	960	790	710	6,700	4,400	4,840	3,140	1,560	1,140
20	4,040	2,330	960	960	710	790	7,300	4,040	4,840	2,970	1,560	1,240
21	3,680	2,330	1,100	960	710	790	7,000	3,860	4,400	2,970	1,560	1,240
22	3,320	2,330	1,140	790	710	870	6,220	3,860	4,220	2,800	1,450	1,240
23	2,970	2,330	1,340	830	710	1,050	5,500	4,040	4,040	2,800	1,450	1,140
24	2,640	2,040	1,340	870	710	1,100	4,840	4,220	4,040	2,800	1,450	1,140
25	2,480	1,790	1,140	870	710	1,100	4,400	4,400	3,860	2,640	1,450	1,140
26	2,330	1,790	1,140	870	710	870	4,400	4,400	5,740	2,640	1,340	1,140
27	2,330	1,910	1,140	870	710	1,000	4,220	4,220	8,200	2,640	1,340	1,140
28	2,180	1,910	1,140	790	710	1,050	4,400	4,400	7,600	2,480	1,340	1,140
29	2,040	1,790	1,140	830	.....	1,100	4,400	4,620	6,700	2,480	1,240	1,140
30	2,040	1,790	1,140	915	.....	1,050	5,500	4,840	6,220	2,480	1,240	1,140
31	2,040	.....	1,140	960	.....	1,100	.....	4,840	.....	2,330	1,240	.....

NOTE.—Discharge ascertained from a well-defined rating curve.

Monthly discharge of Flathead River near Columbia Falls, Mont., for the year ending Sept. 30, 1915.

[Drainage area, 1,620 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	4,040	1,560	2,280	1.41	1.63	140,000	A.
November	4,840	1,790	2,940	1.81	2.02	175,000	A.
December	1,560	960	1,190	.735	.85	73,200	C.
January	1,140	790	939	.580	.67	57,700	C.
February	960	710	804	.496	.52	44,700	C.
March	1,100	640	803	.496	.57	49,400	A.
April	7,300	1,140	3,780	2.33	2.60	225,000	A.
May	7,600	3,860	5,340	3.30	3.80	328,000	A.
June	8,200	3,860	4,960	3.06	3.41	295,000	A.
July	6,220	2,330	3,540	2.19	2.52	218,000	A.
August	2,330	1,240	1,680	1.04	1.20	103,000	A.
September	1,340	1,140	1,190	.735	.82	70,800	A.
The year	8,200	640	2,460	1.52	20.61	1,780,000	

NOTE.—Stage-discharge relation possibly affected by ice and accuracy reduced December, January, and February.

FLATHEAD LAKE AT POLSON, MONT.

LOCATION.—In the SE. ¼ sec. 4, T. 22 N., R. 20 W., at the steamboat dock at Polson, at the south end of the lake, in Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 23, 1908, to September 30, 1915.

GAGE.—Vertical staff attached to a pile at the end of the pier; datum 2,800 feet above sea level. Gage read daily by V. L. Holding.

EXTREMES OF STAGE.—Maximum stage recorded during year, 84 feet May 17 and 18; minimum stage recorded, 79.1 feet March 15 to 20.

1908–1915: Maximum stage recorded, 92.5 feet June 11 and 12, 1913; minimum stage recorded, 78.5 feet February 16–22, 1913.

DIVERSIONS.—None of importance.

REGULATION.—None.

Daily gage height, in feet, of Flathead Lake at Polson, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	79.9	80.6	81.3	80.1	79.6	79.3	79.4	82.8	83.6	83.7	82.5	80.7
2	80.0	80.6	81.3	80.0	79.6	79.3	79.4	83.0	83.6	83.8	82.5	80.7
3	80.0	80.7	81.2	80.0	79.5	79.3	79.4	83.2	83.6	83.8	82.4	80.6
4	80.1	80.8	81.2	80.0	79.5	79.3	79.5	83.3	83.6	83.8	82.4	80.6
5	80.1	81.0	81.2	80.0	79.5	79.2	79.6	83.4	83.6	83.7	82.3	80.6
6	80.2	81.1	81.1	80.0	79.5	79.2	79.7	83.5	83.7	83.7	82.3	80.5
7	80.2	81.2	81.1	80.0	79.5	79.2	79.8	83.4	83.7	83.6	82.2	80.5
8	80.2	81.3	81.0	80.0	79.5	79.2	79.9	83.4	83.7	83.6	82.1	80.5
9	80.2	81.4	81.0	80.0	79.5	79.2	80.0	83.5	83.7	83.5	82.1	80.4
10	80.2	81.4	80.9	79.9	79.5	79.2	80.1	83.5	83.7	83.5	82.0	80.4
11	80.3	81.4	80.9	79.9	79.5	79.2	80.1	83.6	83.7	83.4	81.9	80.4
12	80.3	81.4	80.8	79.9	79.5	79.2	80.2	83.6	83.7	83.4	81.8	80.3
13	80.3	81.3	80.7	79.9	79.5	79.2	80.3	83.7	83.6	83.3	81.7	80.3
14	80.3	81.4	80.6	79.9	79.4	79.2	80.4	83.8	83.6	83.3	81.7	80.3
15	80.2	81.6	80.6	79.9	79.4	79.1	80.5	83.9	83.6	83.2	81.6	80.3
16	80.2	81.7	80.5	79.9	79.4	79.1	80.6	83.9	83.6	83.2	81.5	80.3
17	80.3	81.6	80.5	79.8	79.4	79.1	80.7	84.0	83.5	83.1	81.5	80.3
18	80.3	81.6	80.4	79.8	79.4	79.1	81.0	84.0	83.5	83.1	81.4	80.3
19	80.4	81.6	80.4	79.8	79.4	79.1	81.3	84.0	83.5	83.1	81.3	80.3
20	80.4	81.5	80.3	79.8	79.4	79.1	81 5	83.9	83.5	83.1	81.3	80.3
21	80.5	81.5	80.3	79.8	79.4	79.2	81.7	83.9	83.4	83.1	81.2	80.3
22	80.6	81.5	80.3	79.8	79.4	79.2	81.9	83.9	83.4	83.0	81.1	80.3
23	80.6	81.5	80.2	79.7	79.3	79.2	82.1	83.8	83.4	83.0	81.1	80.3
24	80.7	81.4	80.2	79.7	79.3	79.2	82.2	83.8	83.4	82.9	81.0	80.3
25	80.7	81.4	80.2	79.7	79.3	79.3	82.3	83.8	83.3	82.9	81.0	80.3
26	80.7	81.4	80.1	79.7	79.3	79.3	82.4	83.7	83.3	82.8	80.9	80.3
27	80.7	81.4	80.1	79.7	79.3	79.3	82.5	83.7	83.4	82.8	80.9	80.3
28	80.7	81.3	80.1	79.6	79.3	79.3	82.5	83.7	83.6	82.7	80.8	80.3
29	80.7	81.3	80.1	79.6	.....	79.4	82.6	83.7	83.6	82.7	80.8	80.2
30	80.7	81.3	80.1	79.6	.....	79.4	82.7	83.7	83.7	82.6	80.8	80.2
31	80.7	.....	80.1	79.6	.....	79.4	.....	83.6	.....	82.6	80.7	.....

FLATHEAD RIVER NEAR POLSON, MONT.

LOCATION.—At Mishell's ferry, at Norrisvale, 2½ miles below Newell tunnel, 10 miles below Polson and Flathead Lake, and 15 miles northwest of Ronan, in Flathead County.

DRAINAGE AREA.—7,010 square miles.

RECORDS AVAILABLE.—July 23, 1907, to September 30, 1915.

GAGE.—Chain gage attached to overhanging tree on right bank, 80 feet above the ferry; read once a day by Barney Whitlock.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 80 feet below gage.

CHANNEL AND CONTROL.—Bed of stream composed of small boulders. Mean depth of water at low stages about 6 feet. Current moderately swift. Control not well defined at high water; low-water control is at a riffle about 800 feet below gage. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8 feet May 16, 18, and 20 (discharge, 21,000 second-feet); minimum stage recorded, 1.4 feet March 10–14 (discharge, 2,310 second-feet).

1907–1915: Maximum stage recorded, 16.4 feet June 12, 1913 (discharge, 75,400 second-feet); minimum stage recorded, 1.2 feet December 29–30, 1912 (discharge, 2,150 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—Some small diversions from tributaries above Flathead Lake.

REGULATION.—Natural storage in Flathead Lake.

ACCURACY.—Gage readings somewhat affected by wind on Flathead Lake and also at gage. Results excellent except for winter months.

No discharge measurements made during year.

Daily discharge, in second-feet, of Flathead River near Polson, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,170	6,060	7,820	4,170	2,900	2,590	2,900	13,200	19,000	19,000	13,200	6,290
2	4,170	6,060	7,820	3,880	2,900	2,490	2,900	13,600	18,000	19,000	12,800	6,060
3	4,170	6,520	7,540	4,020	3,010	2,490	2,900	14,400	19,000	19,000	12,800	6,060
4	4,500	6,720	7,540	4,170	3,120	2,590	2,900	15,300	18,500	19,000	12,800	6,290
5	4,670	7,270	7,540	4,170	2,900	2,490	3,010	16,200	19,000	19,000	12,000	6,060
6	4,670	7,540	7,540	4,330	2,900	2,490	3,120	15,700	19,000	19,000	12,000	6,060
7	4,500	8,110	7,010	4,170	2,900	2,490	3,350	16,200	19,000	18,500	12,000	5,840
8	4,850	8,110	7,010	4,020	2,900	2,490	3,470	16,200	18,000	18,000	12,000	5,630
9	4,670	8,400	6,760	3,880	2,900	2,490	3,600	16,200	18,500	18,000	11,300	5,430
10	4,500	8,700	6,520	3,740	2,900	2,310	3,880	16,200	18,500	18,000	11,300	5,630
11	4,500	8,400	6,060	3,740	2,900	2,310	4,500	18,500	19,000	17,100	10,900	5,630
12	4,500	8,700	6,060	3,880	2,900	2,310	4,500	19,000	19,000	17,100	10,600	5,230
13	4,670	9,000	5,230	3,740	2,900	2,310	4,500	19,500	18,500	16,600	10,200	5,040
14	4,670	9,620	5,430	3,600	2,690	2,310	4,850	20,000	19,000	16,200	9,930	4,670
15	4,850	9,930	5,230	3,740	2,690	2,400	5,040	20,500	18,000	15,700	9,930	4,500
16	4,850	9,930	5,040	3,880	2,790	2,400	5,230	21,000	18,000	15,700	9,310	4,850
17	4,850	9,310	4,850	3,470	2,690	2,400	6,060	20,500	17,500	15,300	9,310	4,850
18	6,060	9,310	5,040	3,350	2,690	2,400	6,290	21,000	17,500	15,300	9,310	4,850
19	6,060	9,310	5,230	3,350	2,690	2,400	7,010	20,500	17,500	15,300	9,310	4,850
20	6,060	9,310	5,230	3,350	2,690	2,400	7,540	21,000	17,500	15,300	9,000	4,850
21	6,060	9,310	5,230	3,350	2,690	2,400	8,110	20,000	17,100	15,300	8,700	4,850
22	6,520	9,000	4,850	3,470	2,690	2,400	8,700	19,500	17,500	14,400	8,700	4,850
23	6,520	8,700	4,670	3,350	2,690	2,490	9,930	20,000	17,100	14,800	8,110	4,850
24	6,520	8,700	4,500	3,350	2,690	2,490	11,300	19,000	17,100	14,800	7,820	5,040
25	6,290	8,700	4,170	3,350	2,690	2,590	11,300	18,500	17,100	14,400	7,540	5,040
26	6,290	8,700	4,170	3,230	2,690	2,590	11,300	19,000	17,100	14,400	7,540	4,850
27	6,290	8,400	4,170	3,120	2,590	2,690	11,300	18,500	17,100	14,400	7,010	4,850
28	6,290	8,110	4,170	3,120	2,490	2,590	11,300	18,500	18,000	14,400	7,010	5,040
29	6,060	7,540	4,170	3,230	.....	2,690	12,000	18,500	18,000	13,600	6,520	4,850
30	6,060	7,540	4,170	3,350	.....	2,900	12,400	19,000	18,500	13,600	6,520	4,850
31	6,060	.....	4,170	3,010	.....	2,900	.....	18,500	.....	12,800	6,520	.....

NOTE.—Discharge ascertained from a well-defined rating curve.

Monthly discharge of Flathead River near Polson, Mont., for the year ending Sept. 30, 1915.

[Drainage area, 7,010 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	6,520	4,170	5,320	0.759	0.88	327,000	A.
November	9,930	6,060	8,370	1.19	1.33	498,000	A.
December	7,820	4,170	5,640	.805	.93	347,000	B.
January	4,330	3,010	3,630	.518	.60	223,000	B.
February	3,120	2,490	2,790	.398	.41	155,000	B.
March	2,900	2,310	2,490	.355	.41	153,000	A.
April	12,400	2,900	6,510	.929	1.04	387,000	A.
May	21,000	13,200	18,200	2.60	3.00	1,120,000	A.
June	19,000	17,100	18,100	2.58	2.88	1,080,000	A.
July	19,000	12,800	16,200	2.31	2.66	996,000	A.
August	13,200	6,520	9,740	1.39	1.60	599,000	A.
September	6,290	4,500	5,260	.750	.84	313,000	A.
The year	21,000	2,310	8,560	1.22	16.58	6,200,000	

MIDDLE FORK OF FLATHEAD RIVER AT BELTON, MONT.

LOCATION.—In NW. ¼ sec. 36, T. 32 N., R. 19 W., at Hotel Belton, half a mile below the highway bridge at Belton, about 2 miles above the junction of Lake McDonald outlet, in Flathead County.

DRAINAGE AREA.—900 square miles.

RECORDS AVAILABLE.—October 15, 1910, to September 30, 1915.

GAGE.—Sloping gage on left bank directly back of Hotel Belton; read daily by A. S. Lanneau and S. C. Brock.

DISCHARGE MEASUREMENTS.—Made from a cable 200 feet below the gage.

CHANNEL AND CONTROL.—Practically permanent; banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.2 feet May 2 (discharge, 6,820 second-feet); minimum stage probably occurred during winter season.

1910–1015: Maximum stage recorded, 13.9 feet May 27, 1913 (discharge, 25,900 second-feet); minimum stage recorded, 1.3 feet March 29–30, 1912 (discharge, 182 second-feet).

WINTER FLOW.—Stream freezes over at gage for short periods during winter, but usually remains open at control section below gage.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

No discharge measurements made during the year.

Daily discharge in second-feet of Middle Fork of Flathead River at Belton, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	510	1,100	1,240	182	895	5,980	3,170	3,770	1,770	830
2	960	2,300	1,160	182	960	6,820	3,170	3,610	1,670	862
3	1,100	2,300	1,160	192	1,020	5,190	3,460	3,460	1,580	1,100
4	1,240	2,190	1,160	192	2,410	4,100	3,770	3,460	1,580	1,100
5	1,320	2,080	1,100	192	2,300	3,460	4,100	3,460	1,480	1,020
6	1,020	2,080	1,100	204	2,190	3,030	4,100	3,170	1,400	1,100
7	960	1,870	1,100	215	1,970	2,650	4,270	3,170	1,400	960
8	535	1,770	400	215	1,970	2,410	4,270	2,770	1,320	895
9	535	1,100	400	240	1,770	3,030	4,100	2,770	1,320	895
10	535	1,100	325	240	1,770	5,580	4,100	3,030	1,240	1,100
11	535	1,100	325	252	1,670	5,780	3,930	2,650	1,240	1,020
12	535	1,100	325	252	2,080	6,190	3,770	2,410	1,240	960
13	535	1,100	325	265	2,300	6,190	3,770	2,190	1,160	960
14	535	1,100	325	265	2,900	5,780	3,770	2,300	1,240	960
15	1,580	1,400	295	310	3,030	5,780	3,610	2,190	1,160	960
16	1,670	1,320	295	360	3,170	5,580	3,460	2,080	1,160	1,020
17	1,670	1,320	295	400	3,770	5,380	3,610	2,080	1,100	1,320
18	1,670	1,240	295	440	5,190	4,270	3,770	3,170	1,100	1,400
19	1,670	1,240	295	485	6,400	3,930	3,770	2,900	1,100	1,400
20	1,580	1,320	265	510	6,400	3,460	3,610	2,770	1,020	1,400
21	1,480	1,400	265	590	5,980	3,170	3,460	2,650	1,020	1,400
22	1,400	1,400	265	650	5,980	3,030	3,170	2,410	960	1,320
23	1,240	1,400	265	800	4,270	2,770	3,170	2,410	960	1,240
24	1,240	1,320	265	830	3,930	2,770	3,310	2,300	960	1,020
25	1,240	1,320	265	895	3,170	3,030	3,460	2,190	928	895
26	1,160	1,320	265	895	3,170	3,030	3,460	2,080	895	895
27	1,100	1,240	295	928	3,310	3,170	6,400	2,080	862	895
28	1,100	1,240	295	895	3,310	3,460	5,980	2,190	830	895
29	1,100	1,240	295	862	3,460	3,460	5,580	2,080	830	960
30	1,100	1,240	295	862	3,460	3,460	5,380	1,970	830	960
31	1,100	.....	295	895	.....	3,460	.....	1,770	830	.....

NOTE.—Discharge ascertained from a well-defined rating curve. Discharge Jan. 1 to Feb. 27 not determined, because of ice jams and uncertainty as to gage readings.

Monthly discharge of Middle Fork of Flathead River, at Belton, Mont., for the year ending Sept. 30, 1915.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,670	510	1,100	1.22	1.41	67,600	A.
November	2,300	1,100	1,440	1.60	1.78	85,700	A.
December	1,240	265	492	.547	.63	30,300	B.
March	928	182	474	.527	.61	29,100	C.
April	6,400	895	3,140	3.49	3.89	187,000	A.
May	6,820	2,410	4,170	4.63	5.34	256,000	A.
June	6,400	3,170	3,960	4.40	4.91	236,000	A.
July	3,770	1,770	2,630	2.92	3.37	162,000	A.
August	1,770	830	1,170	1.30	1.50	71,900	A.
September	1,400	830	1,060	1.18	1.32	63,100	A.

NOTE.—Discharge relation probably affected by ice and accuracy reduced December and March.

SOUTH FORK OF FLATHEAD RIVER NEAR COLUMBIA FALLS, MONT.

LOCATION.—In the NW. ¼ SW. ¼ sec. 4, T. 30 N., R. 19 W., at the highway bridge, half a mile above the junction with Flathead River, and about 7 miles east of Columbia Falls, in Flathead County.

DRAINAGE AREA.—1,640 square miles.

RECORDS AVAILABLE.—September 20, 1910, to September 30, 1915. (No gage-height record during 1910.)

GAGE.—Chain gage on right span of bridge; read irregularly by employees of United States Forest Service.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Gravel and small rock; control probably permanent; banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet June 25 (discharge, 7,300 second-feet); minimum stage recorded, 3.3 feet September 8 (discharge, 735 second-feet).

1910–1915: Maximum stage recorded, 14.8 feet June 3, 1913 (discharge, 39,000 second-feet); minimum stage recorded, 3.05 feet October 1, 1913 (discharges 520 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Gage-height record furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of South Fork of Flathead River near Columbia Falls, Mont., for the year ending Sept. 30, 1915.

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
Oct. 12	888	June 16	5,560	Aug. 28	1,420
17	2,570	25	7,300	Sept. 3	1,170
Apr. 3	3,380	July 4	4,530	4	1,300
May 5	4,780	10	3,820	8	735
14	4,780	25	5,030	10	940
23	5,290	Aug. 2	2,760	28	2,960
27	5,290	3	2,760		
June 2	5,030	11	1,570		

NOTE.—Discharge ascertained from a fairly well defined rating curve.

LITTLE BITTERROOT RIVER NEAR MARION, MONT.

LOCATION.—In T. 27 N., R. 24 W., at the log bridge just below the outlet of Little Bitterroot Lake, near Marion, in Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1910, to September 30, 1915.

GAGE.—Vertical staff in middle of stream; read every second day by Bonnell Kelsey.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Fairly permanent in natural condition; somewhat obstructed by moss and weeds; banks high and not subject to overflow.

EXTREMES OF DSICHARGE.—Maximum stage recorded during year, 1.0 foot August 29, September 3 and 5 (discharge, 5.8 second-feet); minimum stage recorded, 0.3 foot January 19–23 (no flow).

1910–1915: Maximum stage recorded, 2.9 feet May 24, 1910 (discharge, 43 second-feet); minimum stage recorded, January 19–23, 1915.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—Some water was stored in the lake above the gage during the spring and summer of 1915. The low discharge is due to this regulation.

ACCURACY.—Results fair.

Discharge measurements of Little Bitterroot River near Marion, Mont., during the year ending Sept. 30, 1915.

[Made by W. A. Lamb.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 12	0.50	0.5
Sept. 9	.90	4.3

Daily discharge, in second-feet, of Little Bitterroot River near Marion, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.1	0.8	1.2	1.4	0.4	0.8	0.6	0.1	0.1	2.5	1.6	5.0
2	2.1	.8	1.2	1.2	.2	1.0	.6	2.5	.2	2.2	1.4	5.4
3	2.1	.8	1.2	1.0	.1	1.2	.5	1.8	.3	2.0	1.2	5.8
4	2.4	.8	1.2	.8	.1	1.2	.5	1.2	.2	1.8	1.0	5.8
5	2.6	.8	1.2	.6	.1	1.2	.5	1.0	.1	1.6	.8	5.8
6	2.9	.8	1.2	.4	.1	1.0	.5	.8	.3	1.4	.8	5.4
7	3.2	.8	1.2	.3	.1	.8	.5	.8	.3	1.2	.8	5.0
8	3.2	.8	1.2	.2	.2	.8	.5	.8	.3	1.2	.6	4.6
9	3.2	.8	1.2	.1	.3	.8	.5	.8	.2	1.2	.5	4.3
10	3.5	.8	1.2	.1	.4	.6	.6	.8	.2	1.0	.6	4.0
11	3.8	.8	1.2	.1	.5	.5	.6	.8	.2	.8	.8	3.6
12	3.8	.8	1.2	.05	.5	.5	.6	.8	.3	.8	.8	3.3
13	3.8	.8	1.2	.05	.5	.5	.6	.8	.8	.8	.8	3.0
14	3.8	.8	1.2	.05	.5	.5	.7	.6	1.0	1.0	.6	3.0
15	3.8	.8	1.2	.05	.5	.5	.8	.6	1.2	1.2	.5	3.0
16	3.8	.8	1.2	.05	.5	.6	.8	.8	1.4	1.2	.5	3.6
17	3.8	.8	1.2	.05	.5	.6	.8	.8	1.6	1.2	.5	3.0
18	3.8	.8	1.2	.05	.4	.6	.5	.8	1.8	1.2	.4	3.0
19	3.8	.8	1.2	.0	.3	.6	.5	.8	2.0	1.4	.3	3.0
20	3.8	.8	1.2	.0	.3	.6	.5	.8	1.6	1.6	.2	3.3
21	3.8	.8	1.2	.0	.3	.6	.5	.7	1.8	1.4	.1	3.6
22	3.8	.8	1.4	.0	.5	.7	.5	.6	2.0	1.2	.1	3.3
23	3.8	.8	1.6	.0	.5	.8	.5	3.0	2.2	1.4	.1	3.0
24	3.0	.9	1.6	.05	.5	.8	.5	2.5	2.5	1.6	.2	3.0
25	2.1	1.0	1.6	.2	.5	.8	.8	2.0	2.6	1.4	.3	3.0
26	1.4	1.0	1.6	.4	.5	.8	.4	1.8	2.8	1.2	.3	3.3
27	.8	1.2	1.6	.4	.5	.8	.1	1.6	2.5	1.2	.3	3.6
28	.8	1.2	1.6	.4	.6	.8	.1	1.0	2.2	1.2	3.0	3.3
29	.8	1.2	1.6	.4	.....	.8	.1	.5	2.0	1.2	5.8	3.0
30	.8	1.2	1.6	.3	.....	.6	.1	.8	2.2	1.2	5.4	3.0
31	.8	.....	1.6	.3	.....	.5	.....	.4	.....	1.4	5.0	.....

NOTE.—Discharge ascertained from two fairly well defined rating curves, applicable Oct. 1 to Jan. 6, and Jan. 7 to Sept. 30, respectively. Low discharge during part of year due to storage of water in lake above gage. Gage read usually every second day; discharge interpolated for intervening days.

Monthly discharge of Little Bitterroot River near Marion, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	3.8	0.8	2.81	173
November	1.2	.8	.87	52
December	1.6	1.2	1.32	81
January	1.4	.0	.29	18
February	.6	.1	.37	21
March	1.2	.5	.74	46
April	.8	.1	.51	30
May	3.0	.1	1.06	65
June	2.8	.1	1.23	73
July	2.5	.8	1.35	83
August	5.8	.1	1.14	70
September	5.8	3.0	3.83	228
The year	5.8	.0	1.30	940

LITTLE BITTERROOT RIVER NEAR HUBBART, MONT.

LOCATION.—Above the canyon leading to the second fall of Little Bitterroot River, 1½ miles west of the ranch buildings of the Hubbart Cattle Co., near Hubbart post office, and 15 miles south of Marion, in Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 22, 1909, to September 30, 1915.

GAGE.—Vertical staff on left bank; read twice a week by C. A. Strodtbeck. From April 22 to October 17, 1909, gage was in box canyon below falls, about a mile downstream.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Gravel and silt; shifts at high stages. Channel slightly obstructed by growth of moss and weeds during summer. Banks high and not subject to overflow at ordinary stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.85 feet April 20 (discharge, 64 second-feet); minimum stage recorded, 0.9 foot October 20–27 and November 10 (discharge, 1.4 second-feet).

1909–1915: Maximum stage recorded, 4.0 feet March 22, 1910 (discharge, 206 second-feet); minimum stage recorded, 0.9 foot October 20–27 and November 10, 1914 (discharge, 1.4 second-feet).

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

DIVERSIONS.—None.

REGULATION.—Stream affected slightly by storage in Little Bitterroot Lake about 15 miles above the station.

ACCURACY.—Results only fair.

Discharge measurements of Little Bitterroot River near Hubbart, Mont., during the year ending Sept. 30, 1915.

[Made by W. A. Lamb.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 12	1.29	24
June 20	[a] 1.25	15.7
Sept. 9	[a] 1.31	12.1

[a] Channel obstructed by a growth of moss and weeds.

Daily discharge, in second-feet, of Little Bitterroot River near Hubbart, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.9	1.9	22	31	37	14	14	7.1
2	1.9	2.4	25	31	37	14	13	7.4
3	1.9	2.4	28	31	33	14	12	7.7
4	1.9	2.4	31	31	29	14	12	8.0
5	2.4	2.2	34	30	29	14	11	8.0
6	2.4	1.9	38	28	29	14	10	10
7	2.4	1.9	34	26	25	14	10	10
8	2.4	1.9	30	25	25	14	10	11
9	2.4	1.4	26	25	25	14	10	12
10	2.4	1.4	22	25	22	14	10	12
11	2.4	2.0	26	25	20	13	10	12
12	2.4	2.6	30	25	20	12	9.7	12
13	2.4	3.2	34	26	20	11	9.5	10
14	2.4	3.8	37	27	16	12	9.2	10
15	2.2	5.1	40	28	16	13	9.2	10
16	1.9	6.4	43	30	16	14	9.2	10
17	1.9	7.7	45	32	16	16	9.2	10
18	1.9	7.0	51	34	16	15	9.1	10
19	1.4	6.2	57	36	16	14	9.0	10
20	1.4	5.5	64	38	16	13	8.9	10
21	1.4	4.8	58	40	14	13	8.8	10
22	1.4	3.8	51	42	13	13	8.8	10
23	1.4	2.8	44	42	14	12	8.8	10
24	1.4	1.9	38	38	15	12	8.8	10
25	1.4	1.9	38	38	16	12	8.3	10
26	1.4	1.9	34	38	18	10	7.8	10
27	1.4	1.9	34	42	18	10	7.3	12
28	1.4	1.9	33	45	15	11	6.8	12
29	1.6	1.9	32	45	15	13	6.8	12
30	1.9	1.9	31	42	15	14	6.8	12
31	1.9	.....	.....	39	.....	15	6.8	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 30, Apr. 1 to May 31, and Sept. 1–30, from a poorly defined rating curve; June 1 to Aug. 31 by method for shifting control.

Monthly discharge of Little Bitterroot River near Hubbart, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2.4	1.4	1.90	117	D.
November	7.7	1.4	3.13	186	D.
April	64	22	37.0	2,200	D.
May	45	25	33.4	2,050	C.
June	37	13	20.5	1,220	C.
July	16	10	13.2	812	C.
August	14	6.8	9.38	577	C.
September	12	7.1	10.2	607	C.

CROW CREEK NEAR RONAN, MONT.

LOCATION.—In the SW. ¼ sec. 13, T. 20 N., R. 20 W., at the old highway bridge about a quarter of a mile above the present bridge on the stage road from St. Ignatius to Ronan, Missoula County, 3 miles south of Ronan, above all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 21, 1906, to September 30, 1915.

GAGE.—Staff gage on center pier of old bridge, installed September 7, 1913; read once a day by Mrs. J. A. Nordgren. From September 21, 1906, to September 7, 1913, staff gage nailed to the left abutment of bridge at same datum.

DISCHARGE MEASUREMENTS.—Made by wading or from new highway bridge 500 feet below gage.

CHANNEL AND CONTROL.—Bed composed of sand and mud. Current is very sluggish at the gage. Sand bar about 50 feet downstream forms partial control; shifts slightly. During the summer some vegetation grows on this bar. Banks fairly high. At extremely high stages water overflows right bank about 100 feet above the gage forming a small secondary channel. During the high water period of 1915, a new channel was formed across a bend about 500 feet below the gage, causing a change in the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 10 a. m., July 18 (discharge, 408 second-feet); minimum stage recorded, 0.9 foot October 9–13 (discharge, 14 second-feet).

1906–1915: Maximum stage recorded, 10.85 feet June 6, 1908 (discharge, 1,400 second-feet); minimum stage recorded, 0.8 foot September 27, 1910, and 0.9 foot October 9–13, 1914 (discharge, 14 second-feet).

These records are for the open season only. A lower flow may have occurred during winter.

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

DIVERSIONS.—Water is diverted above station by the Pablo Feeder canal.

REGULATION.—None.

ACCURACY.—Results fair.

Discharge measurements of Crow Creek near Ronan, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 10	W. A. Lamb	[a] 3.90	212	July 25	W. A. Lamb	3.32	138
June 18	do	[a] 3.90	190	Sept. 15	B. E. Jones	1.65	36

[a] Water flowing through new channel at the bend 500 feet below gage.

Daily discharge, in second-feet, of Crow Creek near Ronan, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	55	33	52	57	133	158	172	54	31
2	17	55	30	52	60	97	165	164	49	30
3	21	51	28	52	62	118	164	164	49	31
4	26	51	25	47	62	125	163	156	45	34
5	31	51	25	50	62	133	162	164	45	36
6	28	51	25	54	62	166	162	172	41	37
7	20	51	25	57	62	184	161	172	41	34
8	16	51	25	57	62	203	151	180	37	34
9	14	51	26	57	62	184	166	196	37	34
10	14	51	28	54	62	198	156	249	37	34
11	14	51	28	52	62	193	164	231	34	34
12	14	51	26	54	64	203	164	196	32	34
13	14	51	.....	57	79	223	188	172	32	34
14	18	51	.....	57	85	233	180	172	31	34
15	22	51	.....	57	104	243	164	213	28	39
16	30	53	.....	62	141	229	180	249	30	45
17	59	55	.....	62	193	210	180	378	28	43
18	109	53	.....	62	213	201	176	378	28	39
19	159	49	.....	67	243	192	172	276	28	37
20	143	45	.....	64	243	167	188	222	31	37
21	129	45	.....	62	223	166	180	188	31	34
22	109	43	.....	62	203	198	196	156	32	34
23	79	39	.....	62	184	214	213	132	34	34
24	47	39	.....	62	149	231	267	124	31	37
25	31	39	.....	70	118	248	303	128	31	34
26	21	39	.....	82	97	247	378	164	31	34
27	24	39	.....	85	64	194	303	180	31	164
28	35	39	.....	76	62	169	258	164	34	148
29	47	37	.....	67	70	176	180	148	34	109
30	49	35	.....	62	85	175	180	116	31	88
31	59	.....	.....	62	.....	158	.....	62	31	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Dec. 12, from a fairly well defined rating curve; Mar. 1 to May 15, from a poorly defined rating curve; May 16 to June 9, by method for shifting control; June 10 to Sept. 30, from a rating curve fairly well defined below and poorly defined above 195 second-feet.

Monthly discharge of Crow Creek near Ronan, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	159	14	45.6	2,800	B.
November	55	35	47.4	2,820	B.
December 1–12	33	25	27.0	643	C.
March	85	47	60.6	3,730	C.
April	243	57	110	6,550	C.
May	248	97	187	11,500	C.
June	378	151	194	11,500	C.
July	378	62	188	11,600	C.
August	54	28	35.1	2,160	B.
September	164	30	47.6	2,830	B.

NOTE.—Diversions were made above the station as follows: October, 2,860 acre-feet; May, 2,984 acre-feet; June, 1,626 acre-feet; August, 346 acre-feet.

CROW CREEK AT LOZEAU'S RANCH, NEAR RONAN, MONT.

LOCATION.—In the E. ½ sec. 15, T. 20 N., R. 21 W., at Louis Lozeau's ranch, about a mile below the mouth of Mud Creek, 2½ miles above junction of Crow Creek with Flathead River, and 8 miles southwest of Ronan, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1911, to September 30, 1915.

GAGE.—Vertical staff with cast-iron face attached to log framework protecting left bank 100 feet below the private highway bridge at Lozeau's ranch, read May 10 to September 30, 1915. April 21, 1912, to May 9, 1915, staff gage on right bank 200 feet upstream from the present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and cobblestones at the gage and at the control; likely to change at high stages. Current swift at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.15 feet April 25 (discharge, 410 second-feet); minimum stage recorded, 2.55 feet August 27–29 (discharge, 42 second-feet).

1911–1915: Maximum stage recorded, 3.4 feet June 29, 1911 (discharge, 960 second-feet); minimum stage recorded, 0.8 foot March 21, 1913 (discharge, 4 second-feet).

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

DIVERSIONS.—Water is diverted from the various branches of Crow Creek by the Pablo Feeder canal supplying Pablo reservoir. A canal also heads just below the mouth of Mud Creek about a mile above the gage.

REGULATION.—None.

ACCURACY.—Results good except during high water.

Discharge measurements at Crow Creek at Lozeau's ranch, near Ronan, Mont., during 1914–15.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Old gage.	New gage.				Old gage.	New gage.	
1914.		*Feet.*	*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Feet.*	*Sec.-ft.*
May 14	W. A. Lamb...	1.82	.....	108	May 10	W. A. Lamb...	2.85	3.60	188
June 16	.....do.....	2.01	3.68	211	June 18	.....do.....	.....	3.65	209
July 28	.....do.....	1.61	2.89	63	July 25	.....do.....	.....	3.48	153
Nov. 23	.....do.....	2.24	.....	84	Sept. 16	B. E. Jones....	.....	2.97	74

Daily discharge, in second-feet, of Crow Creek at Lozeau's ranch, near Ronan, Mont., for the year ending Sept. 30, 1915.

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	179	72	.....	59	.....	188	217	123	50
2	164	72	.....	65	.....	202	188	110	50
3	136	72	.....	65	.....	175	188	102	54
4	136	72	.....	65	.....	188	188	102	57
5	122	80	.....	80	.....	188	175	102	57
6	110	72	.....	72	.....	188	139	102	57
7	90	43	.....	59	.....	188	139	102	57
8	90	43	.....	59	.....	188	139	102	57
9	90	43	.....	53	.....	188	139	102	61
10	99	43	.....	59	179	249	188	94	65
11	90	48	.....	53	217	249	249	87	65
12	90	43	.....	59	233	188	188	87	65
13	90	43	.....	59	188	162	162	81	65
14	90	43	.....	110	150	175	162	75	65
15	122	43	.....	164	202	188	150	65	65
16	110	.....	.....	122	249	188	139	61	70
17	110	.....	.....	122	150	217	139	57	70
18	110	.....	.....	164	150	233	217	57	70
19	99	.....	.....	179	162	217	397	57	70
20	99	.....	.....	179	162	217	338	54	70
21	90	.....	.....	360	217	217	283	54	70
22	90	.....	90	360	301	188	233	54	65
23	90	.....	110	380	249	150	188	50	65
24	80	.....	90	395	233	139	175	45	61
25	90	.....	80	410	233	162	162	45	61
26	80	.....	72	196	283	249	150	45	57
27	72	.....	72	164	266	357	150	42	57
28	72	.....	72	149	217	283	162	42	57
29	72	.....	72	164	217	249	175	42	61
30	80	.....	72	179	217	217	139	45	70
31	.....	.....	65	.....	202	.....	139	48	.....

NOTE.—Discharge ascertained as follows: Nov. 1 to Apr. 30 from a curve well defined between 35 and 150 second-feet; May 10 to Sept. 30 from a rating curve well defined between 50 and 250 second-feet and poorly defined for other discharges; discharge Apr. 23–24 interpolated; estimated May 1–9, as stage discharge relation was probably affected by logs lodging on a beaver dam below gage.

Monthly discharge of Crow Creek at Lozeau's ranch, near Ronan, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	105	6,460	
November	179	72	101	6,010	D.
December 1–15	80	43	55.5	1,650	C.
March 22–31	110	65	79.5	1,580	C.
April	410	53	153	9,100	C.
May	301	150	209	12,900	B.
June	357	139	206	12,300	B.
July	397	139	187	11,500	A.
August	123	42	72.1	4,430	A.
September	70	50	62.1	3,700	B.

NOTE.—During October stage-discharge relation affected by backwater from a beaver dam; mean flow estimated. Diversions were made above the station as follows: From Mud Creek: May, 545 acre-feet; June, 555 acre-feet: July, 246 acre-feet; August, 47 acre-feet. From North Fork of Crow Creek: May, 2,984 acre-feet; June, 1,626 acre-feet; August, 346 acre-feet. From Crow Creek just above Lozeau's house: May, 239 acre-feet; June, 680 acre-feet; July, 1,789 acre-feet; August, 828 acre-feet; September, 285 acre-feet. Total quantity diverted above station for October, 3,940 acre-feet. Accuracy of determinations for June and September lowered by possible errors in gage readings.

MISSION CREEK NEAR ST. IGNATIUS, MONT.

LOCATION.—In the SW. ¼ sec. 10, T. 18 N., R. 20 W., near the house of T. L. Cope, about a mile downstream from St. Ignatius, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 21, 1906, to September 30, 1915.

GAGE.—Vertical staff on the left bank about 500 feet below house of T. L. Cope; read two to three times a week in November, December, July, August, and September, and four to five times a week in other months. Original gage was destroyed July 5, 1907, and a new gage was installed July 24 a short distance downstream at a datum 0.30 foot lower. January 25, 1908, this gage was lowered 0.39 foot. The gage was again destroyed June 7, 1908, and on June 26 a vertical staff gage was installed 20 feet farther downstream and at a different datum. January 29, 1912, a chain gage was installed on the left bank about 200 feet above last gage and at a different datum. Present gage installed May 19, 1913, at the same site and datum as the chain gage.

DISCHARGE MEASUREMENTS.—Made by wading or from a bridge 2 miles above the gage.

CHANNEL AND CONTROL.—Composed of gravel; may shift slightly at high water; current swift. Control not well defined. Left bank high and not subject to overflow; right bank low and subject to overflow only at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet June 26 (discharge, 385 second-feet); minimum stage recorded, 1.7 feet March 16–29 (discharge, 16 second-feet).

1906–1915: Maximum discharge estimated at 2,000 second-feet during period June 7–25, 1908 (gage washed out); minimum stage recorded, 0.2 foot January 30 to February 4, 17–25; March 9–12, 1908; February 28, 1911 (discharge, 8 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice; record discontinued during winter.

DIVERSIONS.—Mission canal, of the United States Reclamation Service, diverts above station. For the amount of diversions during 1915, see footnote to table of mean monthly discharge. There are also several private ditches taking out above the gage.

REGULATION.—St. Mary Lake gives a small amount of natural regulation. The snow melting in the mountains causes some diurnal fluctuation during the spring.

ACCURACY.—Results good when frequent gage readings are made.

Discharge measurements of Mission Creek near St. Ignatius, Mont., during the year ending Sept. 30, 1915.

[Made by W. A. Lamb.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Nov. 23	1.93	32
May 10	2.35	81

Daily discharge, in second-feet, of Mission Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	43	61	29	.....	19	132	201	350	213	111
2	51	61	29	.....	19	104	226	346	201	102
3	59	58	29	.....	19	76	239	342	189	92
4	68	55	29	.....	19	61	252	338	177	87
5	76	52	29	.....	19	61	239	334	166	82
6	61	49	29	.....	19	61	226	331	154	76
7	54	46	29	.....	19	61	226	344	154	72
8	48	42	29	.....	19	69	239	358	178	68
9	38	38	29	.....	19	77	252	347	201	64
10	38	38	29	.....	19	84	226	336	189	61
11	38	38	29	.....	24	76	201	325	177	61
12	38	38	29	.....	29	102	201	314	166	61
13	38	34	29	.....	34	112	201	304	154	61
14	38	29	29	.....	38	122	201	331	154	61
15	50	29	29	.....	76	111	201	278	156	61
16	61	29	29	16	92	111	201	265	158	61
17	61	29	29	16	92	111	201	252	160	61
18	61	29	29	16	92	122	201	265	162	59
19	61	29	27	16	92	132	201	278	164	56
20	58	29	25	16	102	154	201	278	166	53
21	54	29	23	16	111	177	201	278	168	50
22	48	29	22	16	100	177	214	278	171	48
23	48	29	22	16	88	177	226	272	174	46
24	48	29	22	16	76	177	226	266	177	44
25	48	29	22	16	61	166	358	259	170	42
26	48	29	22	16	61	177	385	252	162	40
27	48	29	22	16	61	144	372	252	154	38
28	52	29	22	16	68	111	358	252	149	38
29	56	29	22	16	76	133	358	252	144	38
30	61	29	22	16	111	155	354	239	138	38
31	61	.....	22	16	.....	178	.....	226	132	.....

NOTE.—Discharge ascertained from a well-defined rating curve. Discharge interpolated for days when gage was not read.

Monthly discharge of Mission Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	76	38	52.0	3,200	B.
November	61	29	36.8	2,190	C.
December	29	22	26.4	1,620	B.
March 16–31	16	16	16.0	508	B.
April	111	19	55.8	3,320	B.
May	178	61	120	7,380	C.
June	385	201	246	14,600	C.
July	358	226	295	18,100	C.
August	213	132	167	10,300	C.
September	111	38	61.1	3,640	B.

NOTE.—Water was diverted from Mission Creek above the gage as follows: June, 22 acre-feet; July, 102 acre-feet; August, 560 acre-feet; and September, 326 acre-feet.

DRY CREEK NEAR ST. IGNATIUS, MONT.

LOCATION.—At Felsman's ranch, about 1½ miles below St. Mary Lake, above the only tributary and about 5 miles southeast of St. Ignatius, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 16, 1908, to September 30, 1915.

GAGE.—Staff gage nailed to tree on left bank opposite Henry Felsman's house; read daily by Theresa Felsman.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel is composed of coarse gravel and boulders; shifts slightly. Control is not well defined. Banks low but not subject to overflow, as the fall is great.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.70 feet June 25 (discharge, 113 second-feet); minimum stage recorded, 0.1 foot March 20–22 (discharge, 0.5 second-foot).

1908–1915: Water over gage June 6 and 7, 1908 (discharge estimated at 250 second-feet). No flow, November 30, 1908; May 15, 18–21, October 24, November 1–4, 11–15, 17 and 20–30, 1909; April 23, 1910; May 3–7, 1913; April 1–11, 1914.

WINTER FLOW.—No flow at gage during winter and early spring.

DIVERSIONS.—One small ditch diverts above the station.

REGULATION.—St. Mary Lake forms a natural regulation, Dry Creek carrying simply the overflow. This is the cause of the creek going dry during the winter.

ACCURACY.—Results good.

The following discharge measurement was made by W. A. Lamb:

May 9, 1915, gage height 0.70 foot; discharge, 15.4 second-feet.

Daily discharge, in second-feet, of Dry Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3.0	10	6.0	.....	5.0	47	52	69	49	16
2	3.0	10	6.0	.....	5.0	38	57	67	49	16
3	38	10	6.0	.....	6.0	34	57	67	54	16
4	38	10	6.0	.....	6.0	30	57	75	47	16
5	38	6.0	6.0	.....	10	23	57	78	47	16
6	30	6.0	4.0	.....	10	23	67	81	38	16
7	16	6.0	4.0	.....	10	17	78	86	38	16
8	10	6.0	4.0	.....	10	16	84	78	38	16
9	10	6.0	2.0	.....	6.0	16	67	78	30	16
10	10	6.0	2.0	.....	6.0	20	57	78	30	16
11	10	6.0	2.0	.....	4.0	23	57	78	26	16
12	10	10	2.0	.....	6.0	30	47	78	25	16
13	10	10	.....	.....	16	38	47	69	23	16
14	6.0	10	.....	.....	16	38	40	67	23	16
15	10	6.0	.....	.....	16	42	40	67	23	16
16	16	6.0	.....	.....	23	42	34	67	16	16
17	16	10	.....	.....	23	40	34	62	20	16
18	23	10	.....	.....	26	40	62	62	16	16
19	23	10	.....	.....	30	40	72	57	16	16
20	23	10	.....	0.5	38	38	72	57	16	16
21	16	10	.....	0.5	38	45	62	57	16	16
22	16	10	.....	0.5	38	49	62	62	16	16
23	16	10	.....	2.0	44	47	57	62	16	16
24	16	6.0	.....	4.0	32	47	84	67	16	14
25	16	6.0	.....	6.0	30	47	113	62	16	14
26	10	6.0	.....	6.0	30	47	101	57	16	14
27	10	6.0	.....	4.4	30	47	78	57	16	16
28	10	6.0	.....	4.4	32	40	68	57	16	16
29	10	6.0	.....	5.0	30	47	59	52	16	20
30	10	6.0	.....	5.0	32	47	62	47	16	20
31	10	.....	.....	5.6	.....	47	.....	47	16	.....

NOTE.—Discharge ascertained from a rating curve fairly well defined above and poorly defined below 5 second-feet. Discharge Oct. 1–2 interpolated for lack of gage readings.

Monthly discharge of Dry Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	38	3.0	15.6	959	B.
November	10	6.0	7.87	468	B.
December 1–12	6	2.0	4.17	99.3	C.
March 20–31	6	.5	3.66	87.1	C.
April	44	4.0	20.3	1,210	B.
May	49	16	36.9	2,270	B.
June	113	34	62.8	3,740	B.
July	86	47	66.1	4,060	B.
August	54	16	25.8	1,590	B.
September	20	14	16.1	958	B.

POST CREEK NEAR ST. IGNATIUS, MONT.

LOCATION.—On section line between the SE. ¼ NE. ¼ sec. 23 and the SW. ¼ NW. ¼ sec. 24, T. 19 N., R. 20 W., at the new highway bridge on the stage road between St. Ignatius and Ronan, about a mile below North Fork of Post Creek, and 5 miles north of St. Ignatius, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 19, 1911, to September 30, 1915. For a station 3 miles above present gage, September 1, 1906, to May 9, 1911, and 1½ miles above the present gage, April 20, 1911, to November 11, 1911. Considerable inflow from springs between the present station and stations above. North Fork of Post Creek also enters between the stations above and the present one.

GAGE.—Chain gage installed on downstream side of highway bridge September 19, 1911; read twice daily by I. H. Lee. Staff gage near the house of J. G. Fitzpatrick, about 2 miles above North Fork of Post Creek, September 1, 1906, to May 9, 1911. Staff gage at Deschamp's ranch, 500 feet above North Fork of Post Creek, April 20, 1911, to November 11, 1911.

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

CHANNEL AND CONTROL.—Gravel and small boulders; free from vegetation; shifting at high stages. Banks fairly high, and not subject to overflow except at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.65 feet at 8 a. m. May 21 (discharge, 501 second-feet); minimum stage recorded, 2.05 feet October 10, 12, 15, 22, and 25 (discharge, 22 second-feet).

1906–1915: Maximum stage recorded, 8.48 feet about June 10, 1908, gage washed out (discharge estimated at 2,200 second-feet); minimum stage recorded, 2.0 feet September 3, 1914 (discharge, 20 second-feet).

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

DIVERSIONS.—Two small ditches divert water above the old station at Fitzpatrick's ranch. The United States Reclamation Service diverts water above station for irrigation and for storage in Ninepipe Reservoir. For diversions in 1915, see footnote to table of monthly discharge.

REGULATION.—McDonalds Lake affords a small amount of natural regulation.

ACCURACY.—Results excellent.

Discharge measurements of Post Creek near St. Ignatius, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 10	W. A. Lamb	3.18	136
June 18	do	3.55	222
Sept. 15	B. E. Jones	2.71	72

Daily discharge, in second-feet, of Post Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	32	48	66	55	160	225	214	160	95
2	37	44	62	51	151	236	214	170	117
3	40	55	64	59	142	236	214	160	109
4	45	66	59	83	125	260	214	170	95
5	93	62	57	68	102	260	202	160	95
6	51	59	59	72	109	273	214	160	95
7	28	66	52	68	89	236	248	170	95
8	28	81	57	68	89	260	260	151	89
9	26	86	55	63	117	260	273	151	83
10	22	81	46	59	142	236	273	142	83
11	25	86	48	63	202	225	286	142	83
12	22	81	44	72	191	214	236	134	72
13	25	86	44	102	191	191	225	125	72
14	25	86	44	109	225	180	225	142	72
15	22	79	40	102	260	170	202	125	72
16	26	78	.....	89	225	180	191	125	72
17	27	71	.....	89	191	202	225	125	72
18	34	76	.....	102	180	214	273	125	72
19	32	76	.....	117	214	214	260	125	72
20	25	71	.....	125	236	214	248	134	72
21	26	74	.....	142	431	202	225	125	72
22	22	63	.....	117	236	180	180	125	72
23	25	76	.....	109	214	170	202	125	72
24	25	76	.....	109	225	202	214	117	72
25	22	71	.....	89	214	286	202	117	72
26	26	76	.....	95	225	377	214	109	72
27	30	68	.....	83	202	273	214	95	89
28	38	66	.....	83	191	225	202	95	134
29	40	66	.....	109	202	214	180	95	117
30	40	62	.....	134	191	214	180	102	95
31	48	.....	.....	.....	202	.....	202	95	.....

NOTE.—Discharge ascertained from two well-defined rating curves applicable Oct. 1 to Dec. 15, and Apr. 1 to Sept. 30. Discharge Sept. 13 and 14 interpolated for lack of gage readings.

Monthly discharge of Post Creek near St. Ignatius, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	93	22	32.5	2,000	A.
November	86	44	71.0	4,220	A.
December 1–15	66	40	53.1	1,580	A.
April	142	51	89.5	5,330	A.
May	431	89	189	11,600	A.
June	377	170	228	13,600	A.
July	286	180	223	13,700	A.
August	170	95	132	8,120	A.
September	134	72	85.1	5,060	A.

NOTE.—Water was diverted from Marsh Creek, a tributary of Post Creek, above the station, as follows: May, 180 acre-feet; June, 377 acre-feet; July, 381 acre-feet; August, 417 acre-feet; September, 346 acre-feet. From Post Creek water was diverted as follows: October, 3,152 acre-feet; November, 436 acre-feet.

SOUTH FORK OF JOCKO RIVER NEAR JOCKO, MONT.

LOCATION.—In the NE. ¼ sec. 35, T. 17 N., R. 18 W., about 300 feet below the junction with the Middle Fork, and about 10 miles northeast of Jocko, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 11, 1912, to September 30, 1915.

GAGE.—Vertical staff nailed to tree on right bank; read once a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made from a foot log about 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Boulders and cobblestones; fairly permanent. Current swift at all stages. Banks not very high, but not subject to overflow on account of the large fall of the stream.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.1 feet May 22 and June 6 (discharge, 251 second-feet); minimum discharge estimated at 30 second-feet November 22–30 (gage not read).

1912–1915; Maximum stage recorded, 4.15 feet May 31, 1913 (discharge, 1,080 second-feet); minimum stage recorded, 1.93 feet December 7, 1912 (discharge, 29 second-feet). These records are for the open season only.

WINTER FLOW.—Stage-discharge relation probably not seriously affected by ice. It is very difficult to reach the gage during winter on account of snow, and readings are discontinued.

DIVERSIONS.—None.

REGULATION.—None. The melting snow in the mountains causes a diurnal fluctuation during the spring.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of South Fork of Jocko River near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	W. A. Lamb	2.70	136
July 28	do	2.60	114
Sept. 13	B. E. Jones	2.27	59

Daily discharge, in second-feet, of South Fork of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	54	98	55	170	231	167	105	72
2	53	92	57	164	235	162	104	74
3	52	86	59	158	239	159	103	76
4	58	79	61	151	243	156	101	78
5	64	72	63	144	247	153	100	76
6	70	65	65	137	251	150	99	75
7	76	58	67	144	246	147	98	74
8	82	57	69	150	241	144	97	73
9	89	56	72	157	236	141	96	72
10	96	55	74	164	231	139	94	70
11	105	55	88	171	225	137	92	68
12	114	54	102	178	219	138	90	66
13	124	53	116	185	217	140	88	64
14	134	52	131	192	215	142	86	64
15	144	50	146	199	213	144	84	63
16	154	48	161	206	211	146	83	63
17	164	46	176	213	209	148	82	62
18	163	44	174	220	207	150	81	62
19	162	41	172	227	204	146	80	61
20	160	38	170	235	202	142	78	60
21	158	35	168	243	200	138	76	59
22	156	.....	166	251	198	134	74	57
23	154	.....	164	247	196	130	72	56
24	152	.....	162	243	194	126	71	55
25	145	.....	164	239	192	123	70	54
26	138	.....	166	234	189	120	68	53
27	131	.....	168	229	185	118	66	54
28	124	.....	170	224	181	115	65	55
29	117	.....	173	219	177	115	66	56
30	110	.....	176	223	172	106	68	56
31	104	.....	.....	227	.....	106	70	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 21, from a rating curve well defined above and poorly defined below 35 second-feet; Apr. 1 to Sept. 30 from a fairly well defined rating curve. Gage read once a week; discharge interpolated for intervening periods; discharge Nov. 22–30, estimated 30 second-feet for lack of gage readings.

Monthly discharge of South Fork of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	164	52	116	7,130	D.
November	98	.....	50.1	2,980	D.
April	176	55	125	7,440	C.
May	251	137	198	12,200	D.
June	251	172	214	12,700	C.
July	167	106	138	8,480	C.
August	105	65	84.1	5,170	C.
September	78	53	64.3	3,830	C.

JOCKO RIVER NEAR JOCKO, MONT.

LOCATION.—At highway bridge about 1¼ miles north of Jocko Agency, and 3½ miles east of Arlee, in Missoula County. It is below Big Knife and above Finley, and Valley creeks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 20, 1908, to September 30, 1915.

GAGE.—Vertical staff attached to middle pier of highway bridge, on downstream side; read once a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge. Prior to 1914 high-water measurements were made at a foot log a mile above the gage where the measuring section was better.

CHANNEL AND CONTROL.—Channel composed of boulders and gravel; practically permanent. Bed is very rough at the gage and the water is swift. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.65 feet June 5 (discharge, 625 second-feet); minimum discharge estimated at 95 second-feet, October 1 (gage not read).

1906–1915: Maximum stage recorded, 12.25 feet (obtained from high-water marks) June 6, 1908 (discharge, 6,200 second-feet, determined from floats); minimum stage recorded, 6.86 feet July 31, 1914 (discharge 53 second-feet). Minimum flow of July 31, 1914, was due to diversion above.

These records are for the open season. Only estimates of mean monthly flow are available for the winter.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice. Gage readings are discontinued during winter, as the water is used only for irrigation and the winter flow is not considered important.

DIVERSIONS.—Jocko canal diverts about 2 miles above station, and Big Knife canal diverts from Big Knife Creek. See footnote to table of monthly discharge for diversions in 1915.

REGULATION.—Jocko Lakes furnish a small amount of natural regulation. The melting snow in the mountains causes a diurnal fluctuation during the spring.

ACCURACY.—Records are only fair on account of infrequent gage readings.

The following discharge measurement was made by W. A. Lamb:

November 24, 1914: Gage height, 7.38 feet; discharge, 132 second-feet.

Daily discharge, in second-feet, of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	95	.....	.....	134	347	581	355	211	156
2	96	.....	.....	147	356	592	348	199	159
3	98	.....	.....	160	371	603	341	188	162
4	100	.....	.....	173	383	614	334	176	162
5	102	.....	.....	186	395	625	327	164	162
6	104	.....	.....	199	407	618	320	152	162
7	117	.....	.....	212	419	611	313	151	162
8	130	.....	.....	225	430	604	306	150	162
9	142	.....	.....	238	439	597	298	149	162
10	152	.....	.....	250	448	591	309	148	162
11	162	.....	.....	290	457	585	320	146	163
12	173	.....	.....	330	466	563	330	144	164
13	184	.....	.....	370	475	540	340	142	165
14	201	.....	.....	415	484	518	350	144	167
15	218	.....	.....	460	493	496	360	146	169
16	235	.....	.....	505	502	474	370	148	171
17	217	.....	.....	550	510	452	380	149	173
18	199	.....	.....	515	518	430	360	150	171
19	181	.....	.....	480	526	427	340	151	170
20	162	.....	.....	440	534	425	320	152	169
21	.....	.....	.....	400	542	422	305	151	168
22	.....	.....	.....	360	550	419	285	150	167
23	.....	.....	.....	320	550	416	265	149	166
24	.....	132	.....	280	550	413	261	148	164
25	.....	.....	.....	289	550	410	257	146	162
26	.....	.....	119	298	550	407	253	144	154
27	.....	.....	121	307	550	405	249	142	146
28	.....	.....	124	316	550	392	245	144	138
29	.....	.....	126	325	550	380	240	147	130
30	.....	.....	129	335	560	368	235	150	122
31	.....	.....	131	.....	570	.....	223	153	.....

NOTE.—Discharge ascertained from a fairly well defined rating curve. Discharge October 21–31, estimated for lack of gage readings, 255 second-feet. Gage read once a week; discharge interpolated for intervening periods.

Monthly discharge of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	95	189	11,600	D.
March 26–31	131	119	125	1,490	C.
April	550	134	317	18,900	D.
May	570	347	485	29,800	D.
June	625	368	499	29,700	C.
July	380	223	308	18,900	C.
August	211	142	154	9,470	C.
September	173	122	160	9,520	C.

NOTE.—Water was diverted from Jocko River above the gage as follows: May, 753 acre-feet; June, 855 acre-feet; July, 558 acre-feet; August, 1,876 acre-feet; September, 276 acre-feet. Water was diverted from Big Knife Creek, a tributary entering Jocko River above the gage, as follows: June, 375 acre-feet; July, 1,093 acre-feet; August, 201 acre-feet.

MIDDLE FORK OF JOCKO RIVER NEAR JOCKO, MONT., 1915.

LOCATION.—Near the north line of sec. 35, T. 17 N., R. 18 W., Montana meridian, about 300 feet above junction with the South Fork, and about 10 miles northeast of Jocko, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1915.

GAGE.—Vertical staff nailed to log on right bank; read once a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made from a foot log at the gage or by wading.

CHANNEL AND CONTROL.—Gravel and cobblestones; practically permanent. Banks fairly high and not subject to overflow. Some moss grows on the bottom during the summer but probably has little effect.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 1.07 feet October 17 and April 30 (discharge, 47 second-feet); minimum stage recorded, 0.4 foot December 12 (discharge, 9 second-feet); open-season records only.

1912–1915: Maximum stage recorded, 1.4 feet June 1, 1912 (discharge, 134 second-feet); minimum stage recorded, 0.45 foot December 13, 1913 (discharge, 8 second-feet); open-season records only.

WINTER FLOW.—Stage-discharge relation probably not seriously affected by ice. It is very difficult to reach the gage during winter on account of snow, and readings are discontinued.

DIVERSIONS.—No diversions.

REGULATION.—None. The melting snow in the mountains causes a diurnal fluctuation during the spring months.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of Middle Fork of Jocko River near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	W. A. Lamb	0.87	33.6
July 28	....do	.77	30.5
Sept. 13	B. E. Jones	.61	17.4

Daily discharge, in second-feet, of Middle Fork of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	18	25	10	18	45	37	37	30	22
2	18	24	10	18	43	37	37	30	23
3	18	23	10	19	41	38	37	29	24
4	19	23	10	19	38	39	37	28	24
5	20	22	10	20	35	39	36	27	24
6	21	21	10	20	33	39	35	26	24
7	23	20	10	21	32	39	34	26	24
8	25	19	10	21	31	38	33	26	22
9	27	18	9	22	31	37	32	26	22
10	29	17	9	22	32	37	32	26	22
11	31	15	9	25	33	36	32	25	22
12	33	14	9	28	34	36	32	26	20
13	35	13	.....	31	35	36	33	24	18
14	38	12	.....	34	36	36	34	24	19
15	41	12	.....	37	37	36	35	24	20
16	44	12	.....	40	37	35	36	24	21
17	47	12	.....	43	38	35	37	23	22
18	46	12	.....	43	39	35	38	22	23
19	45	12	.....	42	40	35	38	21	23
20	44	12	.....	41	41	35	37	21	23
21	43	12	.....	41	42	35	36	21	22
22	42	12	.....	40	42	35	35	21	22
23	41	12	.....	39	41	36	34	21	21
24	40	12	.....	39	40	36	34	21	20
25	38	10	.....	40	39	36	33	20	20
26	36	10	.....	41	39	36	32	20	20
27	34	10	.....	42	38	36	31	20	20
28	32	10	.....	44	37	36	30	20	20
29	30	10	.....	46	36	36	30	20	20
30	28	10	.....	47	36	37	30	21	20
31	26	.....	.....	.....	36	.....	30	22	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to June 14, and Aug. 16 to Sept. 30, from a rating curve well defined above 15 second-feet; June 15 to Aug. 15, by indirect method for shifting control. Gage read once a week; discharge interpolated for intervening periods.

Monthly discharge of Middle Fork of Jocko River, near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	47	18	32.7	2,010	C.
November	25	10	14.9	887	C.
December 1-12	10	9	9.7	231	C.
April	47	18	32.8	1,950	C.
May	45	31	37.3	2,290	D.
June	39	35	36.5	2,170	C.
July	38	30	34.1	2,100	C.
August	30	20	23.6	1,450	C.
September	24	18	21.6	1,290	C.

NORTH FORK OF JOCKO RIVER NEAR JOCKO, MONT., 1915.

LOCATION.—In the NW. ¼ sec. 23, T. 17 N., R. 18 W., three-fourths mile above the junction with Falls Creek, and about 11 miles northeast of Jocko, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1912, to September 30, 1915.

GAGE.—Vertical staff nailed to tree on left bank; read once a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made from a foot log about 100 feet above gage or by wading.

CHANNEL AND CONTROL.—Boulders and cobblestones; practically permanent. Water swift at all stages but the gage is set in a deep quiet pool. Banks fairly high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.35 feet April 17 (discharge, 198 second-feet); minimum stage recorded, 0.87 foot December 12 (discharge, 15 second-feet).

1912–1915: Maximum stage recorded, 3.4 feet May 31, 1913 (discharge, 492 second-feet); minimum stage recorded, 0.55 foot December 13, 1913 (discharge, 6 second-feet). These records are for the open season only.

WINTER FLOW.—Stage-discharge relation probably not seriously affected by ice. It is very difficult to reach the gage during winter on account of snow and readings are discontinued.

DIVERSIONS.—None.

REGULATION.—None. The melting snow in the mountains causes some diurnal fluctuation during the spring months.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of North Fork of Jocko River near Jocko, Mont., during the year ending Sept. 30, 1915.

[Made by W. A. Lamb.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 6	1.75	88
July 28	1.33	41

Daily discharge, in second-feet, of North Fork of Jocko River near Jocko Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	60	17	.....	31	147	170	90	39	20
2	16	56	16	.....	32	136	171	84	38	21
3	16	52	16	.....	33	125	172	83	36	21
4	18	48	16	.....	35	114	173	82	34	21
5	20	44	16	.....	37	103	175	81	32	21
6	23	40	16	.....	39	92	177	81	30	21
7	26	37	16	.....	41	120	164	80	28	22
8	28	35	16	.....	43	148	151	79	26	22
9	30	33	15	.....	45	151	138	78	26	23
10	33	31	15	.....	47	154	125	77	26	23
11	43	29	15	.....	68	157	112	76	25	23
12	53	28	15	.....	90	160	99	79	24	24
13	64	27	.....	.....	112	163	99	82	24	25
14	74	26	.....	.....	134	166	99	85	24	26
15	85	26	.....	.....	156	169	99	88	24	27
16	95	25	.....	.....	177	172	99	91	24	28
17	106	24	.....	.....	198	175	99	94	23	29
18	103	23	.....	.....	191	178	99	96	22	31
19	100	22	.....	.....	184	181	99	88	21	31
20	97	21	.....	.....	177	183	101	80	21	31
21	94	21	.....	.....	170	185	103	72	21	30
22	90	21	.....	.....	163	187	105	64	21	30
23	87	20	.....	.....	156	184	108	56	21	29
24	84	19	.....	.....	148	181	111	47	20	28
25	81	19	.....	.....	149	178	114	45	19	28
26	78	18	.....	31	151	175	117	43	18	28
27	75	17	.....	31	153	172	112	41	18	28
28	72	17	.....	31	155	169	107	40	18	28
29	70	17	.....	31	157	167	102	40	18	28
30	67	17	.....	31	158	168	96	40	18	27
31	64	.....	.....	31	.....	169	.....	40	19	.....

NOTE.—Discharge ascertained from a well-defined rating curve. Gage read once a week; discharge interpolated for intervening periods.

Monthly discharge of North Fork of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	106	16	61.5	3,780	D.
November	60	17	29.1	1,730	C.
December 1–12	17	15	15.8	376	C.
March 26–31	31	31	31.0	369	C.
April	198	31	114	6,780	C.
May	187	92	159	9,780	D.
June	177	96	123	7,320	C.
July	96	40	71.0	4,370	C.
August	39	18	24.5	1,510	C
September	31	20	25.8	1,540	C.

FALLS CREEK NEAR JOCKO, MONT.

LOCATION.—In the NE. ¼ sec. 22, T. 17 N., R. 18 W., about a quarter of a mile above junction with North Fork of Jocko River and 10 miles northeast of Jocko, Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 11, 1912, to September 30, 1915.

GAGE.—Staff gage nailed to tree on right bank about a quarter of a mile above junction with North Fork of Jocko River; read once a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made by wading. Section is only fair.

CHANNEL AND CONTROL.—Channel gravel, cobblestones, and boulders. Stream consists of a succession of pools, waterfalls, and rapids. Gage is in a pool above a small fall. Control is an irregular rocky ledge, strewn with rocks and gravel, shifts slightly at high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.00 foot May 8 (discharge, 60 second-feet); minimum stage recorded, 0.00 December 12 (discharge, 1.5 second-feet).

1912–1915: Maximum stage recorded, 1.5 feet May 31 and June 1, 1912 (discharge, 89 second-feet); minimum stage recorded zero on gage November 29 and December 6, 1913 (discharge, 1.0 second-foot).

WINTER FLOW.—Stage-discharge relation probably affected by ice. Record discontinued during winter as it is impossible to reach gage on account of snow.

DIVERSIONS.—No diversions.

REGULATION.—No regulation, but the melting snow causes a diurnal fluctuation during the spring.

ACCURACY.—Gage-height record fair; rating curve for October to December well defined above 4 second-feet; March to September, fairly well defined up to 25 second-feet; results fair for November, December, March, July, and August, and poor for remainder of year.

Discharge measurements of Falls Creek near Jocko, Mont., during the year ending Sept. 30,1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	W. A. Lamb	0.52	16.9
July 28	do	.43	13.6
Sept. 13	B. E. Jones	.28	5.8

Daily discharge, in second-feet, of Falls Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.5	9.8	3.8	.....	3.8	40	52	25	14	4.0
2	5.2	9.6	3.7	.....	4.3	36	53	23	14	4.2
3	4.8	9.4	3.7	.....	4.8	32	54	23	13	4.4
4	5.5	9.2	3.7	.....	5.3	28	55	23	12	4.6
5	6.2	9.0	3.7	.....	5.8	23	56	23	12	5.7
6	6.9	8.8	3.4	.....	6.3	18	58	22	11	6.8
7	7.6	8.5	3.1	.....	6.8	39	53	21	10	7.9
8	8.3	8.1	2.8	.....	7.3	60	48	20	9.6	8
9	9	7.7	2.5	.....	7.8	59	43	20	9.0	9
10	10	7.3	2.2	.....	8.3	58	37	20	8.4	10
11	13	6.9	1.8	.....	16	57	31	20	7.8	12
12	16	6.5	1.5	.....	23	56	25	21	7.1	9
13	19	6.1	.....	.....	30	55	29	22	6.4	6.0
14	22	5.8	.....	.....	37	54	33	24	5.7	8
15	25	5.6	.....	.....	44	53	37	26	5.5	10
16	28	5.4	.....	.....	51	52	41	27	5.3	12
17	31	5.3	.....	.....	58	51	45	28	5.1	14
18	30	5.2	.....	.....	55	50	49	29	4.9	16
19	29	5.1	.....	.....	52	49	54	28	4.6	16
20	28	5.0	.....	.....	49	48	51	27	4.3	16
21	26	4.8	.....	.....	46	47	48	25	4.1	16
22	24	4.6	.....	.....	43	47	45	23	4.0	15
23	22	4.4	.....	.....	40	47	42	21	3.9	14
24	20	4.2	.....	.....	37	47	39	19	3.8	14
25	18	4.1	.....	.....	38	48	36	17	3.7	14
26	16	4.0	.....	4.9	39	48	32	15	3.6	14
27	14	3.9	.....	4.7	40	49	30	14	3.5	14
28	13	3.8	.....	4.5	41	49	28	13	3.4	14
29	12	3.8	.....	4.3	42	49	27	13	3.5	13
30	11	3.8	.....	4.1	44	50	26	15	3.6	12
31	10	.....	.....	3.9	.....	51	.....	15	3.8	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Dec. 12, from a rating curve well defined above 4 second-feet; Mar. 26 to Sept. 30, from a rating curve fairly well defined below and poorly defined above 25 second-feet. Gage read once a week; discharge interpolated for intervening periods.

Monthly discharge of Falls Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	31	4.8	16.0	984	D.
November	9.8	3.8	6.19	368	C.
December 1-12	3.8	1.5	2.99	71.2	C.
March 26-31	4.9	3.9	4.40	52.4	C.
April	58	3.8	29.5	1,760	D.
May	60	18	46.8	2,880	D.
June	58	25	41.9	2,490	D.
July	29	13	21.4	1,320	C.
August	14	3.4	6.79	418	C.
September	16	4.0	10.8	643	D.

BIG KNIFE CREEK NEAR JOCKO, MONT.

LOCATION.—In the NW. ¼ sec. 14, T. 16 N., R. 19 W., just above head gates of Big Knife canal, about 2½ miles northeast of Jocko, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 5, 1910, to September 30, 1015, at present station; August 19, 1908, to December 31, 1910, for station about a mile farther downstream.

GAGE.—Staff gage on right bank about 200 feet above head gate of canal; read twice a week by Tony Delaware. Staff gage used from August 19, 1908, to December 31, 1910, was about a mile below present gage.

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DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed of gravel and boulders; shifts slightly; slightly obstructed during the summer by a growth of moss at the control. The stream has considerable fall and the current is swift, but there is a pool at the gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.82 feet May 24 and June 5 (discharge, 34 second-feet); minimum stage recorded, 2.11 feet October 2 (discharge, 8.5 second-feet).

1910–1015: Maximum stage recorded, 3.15 feet June 14, 1912 (discharge, 50 second-feet); minimum stage recorded, 1.83 feet April 17, 1911 (discharge, 4.3 second-feet.

These records are for the open season only.

WINTER FLOW.—Record discontinued during the winter.

DIVERSIONS.—None above the station.

REGULATIONS.—None. The melting snow at the headwaters causes a slight diurnal variation during the spring.

ACCURACY.—Results are only fair on account of infrequent gage readings.

Discharge measurements of Big Knife Creek near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	W. A. Lamb	2.21	[a] 12.2
Sept. 14	B. E. Jones	2.28	12.3

[a] Measurement made on the crest of a weir. Results thought to be too great.

Daily discharge, in second-feet, of Big Knife Creek Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	8.8	.....	31	27	20	14	16	14.8	.....	31	27	16	12
2	8.5	.....	32	27	20	14	17	13.8	.....	32	28	16	12
3	9.0	.....	33	26	20	14	18	12.8	.....	33	28	16	12
4	9.5	.....	34	26	19	14	19	11.8	.....	33	26	16	12
5	10.1	.....	34	26	19	13	20	10.7	.....	32	26	16	12
6	10.7	.....	33	26	19	13	21	.....	.....	32	26	16	12
7	11.2	12	31	26	19	13	22	.....	.....	32	23	15	12
8	11.7	.....	30	27	18	13	23	.....	.....	32	23	15	12
9	12.2	.....	29	27	18	13	24	.....	34	31	23	15	11
10	12.6	.....	30	26	18	13	25	.....	33	30	22	15	11
11	13.0	.....	31	25	18	13	26	.....	32	30	22	14	11
12	13.4	.....	31	24	17	12	27	.....	31	30	22	14	13
13	13.8	.....	30	24	17	12	28	.....	30	28	21	14	13
14	13.8	.....	30	25	17	12	29	.....	30	27	20	13	13
15	14.8	.....	30	26	16	12	30	.....	30	27	20	13	13
							31	.....	30	.....	20	13	.....

NOTE.—Discharge ascertained as follows: Oct. 1–20 from a well-defined rating curve; May 24 to Sept. 30 from a fairly well-defined rating curve; gage read twice a week; discharge interpolated for intervening periods; discharge Oct. 21–31, estimated 8 second-feet for lack of gage readings.

Monthly discharge of Big Knife Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14.8	.....	10.5	646	C.
May 24-31	34	30	31.2	495	C.
June	34	27	31.0	1,840	C.
July	28	20	24.7	1,520	C.
August	20	13	16.5	1,010	C.
September	14	11	12.5	744	C.

AGENCY CREEK NEAR JOCKO, MONT.

LOCATION.—Just above the intake of the Matt ditch, about 2 miles east of Jocko, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 19, 1908, to September 30, 1915.

GAGE.—Staff gage bolted to a large boulder on left bank 300 feet above intake; read twice a week by Tony Delaware. August 19, 1908, to March 31, 1913, staff gage at a different datum about 100 feet below the present gage. The discharge at the two stations is the same. Present gage has been used since April 1, 1913.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel is composed of boulders and gravel, shifting slightly. The fall is so great that the stream is a succession of small waterfalls. Gage is in a pool just above a small fall. Banks poorly defined but not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 2.40 feet June 5 (discharge, 50 second-feet). Minimum discharge, 5.6 second-feet October 1 (gage not read, discharge interpolated).

1908–1915: Maximum stage recorded, 2.57 feet June 3, 1909 (discharge, 104 second-feet); minimum stage recorded, 1.38 feet December 12, 1913 (discharge, 2.0 second-feet). These records are for the open season only.

WINTER FLOW.—Record discontinued during winter.

DIVERSIONS.—None above station. The Matt ditch is the largest diverting from the stream; smaller ditches also divert below the station.

REGULATION.—None. The melting snow at the headwaters causes a slight diurnal fluctuation at certain seasons.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of Agency Creek near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 7	W. A. Lamb	1.98	16.0
Sept. 14	B. E. Jones	1.77	8.0

Daily discharge, in second-feet, of Agency Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	5.6	.....	42	32	18.2	9.0	16	10.6	.....	36	42	10.2	8.7
2	6.0	.....	44	28	18	10.0	17	9.7	.....	34	46	10.5	9.3
3	6.2	.....	46	24	17.2	11.0	18	8.8	.....	32	46	10.8	9.3
4	6.5	.....	48	21	16.4	10.2	19	7.7	.....	32	32	11.1	10.2
5	6.8	.....	50	17.5	15.6	9.4	20	6.7	.....	30	32	11.4	10.2
6	7.0	.....	48	23	14.8	8.5	21	.....	.....	30	32	11.4	9.9
7	7.6	16.9	46	29	14.8	7.6	22	.....	.....	30	27	10.6	9.6
8	8.2	.....	44	35	14.3	7.6	23	.....	.....	30	27	10.6	9.3
9	8.9	.....	41	41	14.3	7.6	24	.....	.....	31	27	9.8	8.9
10	9.3	.....	38	39	13.6	7.6	25	.....	.....	32	22	9.0	8.5
11	9.8	.....	36	37	12.9	7.5	26	.....	.....	32	22	8.3	11.5
12	10.2	.....	36	35	12.2	7.4	27	.....	.....	32	21	7.6	14.5
13	10.6	.....	41	32	11.4	7.4	28	.....	39	32	20	7.6	17.5
14	10.6	.....	41	35	11.4	7.3	29	.....	39	32	19.3	7.0	24
15	10.6	.....	38	39	10.2	8.0	30	.....	39	32	18.6	7.0	31
							31	.....	39	.....	18.4	8.0	.....

NOTE.—Discharge ascertained as follows: Oct. 1–20, from a well-defined rating curve; May 28 to Sept. 30, from a fairly well-defined rating curve. Gage read twice a week; discharge interpolated for intervening periods.

Monthly discharge of Agency Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 1–20	10.6	5.6	8.37	332	C.
June	50	30	37.2	2,210	C.
July	46	17.5	29.7	1,830	C.
August	18.2	7.0	11.8	726	C.
September	31.0	7.3	10.6	631	C.

FINLEY CREEK NEAR JOCKO, MONT.

LOCATION.—In sec. 31. T. 16 N., R. 19 W., at a ford about 100 feet above highway bridge, about one-eighth mile below the junction of East and West forks, 4 miles southwest of Jocko, and 5 miles southeast of Arlee, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 19, 1908, to September 30, 1915.

GAGE.—Vertical staff nailed to tree on right bank 100 feet above highway bridge; read twice a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed of gravel and small boulders; fairly permanent. Current swift; control not well defined. Banks of moderate height not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.01 feet June 5 (discharge, 95 second-feet); minimum discharge estimated at 6 second-feet October 1 (gage not read).

1909–1915: Maximum stage recorded, 2.3 June 3, 1909 (discharge, 269 second-feet); minimum stage recorded, 0.95 foot December 12, 1913 (discharge, 4.5 second-feet).

WINTER FLOW.—Record discontinued during winter.

DIVERSIONS.—Indian ditch diverts water from East Finley Creek just below station on that stream. A United States Reclamation Service ditch also diverts water from both branches, during the irrigation season, but was not used in 1915.

REGULATION.—None. The melting snow causes a small diurnal fluctuation during the spring.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of Finley Creek near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	W. A. Lamb	1.35	12.6	July 29	W. A. Lamb	1.57	30
May 7	do	1.56	31	Sept. 14	B. E. Jones	1.31	8.5
June 17	do	1.86	70				

Daily discharge, in second-feet, of Finley Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	6.0	.....	84	40	24	9.4	16	14.8	.....	71	55	12.4	9.2
2	6.2	.....	86	36	24	10.2	17	12.7	.....	71	61	12.4	9.2
3	6.5	.....	89	32	24	11.1	18	10.6	.....	71	53	12.1	9.2
4	6.8	.....	92	28	23	10.2	19	8.5	.....	71	44	11.8	9.2
5	7.2	.....	95	23	23	9.4	20	6.4	.....	64	35	11.8	9.2
6	7.5	.....	92	28	23	8.6	21	.....	.....	64	35	11.8	8.9
7	7.5	30	89	34	23	7.8	22	.....	.....	62	40	11.1	8.6
8	9.3	.....	86	39	21	7.8	23	.....	.....	60	40	11.1	8.2
9	9.3	.....	82	44	21	8.2	24	.....	91	58	40	10.3	7.8
10	10.4	.....	85	42	19	8.2	25	.....	89	56	34	9.5	7.4
11	11.5	.....	88	40	17	8.7	26	.....	87	53	34	8.7	9.1
12	12.6	.....	88	38	15	9.2	27	.....	85	50	34	7.8	10.8
13	13.6	.....	88	37	12.4	9.8	28	.....	82	46	31	7.8	12.4
14	13.6	.....	88	43	12.4	10.4	29	.....	82	43	31	7.8	13.2
15	14.8	.....	88	49	12.4	10.4	30	.....	82	42	30	7.8	14.0
							31	.....	82	.....	30	8.6	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to June 20, from a rating curve well defined up to 80 second-feet; June 21 to Sept. 30, from a rating curve fairly well defined up to 80 second-feet. Gage read twice a week; discharge interpolated for intervening periods.

Monthly discharge of Finley Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 1–20	14.8	6.0	9.79	388	C.
May 24–31	91	82	85.0	1,350	C.
June	95	42	73.4	4,370	C.
July	61	23	38.1	2,340	C.
Aujust	24	7.8	14.7	904	C.
September	14	7.4	9.53	567	C.

EAST FINLEY CREEK NEAR JOCKO, MONT.

LOCATION.—Near the south line of sec. 32, T. 16 N., R. 19 W., just above the intake of Indian ditch, and about 200 feet below the crossing of the United States Reclamation Service canal, 4 miles southwest of Jocko, and 6 miles southeast of Arlee, in Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 18, 1908, to July 31, 1911; January 31, 1912, to September 30, 1915.

GAGE.—Vertical staff nailed to tree on left bank, about 100 feet above the headworks of Indian ditch; read twice a week by Tony Delaware.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel composed of gravel and small boulders, practically permanent; banks high, not subject to overflow; current swift at all stages. On account of the fall, the dam at the head of Indian ditch has little or no effect.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.40 feet May 24 and June 5 (discharge, 71 second-feet); minimum discharge estimated at 5.0 second-feet October 25–31 (gage not read).

1909–1915: Maximum stage recorded, 2.84 feet June 3, 1909 (discharge, 132 second-feet); minimum stage recorded, 1.23 feet April 2, 1912 (discharge, 2.5 second-feet). These records are for the open season.

WINTER FLOW.—Record discontinued during winter.

DIVERSIONS.—Indian ditch, heading below the station, takes practically the entire low-water flow. The United States Reclamation Service canal, crossing above the station, can divert the entire flow, but was not operated during the 1915 season.

No record was kept at this station in 1911 after July 31, as practically the entire flow was being diverted by this Reclamation Service canal.

REGULATION.—None. The melting snow causes a small diurnal fluctuation during the spring months.

ACCURACY.—Results only fair on account of infrequent gage readings.

Discharge measurements of East Finley Creek near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 24	W. A. Lamb	1.43	6.0	June 17	W. A. Lamb	2.15	45
May 7	do	1.75	15.9	Sept. 14	B. E. Jones	1.55	8.1

Daily discharge, in second-feet, of East Finley Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	6.0		52	24	16	8	16	16		45	49	9.7	8.8
2	6.2		56	23	16	9	17	14		45	55	9.5	8.8
3	6.2		61	22	16	10	18	12		50	47	9.3	8.8
4	6.8		66	21	15	10	19	11		50	39	9.1	9.1
5	7.3		71	20	14	9	20	9.8		48	31	8.8	9.1
6	7.3		67	23	14	7.9	21	8.8		48	31	8.8	8.8
7	7.3		63	26	14	7.9	22	7.8		44	25	8.5	8.5
8	12		59	30	13	7.9	23	6.8		40	25	8.5	8.2
9	12		55	34	13	7.9	24	5.7	71	36	25	8.3	7.9
10	12		52	33	12	7.9	25		65	32	21	8.0	7.6
11	13		48	32	11	7.9	26		59	28	21	7.8	7.6
12	14		48	30	10	7.9	27		52	25	21	7.6	14
13	14		50	28	10	7.9	28		45	24	19	7.4	14
14	14		50	35	10	7.9	29		45	24	17	7.2	14
15	16		50	42	9.7	7.9	30		48	24	17	7.0	14
							31		48		17	7.0	

NOTE.—Discharge ascertained from well-defined rating curves applicable Oct. 1–24 and May 24 to Sept 30. Gage read twice a week; discharge interpolated for intervening periods; discharge Oct. 25–31, estimated 5 second-feet for lack of gage readings.

Monthly discharge of East Finley Creek near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	16	.....	9.06	557	C.
May 24–31	71	45	54.1	858	C.
June	71	24	47.0	2,800	C.
July	55	17	28.5	1,750	C.
August	16	7.0	10.5	646	C.
September	14	7.6	9.14	544	C.

INDIAN DITCH NEAR JOCKO, MONT.

LOCATION.—Near the south line of sec. 32, T. 16 N., R. 19 W., 200 feet below the intake on East Finley Creek, 4 miles southwest of Jocko, and 6 miles southeast of Arlee, in Missoula County. The intake is 100 feet below the gage on East Finley Creek and 300 feet below the crossing of the United States Reclamation Service canal on East Finley Creek.

RECORDS AVAILABLE.—August 18, 1908, to July 31, 1911; January 31, 1912, to September 30, 1915.

GAGE.—Vertical staff nailed to tree on left bank, 100 feet below the intake, installed May 14, 1913, read twice a week by Tony Delaware. August 18, 1908, to May 13, 1913, vertical staff nailed to the headworks 200 feet above present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made by wading.

REGULATION.—The flow is regulated by the height of the diversion dam, there being no headgate.

ACCURACY.—Results only fair on account of shifting control and infrequent gage readings.

Water is diverted from East Finley Creek mostly for stock water and so runs most of the year. It is also used during the summer for the irrigation of hay lands. Water not used returns to Finley Creek below the station on that stream.

Discharge measurements of Indian ditch near Jocko, Mont., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 7	W. A. Lamb	1.11	2.8	July 29	W. A. Lamb	1.02	2.9
June 17	do	[a]1.49	8.2	Sept. 14	B. E. Jones	1.32	6.5

[a] Channel below gage obstructed by small dam.

Daily discharge, in second-feet, of Indian ditch near Jocko, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	7.4	.....	1.8	12.2	2.7	6.7	16	9.8	.....	5.7	6.5	8.7	6.6
2	7.5	.....	2.1	11.9	2.6	7.3	17	9.2	.....	8.3	7.4	7.9	6.6
3	7.6	.....	2.5	11.6	2.5	7.9	18	8.6	.....	7.4	7.4	7.1	6.6
4	7.7	.....	2.9	11.2	2.4	7.5	19	8.0	.....	7.4	4.4	6.4	7.0
5	7.8	.....	3.3	10.8	2.3	7.0	20	7.3	.....	7.2	4.4	5.7	7.0
6	7.9	.....	3.3	11.5	2.3	6.5	21	.....	.....	7.2	4.4	5.7	6.5
7	7.9	.....	3.3	12.3	2.3	6.0	22	.....	.....	7.8	4.0	5.5	6.0
8	8.9	.....	3.2	13.1	1.9	6.0	23	.....	.....	8.4	4.0	5.5	6.0
9	8.9	.....	3.2	13.8	1.9	6.0	24	.....	.....	9.0	4.0	5.7	5.5
10	8.9	.....	2.0	11.4	3.8	6.0	25	.....	.....	9.6	3.3	5.9	5.0
11	9.2	.....	.8	8.9	5.7	6.3	26	.....	.....	10.3	3.3	6.1	7.0
12	9.5	.....	.8	6.4	7.6	6.6	27	.....	.....	11.0	3.2	6.2	9.0
13	9.5	.....	.7	4.0	9.4	6.9	28	.....	1.6	10.9	3.1	6.2	10.6
14	9.5	.....	.7	4.8	9.4	7.3	29	.....	1.6	10.8	3.0	5.7	9.6
15	9.8	.....	3.2	5.6	8.7	7.3	30	.....	1.5	11.5	2.9	5.7	8.6
							31	.....	1.5	.....	2.8	6.2	.....

NOTE.—Discharge ascertained as follows: Oct. 1-20, from a well-defined rating curve; May 28 to Sept. 30, by indirect method for shifting control. Gage read twice a week; discharge interpolated for intervening periods; discharge Oct. 21-31, estimated 6.0 second-feet for lack of gage readings.

Monthly discharge of Indian ditch near Jocko, Mont., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (totalin acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9.8	.....	7.64	470	C.
June	11.5	0.7	5.54	330	C.
July	13.8	2.8	7.02	432	C.
August	9.4	1.9	5.35	329	C.
September	10.6	5.0	6.96	414	C.

REVAIS CREEK NEAR DIXON, MONT.

LOCATION.—In T. 18 N., R. 22 W., below highway bridge near residence of A. Bishop, about 4 miles southwest of Dixon, in Sanders County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 30, 1911, to September 30, 1915.

GAGE.—Staff gage attached to tree on right bank about 100 feet below a log highway bridge, read to half-tenths twice a day by A. Bishop.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Narrow, with high banks, not subject to overflow; bed composed of small boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.73 feet May 22 (discharge, 139 second-feet); minimum stage recorded, 1.3 feet October 1-3, 8-9, 11-13, March 15 and 17 (discharge, 6 second feet).

1911-1915: Maximum stage recorded, 3.5 feet May 27, 1913, (discharge, 336 second-feet); minimum stage recorded, 1.3 feet several times during January, February, August, September, and October, 1914; also twice during March, 1914 and 1915 (discharge, 6 second-feet.)

WINTER FLOW.—Record discontinued during the winter.

DIVERSIONS.—None of importance.

REGULATION.—None. The melting snow causes a small diurnal fluctuation during the spring.

ACCURACY.—Results excellent except for low stages, for which they are good, as reading of gage only to half-tenths at times causes considerable error in determination of discharge.

The following discharge measurement was made by W. A. Lamb:

May 7, 1915: Gage height, 1.98 feet; discharge, 36 second-feet.

Daily discharge, in second-feet, of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6	14	11	.....	11.9	50	61	26	16.0	8.0
2	6	18	11	.....	12.5	45	55	26	16.0	8.0
3	6	18	11	.....	26	50	61	23	13.4	8.6
4	8	18	11	.....	26	40	52	26	14.0	9.5
5	8	18	14	.....	23	36	45	20	12.5	8.0
6	8	18	11	.....	26	34	50	22	12.5	9.5
7	8	18	8	.....	22	28	45	20	12.5	8.0
8	6	14	8	.....	23	26	50	20	11.0	7.0
9	6	14	8	.....	22	40	42	25	12.5	8.0
10	8	18	11	.....	19.0	61	36	23	11.0	7.0
11	6	14	8	.....	26	61	48	25	12.5	8.0
12	6	18	8	.....	24	55	45	22	11.0	9.5
13	6	18	.....	.....	32	68	50	18.0	9.5	9.5
14	8	18	.....	7.0	45	81	50	20	11.0	11.0
15	11	18	.....	6.0	40	67	45	18.0	9.5	9.5
16	8	18	.....	7.0	45	74	50	20	11.0	11.0
17	8	14	.....	6.0	47	67	43	23	9.5	9.5
18	11	14	.....	7.0	59	81	42	20	8.0	8.0
19	14	14	.....	7.4	63	89	40	20	9.5	9.5
20	14	18	.....	6.4	70	94	32	18.0	8.0	8.0
21	14	14	.....	8.9	74	124	36	18.0	9.5	9.5
22	14	14	.....	8.6	61	139	34	16.0	9.5	8.0
23	14	14	.....	11.9	52	127	32	13.4	8.0	7.0
24	14	14	.....	12.5	45	133	29	14.0	9.5	8.0
25	14	18	.....	10.4	40	129	30	11.0	8.0	7.0
26	14	14	.....	11.0	45	109	40	16.8	9.5	8.0
27	11	12	.....	9.5	40	97	36	22	9.5	9.5
28	11	12	.....	11.0	45	92	36	18.0	8.0	8.6
29	11	11	.....	11.9	48	89	32	20	9.5	12.5
30	14	14	.....	9.5	55	67	23	16.0	8.0	12.5
31	11	.....	.....	11.0	.....	67	.....	16.0	8.0	.....

NOTE.—Discharge ascertained from well-defined rating curve. May 13, gage not read; discharge interpolated.

Monthly discharge of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1915,

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	6.0	9.8	603	B.
November	18	11.0	15.6	928	B.
December 1–12	14	8.0	10.0	238	B.
March 14–31	12.5	6.0	9.06	323	B.
April	74	11.9	38.9	2,310	A.
May	139	26.0	74.8	4,600	A.
June	61	23.0	42.3	2,520	A.
July	26	11.0	19.9	1,220	A.
August	16	8.0	10.6	652	B.
September	12.5	7.0	8.86	527	B.

THOMPSON RIVER NEAR THOMPSON FALLS, MONT.

LOCATION.—In the SE. ¼ sec. 7, T. 21 N., R. 28 W., at highway bridge, 1 mile above junction with Clark Fork, and 8 miles east of Thompson Falls, in Sanders County.

DRAINAGE AREA.—601 square miles.

RECORDS AVAILABLE.—February 12, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to the right-hand downstream side of center pier; read occasionally by F. E. Brown.

DISCHARGE MEASUREMENTS.—Made from the highway bridge or by wading at the ford 50 feet above bridge.

CHANNEL AND CONTROL.—Composed of gravel and small rock; practically permanent. Banks high, not suject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.0 feet April 17 (discharge, 870 second-feet); minimum stage recorded, 3.82 feet October 7, August 13, 22, 29, September 3, 14 and 16 (discharge, 162 second-feet).

1911–1915: Maximum stage recorded, 7.8 feet May 29, 1913 (discharge, 3,180 second-feet); minimum stage recorded, 3.6 feet December 12, 1913 (discharge, 82 second-feet).

WINTER FLOW.—Seriously affected by surface and anchor ice; record discontinued during winter.

DIVERSIONS.—A large flume takes water from the river half a mile above the gage for use in the irrigation of bench lands adjoining Clark Fork between the mouth of Thompson River and Thompson Falls.

REGULATION.—None.

ACCURACY.—Results good.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Thompson River near Thompson Falls, Mont., for the year ending Sept. 30, 1915.

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
Oct. 7	162	June 12	467	Aug. 22	162
Mar. 20	206	23	183	29	162
Apr. 3	350	28	350	Sept. 3	162
8	407	July 30	254	14	162
17	870	Aug. 7	206	16	162
June 9	437	13	162	21	206

NOTE.—Discharge ascertained from a fairly well defined rating curve.

PROSPECT CREEK NEAR THOMPSON FALLS, MONT.

LOCATION.—In the NE. ¼ NE. ¼ sec. 18, T. 21 N., R. 29 W., at the first highway bridge over Prospect Creek above the mouth of Dry Creek, about a mile from Thompson Falls, in Sanders County.

DRAINAGE AREA.—139 square miles.

RECORDS AVAILABLE.—February 12, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to a bridge pier; read at irregular intervals by F. E. Brown.

DISCHARGE MEASUREMENTS.—Made by wading 200 feet below the bridge or from bridge.

CHANNEL AND CONTROL.—Large rocks, very rough, probably permanent; banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.7 feet April 18 (discharge, 547 second-feet); minimum stage recorded, 2.0 feet October 28 and November 10 (discharge, 8 second-feet).

1911–1915: Maximum stage recorded, 7.5 feet May 29, 1913 (discharge, 1,860 second-feet); minimum stage recorded, 2.0 feet August 26–27, Ocotber 28 and November 10, 1914 (discharge, 8 second-feet).

These records are for the open season only.

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

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Results fair.

COOPERATION.—Field data furnished by United States Forest Service.

No discharge measurements made during the year.

Daily discharge, in second-feet, of Prospect Creek near Thompson Falls, Mont., for the year ending Sept. 30, 1915.

Date.	Discharge.	Date.	Discharge.	Date.	Discharge.
Oct. 14	12	May 20	178	July 31	17
28	8	June 8	83	Aug. 1	14
Nov. 10	8	17	60	2	14
13	49	18	54	14	20
Feb. 20	23	19	54	16	23
Apr. 1	331	20	49	22	17
16	470	22	39	29	39
17	508	25	39	Sept. 2	17
18	547	July 4	30	18	14
May 8	143	18	23	25	10

NOTE.—Discharge ascertained from a well-defined rating curve.

PRIEST RIVER AT OUTLET OF PRIEST LAKE, NEAR COOLIN, IDAHO.

LOCATION.—In the SW. ¼ sec. 5, T. 59 N., R. 4 W., at south end of Priest Lake, 2 miles northwest of Coolin, in Bonner County.

DRAINAGE AREA.—572 square miles.

RECORDS AVAILABLE.—June 18, 1911, to September 30, 1915, fragmentary.

GAGE.—April 18, 1913, to November 23, 1914, and August 26 to September 30, 1915, inclined staff gage about 200 feet east of the wharf and 200 feet north of Northern Hotel; read once daily to hundredths by Henry Gable and R. J. Gick. November 24, 1914, to August 25, 1915, Stevens water-stage recorder on right bank 600 feet below outlet of lake; June 18, 1911, to April 6, 1912, and July 13, 1912, to January 8, 1913, two vertical staff gages attached to piers of wharf at Coolin. These gages were not accurately referred to bench marks, and both were torn out by ice.

DISCHARGE MEASUREMENTS.—Prior to September 17, 1913, made from a boat at outlet; after that date made from a cable about 300 feet above gage.

CHANNEL AND CONTROL.—One channel at all stages, bed, rocky; banks, high. Control probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.5 feet May 1–3 (discharge, 2,450 second-feet); minimum stage recorded, 1.48 feet September 21-30 (discharge, 308 second-feet).

1911–1915: Maximum stage recorded, 7.42 feet June 4–6, 1913 (discharge, 5,970 second-feet); minimum stage recorded, 1.54 feet at 6.30 p. m. September 13, 1914 (discharge, 276 second-feet).

WINTER FLOW.—Lake frozen over from about January 1 to April 15. Stage-discharge relation, at outlet, not affected by ice except for short intervals when ice, running out of lake in the spring, jams on rocks below gage.

DIVERSIONS.—None.

REGULATION.—Natural, in lake.

ACCURACY.—A rating curve, well defined below 6,500 second feet, applicable to readings on gage at the outlet has been developed and transferred to readings on inclined gage at Coolin by means of a curve of relation between the two gages. Wind on the lake causes changes in stage at Coolin without corresponding changes at outlet; as the discrepancy may not be compensating, a rating curve based on gage height for inclined gage at Coolin may be considerably in error. Results at outlet excellent; at Coolin lake gage good.

COOPERATION.—Gage height record furnished by United States Forest Service.

Discharge measurements of Priest River at outlet of Priest Lake, near Coolin, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Nov. 17	C. O. Brown	2.10	1,120
Sept. 6	Brown and Hoyt	.75	344

Daily discharge, in second-feet, of Priest River at outlet of Priest Lake, near Coolin, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	486	735	980	572	428	446	780	2,400	2,120	1,160	780	408
2	466	790	980	572	423	450	845	2,400	2,070	1,160	780	390
3	486	850	945	567	423	482	910	2,400	2,020	1,120	748	390
4	486	910	945	567	418	520	1,020	2,400	1,970	1,080	734	390
5	466	975	945	556	418	525	1,080	2,340	1,920	1,080	722	373
6	466	1,040	945	545	418	520	1,160	2,340	1,870	1,050	709	356
7	486	1,180	945	540	414	515	1,240	2,280	1,870	1,020	697	340
8	466	1,110	910	535	414	510	1,280	2,280	1,820	1,020	691	340
9	466	1,180	878	535	436	510	1,320	2,280	1,770	980	685	356
10	486	1,180	845	525	441	500	1,360	2,280	1,720	980	673	340
11	486	1,180	845	515	441	500	1,400	2,280	1,720	980	655	340
12	486	1,180	812	510	432	500	1,450	2,280	1,630	945	638	324
13	486	1,180	812	510	423	495	1,540	2,230	1,630	910	628	324
14	486	1,180	780	500	423	495	1,680	2,280	1,580	910	622	324
15	486	1,180	774	500	414	510	1,720	2,280	1,580	910	616	324
16	486	1,180	754	490	414	525	1,820	2,280	1,540	910	606	324
17	486	1,180	734	482	405	535	1,920	2,230	1,500	945	594	308
18	530	1,110	728	477	410	482	2,020	2,230	1,500	910	578	308
19	592	1,040	715	472	405	500	2,120	2,230	1,450	945	567	308
20	653	1,040	691	482	405	505	2,230	2,180	1,400	910	567	308
21	653	1,040	650	477	410	525	2,340	2,180	1,400	910	545	308
22	680	1,040	638	472	414	540	2,340	2,120	1,360	878	535	308
23	680	1,040	628	464	418	562	2,400	2,120	1,320	878	525	308
24	708	1,010	616	454	423	611	2,400	2,120	1,280	845	515	308
25	708	980	616	450	428	638	2,400	2,120	1,240	845	495	308
26	708	1,020	611	446	432	644	2,400	2,120	1,240	845	446	308
27	708	1,020	600	441	436	661	2,400	2,120	1,240	812	446	308
28	708	1,020	600	436	441	679	2,400	2,120	1,240	812	446	308
29	735	1,020	589	428	.....	703	2,340	2,180	1,200	812	427	308
30	680	980	589	428	.....	760	2,400	2,180	1,200	780	408	308
31	680	.....	584	428	.....	754	.....	2,120	.....	780	408	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 23, and Aug. 26 to Sept. 30, from gage-height record on gage at Coolin and well-defined rating curve, based on well-defined rating curve for gage below outlet and gage-relation curve; Nov. 26 to Aug. 25, from record from water-stage recorder below outlet and well-defined rating curve. Oct. 13–16, 19, 27, Nov. 13–16, 24, gage not read; discharge interpolated. Feb. 21 to Mar. 2, intake to water-stage recorder clogged; mean gage height Mar. 2, assumed 1.00 foot, same as morning of Mar. 3 (discharge, 450 second-feet); discharge Feb. 21 to Mar. 1, interpolated. Aug. 26 to Sept. 6, recorder stopped. Sept. 7–30, stage below intake.

Monthly discharge of Priest River at outlet of Priest Lake near Coolin, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 572 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	735	466	567	0.991	1.14	34,900	B.
November	1,180	735	1,050	1.84	2.05	62,500	B.
December	980	584	764	1.34	1.54	47,000	A.
January	572	428	496	.867	1.00	30,500	A.
February	441	405	422	.738	.77	23,400	B.
March	760	446	552	.965	1.12	33,900	A.
April	2,400	780	1,760	3.08	3.44	105,000	A.
May	2,400	2,120	2,240	3.92	4.52	138,000	A.
June	2,120	1,200	1,580	2.76	3.08	94,000	A.
July	1,160	780	939	1.64	1.89	57,700	A.
August	780	408	596	1.04	1.20	36,600	A.
September	408	308	332	.580	.65	19,800	B.
The year	2,400	308	943	1.65	22.40	683,000	

SULLIVAN LAKE NEAR METALINE FALLS, WASH.

LOCATION.—Approximately in sec. 31, T. 39 N., R. 44 E. (unsurveyed), near the forest ranger station, at north end of Sullivan Lake, about 4½ miles east of Metaline Falls, in Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1915.

GAGE.—Since May 9, 1913, a float gage on dam at outlet of lake; read once daily to half-tenths by A. J. McDougall. Prior to May 9, 1913, a vertical staff at same site.

EXTREMES OF STAGE.—Maximum stage recorded during year, 25.5 feet May 28 to June 2; minimum stage recorded, 16.0 feet April 2.

1912–1915: Maximum stage recorded, 26.55 feet at 8.30 a. m. May 16, 1914. minimum stage recorded, 11.2 feet April 13, 1913.

REGULATION.—Most of the surplus flow of Sullivan Creek is diverted into the lake; Sufficient water is stored in the lake to afford a continuous flow of about 60 second-feet in the flume of the Lehigh Portland Cement Co. Zero of gage at elevation of gate sills; crest of log chute is 22 feet and crest of spillway 25 feet above gate sills.

COOPERATION.—Gage-height record furnished by Lehigh Portland Cement Co.

Daily gage height, in feet, of Sullivan Lake near Metaline Falls, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	21.35	21.05	21.95	20.2	18.4	17.1	16.1	22.2	25.5	25.1	24.9	23.45
2	21.3	21.15	21.95	20.2	18.35	17.1	16.0	22.4	25.5	25.1	24.85	23.4
3	21.2	21.25	21.95	20.1	18.3	17.05	16.3	22.65	25.45	25.1	24.8	23.35
4	21.2	21.35	21.95	20.0	18.3	17.0	16.35	22.95	25.4	25.1	24.8	23.25
5	21.2	21.4	21.9	20.0	18.2	16.9	16.45	23.2	25.4	25.1	24.8	22.95
6	21.15	21.45	21.85	19.95	18.1	16.9	16.65	23.3	25.4	25.1	24.8	22.85
7	21.1	21.5	21.8	19.9	18.05	16.9	16.8	23.45	25.35	25.05	24.75	22.75
8	21.05	21.6	21.75	19.8	18.0	16.9	16.85	23.65	25.3	25.05	24.75	22.6
9	20.95	21.7	21.7	19.8	17.95	16.9	16.95	23.7	25.3	25.05	24.7	.....
10	20.9	21.85	21.65	19.85	17.9	16.85	16.8	23.9	25.3	25.0	24.7	.....
11	20.95	21.95	21.6	19.8	17.8	16.7	16.85	24.1	25 3	25.0	24.65	.....
12	20.95	22.05	21.55	19.7	17.8	16.6	16.9	24.25	25.3	25.0	24.55	22.2
13	20.8	22.15	21.4	19.7	17.8	16.55	17.4	24.45	25.25	25.0	24.5	22.1
14	20.8	22.35	21.35	19.6	17.8	16.5	17.85	24.65	25.2	24.95	24.5	22.0
15	20.75	22.45	21.25	19.5	17.75	16.5	18.1	24.9	25.15	24.95	24.5	21.95
16	20.7	22.5	21.2	19.45	17.7	16.5	18.6	25.0	25.1	24.9	24.5	21.8
17	20.7	22.45	21.15	19.4	17.7	16.45	18.8	25.1	25.1	24.9	24.45	21.65
18	20.75	22.45	21.1	19.3	17.65	16.45	19.15	25.2	25.0	24.95	24.35	21.55
19	20.8	22.45	20.95	19.25	17.6	16.45	19.6	25.15	25.1	24.95	24.35	21.5
20	20.85	22.4	20.85	19.2	17.55	16.4	19.8	25.15	25.1	25.0	24.3	21.45
21	20.85	22.35	20.8	19.15	17.5	16.4	20.0	25.15	25.1	25.0	24.3	21.35
22	20.8	22.35	20.75	19.1	17.4	16.35	20.4	25.15	25.1	25.0	24.15	21.25
23	20.85	22.3	20.65	19.05	17.3	16.3	20.55	25.2	25.1	25.0	24.0	21.2
24	20.9	22.3	20.6	19.0	17.25	16.3	20.65	25.25	25.1	24.9	23.95	21.1
25	20.85	22.3	.....	18.95	17.2	16.25	20.9	25.4	25.1	24.9	23.9	21.05
26	20.85	22.3	20.5	18.85	17.15	16.25	21.1	25.4	25.1	24.9	23.9	21.0
27	20.9	22.25	20.5	18.7	17.1	16.2	21.2	25.45	25.1	24.9	23.85	20.9
28	20.95	22.2	20.45	18.6	17.1	16.2	21.4	25.5	25.05	25.0	23.8	20.8
29	21.0	22.15	20.45	18.5	.....	16.2	21.6	25.5	25.05	25.0	23.7	20.65
30	21.0	22.1	20.35	18.45	.....	16.2	21.95	25.5	25.0	25.0	23.6	20.55
31	21.05	.....	20.25	18.4	.....	16.2	.....	25.5	.....	25.0	23.5	.....

NOTE.—Mean height for year, 21.48 feet.

SULLIVAN CREEK NEAR METALINE FALLS, WASH.

LOCATION.—In sec. 30, T. 39 N., R. 44 E. Willamette meridian, one-eighth mile below Outlet Creek, half a mile below Sullivan Lake, and about 4 miles east of Metalline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1915.

GAGE.—Vertical staff on right bank one-eighth mile below mouth of Outlet Creek; read once daily to half-tenths by A. J. McDougall.

DISCHARGE MEASUREMENTS.—Made by wading at all stages.

CHANNEL AND CONTROL.—Stream bed of cobble stones and large gravel; likely to shift. Banks high and not subject to overflow. Channel for some distance below gage acts as control. Gradient steep.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.7 feet at 8 a. m. April 24 (discharge, 635 second-feet); minimum stage recorded, 1.3 feet January 27–31 (discharge, 64 second-feet).

1912–1915: Maximum stage recorded, 4.2 feet June 2, 1913 (discharge, 1,650 second-feet); minimum stage recorded, 1.10 feet February 1, 1913 (discharge, 53 second-feet.)

WATER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Water diverted from Sullivan Creek, for storage in Sullivan Lake, about 1 mile above station but entire run-off of drainage area passes gage.

REGULATION.—Storage in Sullivan Lake is utilized by Lehigh Portland Cement Co. to increase the flow during low water.

ACCURACY.—Results good October to May and excellent June to September.

COOPERATION—Maintained in cooperation with United States Forest Service and Lehigh Portrand Cement Co.

Discharge measurements of Sullivan Creek near Metaline Falls, Wash., during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 2	1.60	127
June 20	1.85	202

Daily discharge, in second-feet, of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	120	148	133	106	83	94	164	381	508	145	118	118
2	106	164	120	106	83	83	240	591	508	132	118	118
3	120	164	133	106	83	83	260	406	481	132	118	118
4	106	164	148	106	83	83	280	336	456	132	106	118
5	106	164	148	83	83	94	260	336	456	118	106	118
6	106	182	120	83	74	94	240	336	431	118	106	118
7	106	164	106	94	74	94	200	358	431	118	106	118
8	106	164	94	94	83	83	220	381	358	118	95	118
9	106	148	94	94	83	83	220	381	291	118	95	118
10	106	148	83	94	83	94	200	381	291	118	95	118
11	120	148	83	94	94	94	240	336	251	118	95	118
12	120	164	83	94	106	83	220	336	251	118	95	118
13	120	164	83	120	94	83	260	336	251	118	95	118
14	106	164	83	120	94	94	325	406	251	106	95	118
15	106	164	83	106	83	106	370	406	251	118	95	118
16	94	148	83	120	83	106	370	381	231	132	95	118
17	106	164	83	106	83	120	420	406	231	132	95	106
18	133	164	83	83	106	120	445	406	231	118	95	106
19	164	164	83	83	120	106	470	431	211	132	95	106
20	148	148	74	83	106	106	498	431	194	132	95	106
21	133	148	74	83	106	120	498	456	176	118	95	106
22	133	148	74	74	94	133	525	456	176	118	95	95
23	120	148	74	74	83	133	608	481	160	118	95	95
24	120	148	74	74	94	133	635	481	160	106	95	95
25	120	164	74	74	94	120	508	481	160	106	95	95
26	120	148	74	74	94	120	481	536	160	118	95	95
27	106	164	74	64	83	106	336	564	160	132	95	95
28	106	148	74	64	94	120	291	564	145	132	85	95
29	106	148	74	64	.....	133	291	591	145	132	85	95
30	106	148	94	64	.....	148	291	536	145	132	95	106
31	120	.....	120	64	.....	164	.....	508	.....	118	106	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Apr. 24, from rating curve fairly well defined between 100 and 600 second-feet; Apr. 25 to Sept. 30, from rating curve well defined between 75 and 250 second-feet and fairly well defined above 250 second-feet. Sept. 9–11, gage not read, discharge interpolated.

Monthly discharge of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	164	94	116	7,130	B.
November	182	148	157	9,340	B.
December	148	74	92.9	5,710	B.
January	120	64	88.6	5,450	B.
February	120	74	90.1	5,000	B.
March	164	83	108	6,640	B.
April	635	164	346	20,600	B.
May	591	336	433	26,600	B.
June	508	145	272	16,200	A.
July	145	106	123	7,560	A.
August	118	85	98.4	6,050	A.
September	118	95	109	6,490	A.
The year	635	64	169	123,000	

KETTLE RIVER AT BOYDS, WASH.

LOCATION.—In sec. 9, T. 37 N., R. 37 E. Willamette meridian, opposite Great Northern Railway station at Boyds, 1¼ miles above Sherwood Creek [1] and 4 miles above the mouth, in Ferry County.

DRAINAGE AREA.—4,060 square miles, measured on British Columbia Railway Belt map and United States Geological Survey map of State of Washington.

RECORDS AVAILABLE.—September 10, 1913, to October 31, 1915.

GAGE.—Since October 18, 1913, inclined and vertical staff on right bank, 800 feet east of Great Northern Railway depot. From September 13 to October 17, 1913, a vertical staff gage anchored to upstream side of right abutment of Great Northern Railway bridge, 1 mile below present gage and at different datum. Gage read once a day to hundredths by Fred Wercker from October 1, 1914, to August 7, 1915, and by P. C. Pedrsen from August 8 to October 31, 1915.

DISCHARGE MEASUREMENTS.—Made from a cable 600 feet above gage or by wading.

CHANNEL AND CONTROL.—One channel at all stages; banks high and not subject to overflow; control at low stages formed by gravel and cobblestone riffle about 200 feet below gage; control at medium and high stages formed by section of stream bed extending for some distance below gage; may shift during floods. Stage of zero flow, gage height -1.3 ± 0.1 foot, as determined October 8, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1914, to October 31, 1915, 8.7 feet at 11 a. m. May 21 (discharge, 14,300 second-feet); minimum stage recorded, 0.58 foot at 10 a. m. March 10 (discharge, 411 second-feet).

1913–1915: Maximum stage recorded, 10.0 feet at 7 a. m. May 17, 1914 (discharge, 18,000 second-feet); minimum stage recorded, 0.28 foot at 7 a. m. August 30, 1911 (discharge, 288 second-feet).

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

DIVERSIONS.—None.

REGULATION.—A small amount of storage is utilized for meeting diurnal fluctuation of load at the power plant at Cascade, British Columbia.

ACCURACY.—Very little diurnal fluctuation. Results excellent except for period in which stage-discharge relation was affected by ice.

Discharge measurements of Kettle River at Boyds, Wash., during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft*
Aug. 5	3.26	2,930
6	3.14	2,810
Oct. 8	.71	530

[1] For discharge of Sherwood Creek see page 252.

Daily discharge, in second-feet, of Kettle River at Boyds, Wash., from Oct. 1, 1914, to Oct. 31, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	970	1,200	1,120	760	1,950	9,750	12,800	4,750	3,450	840	552
2	935	1,370	1,040	700	2,170	8,540	12,000	4,240	3,450	840	552
3	900	1,650	1,040	640	2,910	8,780	11,200	4,080	3,150	805	552
4	865	1,750	1,040	575	4,930	8,540	10,200	3,760	3,010	805	552
5	830	1,850	1,040	520	5,470	8,310	9,460	3,450	3,010	770	552
6	795	1,950	1,040	495	5,290	7,860	9,220	4,080	2,740	770	552
7	760	1,950	970	470	5,290	7,860	8,980	3,920	2,610	738	552
8	728	1,950	935	470	5,470	8,780	8,740	4,080	2,420	738	552
9	728	1,750	970	470	5,650	10,000	7,830	4,080	2,240	705	580
10	695	1,650	865	411	5,110	10,000	6,980	4,080	1,890	705	552
11	677	1,650	970	445	5,110	11,300	6,580	5,270	1,890	705	552
12	671	1,560	900	470	5,110	10,000	6,190	4,580	1,780	705	552
13	671	1,560	830	470	5,830	8,310	5,810	4,080	1,680	705	552
14	671	1,560	665	470	7,000	7,860	5,810	4,750	1,580	705	552
15	671	1,460	650	495	7,210	9,750	5,810	4,580	1,490	705	552
16	728	1,370	640	520	7,000	10,500	5,450	4,580	1,490	705	552
17	795	1,200	590	520	7,210	9,260	5,270	5,450	1,400	705	552
18	795	1,200	640	548	8,310	8,780	5,090	6,190	1,360	705	580
19	970	1,200	690	575	9,500	10,200	4,750	5,810	1,310	738	610
20	1,560	1,280	730	728	10,200	13,700	5,090	5,450	1,220	705	610
21	1,560	1,200	760	970	11,000	14,300	4,920	5,090	1,310	672	610
22	1,560	1,200	730	970	9,500	14,000	4,580	4,750	1,220	672	640
23	1,460	1,200	760	1,120	8,080	14,000	4,410	4,080	1,310	640	640
24	1,370	1,120	800	1,460	7,210	13,400	4,080	3,760	1,220	610	640
25	1,280	1,120	750	1,750	6,600	12,800	3,920	3,300	1,060	640	640
26	1,200	1,120	830	1,850	6,400	13,400	3,760	3,150	1,060	610	672
27	1,200	1,120	800	1,750	6,210	12,300	3,920	3,760	985	610	1,060
28	1,200	1,120	860	1,650	6,400	11,700	4,080	3,450	985	610	1,060
29	1,120	1,120	830	1,650	6,210	11,500	5,450	3,450	948	580	840
30	1,120	1,120	860	1,650	7,860	14,200	5,450	3,760	910	580	875
31	1,120	.....	900	1,650	.....	13,100	.....	3,450	910	.....	840

NOTE.—Discharge ascertained from a well-defined rating curve. Stage-discharge relation seriously affected by ice Dec. 15 to Mar. 3. Discharge estimated from observer's notes and records of precipitation and temperature Dec. 15–31 and Mar. 1–3. Discharge for January and February not considered sufficiently reliable for publication, but monthly means are given in the following table:

Monthly discharge of Kettle River at Boyds, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,560	671	987	60,700	A.
November	1,950	1,120	1,420	84,500	A.
December	1,120	590	847	52,100	B.
January	.....	.....	800	49,200	D.
February	.....	.....	930	51,600	D.
March	1,850	411	878	54,000	A.
April	11,000	1,950	6,410	381,000	A.
May	14,300	7,860	10,700	658,000	A.
June	12,800	3,760	6,590	392,000	A.
July	6,190	3,150	4,300	264,000	A.
August	3,450	910	1,780	109,000	A.
September	840	580	701	41,700	A.
The year	14,300	411	3,040	2,200,000	

NOTE.—Mean discharge for October, 1915, 636 second-feet; run-off, 39,100 acre-feet.

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HALL CREEK NEAR INCHELIUM, WASH.

LOCATION.—In the NW. ¼ sec. 6, T. 32 N., R. 37 E., half a mile above highway bridge, three-fourths mile above mouth, and 1¼ miles northwest of Inchelium, in Ferry County. From May 16, 1913, to July 31, 1915, in the NE. ¼ sec. 2, T. 32 N., R. 36 E., at Wire's bridge, a quarter of a mile from Gwen mine, 3 miles above mouth, and 3 miles west of Inchelium.

DRAINAGE AREA.—163 square miles at present site and 160 square miles at upper site (measured on map of Colville Indian Reservation).

RECORDS AVAILABLE.—December 18, 1912, to September 30, 1915.

GAGE.—Vertical staff attached to tree on right bank, half a mile above highway bridge; read once daily to hundredths by Walter Johnson. Upper gage was a vertical staff on left abutment of Wire's bridge; read twice daily to hundredths by Mrs. G. E. Fish.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Stream bed at both sites composed of gravel and boulders; shifting at high stages. Banks at present site heavily wooded and subject to overflow above gage height, 3.0 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.78 feet (at upper gage) May 25 (discharge, 519 second-feet); minimum stage recorded, 0.34 foot September 21–23 (discharge, 20 second-feet).

1912–1915: Maximum stage recorded, 3.10 feet at 6.20 a. m. April 16, 1914 (discharge, 965 second-feet); minimum stage recorded, 0.03 foot at 6.45 p. m. September 5 and 7.30 p. m. September 6, 1914 (discharge, 18 second-feet).

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

DIVERSIONS.—Water diverted for use in Gwen mine power plant but is returned to creek.

REGULATION.—Practically no regulation.

ACCURACY.—Results good, practically no diurnal fluctuation.

Discharge measurements of Hall Creek at Inchelium, Wash., for the period Aug. 25, 1914, to Sept. 30, 1915.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Upper gage.	Lower gage.				Upper gage.	Lower gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Aug. 25	C. O. Brown.....	[a] 0.05	0.43	20	Mar. 31	C. O. Brown.....	1.09	1.35	184
25	.....do.....	[a] .05	.43	20	Apr. 1	.....do.....	1.12	1.38	188
Dec. 8	.....do.....	.17	.49	27	Sept. 16	G. L. Parker....	.12	.38	21

[a] Incorrectly published as 0.08 foot in Water-Supply Paper 392.

Daily discharge, in second-feet, of Hall Creek near Inchelium, Wash., from Apr. 1, 1914, to Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							1914.						
1	157	426	160	64	27	20	16	920	407	100	43	21	32
2	152	434	163	67	26	20	17	785	355	95	43	21	36
3	152	548	151	59	26	21	18	653	355	93	39	21	40
4	189	576	146	64	27	21	19	610	330	86	40	21	39
5	236	548	163	68	26	18	20	653	306	84	35	21	32
6	327	490	151	67	26	18	21	610	292	82	35	21	31
7	445	434	160	57	26	22	22	567	261	86	35	20	28
8	525	434	166	52	25	25	23	525	274	78	34	20	25
9	525	407	136	52	24	24	24	504	261	87	34	20	24
10	567	381	126	46	23	24	25	492	237	98	32	20	26
11	567	381	126	45	23	25	26	480	221	86	31	20	26
12	610	381	124	45	22	23	27	480	229	78	31	20	27
13	653	381	119	45	22	22	28	466	233	78	31	20	28
14	653	355	113	51	21	24	29	436	199	71	29	20	26
15	830	355	104	47	21	27	30	428	185	68	28	20	28
							31	.....	163	.....	28	20	.....

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–5.											
1	.....	39	28	28	34	199	257	330	76	.....	23
2	.....	43	28	28	34	253	221	306	74	.....	22
3	.....	41	28	29	35	355	203	274	71	.....	22
4	.....	37	28	28	36	381	192	270	75	.....	22
5	.....	35	28	28	37	381	185	241	66	.....	22
6	.....	39	28	28	37	355	170	225	69	.....	21
7	.....	34	28	26	37	330	166	210	71	.....	21
8	.....	28	29	26	40	330	138	192	68	.....	21
9	.....	27	31	28	43	306	133	179	74	.....	21
10	.....	.....	32	28	40	306	128	179	68	.....	21
11	.....	.....	34	28	40	284	133	170	63	.....	21
12	.....	.....	32	28	40	284	133	170	60	.....	20
13	.....	.....	31	28	40	330	126	170	57	.....	20
14	.....	.....	31	28	44	381	166	166	60	.....	20
15	.....	.....	31	29	57	355	192	149	63	.....	21
16	.....	.....	31	31	76	330	170	146	58	.....	20
17	.....	.....	.....	31	81	302	166	136	53	.....	20
18	.....	.....	.....	31	82	292	229	124	58	.....	20
19	35	.....	.....	29	91	330	330	136	62	.....	20
20	41	.....	.....	28	98	330	407	133	55	.....	20
21	41	.....	.....	28	106	306	462	121	51	.....	19
22	39	.....	.....	28	136	257	490	102	48	26	19
23	37	.....	.....	28	126	257	462	102	45	26	19
24	35	.....	.....	29	196	245	490	96	42	26	20
25	35	.....	.....	31	173	225	519	93	42	25	20
26	35	.....	.....	31	136	207	462	93	39	24	20
27	36	.....	.....	31	113	196	407	93	44	24	20
28	41	.....	.....	31	108	189	434	89	45	24	20
29	41	.....	.....	.....	108	189	434	84	42	24	20
30	40	.....	.....	.....	144	274	381	80	45	24	20
31	.....	28	.....	.....	146	.....	355	.....	45	24	.....

NOTE.—Discharge ascertained as follows: Apr. 1–23, 1914, from rating curve well defined between 30 and 500 second-feet; Apr. 24 to May 1, 1914, by method for shifting control; May 2, 1914, to July 31, 1915, from a fairly well-defined rating curve (curves applicable to readings on upper gage); Aug. 22 to Sept. 30, 1915, from a fairly well-defined rating curve applicable to readings on lower gage. Discharge for periods in which gage was not read estimated by hydrographic comparison with records of Stranger Creek at Inchelium, Oct. 1–31, 1914, 36 second-feet; Nov. 1–18, 1914, 39 second-feet; Aug. 1–21, 1915, 32 second-feet. Discharge estimated, because of ice, from observer's notes and records of precipitation and temperature, Dec. 10–30, 1914, 24 second-feet; Jan. 17–24, 1915, 30 second-feet; Jan. 25–31, 1915, 27 second-feet.

Monthly discharge of Hall Creek, near Inchelium, Wash., for the period Apr. 1, 1914, to Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
April	920	152	507	30,200	B.
May	576	163	350	21,500	B.
June	166	68	113	6,720	B.
July	68	28	44.4	2,730	B.
August	27	20	22.3	1,370	B.
September	40	18	26.1	1,550	B.
The period				64,100	
1914–15.					
October			36.0	2,210	D.
November			38.6	2,300	D.
December	43		27.6	1,700	C.
January	34		29.3	1,800	C.
February	31	26	28.8	1,600	B.
March	196	34	81.1	4,990	B.
April	381	189	292	17,400	B.
May	519	126	282	17,300	B.
June	330	80	162	9,640	B.
July	76	39	57.7	3,550	B.
August		24	29.6	1,820	C.
September	23	19	20.5	1,220	C.
The year	519		90.5	65,500	

STRANGER CREEK AT INCHELIUM, WASH.

LOCATION.—In sec. 5, T. 32 N., R. 37 E. Willamette meridian, below all tributaries, about half a mile above mouth and half a mile south of Inchelium, in Ferry County.

DRAINAGE AREA.—74 square miles (measured on Colville Indian Reservation map, edition of 1913).

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1915.

GAGE.—Vertical staff on right bank; read once a day to quarter-tenths, by Walter Johnson.

DISCHARGE MEASUREMENTS.—Made from wagon bridge 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of sand and gravel; overhanging brush partially obstructs flow at high stages. One channel at all stages. Sand and gravel riffle control 15 feet below gage shifts readily. Stage of zero flow, gage height 0.4 feet, as determined August 26, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.15 feet at 1.30 p. m. April 12 (discharge, 86 second-feet); minimum discharge estimated 3.2 second-feet during ice season.

1914–1915: Maximum stage recorded, 3.80 feet April 18, 1914 (discharge, 209 second-feet); minimum discharge in 1915.

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

DIVERSIONS.—Several small ditches divert water for irrigation above gage.

REGULATION.—None.

ACCURACY.—Results good except during ice season and extremely low water, when rating curve is not well defined. Some diurnal fluctuation March to June.

Discharge measurements of Stranger Creek at Inchelium, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 8	C. O. Brown	0.80	5.22	Apr. 2	C. O. Brown	1.32	36.3
8	do	.80	5.18	Sept. 16	G. L. Parker	.41	4.71
Mar. 30	do	1.18	27.6	16	do	.40	4.72
Apr. 2	do	1.34	40.0				

Daily discharge, in second-feet, of Stranger Creek at Inchelium, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.5	11	9	.....	4.6	11	32	40	40	18	11	6.2
2	7.4	11	9	.....	5	10	35	38	40	18	11	4.9
3	7.4	9.9	9.3	.....	5	10	38	38	40	18	11	4.9
4	7.7	9.6	9.3	.....	5	10	42	38	40	18	11	4.9
5	7.4	9	7.7	.....	4.6	10	50	38	38	17	11	4.9
6	6.9	9	7.4	6.9	3.9	9	56	32	35	17	10	4.9
7	6.9	9	7.4	6.6	4.6	10	62	30	35	16	9.8	4.9
8	6.6	8.3	5	6.6	5	10	68	29	35	16	9.8	4.9
9	6.6	8.3	4.8	6.6	5.5	11	74	29	35	16	9.8	4.9
10	6.6	8.3	4.6	6.6	5.8	11	80	28	35	16	9.2	4.9
11	7.2	8.3	.....	6.9	6.4	11	80	27	35	16	9	4.9
12	7.2	8	.....	6.9	6.9	11	86	26	32	16	9	4.7
13	6.9	12	.....	6.4	6.4	14	80	26	30	16	9	4.7
14	7.2	11	.....	6.4	6.4	15	80	28	29	16	8.7	4.7
15	6.9	9.3	.....	6.4	6.4	16	77	28	27	15	8.7	5.1
16	7.2	7.2	.....	6.1	6.4	16	74	29	27	15	8.5	4.7
17	7.7	7.7	.....	6.1	6.4	18	74	30	27	15	8.2	4.7
18	7.7	8	.....	6.1	6.4	18	71	32	27	15	8	4.7
19	14	9	.....	5.5	6.4	19	65	32	27	14	7.5	4.7
20	14	9.3	.....	5.5	6.4	18	62	35	25	14	7.3	4.7
21	10	10	.....	5.5	6.6	18	59	35	21	14	7.3	4.7
22	9.3	9.3	.....	5.5	6.6	19	53	35	20	14	7	4.7
23	9	9.3	.....	5.3	6.9	19	50	35	19	13	7	4.7
24	8.7	9	.....	5	6.9	20	48	38	19	12	6.8	5.1
25	7.7	9	.....	.....	9.3	22	42	38	18	12	6.6	5.1
26	8.7	9	.....	.....	9.3	23	42	40	18	12	6.6	5.1
27	10	8.7	.....	.....	7.7	24	40	40	18	12	6.4	5.1
28	10	9.3	.....	.....	9.3	24	40	42	18	12	6.4	5.1
29	11	9.3	.....	.....	.....	25	40	40	18	12	6.4	5.1
30	11	9.3	.....	.....	.....	29	42	40	18	11	6.4	5.1
31	11	.....	.....	4.6	.....	30	.....	40	.....	11	6.4	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Feb. 28, from rating curve fairly well defined between 4 and 120 second-feet. Mar. 1-29, by methods devised for shifting control. Mar. 30 to Sept. 30, from rating curve fairly well defined between 5 and 50 second-feet. Stage-discharge relation affected by ice Dec. 11 to Jan. 5 and Jan. 25-30; discharge estimated from observer's notes and records of precipitation and temperature: Dec. 11-15, 4 second-feet; Dec. 16-20, 3 second-feet; Dec. 21-25 ,4 second-feet; Dec. 26-31, 5 second-feet; Jan. 1-5 ,6 second-feet; and Jan. 25-30 ,5 second-feet.

Monthly discharge of Stranger Creek at Inchelium, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	5.5	8.43	518	B.
November	12	7.2	9.18	546	B.
December	9.3	.....	5.11	314	C.
January	6.9	.....	5.85	360	C.
February	9.3	3.9	6.29	349	C.
March	30	9	16.5	1,010	D.
April	86	32	58.1	3,460	C.
May	42	26	34.1	2,100	B.
June	40	18	28.2	1,680	B.
July	18	11	14.7	904	B.
August	11	6.4	8.41	517	B.
September	6.2	4.7	4.92	293	B.
The year	86	.....	16.6	12,100	

COEUR D'ALENE LAKE AT COEUR D'ALENE, IDAHO.

LOCATION.—In the SW. ¼ SW. ¼ sec. 13, T. 50 N., R. 4 W., at Johnson's wharf, 800 feet southeast of railroad station at Coeur d'Alene, in Kootenai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 11, 1905, to September 30, 1915; April 25, 1903, to February 10, 1905, at gage of the St. Joe Boom Co., at mouth of St. Joe River.

GAGE.—Vertical staff on pile at wharf; read to hundredths daily by Henry Kloppenburg. Add 2,100 feet to reduce readings to mean sea level.

EXTREMES OF STAGE.—Maximum stage recorded during year, 27.12 feet May 22; minimum stage recorded, 21.90 feet January 31.

1903–1915: Maximum stage recorded, 34.45 feet May 30–31, 1913; minimum stage recorded, 19.9 feet on October 10–12, 1904, September 24–25, 1905, October 14 to November 3, 1906.

DIVERSIONS.—None.

REGULATION.—Considerable storage is utilized by the Washington Water Power Co. for increasing the summer flow of Spokane River; regulation is effected by tainter gates and a bear-trap dam at Post Falls.

COOPERATION.—Gage-height record furnished by the Washington Water Power Co.

Daily gage height, in feet, Coeur d'Alene Lake at Coeur d'Alene, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24.33	24.70	25.35	23.20	21.92	23.34	25.60	25.26	26.46	26.48	25.56	24.14
2	24.40	24.78	25.28	23.18	21.93	23.44	25.66	25.28	26.40	26.44	25 52	24.10
3	24.36	24.89	25.21	23.56	21.99	23.52	25.78	25.30	26.28	26.42	25.50	24.02
4	24.38	25.20	25.14	23.14	21.99	23.64	25.94	25.30	26.16	26.42	25.48	24.00
5	24.39	25.40	25.06	23.11	21.98	23.74	26.12	25.20	26.00	26.42	25.42	23.96
6	24.38	25.50	24.98	23.06	21.98	23.84	26.24	25.28	25.90	26.42	25.38	23.88
7	24.37	25.51	24.88	23.03	21.98	23.92	26.32	25.38	25.86	26.40	25.36	23.80
8	24.36	25.50	24.77	22.99	21.98	24.02	26.32	25.48	25.92	26.40	25.30	23.74
9	24.36	25.47	24.64	22.96	21.98	24.12	26.22	25.60	25.96	26.44	25.26	23.70
10	24.36	25.43	24.52	22.89	22.04	24.20	26.18	25.70	25.98	26.46	25.22	23.66
11	24.40	25.42	24.40	22.83	22.06	24.30	26.12	25.90	26.18	26.48	25.18	23.58
12	24.43	25.41	24.27	22.81	22.10	24.40	26.02	26.02	26.26	26.44	25.18	23.56
13	24.44	25.52	24.10	22.74	22.12	24.56	26.02	26.16	26.32	26.42	25.06	23.56
14	24.44	25.76	23.98	22.73	22.13	24.66	26.10	26.30	26.36	26.42	25.02	23.54
15	24.45	25.98	23.87	22.68	22.17	24.86	26.20	26.26	26.38	26.44	24.98	23.50
16	24.45	26.09	23.76	22.59	22.16	25.08	26.30	26.24	26.40	26.46	24.92	23.46
17	24.47	26.13	23.68	22.52	22.18	25.30	26.40	26.26	26.38	26.48	24.88	23.42
18	24.49	26.15	23.60	22.49	22.18	25.42	26.46	26.38	26.36	26.44	24.86	23.38
19	24.54	26.12	23.52	22.47	22.20	25.50	26.50	26.71	26.42	26.40	24.80	23.34
20	25.51	26.09	23.47	22.44	22.30	25.48	26.54	26.47	26.42	26.34	24.74	23.28
21	24.58	26.04	23.41	22.39	22.40	25.46	26.52	27.10	26.42	26 28	24.66	23.22
22	24.59	25.99	23.39	22.36	22.54	25.42	26.46	27.12	26.44	26.22	24.66	23.18
23	24.60	25.92	23.34	22.28	22.70	25.42	26.38	27.10	26.48	26.16	24.62	23.12
24	24.60	25.85	23.31	22.24	22.80	25.50	26.24	27.04	26.54	26.08	24.56	23.10
25	24.61	25.80	23.30	22.19	22.90	25.64	26.08	26.98	26.48	25.98	24.52	23.06
26	24.64	25.65	23.31	22.14	23.00	25.74	25.92	26.88	26.44	25.94	24.48	23.00
27	24.64	25.63	23.33	22.07	23.12	25.70	25.74	26.78	26.44	25.86	24.42	22.98
28	24.63	25.60	23.34	21.99	23.24	25.62	25.58	26.70	26.44	25.78	24.38	22.94
29	24.62	25.49	23.31	21.97	.....	25.52	25.42	26.64	26.44	25.74	24.32	22.90
30	24.62	25.42	23.29	21.92	.....	25.52	25.32	26.58	26.46	25.68	24.26	22.84
31	24.64	.....	23.23	21.90	.....	25.56	.....	26.52	.....	25.60	24.20	.....

SPOKANE RIVER AT POST FALLS, IDAHO.

LOCATION.—In sec. 4, T. 50 N., R. 5 W. Boise meridian, a quarter of a mile below power plant of Washington Water Power Co., three-fourths mile below intake of Spokane Valley Land & Water Co.'s canal, and a mile west of Post Falls, in Kootanai County.

DRAINAGE AREA.—3,890 square miles (as measured on topographic and General Land Office maps).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1915.

GAGE.—Vertical staff in three sections, on left bank, a quarter of a mile below power house, read once daily by power plant attendant. Add 2,000 feet to gage heights to reduce readings to mean sea level.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet below gage.

CHANNEL AND CONTROL.—River bed at and below gage composed of coarse gravel and boulders; may shift at flood stage. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 72.32 feet at 7.30 a. m. April 21 (discharge, 12,000 second-feet); minimum stage recorded, 66.20 feet at 7.30 a. m. October 25 (discharge, 875 second-feet).

1911–1915: Maximum stage recorded, 77.80 feet at 8 a. m. May 30 and June 1, 1913 (discharge, 31,500 second-feet); minimum stage recorded on October 25, 1914.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Spokane Valley Land & Water Co.'s canal divertsabovegage for irrigation. Maximum diversion, 170 second-feet; minimum, 30 second-feet. Storage in Coeur d'Alene Lake partly regulated by operation of gates in dam at Post Falls.

REGULATION.—Varying load on power plant causes fluctuation at gage.

ACCURACY.—When discharge is less than 5,000 second-feet, stage is somewhat variable, owing to changing load at power plant, so that the one gage reading recorded daily may not indicate true mean gage height. Results below 5,000 second-feet good; between 5,000 and 20,000 second-feet, excellent.

COOPERATION.—Gage-height record furnished by the Washington Water Power Co.

Discharge measurements of Spokane River at Post Falls, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 18	Brown and Slack	67.88	2,420	Apr. 20	C. O. Brown	72.30	11,900
18	do	67.51	1,930	July 14	do	67.15	1,470
Mar. 7	C. O. Brown	66.75	1,200				

Daily discharge, in second-feet, of Spokane River at Post Falls, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,220	920	4,710	1,560	1,560	1,220	9,840	7,990	9,290	1,880	1,660	1,470
2	1,150	1,150	4,530	1,880	1,470	1,300	10,100	5,490	9,290	1,880	1,470	1,470
3	1,220	1,220	4,530	1,560	1,560	1,300	10,100	5,490	9,290	1,880	1,470	1,560
4	920	1,220	4,350	1,770	1,660	1,470	10,700	6,550	9,020	1,880	1,380	1,560
5	1,220	3,050	4,530	2,770	1,300	1,380	11,000	5,900	8,760	1,770	1,380	1,470
6	1,300	3,350	4,350	1,770	970	1,380	11,000	3,350	7,490	1,880	1,560	1,560
7	1,220	4,350	4,350	1,770	1,080	1,150	11,300	2,910	5,900	1,770	1,660	1,560
8	1,300	4,350	4,170	1,770	1,220	1,300	11,300	1,770	4,530	1,470	1,660	1,470
9	1,220	4,170	4,170	2,240	1,300	1,300	11,600	2,240	3,670	1,470	1,380	1,470
10	1,300	4,170	4,000	1,880	1,220	1,380	11,000	2,240	3,200	1,560	1,560	1,470
11	920	4,000	4,000	2,500	1,380	1,380	11,000	2,240	2,000	1,470	1,560	1,470
12	1,150	4,170	4,000	2,000	1,080	1,380	11,000	2,240	4,000	1,380	1,770	1,380
13	1,300	4,350	4,000	2,240	1,300	1,470	10,700	1,880	4,000	1,380	1,770	1,470
14	1,220	4,350	4,000	1,560	1,080	2,770	11,000	2,120	4,000	1,380	1,470	1,560
15	1,300	5,090	4,000	2,770	1,300	2,910	11,000	6,780	4,170	1,470	1,560	1,560
16	1,300	5,090	2,910	1,660	1,770	5,290	11,300	4,000	4,000	1,560	1,560	1,470
17	1,220	5,090	2,910	1,560	1,220	7,010	11,600	4,000	4,000	1,770	1,470	1,470
18	920	5,090	2,770	1,560	1,470	8,760	11,900	3,830	4,000	2,770	1,560	1,470
19	1,220	5,090	2,770	1,880	1,150	9,560	11,900	5,690	1,880	2,630	1,660	1,380
20	1,220	5,090	2,120	1,880	1,220	9,560	11,900	11,000	3,200	2,630	1,560	1,560
21	1,560	5,090	2,120	1,300	1,220	9,560	11,900	11,000	3,200	2,630	1,470	1,470
22	1,220	5,090	1,770	1,470	1,220	9,560	11,900	11,300	2,000	2,500	1,560	1,470
23	1,380	4,900	2,120	1,880	1,300	9,290	11,600	11,300	1,880	2,500	1,380	1,470
24	1,300	4,900	2,120	1,380	1,300	9,290	11,000	11,300	2,000	2,500	1,660	1,380
25	875	4,900	1,470	1,560	1,300	9,840	10,700	11,000	4,170	2,500	1,560	1,560
26	1,220	4,710	1,300	1,770	1,380	10,100	10,700	11,000	3,050	2,770	1,660	1,560
27	1,220	4,710	1,380	1,880	1,380	10,100	10,100	10,700	2,000	2,370	1,560	1,470
28	1,660	4,710	1,770	1,470	1,220	9,840	9,840	10,700	1,880	2,500	1,560	1,470
29	1,220	4,710	2,000	1,380	.....	9,560	8,760	10,400	1,880	2,500	1,560	1,470
30	1,220	4,710	1,880	1,380	.....	9,560	8,240	10,400	2,000	2,630	1,560	1,470
31	1,220	.....	1,880	1,150	.....	9,560	.....	10,100	.....	2,370	1,560	.....

NOTE.—Discharge ascertained from a rating curve well defined between 1,000 and 20,000 second-feet.

Monthly discharge of Spokane River and Spokane Valley Land & Water Co. canal at Post Falls, Idaho, for the year ending Sept. 30, 1915.

[Discharge in second-feet.]

Month.	River.			Canal (mean).	Total (mean).	Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.				
October	1,660	875	1,220	44.8	1,260	77,500	B.
November	5,090	920	4,130	38.1	4,170	248,000	B.
December	4,710	1,300	3,130	35.0	3,160	194,000	B.
January	2,770	1,150	1,750	33.8	1,780	109,000	B.
February	1,770	970	1,310	31.4	1,340	74,400	B.
March	10,100	1,150	5,470	37.9	5,510	339,000	A.
April	11,900	8,240	10,900	56.3	11,000	655,000	A.
May	11,300	1,770	6,670	72.9	6,740	414,000	A.
June	9,290	1,880	4,320	88.0	4,410	262,000	B.
July	2,770	1,380	2,050	88.0	2,140	132,000	B.
August	1,770	1,380	1,560	90.7	1,650	101,000	B.
September	1,560	1,380	1,490	90.4	1,580	94,000	B.
The year	11,900	875	3,670	59.1	3,730	2,700,000	

SPOKANE RIVER AT SPOKANE, WASH.

LOCATION.—In sec. 9, T. 25 N., R. 43 E. Willamette meridian, above the Washington Water Power Co.'s steam plant in Spokane, 2.8 miles above Spokane Falls and about 4 miles above Latah Creek, in Spokane County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 22, 1891, to September 30, 1915.

GAGE.—From October 16, 1913, to July 30, 1915, a combined inclined and vertical staff gage on right bank, 500 feet above the Washington Water Power Co.'s steam plant; read once daily by power plant attendants; approximate elevation of gage datum, 1.800 feet above sea-level; Gages previously used as follows: July 31 to September 30, 1915, a Stevens water-stage recorder at same site and datum as present gage; March 22, 1891, to October 24, 1896, vertical staff gage near headgates at Washington Water Power Co.'s dam at Spokane Falls, 2.8 miles below the present site, and with zero at crest of dam; October 25, 1896, to July 8, 1903, two wire gages at Oregon Railroad & Navigation Co.'s bridge, 0.9 mile below present site, set at sea level datum; July 9, 1903, to March 30, 1904, a wire gage on Olive Street bridge, 1.1 mile below the present site, set at sea-level datum; March 31, 1904, to March 1, 1907, a vertical staff at the Mission Street bridge, 0.4 mile below the present site; March 2, 1907, to July 23, 1911, combined inclined and vertical staff gage at Martha Street bridge, 1,150 feet above present site; July 24, 1911, to October 15, 1913, several gages at present site and datum. Datum of gage was changed with each relocation but simultaneous readings were obtained either before or after change so that the relation of stage at the different sites was established.

DISCHARGE MEASUREMENTS.—Made from a cable 75 feet upstream from gage.

CHANNEL AND CONTROL.—One channel at all stages; bed of stream composed of gravel and boulders. Control is stretch of channel, contracted by bridge structures and embankments, between station and crest of Spokane Falls; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 74.6 feet at 8 a. m. May 23 (discharge, 11,500 second-feet); minimum stage recorded, 68.6 feet at 8 a. m. October 24, 1914 (discharge, 1,300 second-feet).

1891–1915: Maximum stage recorded, 12.42 feet (Washington Water Power Co.'s gage at Spokane Falls dam); May 31, 1894 (discharge, 35,200 second-feet); minimum stage recorded, 1.3 feet (Martha Street gage) September 28 and 30, 1905 (discharge, 1,240 second-feet).

WINTER FLOW.—Stage discharge relation not affected by ice.

DIVERSION.—Water is diverted above station for irrigation by the Spokane Valley Land & Water Co.

REGULATION.—Flow partly regulated by storage in Coeur d'Alene Lake.

ACCURACY.—Results excellent. Little diurnal fluctuation due to changes in load at Post Falls power plant.

COOPERATION.—Gage-height record furnished by the Washington Water Power Co.

Discharge measurements of Spokane River at Spokane, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 17	C. O. Brown	69.38	2,170
Sept. 7	Parker and Richardson	69.10	1,940
14	G. L. Parker	69.12	1,940

Daily discharge, in second-feet, of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,600	1,500	4,370	2,470	2,140	1,700	9,180	8,300	9,460	2,220	2,220	1,940
2	1,600	1,500	4,370	2,710	2,250	1,700	9,180	5,560	9,460	2,450	2,060	1,840
3	1,600	1,600	4,210	2,590	2,140	1,810	9,400	5,560	9,240	2,330	1,940	1,890
4	1,400	1,600	4,210	2,590	2,360	1,810	9,620	6,490	9,020	2,220	1,940	1,840
5	1,500	2,590	4,210	2,590	2,140	1,810	10,100	5,920	8,810	2,220	1,940	1,890
6	1,600	3,220	4,210	2,590	1,920	1,700	10,500	3,920	7,590	2,220	2,000	1,890
7	1,600	3,780	4,210	2,590	1,920	1,700	10,500	3,360	6,060	2,220	2,000	1,890
8	1,500	3,780	4,060	2,590	2,140	1,700	10,500	2,590	4,990	2,000	2,000	1,890
9	1,600	3,780	4,060	2,470	2,030	1,700	10,500	2,830	4,180	1,890	2,000	1,890
10	1,600	3,780	3,920	2,590	2,140	1,810	10,500	2,710	3,610	2,000	2,000	1,890
11	1,400	3,780	3,920	2,710	2,360	1,810	10,300	2,830	2,690	2,000	2,060	1,890
12	1,500	3,780	3,920	2,710	1,920	1,810	10,100	2,830	4,030	1,890	2,000	1,890
13	1,500	3,920	3,920	2,590	2,030	1,700	10,100	2,590	4,330	1,780	1,940	1,890
14	1,600	4,210	3,920	2,360	2,140	2,590	10,100	2,470	4,180	2,000	1,890	1,890
15	1,600	4,530	3,920	2,960	2,140	2,590	10,300	5,920	4,180	2,000	1,940	1,890
16	1,600	4,690	3,090	2,710	2,140	4,530	10,500	3,920	4,030	1,890	1,890	1,890
17	1,500	4,690	3,090	2,360	1,920	6,300	10,800	3,920	4,180	2,110	1,890	1,890
18	1,400	4,690	3,090	2,250	1,810	7,470	11,000	3,920	4,030	2,810	1,890	1,890
19	1,500	4,860	3,090	2,250	1,920	8,300	11,000	5,380	2,690	2,690	1,890	1,840
20	1,500	4,690	2,590	2,140	1,920	8,520	11,000	10,500	3,470	2,690	1,890	1,940
21	1,700	4,690	2,590	2,360	1,810	8,520	11,000	11,000	3,470	2,690	1,890	1,940
22	1,810	4,690	2,470	2,250	1,700	8,300	11,000	11,000	2,570	2,690	1,890	1,940
23	1,810	4,690	2,590	2,360	1,700	8,520	11,000	11,500	2,690	2,810	1,890	1,940
24	1,600	4,690	2,470	2,250	1,700	8,520	10,500	11,000	2,690	2,690	1,940	1,940
25	1,400	4,530	2,250	2,140	1,700	8,740	10,500	11,300	4,030	2,690	1,890	1,940
26	1,500	4,690	2,140	2,360	1,810	9,180	10,100	11,000	3,470	2,690	1,940	1,940
27	1,500	4,530	2,250	2,250	1,810	9,180	9,620	10,800	2,570	2,450	1,940	2,000
28	1,700	4,530	2,590	2,140	1,810	9,180	9,400	10,600	2,450	2,690	1,890	1,940
29	1,600	4,530	2,710	2,140	.....	8,960	8,740	10,600	2,450	2,690	1,890	1,940
30	1,810	4,370	2,830	2,140	.....	8,960	8,300	10,600	2,220	2,690	1,940	1,890
31	1,700	.....	2,710	2,140	.....	8,960	.....	10,400	.....	2,750	1,940	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to May 25, from rating curve well defined between 2,000 and 35,000 second-feet; May 26 to Sept 30, from rating curve well defined between 1,800 and 30,000 second-feet.

Monthly discharge of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,810	1,400	1,580	97,200	A.
November	4,860	1,500	3,900	232,000	A.
December	4,370	2,140	3,350	206,000	A.
January	2,960	2,140	2,430	149,000	A.
February	2,360	1,700	1,980	110,000	A.
March	9,180	1,700	5,160	317,000	A.
April	11,000	8,300	10,200	607,000	A.
May	11,500	2,470	6,820	419,000	A.
June	9,460	2,220	4,630	276,000	A.
July	2,810	1,780	2,360	145,000	A.
August	2,220	1,890	1,950	120,000	A.
September	2,000	1,840	1,910	114,000	A.
The year	11,500	1,400	3,850	2,790,000	

SPOKANE RIVER BELOW LITTLE FALLS, NEAR LONG LAKE, WASH.

LOCATION.—In the NW. ¼ sec. 19, T. 27 N., R. 39 E., just above Chamokane Ferry, 1½ miles below Little Falls power plant of Washington Water Power Co., 4 miles below Chamokane Creek, and about 5 miles below Long Lake, in Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 5, 1912, to September 30, 1915.

GAGE.—Stevens water-stage recorder on left bank 1½ miles below the power plant. Gage datum 1,200 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage.

CHANNEL AND CONTROL.—Large boulders; practically permanent. Banks high. One channel at all stages. No noticeable riffle control below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 82.5 feet at 7.30 a. m. May 22 (discharge, 15,300 second-feet). Minimum mean daily discharge, 2,000 second-feet, January 15 (stage below intake to stilling well, elevation, 75.05 feet, for 13 hours during day).

1912–1915: Maximum stage from water-stage recorder, 88.7 feet at 11 a. m. and 7 p. m June 1, 1913 (discharge, 31,900 second-feet); minimum mean daily discharge, 1,910 second-feet September 7, 1914.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Spokane Valley Land & Water Co. diverts for irrigation above the station.

REGULATION.—Flow affected considerably by power regulation at Little Falls and Long Lake and slightly by power regulation at Ninemile, Spokane, and Post Falls. Low-water flow is affected by storage regulation in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation permanent; rating curve well defined; results excellent except during periods when stage fell below intake to stilling well.

COOPERATION.—Maintained in cooperation with Washington Water Power Co.

The following discharge measurement was made by Brown and Slack:

February 19, 1915: Gage height, 76.42 feet; discharge, 3,560 second-feet. Mean gage height determined from two readings, subject to error on account of fluctuation in stage during measurement.

Daily discharge, in second-feet, of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,420	2,300	4,660	2,600	2,600	2,920	10,500	9,940	11,700	3,040	3,320	2,450
2	2,450	2,840	4,040	2,550	2,550	2,850	10,800	8,360	11,500	3,020	3,100	2,450
3	2,350	2,340	3,680	2,550	2,740	2,890	11,000	7,170	11,000	3,000	3,000	2,480
4	2,130	2,570	3,760	2,640	3,030	2,860	11,200	7,320	11,000	2,850	2,740	2,510
5	2,490	2,230	3,840	2,640	3,600	2,900	11,500	7,260	10,500	2,830	2,640	2,570
6	2,410	2,720	3,660	2,550	3,340	2,920	12,000	5,950	9,650	2,840	2,710	2,710
7	2,580	2,810	3,380	2,630	2,730	2,780	12,000	5,020	8,380	2,900	2,700	2,630
8	2,480	3,230	2,890	2,580	2,730	2,870	12,200	4,250	7,280	2,800	2,470	2,660
9	2,290	3,540	2,700	2,700	2,740	2,790	12,200	3,960	6,300	2,760	2,780	2,620
10	2,450	3,700	2,940	2,250	2,710	2,880	12,200	3,960	5,600	2,740	2,720	2,390
11	2,200	3,860	3,000	2,240	3,050	2,810	12,000	3,820	4,840	2,690	2,650	2,440
12	2,540	4,200	2,890	2,400	3,150	2,870	11,700	3,440	4,800	2,800	2,740	2,340
13	2,480	4,500	2,880	2,520	3,040	2,720	11,200	3,560	5,240	2,580	2,600	2,700
14	2,400	4,580	2,700	2,300	2,880	2,970	11,500	3,380	4,600	2,600	2,560	2,560
15	2,430	4,910	2,490	2,000	2,690	3,200	11,700	4,620	4,480	2,600	2,400	2,520
16	2,490	4,630	2,350	2,320	2,730	4,080	12,000	5,100	4,840	2,590	2,700	2,550
17	2,520	3,500	2,430	2,600	2,780	6,640	12,200	5,050	4,940	2,600	2,720	2,500
18	2,180	3,160	2,310	2,670	2,820	8,120	12,200	5,020	4,950	2,790	2,560	2,620
19	2,340	3,300	2,460	2,850	3,080	9,220	12,400	5,640	4,450	3,080	2,560	2,340
20	2,520	3,430	2,310	2,700	3,200	9,570	12,700	9,650	4,050	3,210	2,580	2,550
21	2,050	3,600	2,530	2,880	3,110	9,580	12,700	13,600	4,130	3,210	2,520	2,540
22	2,030	3,780	2,430	2,670	3,050	9,810	12,700	14,800	3,540	3,230	2,460	2,500
23	2,120	4,000	2,470	2,580	3,030	9,840	12,700	14,000	3,110	3,270	2,650	2,650
24	2,290	4,120	2,420	2,740	2,960	9,970	12,400	13,700	2,930	3,260	2,560	2,600
25	2,200	4,200	2,480	2,600	2,990	10,200	12,200	13,500	3,420	3,220	2,540	2,460
26	2,420	4,300	2,520	2,760	3,000	10,500	11,700	13,200	3,800	3,280	2,670	2,270
27	2,510	4,410	2,450	2,740	3,000	10,700	11,200	13,200	3,650	5,040	2,580	2,510
28	2,220	4,480	2,500	2,730	2,920	10,700	11,000	13,000	3,440	4,540	2,560	2,530
29	2,480	4,540	2,480	2,760	.....	10,600	10,500	12,700	3,280	3,810	2,560	2,470
30	2,350	4,600	2,430	2,720	.....	10,400	10,100	12,400	3,000	3,550	2,470	2,540
31	2,650	.....	2,590	2,610	.....	10,500	.....	12,200	.....	3,480	2,560	.....

NOTE.—Discharge ascertained from well-defined rating curve. Recording gage failed to operate Oct. 31 to Nov. 2, Feb. 10, Aug. 18, 19, 23, 24, 28–31, and Sept. 1–4, and 29; discharge estimated from load curve at Little Falls power plant, effective head, and probable seepage. Water surface fell below intake to water-stage recorder for a portion of each day Oct. 1–30; Nov. 3–5; Dec. 16, 18–20, 26, 29–30; Jan. 6, 10–12, 14, 15; Aug. 14, 21, 25; and Sept. 10–12, 14–17, 19, and 26; discharge based on (1) integration of recording gage graph, when water was above intake, and (2) approximate flow, when water was below intake, determined from German water meter at Little Falls power plant and probable waste and leakage at plant. Discharge determined by integrating recording gage graph, when recorder was running, except Apr. 1–30, May 20 to June 6. Discharge Apr. 1–30 and May 20 to June 6, determined by applying mean gage heights to rating table.

Monthly discharge of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,650	2,030	2,370	146,000	B.
November	4,910	2,230	3,680	219,000	A.
December	4,660	2,310	2,860	176,000	B.
January	2,880	2,000	2,580	159,000	A.
February	3,600	2,550	2,940	163,000	A.
March	10,700	2,720	6,250	384,000	A.
April	12,700	10,100	11,700	696,000	A.
May	14,800	3,380	8,350	513,000	A.
June	11,700	2,930	5,810	346,000	A.
July	5,040	2,580	3,100	191,000	A.
August	3,320	2,400	2,660	164,000	A.
September	2,710	2,270	2,520	150,000	B.
The year	14,800	2,000	4,540	3,310,000	

ST. JOE RIVER AT AVERY, IDAHO.

LOCATION.—In sec. 15, T. 45 N., R. 5 E., at Avery, in Shoshone County, half a mile below junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1915.

GAGE.—Vertical and inclined staff installed September 18, 1912, on left bank 20 feet above suspension bridge, about 500 feet below Chicago, Milwaukee & St. Paul Railway depot; read twice daily to hundredths by W. H. Daugs. Original gage read January 1 to July 2, 1911, and May 13 to September 16, 1912, attached to old bridge pier a short distance below the Mountain View Hotel, about 700 feet below present site. Readings July 11, 1911, to May 10, 1912, made on gage in front of post office and about 100 feet below present gage.

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

CHANNEL AND CONTROL.—Wide and shallow with steep gradient; bed of gravel and small boulders; shifting during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.3 feet at 8 a. m. April 19 (discharge, 4,110 second-feet); minimum stage recorded, 0.35 foot at 6 p. m. September 5, and 8 a. m. September 20 (discharge, 320 second-feet).

1911–1915: Maximum stage recorded, 7.3 feet at 5 a. m. May 28, 1913 (discharge, 17,900 second-feet). Minimum flow probably occurs during winter, when discharge relation is seriously affected by ice. Data insufficient for estimating flow during January and February, 1911, or December, 1911, and January, 1912.

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

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Results good at medium stages and fair at high and low water. Results poor during ice season.

COOPERATION.—Gage-height record furnished by the United States Forest Service.

Discharge measurements of St. Joe River at Avery, Idaho, during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Mar. 17	0.81	935
May 25	1.54	2,250

Daily discharge, in second-feet, of St. Joe River at Avery, Idaho, for the years ending Sept. 30, 1914–15.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1913–14.										
1	284	310	432	.....	610	1,040	3,600	2,870	968	485
2	286	340	420	.....	745	1,220	3,600	2,990	906	462
3	288	310	310	.....	624	1,400	6,530	2,870	890	498
4	289	310	310	.....	610	1,580	5,990	2,640	906	462
5	290	340	.....	.....	598	2,420	5,720	2,360	921	450
6	290	660	.....	.....	610	3,110	5,990	2,100	890	450
7	310	615	.....	.....	678	3,110	6,260	1,990	861	450
8	310	615	.....	.....	968	3,230	6,530	1,880	818	462
9	310	615	.....	.....	1,040	3,350	6,530	1,780	745	450
10	320	690	.....	.....	1,040	3,600	5,990	1,780	745	439
11	384	645	.....	.....	1,130	3,600	5,450	1,730	745	416
12	408	602	.....	.....	1,680	3,600	5,450	1,680	745	393
13	432	548	507	.....	1,780	3,850	5,720	1,580	760	382
14	408	548	480	.....	1,390	4,110	6,260	1,580	718	382
15	350	480	480	.....	1,780	5,180	6,530	1,580	718	370
16	330	456	456	.....	1,780	5,720	6,800	1,580	718	370
17	310	480	384	.....	2,420	4,640	6,260	1,580	691	393
18	280	548	420	.....	2,420	3,580	5,990	1,390	637	416
19	295	548	.....	.....	2,420	3,850	5,450	1,210	610	393
20	310	480	.....	.....	2,420	4,640	4,910	1,210	610	370
21	310	456	.....	.....	2,420	4,110	4,910	1,130	610	370
22	310	507	.....	.....	1,780	4,910	4,910	1,130	591	370
23	300	480	.....	.....	1,990	6,800	5,990	1,040	572	370
24	320	480	.....	.....	1,780	6,530	5,180	1,130	572	370
25	350	480	.....	.....	1,390	6,260	4,370	1,130	548	370
26	360	456	.....	610	1,210	4,370	4,110	1,040	548	370
27	384	360	.....	572	1,210	4,110	3,350	1,040	535	360
28	360	432	.....	585	1,210	3,850	3,350	1,040	510	350
29	310	480	.....	.....	1,210	3,350	3,110	1,040	485	350
30	310	456	.....	.....	1,040	3,600	2,870	968	485	350
31	310	.....	.....	.....	1,040	.....	2,870	.....	485	350

Daily discharge, in second-feet, of St. Joe River at Avery, Idaho, for the year ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.											
1	416	637	861	.....	462	1,300	1,900	2,100	890	548	340
2	416	952	803	.....	485	1,390	1,880	1,990	876	535	330
3	416	2,640	983	.....	498	2,100	1,880	1,780	832	485	340
4	416	2,100	968	.....	598	2,420	1,780	1,680	818	485	330
5	428	1,580	921	.....	637	2,310	1,780	1,680	818	474	330
6	416	1,390	818	.....	498	2,200	1,580	1,580	803	474	350
7	416	1,260	745	.....	439	2,100	1,680	1,580	803	474	360
8	416	1,130	.....	.....	439	2,200	1,680	1,390	803	462	350
9	393	1,080	.....	.....	485	1,990	1,780	1,580	818	450	462
10	416	1,040	.....	.....	485	1,990	1,880	1,580	774	439	393
11	485	1,390	.....	.....	510	1,880	1,990	1,780	745	428	370
12	462	1,990	.....	.....	498	2,640	1,880	1,780	718	416	393
13	485	3,350	.....	.....	522	3,350	1,780	1,680	691	416	382
14	450	3,850	.....	.....	560	3,350	1,780	1,580	732	416	382
15	462	2,800	.....	.....	774	3,110	1,780	1,390	718	428	370
16	462	2,100	.....	.....	936	3,110	1,780	1,390	730	474	360
17	485	1,700	.....	.....	921	3,350	1,780	1,390	745	462	350
18	510	1,550	.....	.....	921	3,850	2,310	1,300	732	393	350
19	560	1,450	.....	.....	952	4,110	2,870	1,300	678	382	350
20	610	1,260	.....	.....	968	4,110	2,870	1,300	610	370	330
21	585	1,150	.....	.....	1,010	3,600	2,870	1,210	598	370	330
22	535	1,080	.....	.....	1,040	3,110	2,530	1,210	585	416	340
23	535	1,040	.....	.....	1,210	2,640	2,200	1,210	560	393	350
24	498	1,040	.....	.....	1,580	2,420	2,420	1,130	548	370	340
25	510	1,030	.....	585	1,300	2,200	2,310	1,130	560	370	350
26	485	1,040	.....	572	1,130	1,990	2,200	1,130	548	370	360
27	474	1,040	.....	560	1,130	1,990	2,100	1,040	560	370	450
28	474	1,130	.....	510	1,040	1,990	2,420	1,010	560	360	382
29	485	1,210	.....	.....	1,130	1,990	2,310	952	560	360	370
30	485	983	.....	.....	1,210	2,100	2,200	890	572	350	350
31	585	.....	.....	.....	1,130	.....	2,200	.....	585	350	.....

NOTE.—Discharge ascertained as follows: Oct. 1, 1913, to Jan. 10, 1914, from a rating curve fairly well defined between 260 and 3,350 second feet; Jan. 11, 1914, to Sept. 30, 1915, from a rating curve fairly well defined between 500 and 3,350 second-feet; mean discharge estimated, because of ice, from observer's notes, records of precipitation and temperature, and one discharge measurement; Dec. 5–12, 1913, 420 second-feet; Dec. 19–31, 1913, 370 second-feet; Jan. 1–31, 1914, 470 second-feet; Feb. 1–25, 1915, 400 second-feet; Dec. 8–31, 1914, 580 second-feet; Jan. 1–31, 550 second-feet; Feb. 1–24, 1915, 570 second-feet. Discharge interpolated for lack of gage readings, Oct. 1–4, 19, 1913; Apr. 2–3, 8, May 6–7, 24, June 5–7, 11, 15, July 22, 1914, Nov. 7, 9, 15–21, 1915. Discharge estimated for lack of gage readings Dec. 4, 1913, Oct. 1–3, 1914. Discharge records from Oct. 1, 1913, to Aug. 31, 1914, supersede those published in Water-Supply Paper 392.

Monthly discharge of St. Joe River at Avery, Idaho, for the years ending Sept. 30, 1914–15.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913–14.					
October	432	280	326	20,000	B.
November	690	310	491	29,200	B.
December	.....	.....	399	24,500	D.
January	.....	.....	470	28,900	D.
February	.....	.....	420	23,300	D.
March	2,420	598	1,390	85,500	B.
April	6,800	1,040	3,830	228,000	C.
May	6,800	2,870	5,180	319,000	C.
June	2,990	968	1,640	97,600	B.
July	968	485	695	42,700	B.
August	498	350	402	24,700	C.
The period	.....	.....	.....	931,000	
1914–15.					
October	610	393	476	29,300	C.
November	3,850	637	1,530	91,000	C.
December	983	.....	646	39,700	C.
January	.....	.....	550	33,800	D.
February	.....	.....	568	31,500	D.
March	1,580	439	823	50,600	B.
April	4,110	1,300	2,560	152,000	B.
May	2,870	1,580	2,080	128,000	B.
June	2,100	890	1,420	84,500	B.
July	890	548	696	42,800	B.
August	548	350	422	25,900	C.
September	462	330	361	21,500	C.
The year	4,110	330	1,010	731,000	

SPOKANE VALLEY LAND & WATER CO.'S CANAL AT POST FALLS, IDAHO.

LOCATION.—In the NE. ¼ sec. 4, T. 50 N., R. 5 W. 1,200 feet below canal headgates, on right bank of Spokane River, and half a mile west of Post Falls, in Kootenai County.

RECORDS AVAILABLE.—May 20, 1911, to September 30, 1915.

GAGE.—Vertical staff on left side of flume, 1,200 feet below headgates; read once daily to hundredths by Emil Johnson. Prior to April 21, 1915, a vertical staff at end of flume, about 1,200 feet below present gage. Relation between gages not determined.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Flume and canal section below gages shifts occasionally owing to influence of gravel bar at end of flume and plant growth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.25 feet August 11 to September 18 (discharge, 92 second-feet); minimum stage recorded, 1.7 feet February 14–24 (discharge, 29 second-feet).

1911–1915: Maximum stage recorded, 3.20 feet June 18–22, 1911 (discharge, 170 second-feet). No water in canal June 23–28, 1911, and January 7–9, 1912.

WINTER FLOW.—Stage-discharge relation not affected by ice.

ACCURACY.—Results excellent since installation of new gage. Results good at old station except when control was shifting.

COOPERATION.—Gage-height record furnished by Spokane Valley Land & Water Co.

Discharge measurements of Spokane Valley Light & Water Co.'s canal at Post Falls, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 18	Brown and Slack	1.72	30.2	Apr. 21	C. O. Brown	2.10	81.3
23	C. O. Brown	1.73	31.1	21	do	1.44	42.1
23	do	1.73	30.1				

Daily discharge, in second-feet, of Spokane Valley Land & Water Co.'s canal at Post Falls, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	47	41	35	35	33	33	49	62	88	88	88	92
2	47	41	35	35	33	33	49	62	88	88	88	92
3	47	41	35	35	33	33	49	62	88	88	88	92
4	47	41	35	35	33	33	49	62	88	88	88	92
5	47	39	35	35	33	33	49	62	88	88	88	92
6	47	39	35	35	33	33	52	62	88	88	88	92
7	47	39	35	35	33	33	52	62	88	88	88	92
8	46	39	35	35	33	33	52	74	88	88	88	92
9	46	39	35	35	33	33	52	74	88	88	88	92
10	46	39	35	35	33	33	52	74	88	88	88	92
11	46	39	35	35	33	33	55	74	88	88	92	92
12	46	38	35	35	33	33	55	74	88	88	92	92
13	46	38	35	33	33	33	55	74	88	88	92	92
14	46	38	35	33	29	33	55	74	88	88	92	92
15	45	38	35	33	29	33	55	74	88	88	92	92
16	45	38	35	33	29	33	58	74	88	88	92	92
17	45	38	35	33	29	33	58	74	88	88	92	92
18	45	38	35	33	29	33	58	74	88	88	92	92
19	45	37	35	33	29	33	58	74	88	88	92	88
20	45	37	35	33	29	44	58	74	88	88	92	88
21	45	37	35	33	29	44	62	74	88	88	92	88
22	43	37	35	33	29	44	62	74	88	88	92	88
23	43	37	35	33	29	44	62	74	88	88	92	88
24	43	37	35	33	29	44	62	74	88	88	92	88
25	43	37	35	33	33	47	62	81	88	88	92	88
26	43	36	35	33	33	47	62	81	88	88	92	88
27	43	36	35	33	33	47	62	81	88	88	92	88
28	43	36	35	33	33	47	62	81	88	88	92	88
29	41	36	35	33	.....	47	62	81	88	88	92	88
30	41	36	35	33	.....	47	62	81	88	88	92	88
31	41	.....	35	33	.....	47	.....	81	.....	88	92	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 30, and Mar. 20 to Apr. 20, by method for shifting control; Dec. 1 to Mar. 19, from a rating curve well defined between 22 and 42 second-feet; Apr. 21 to Sept. 30, from a rating curve well defined up to 120 second-feet.

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Monthly discharge of Spokane Valley Land & Water Co.'s canal at Post Falls, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	47	41	44.8	2,750	C.
November	41	36	38.1	2,270	C.
December	35	35	35.0	2,150	B.
January	35	33	33.8	2,080	B.
February	33	29	31.4	1,740	B.
March	47	33	37.9	2,330	C.
April	62	49	56.3	3,350	C.
May	81	62	72.9	4,480	A.
June	88	88	88.0	5,240	A.
July	88	88	88.0	5,410	A.
August	92	88	90.7	5,580	A.
September	92	88	90.4	5,380	A.
The year	92	29	59.1	42,800	

SANPOIL RIVER AT KELLER, WASH.

LOCATION.—In the NW. ¼ NW. ¼ sec. 9, T. 29 N., R. 33 E., just below highway bridge at Keller, in Ferry County, three-fourths mile below Silver Creek, and about 22 miles north of Wilbur.

DRAINAGE AREA.—971 square miles.

RECORDS AVAILABLE.—April 29, 1911, to September 30, 1915.

GAGE.—Vertical staff on right bank 100 feet below bridge; read twice daily to hundredths by Mrs. Sadie McShane, October 1 to December 12; Miss Josie Blackshere, December 13 to February 15; Mrs. C. A. Sovereign, February 16 to September 30.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Rock and gravel; shifts at extremely high water. Some water carried through slough on right side during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.2 feet 4.30 p. m. April 4 (discharge 1,080 second-feet); minimum stage recorded, 0.64 foot October 8 (discharge, 40 second-feet).

1911–1915: Maximum stage recorded, 4.2 feet at 6.30 a. m. April 17, 1914 (discharge, 1,650 second-feet); minimum stage recorded, 0.45 foot at 7 a. m. and 4 p. m. September 1, 1914 (discharge, 26 second-feet.)

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results excellent or good between limits of well and fairly well defined rating curves; poor during winter season. Practically no diurnal fluctuation.

Discharge measurements of Sanpoil River at Keller, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 25	C. O. Brown	2.62	750	June 27	C. O. Brown	1.73	322
25	do	2.63	760	Sept. 24	G. L. Parker	.70	58

Daily discharge, in second-feet, of Sanpoil River at Keller, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	50	85	108	.....	130	743	604	992	268	160	62
2	55	83	112	.....	135	797	604	934	250	150	61
3	55	81	81	.....	140	963	578	878	250	146	61
4	56	78	85	.....	150	1,080	552	822	232	141	59
5	57	112	.....	.....	163	1,050	526	766	250	137	59
6	60	112	.....	.....	166	992	526	712	232	133	58
7	60	108	.....	.....	172	934	500	712	232	124	58
8	40	108	.....	.....	172	878	500	658	232	120	58
9	42	104	.....	.....	177	878	475	631	250	112	58
10	45	102	.....	.....	183	878	475	604	232	108	58
11	45	100	.....	.....	189	822	450	604	232	102	58
12	48	100	.....	.....	189	766	450	578	216	97	58
13	50	100	.....	.....	192	766	425	552	200	95	59
14	55	102	.....	.....	195	822	475	552	197	90	62
15	61	100	.....	.....	249	822	526	552	197	86	65
16	71	98	.....	.....	403	822	526	526	192	82	65
17	81	98	.....	.....	479	766	526	475	192	80	64
18	85	100	.....	.....	479	766	552	450	200	77	62
19	81	100	.....	.....	505	766	712	425	197	77	59
20	112	98	.....	.....	531	766	822	425	192	80	58
21	108	100	.....	.....	531	712	992	400	186	77	57
22	104	100	.....	.....	583	658	1,050	400	172	77	57
23	100	100	.....	.....	689	631	1,050	376	160	75	57
24	135	98	.....	.....	743	604	1,050	352	155	74	58
25	96	100	.....	112	743	604	1,050	330	146	74	57
26	83	100	.....	110	689	578	1,050	330	137	71	57
27	76	98	.....	112	635	552	1,050	330	128	71	58
28	74	98	.....	121	609	500	1,050	308	133	68	58
29	74	98	.....	.....	609	500	1,050	288	127	65	58
30	81	102	.....	.....	609	552	1,050	268	160	65	57
31	85	.....	.....	.....	635	.....	1,050	.....	165	62	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Apr. 4, from a rating curve well defined between 20 and 800 second-feet; Apr. 5 to Sept. 30, from a rating curve fairly well defined. Discharge estimated, because of ice, from observer's notes and records of precipitation and temperature, Dec. 5–14, 80 second-feet; Dec. 15–23, 70 second-feet; Dec. 24–31, 85 second-feet; Jan. 1–10, 90 second-feet; Jan. 11–20, 85 second-feet; Jan. 21–31, 80 second-feet; Feb. 1–8, 95 second-feet; Feb. 9–16, 105 second-feet; Feb. 17–24, 110 second-feet.

Monthly discharge of Sanpoil River at Keller, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	135	40	71.8	4,410	A.
November	112	78	98.8	5,880	A.
December	108	.....	80.5	4,950	D.
January	.....	.....	84.8	5,210	D.
February	121	.....	105	5,830	D.
March	743	130	389	23,900	A.
April	1,080	500	766	45,600	B.
May	1,050	425	719	44,200	B.
June	992	268	541	32,200	B.
July	268	127	197	12,100	B.
August	160	62	96.0	5,900	B.
September	65	57	59.2	3,520	B.
The year	1,080	40	268	194,000	

NESPELEM RIVER AT NESPELEM, WASH.

LOCATION.—In the SE. ¼ sec. 24, T. 31 N., R. 30 E., at United States Indian Office gaging bridge, about half a mile above Nespelem, in Okanogan County, about 5 miles above Little Nespelem River and 6 miles above the mouth.

DRAINAGE AREA.—122 square miles (measured on Colville Indian Reservation map, edition of 1911).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to overhanging tree on left bank at gaging bridge; read once daily to hundredths by Mrs. C. T. Kronk. Prior to July 30, 1913, station was about 1,000 feet upstream at different datum.

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

CHANNEL AND CONTROL.—Gravel and boulders; shifting; aquatic growth during summer months. Right bank flat, subject to overflow at gage height 4.0 feet. Left bank high, not subject to overflow. Zero flow would occur at gage height 0.25 foot ±0.10 foot, as determined September 22, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.52 feet at 5.35 p. m. April 4 (discharge, 255 second-feet); minimum stage recorded, 0.72 foot August 27 to September 4 (discharge, 9.1 second-feet).

1911–1915: Maximum stage recorded, 4.75 feet at 9 a. m. April 16, 1914 (discharge, 442 second-feet); minimum stage recorded, 1.00 foot August 6–7, August 13 to September 28, 1913, and October 1–5, 1913 (discharge, 7.0 second-feet).

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

DIVERSIONS.—Above all diversions.

ACCURACY.—Results fair for periods of extremely low discharge, owing to poorly defined rating curves; excellent for high stages.

Discharge measurements of Nespelem River at Nespelem, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	C. O. Brown	2.26	122	Apr. 8	C. O. Brown	3.32	232
22	do	2.34	128	June 26	do	1.36	50.2
23	do	2.46	139	26	do	1.35	48.9
23	do	2.50	143	Sept. 22	G. L. Parker	.80	11.5
Apr. 7	do	3.34	235				

Daily discharge, in second-feet, of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.6	14	19	14	13	29	174	134	124	44	27	9.1
2	10	15	20	14	14	29	185	119	119	42	21	9.1
3	10	15	20	15	14	28	243	114	114	40	20	9.1
4	10	15	21	15	14	40	255	93	110	41	19	9.1
5	10	16	20	15	15	38	255	93	101	41	18	9.4
6	10	17	20	16	15	37	243	101	93	40	18	9.7
7	10	18	20	16	16	40	231	93	89	39	17	10
8	10	18	19	16	16	40	231	89	89	40	17	10
9	10	18	18	16	16	42	219	93	81	41	15	11
10	10	18	17	16	16	43	219	93	81	40	14	11
11	10	18	16	16	15	44	207	93	85	40	14	12
12	10	18	15	16	15	48	196	93	81	38	13	12
13	10	18	14	16	14	49	207	93	81	37	13	12
14	10	20	13	16	13	54	196	93	77	36	13	13
15	10	18	13	16	13	63	185	93	70	36	13	13
16	10	18	13	15	13	72	174	97	66	35	11	13
17	11	18	12	15	14	91	174	101	62	36	11	13
18	11	18	12	15	14	101	174	119	62	39	11	13
19	13	18	12	15	14	106	164	144	59	38	10	13
20	13	18	12	15	15	116	164	134	59	36	10	12
21	13	18	12	14	15	124	154	134	56	36	10	12
22	16	19	12	14	15	134	154	119	56	35	9.7	12
23	15	18	12	14	16	144	154	110	52	34	9.4	11
24	13	18	12	13	16	164	144	124	52	29	9.4	11
25	13	18	12	13	20	174	134	134	49	22	9.4	11
26	13	18	12	13	27	154	124	134	49	18	9.4	11
27	13	18	12	13	24	144	124	144	49	20	9.1	11
28	13	18	13	13	26	144	124	144	49	22	9.1	11
29	13	18	13	13	.....	144	134	134	49	29	9.1	11
30	13	18	13	13	.....	144	134	134	46	32	9.1	12
31	13	.....	13	13	.....	154	.....	124	.....	30	9.1	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Mar. 20, and Mar. 21 to June 30, from rating curves well defined above 40 second-feet; July 1 to Aug. 15, by method for shifting control; Aug. 16 to Sept. 30, from a rating curve fairly well defined above 40 second-feet.

Monthly discharge of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	16	9.6	11.5	707	C.
November	20	14	17.6	1,050	C.
December	21	12	14.9	916	C.
January	16	13	14.6	898	C.
February	27	13	16.0	889	C.
March	174	28	88.2	5,420	A.
April	255	124	183	10,900	A.
May	144	89	113	6,950	A.
June	124	46	73.7	4,390	A,
July	44	18	35.0	2,150	B.
August	27	9.1	13.2	812	C.
September	13	9.1	11.2	666	C.
The year	255	9.1	49.4	35,700	

OKANOGAN RIVER AT OKANOGAN, WASH.

LOCATION.—In sec. 16, T. 33 N., R. 26 E., at Okanogan, in Okanogan County, a quarter of a mile above Salmon Creek.

DRAINAGE AREA.—7,740 square miles (measured on topographic, Okanogan National Forest, Colville Indian Reservation, and Canadian railway belt maps).

RECORDS AVAILABLE.—May 10, 1911, to September 30, 1915.

GAGE.—Vertical staff attached to steamboat dock on left bank at Okanogan; read once daily to hundredths by J. B. Gordon.

DISCHARGE MEASUREMENTS.—Made from a boat at gage or from Omak highway bridge 4 miles upstream.

CHANNEL AND CONTROL.—Large boulders and cobble stones; shifting at extremely high stages. Banks fairly high, one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.0 feet May 26 (discharge, 7,220 second-feet); minimum discharge estimated as 900 second-feet January 25–28 during period of ice affect.

1911–1915: Maximum stage recorded, 11.2 feet at 4 p. m. June 5, and at 10.30 a. m., and 1.30 p. m. June 6, 1913 (discharge, 17,600 second-feet); minimum stage recorded, 1.9 feet September 14–15, 1911 (discharge, 720 second-feet).

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

DIVERSIONS.—Numerous small ditches divert for irrigation above the station.

REGULATION.—None.

ACCURACY.—Results excellent except those for ice season.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Okanogan River at Okanogan, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 1	J. T. Hartson	2.55	987	May 31	J. T. Hartson	6.64	6,440
May 26	do	6.97	6,990	Aug. 10	C. O. Brown	3.51	2,090

Daily discharge, in second-feet, of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,270	1,270	.....	1,040	1,270	4,420	6,300	3,160	2,590	1,360
2	1,270	1,360	.....	1,040	1,360	4,200	6,130	3,030	2,650	1,270
3	1,270	1,360	.....	1,040	1,450	3,990	5,960	3,000	2,650	1,270
4	1,270	1,450	.....	1,040	1,840	3,850	5,800	2,980	2,650	1,270
5	1,270	1,540	.....	1,040	2,060	3,990	5,480	2,950	2,530	1,270
6	1,270	1,540	.....	1,040	2,180	3,990	5,640	2,930	2,410	1,270
7	1,270	1,640	.....	1,040	2,300	4,130	5,800	2,900	2,300	1,270
8	1,270	1,540	.....	1,040	2,300	4,570	5,800	2,900	2,240	1,190
9	1,270	1,540	.....	1,040	2,410	4,870	5,480	2,770	2,180	1,190
10	1,190	1,540	.....	965	2,410	5,170	5,180	2,770	2,060	1,190
11	1,270	1,540	.....	1,040	2,300	5,320	4,870	2,710	2,060	1,190
12	1,270	1,540	.....	1,040	2,300	5,170	4,720	2,650	1,960	1,190
13	1,270	1,540	.....	1,040	2,410	4,870	4,720	2,530	1,960	1,190
14	1,270	1,740	.....	1,040	2,770	4,720	4,720	2,530	1,840	1,190
15	1,270	1,670	.....	1,040	3,030	4,870	4,570	2,650	1,840	1,190
16	1,270	1,600	.....	1,040	3,030	4,870	4,570	2,770	1,740	1,190
17	1,270	1,540	.....	1,040	3,160	4,870	4,420	2,770	1,740	1,190
18	1,270	1,450	.....	1,110	3,660	4,720	4,270	2,770	1,740	1,190
19	1,270	1,450	.....	1,090	4,160	5,020	4,130	2,770	1,740	1,190
20	1,360	1,450	.....	1,080	4,670	5,800	3,990	2,770	1,640	1,110
21	1,360	1,450	.....	1,060	5,170	6,480	3,850	2,650	1,640	1,110
22	1,360	1,540	.....	1,040	5,170	6,660	3,710	2,650	1,640	1,110
23	1,360	1,540	.....	1,040	4,570	6,750	3,710	2,530	1,540	1,110
24	1,360	1,540	1,040	1,110	4,420	6,840	3,570	2,410	1,540	1,110
25	1,360	1,540	1,040	1,110	4,280	6,840	3,570	2,300	1,540	1,110
26	1,360	1,500	1,040	1,190	4,130	7,220	3,430	2,180	1,450	1,110
27	1,270	1,450	1,040	1,190	4,130	6,840	3,360	2,180	1,450	1,110
28	1,270	.....	1,040	1,190	4,130	6,660	3,290	2,300	1,450	1,110
29	1,270	.....	.....	1,190	4,130	6,840	3,290	2,300	1,360	1,110
30	1,270	.....	.....	1,190	4,130	6,750	3,160	2,530	1,360	1,110
31	1,270	.....	.....	1,190	.....	6,660	.....	2,530	1,360	.....

NOTE.—Discharge ascertained from rating curve well defined from 800 to 15,000 second-feet. Discharge interpolated, for lack of gage readings, Oct. 18, 24; Nov. 15, 16, 26; Mar. 14, 19–21, 28; Apr. 6, 18–20, 25; May 2, 16, 23, 30; June 6, 10, 13, 20, 21, 27; July 3–6, 11, 15, 25; Aug. 1, 8, and Sept. 26. Discharge estimated, because of ice, from observer's notes, records of precipitation and temperature and one discharge measurement, Nov. 28–30, 1,420 second-feet; Dec. 1–10, 1,260 second-feet; Dec. 11–20, and 21–30, 1,040 second-feet; Jan. 1–10, 1,020 second-feet; Jan. 11–20, 960 second-feet; Jan. 21–31, 940 second-feet; Feb. 1–10, 1,060 second-feet; Feb. 11–20, 1,110 second-feet; Feb. 21–23, 1,040 second-feet.

Monthly discharge of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,360	1,270	1,290	79,300	A.
November	1,740	1,270	1,500	89,300	A.
December	.....	.....	1,110	68,200	C.
January	.....	.....	972	59,800	C.
February	.....	.....	1,070	59,400	C.
March	1,190	965	1,080	66,400	A.
April	5,170	1,270	3,180	189,000	A.
May	7,220	3,850	5,420	333,000	A.
June	6,300	3,160	4,580	273,000	A.
July	3,160	2,180	2,670	164,000	A.
August	2,650	1,360	1,900	117,000	A.
September	1,360	1,110	1,180	70,200	A.
The year	7,220	.....	2,170	1,570,000	

SIMILKAMEEN RIVER NEAR OROVILLE, WASH.

LOCATION.—In the SE. ¼ sec. 13, T. 40 N., R. 25 E., at the Similkameen Power Co.'s plant, 4 miles above Oroville, 5 miles above the mouth, and below all tributaries.

DRAINAGE AREA.—3,450 square miles (measured on topographic and Canadian railway belt maps).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1915.

GAGE.—Vertical staff in 7 sections on left bank, 3 sections 15 feet above tailrace and 4 sections nailed to power house; read to hundredths twice daily by G. M. Raburn.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Oroville, 4 miles below gage.

CHANNEL AND CONTROL.—River flows through narrow, solid rock canyon at gage and control; practically permanent. Banks high, not subject to overflow. Lower falls (25 feet high), 150 feet above gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.68 feet at 5.30 p. m. May 30 (discharge, 5,900 second-feet); minimum estimated at 260 second-feet January 20–21 during period when stage-discharge relation was affected by ice.

1911–1915: Maximum stage recorded, 16.9 feet at 7.30 a. m. and 5 p. m. June 4, 1913 (discharge, 17,900 second-feet); minimum discharge, January 20–21, 1915.

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

DIVERSIONS.—Some diversion for irrigation from tributaries above station.

COOPERATION.—Gage-height record furnished by the Similkameen Power Co.

Discharge measurements of Similkameen River near Oroville, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 31	J. T. Hartson	[a] 1.51	404	June 1	J. T. Hartson	7.19	4,320
May 25	do	8.52	5,780	Aug. 7	C. O. Brown	3.08	1,260
27	do	7.88	5,110				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	602	642	865	.....	404	602	3,160	4,350	1,750	1,510	526
2	602	685	865	.....	404	642	2,910	4,250	1,690	1,630	526
3	602	730	820	.....	404	910	2,750	3,970	1,690	1,510	526
4	602	820	775	.....	404	1,390	2,910	3,520	1,690	1,450	526
5	602	865	775	.....	404	1,630	2,990	3,520	1,690	1,390	526
6	602	910	775	420	404	1,510	3,160	4,060	1,690	1,210	490
7	602	865	730	420	404	1,570	3,520	4,250	1,690	1,160	454
8	564	865	685	454	404	1,570	3,970	4,060	1,630	1,110	454
9	564	865	685	454	404	1,510	4,150	3,790	1,570	1,110	454
10	564	865	526	454	404	1,510	4,450	3,430	1,450	1,060	454
11	602	865	526	437	404	1,510	4,250	3,250	1,390	1,010	454
12	602	865	526	420	404	1,630	3,790	3,160	1,330	960	490
13	642	960	.....	420	404	1,810	3,520	3,070	1,330	910	490
14	642	1,010	.....	404	388	2,070	3,520	3,070	1,330	865	490
15	602	960	.....	404	388	2,070	3,610	2,990	1,510	820	490
16	602	865	.....	388	388	2,210	3,610	2,910	1,690	820	490
17	602	820	.....	388	404	2,670	3,520	2,830	1,630	775	490
18	642	775	.....	388	404	3,340	3,880	2,750	1,630	775	490
19	642	775	.....	404	420	3,790	4,450	2,750	1,570	775	454
20	642	775	.....	404	437	4,350	5,150	2,510	1,510	730	454
21	685	775	.....	404	437	4,350	5,590	2,280	1,390	730	454
22	685	775	.....	404	454	3,880	5,590	2,210	1,330	685	454
23	642	820	.....	388	454	3,430	5,590	2,140	1,270	685	454
24	642	820	.....	404	490	3,250	5,370	2,140	1,160	642	454
25	642	820	.....	404	564	3,070	5,700	2,280	1,110	642	454
26	602	820	.....	404	602	3,070	5,590	2,210	1,160	602	490
27	602	865	.....	404	602	3,160	5,050	2,000	1,160	602	490
28	602	910	.....	404	564	3,070	5,150	1,930	1,270	564	454
29	602	910	.....	.....	564	3,070	5,480	1,930	1,390	564	454
30	602	910	.....	.....	602	3,430	5,810	1,810	1,450	526	454
31	642	.....	.....	.....	602	.....	4,550	.....	1,450	526	.....

NOTE.—Discharge ascertained from a rating curve well defined between 500 and 15,000 second-feet. Discharge estimated, because of ice, from observer's notes, records of precipitation and temperature, and one discharge measurement: Dec. 13–20, 470 second-feet; Dec. 21–31, 440 second-feet; Jan. 1–10, 390 second-feet; Jan. 11–20, 320 second-feet; Jan. 21–31, 320 second-feet, and Feb. 1–5, 400 second-feet.

Monthly discharge of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	685	564	615	37,800	A.
November	1,010	642	840	50,000	A.
December	865	.....	553	34,000	B.
January	.....	.....	343	21,100	C.
February	454	.....	410	22,800	B.
March	602	388	452	27,800	B.
April	4,350	602	2,400	143,000	A.
May	5,810	2,750	4,280	263,000	A.
June	4,350	1,810	2,980	177,000	A.
July	1,750	1,110	1,470	90,400	A.
August	1,630	526	914	56,200	A.
September	526	454	478	28,400	A.
The year	5,810	.....	1,320	952,000	

SALMON CREEK NEAR CONCONULLY,[1] WASH.

LOCATION.—In sec. 18, T. 35 N., R. 25 E., half a mile below Conconully reservoir of Okanogan project of United States Reclamation Service, 2 miles south of Conconully and about 14 miles above Okanogan, in Okanogan County.

DRAINAGE AREA.—121 square miles (revised value); 152 square miles at Jones ranch.

RECORDS AVAILABLE.—July 6, 1910, to September 30, 1915. From May 27, 1903, to March 31, 1912, records were obtained at Jones ranch in sec. 31, T. 34 N., R. 26 E., about 6 miles above Okanogan.

GAGE.—Vertical staff indicating head on weir half a mile below the reservoir; read daily to hundredths by Allen Honey.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage.

CHANNEL AND CONTROL.—20-foot rectangular, sharp-crested weir with two end contractions; prior to October 1, 1912, a 20-foot Cippoletti weir was used.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.45 feet May 29 (discharge, 292 second-feet); minimum stage recorded, 0.08 foot October 1–3, 6–31, and November 1–4 (discharge, 1.7 second-feet).

1903–1915: Maximum stage recorded, 3.63 feet April 29, 1904 (discharge, 577 second-feet). No flow 4 p. m. October 3 to 6 p. m. October 11, 1910, when water was being stored in Salmon Lake and Conconully reservoirs.

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow completely controlled by storage in Salmon Lake reservoir, capacity 2,600 acre-feet, and Conconully reservoir, capacity 13,000 acre-feet. Monthly summaries of flow for 1912–1915 have been corrected for storage.

ACCURACY.—Stage-discharge relation permanent. Results excellent.

COOPERATION.—Field data furnished by United States Reclamation Service.

Discharge measurements of Salmon Creek near Conconully, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 29	J. T. Hartson	2.35	272
30	....do	2.11	226
Sept. 4	Casteel and Edwards	1.06	74.5

[1] Formerly described as near Okanogan.

Daily discharge, in second-feet, of Salmon Creek near Conconully, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.7	1.7	2.1	2.1	2.8	2.8	3.2	67	166	108	117	108
2	1.7	1.7	2.1	2.1	2.8	2.8	3.2	58	171	110	116	102
3	1.7	1.7	2.1	2.1	2.8	2.8	3.2	52	176	112	124	94
4	3.8	1.7	2.1	2.1	2.8	2.8	3.2	54	170	112	121	78
5	6.7	1.9	2.1	2.1	2.8	2.8	3.2	56	153	85	122	2.8
6	1.7	2.1	2.1	2.1	2.8	2.8	3.6	58	153	22	124	2.5
7	1.7	2.1	2.1	2.1	2.8	2.8	3.6	61	152	108	124	1.9
8	1.7	2.1	2.1	2.8	2.8	2.8	3.6	68	147	112	121	1.9
9	1.7	2.1	2.1	2.8	2.8	2.8	3.6	73	122	104	120	1.9
10	1.7	2.1	2.1	2.8	2.8	2.8	3.6	92	119	101	115	1.9
11	1.7	2.1	2.1	2.8	2.8	2.8	3.6	117	132	99	113	1.9
12	1.7	2.1	2.1	2.8	2.8	2.8	4.0	125	127	98	112	1.9
13	1.7	2.1	2.1	2.8	2.8	2.8	4.0	125	114	91	110	1.9
14	1.7	2.1	2.1	3.2	2.8	2.8	4.0	125	114	82	110	1.9
15	1.7	2.1	2.1	3.2	2.8	2.8	4.3	141	113	78	110	2.1
16	1.7	2.1	2.1	2.8	2.8	2.8	4.3	149	106	75	111	2.1
17	1.7	2.1	2.1	2.8	2.8	2.8	4.7	149	106	71	121	2.1
18	1.7	2.1	2.1	2.8	2.8	2.8	4.7	149	106	71	122	2.5
19	1.7	2.1	2.1	2.8	2.8	2.8	5.1	153	107	72	124	2.5
20	1.7	2.1	2.1	2.8	2.8	2.8	5.1	162	109	83	122	2.5
21	1.7	2.1	2.1	2.8	2.8	2.8	5.1	162	111	93	122	2.5
22	1.7	2.1	2.1	2.8	2.8	2.8	5.4	173	121	95	122	2.5
23	1.7	2.1	2.1	2.8	2.8	2.8	5.8	229	123	104	121	2.5
24	1.7	2.1	2.1	2.8	2.8	2.8	5.8	250	124	110	115	2.8
25	1.7	2.1	2.1	2.8	2.8	2.8	6.3	270	121	118	114	2.8
26	1.7	2.1	2.1	2.8	2.8	2.8	12	270	120	121	116	2.8
27	1.7	3.2	2.1	2.8	2.8	2.8	34	270	118	115	118	2.8
28	1.7	2.1	2.1	2.8	2.8	2.8	47	273	113	120	118	2.8
29	1.7	2.1	2.1	3.2	.....	2.8	74	292	105	122	118	2.5
30	1.7	2.1	2.1	3.2	.....	2.8	73	252	109	119	117	2.5
31	1.7	.....	2.1	3.2	.....	3.2	.....	226	.....	117	111	.....

NOTE.—Discharge ascertained from a well-defined rating curve Oct. 3–4, Apr. 26–30, May 1–11, 15, 19, 22, 24, 28, 30–31, June 1–2, 4, 8–10, 12, 15, 19, 21–24, 26–30, July 1–2, 4–20, 22–31, Aug. 2–5, 7, 9, 11–12, 16, 18, 19, 23–26, 30–31, Sept. 1–4, by weighting discharge between time of outlet gage changes at Conconully reservoir.

Monthly discharge of Salmon Creek near Conconully, Wash..

Month.	Discharge in second-feet.			Run-off in acre-feet.			Discharge without storage, in second-feet.	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.		
1911–12.								
October	10.0	1.2	4.61	283	+ 98	381	6.18	B.
November	4.7	1.5	2.71	161	+ 256	417	7.01	B.
December	1.5	1.5	1.50	92.2	+ 693	785	12.8	B.
January	1.7	.8	1.26	77.5	+ 310	388	6.31	B.
February	.8	.8	.80	46.0	+ 267	313	5.44	B.
March	1.5	.8	1.21	74.4	+ 408	482	7.84	B.
April	7.5	1.5	2.29	136	+1,050	1,190	20.0	B.
May	108	2.1	24.9	1,530	+5,880	7,410	121	A.
June	126	8.6	96.8	5,760	− 641	5,120	86.0	A.
July	115	6.5	86.7	5,330	−3,540	1,790	29.1	A.
August	103	1.9	68.7	4,220	−3,280	940	15.3	A.
September	4.8	1.3	2.15	128	+ 346	474	7.97	B.
The year	126	.8	24.6	17,800	+1,850	19,700	27.1	
1912–13.								
October	8.4	1.7	5.27	324	+ 442	766	12.5	A.
November	1.7	1.7	1.70	101	+ 386	487	8.18	A.
December	2.5	1.7	1.78	109	+ 422	531	8.64	A.
January	1.9	1.5	1.71	105	+ 272	377	6.13	A.
February	1.9	1.7	1.89	105	+ 186	291	5.24	A.
March	14.8	1.9	2.96	182	+ 166	348	5.66	A.
April	9.2	2.1	5.86	349	+ 944	1,290	21.7	A.
May	79	8.9	46.4	2,850	+3,650	6,500	106	A.
June	105	9.4	67.0	3,990	+3,260	7,250	122	A.
July	120	32	92.3	5,680	−3,500	2,180	35.5	A.
August	110	94	99.9	6,140	−5,170	970	15.8	A.
September	82	1.9	5.33	317	− 64	253	4.25	A.
The year	120	1.5	28.0	20,300	+ 994	21,200	29.3	
1913–14.								
October	5.7	1.9	3.47	213	+ 294	507	8.25	A.
November	4.7	1.9	2.04	121	+ 413	534	8.97	A.
December	1.9	1.9	1.90	117	+ 268	385	6.26	A.
January	2.1	1.9	2.07	127	+ 554	681	11.1	A.
February	2.1	2.1	2.10	117	+ 237	354	6.37	A.
March	2.5	2.1	2.27	140	+ 449	589	9.58	A.
April	3.9	2.5	3.01	179	+4,260	4,440	74.6	A.
May	246	3.9	114	7,010	+5,620	12,600	205	A.
June	243	93	156	9,280	− 153	9,130	153	A.
July	125	91	104	6,400	−4,270	2,130	34.6	A.
August	119	72	108	6,640	−6,240	400	6.50	A.
September	90	1.7	5.66	337	+ 222	115	1.93	A.
The year	246	1.7	42.4	30,700	+1,650	31,900	44.1	
1914–15.								
October	6.7	1.7	1.93	119	+ 943	1,060	17.2	A.
November	3.2	1.7	2.08	124	+1,000	1,120	18.8	A.
December	2.1	2.1	2.10	129	+ 524	653	10.6	A.
January	3.2	2.1	2.71	167	+ 417	584	9.50	A.
February	2.8	2.8	2.80	156	+ 390	546	9.83	A.
March	3.2	2.8	2.81	173	+1,020	1,190	19.4	A.
April	74	3.2	11.5	684	+5,320	6,000	101	A.
May	292	52	152	9,350	+1,040	10,400	169	A.
June	176	105	128	7,620	− 933	6,690	112	A.
July	122	22	97.7	6,010	−2,850	3,160	51.4	A.
August	124	110	118	7,260	−6,290	970	158	A.
September	108	1.9	14.8	881	− 742	139	2.33	A.
The year	292	1.7	45.0	32,700	− 161	32,500	44.9	

NOTE.—Monthly discharge 1912–1914 supersedes that published in Water-Supply Papers 362 and 392. Records previously published were not corrected for storage in Salmon Lake reservoir.

METHOW RIVER AT PATEROS, WASH.

LOCATION.—In sec. 35, T. 30 N., R. 23 E., three -fourths mile above county highway bridge at Pateros, in Okanogan County, and a mile above the mouth of stream.

DRAINAGE AREA.—1,850 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—May 3, 1903, to September 30, 1915.

GAGE.—Inclined and vertical staff gage on left bank 500 feet below observer's house and three-fourths mile above the county highway bridge; read twice daily to hundredths by F. W. Robinson. Prior to June 17, 1903, the gage was half a mile downstream, but all gage heights have been reduced to present datum.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet upstream or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of large boulders and gravel; shifts at extremely high stages. One channel at all stages. Right bank high and not subject to overflow; left bank not subject to overflow below gage height 12 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.95 feet at 5 p. m. April 20 (discharge, 5,200 second-feet); minimum stage recorded, 4.0 feet February 16, 18–23, 26–28, March 1–3, and 7–8 (discharge, 360 second-feet; discharge may have been less at times when ice was present).

1903–1915: Maximum stage recorded, 11.6 feet, May 11, 1910 (discharge, 14,800 second-feet); minimum flow estimated at 230 second-feet, February 5 and 6, 1914, during period of ice effect.

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

DIVERSIONS.—Many small ditches divert for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed by high water of April 20 and seriously affected by ice December 15 to February 15. Results fair for ice season and excellent for rest of year.

Discharge measurements of Methow River at Pateros, Wash., during the year ending Sept. 30, 1915.

[Made by J. T. Hartson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 30	4.68	513	June 2	6.98	3,360
Feb. 2	4.46	493	3	6.85	3,290

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	652	830	755	.....	360	870	2,780	3,580	1,540	958	437
2	652	870	755	.....	360	1,080	2,640	3,400	1,640	997	437
3	620	990	720	.....	360	1,540	2,500	3,080	1,640	920	437
4	620	950	720	.....	382	1,750	2,500	3,080	1,750	884	437
5	590	990	720	.....	382	1,750	2,500	3,580	1,750	814	437
6	590	990	685	.....	382	1,750	2,640	4,500	1,750	781	437
7	560	950	685	.....	360	1,750	3,240	4,700	1,640	750	437
8	560	910	685	.....	360	1,860	4,120	4,120	1,540	719	437
9	560	910	652	.....	382	1,860	4,500	3,580	1,440	690	420
10	590	870	590	.....	382	1,750	4,900	3,240	1,350	662	420
11	620	830	478	.....	382	1,750	4,300	2,930	1,260	636	420
12	620	870	404	.....	382	1,860	3,760	2,780	1,120	609	420
13	620	870	382	.....	382	2,100	3,400	2,780	1,080	609	420
14	620	792	.....	.....	382	2,100	3,760	2,780	1,040	584	420
15	620	755	.....	.....	404	2,230	3,400	2,930	1,040	560	420
16	620	755	.....	360	428	2,360	3,240	2,930	1,040	560	420
17	620	755	.....	382	452	2,780	2,930	2,780	997	560	437
18	755	755	.....	360	452	3,580	3,080	2,640	958	560	420
19	830	755	.....	360	478	4,500	3,400	2,500	920	538	420
20	792	755	.....	360	478	4,900	3,400	2,230	920	515	403
21	792	792	.....	360	504	4,500	3,580	2,230	848	515	403
22	755	792	.....	360	560	3,760	3,760	2,100	814	515	403
23	755	755	.....	360	560	3,400	3,760	2,100	781	515	403
24	720	755	.....	382	685	3,080	3,940	2,100	781	515	403
25	720	755	.....	382	720	2,930	4,300	2,230	750	494	403
26	720	755	.....	360	720	2,930	3,940	2,100	750	474	403
27	720	755	.....	360	720	2,780	3,760	1,860	848	474	388
28	720	792	.....	360	755	2,930	4,500	1,640	884	474	388
29	720	792	.....	.....	792	3,080	4,500	1,540	958	456	388
30	720	755	.....	.....	830	3,080	4,120	1,540	997	456	372
31	755	.....	.....	.....	830	.....	3,760	.....	958	456	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Apr. 20, from a rating curve well defined between 300 and 5,000 second-feet; Apr. 21 to Sept. 30 from a rating curve well defined between 350 and 8,000 second-feet. Discharge estimated, because of ice, from observer's notes and records of precipitation and temperature, Dec. 14–21, 370 second-feet; Dec. 22–31, 405 second-feet; Jan. 1–10, 435 second-feet; Jan. 11–20, 395 second-feet; Jan. 21–31, 380 second-feet; Feb. 1–10, 445 second-feet; Feb. 11–15, 365 second-feet.

Monthly discharge of Methow River at Pateros, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	830	560	671	41,300	A.
November	990	755	828	49,300	A.
December	755	.....	492	30,300	B.
January	.....	.....	403	24,800	C.
February	.....	.....	394	21,900	C.
March	830	360	503	30,900	A.
April	4,900	870	2,550	152,000	A.
May	4,900	2,500	3,580	220,000	A.
June	4,700	1,540	2,790	166,000	A.
July	1,750	750	1,150	70,700	A.
August	997	456	621	38,200	A.
September	437	372	416	24,800	A.
The year	4,900	.....	1,200	870,000	

STEHEKIN RIVER AT STEHEKIN, WASH.

LOCATION.—In the SW. ¼ sec. 26, T. 33 N., R. 17 E., one-fourth mile below Boulder Creek, a mile above Stehekin, in Chelan County, and 1¼ miles above Lake Chelan.

DRAINAGE AREA.—368 square miles (measured on Chelan National Forest and topographic maps).

RECORDS AVAILABLE.—December 6, 1910, to October 31, 1915, when station was discontinued.

GAGE.—Inclined and vertical staff on left bank one-fourth mile below Boulder Creek; read to hundredths once daily by Mrs. F. W. Merritt. Prior to August 19, 1911, the station was at the pipe-line trestle of Hotel Field at Stehekin.

DISCHARGE MEASUREMENTS.—Made from cable 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders; practically permanent. Banks low and subject to overflow at extremely high stages. Zero flow would occur at gage height −1.2 feet ±0.2 foot, as determined September 17, 1914.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.82 feet at 5 p. m. May 9 (discharge, 3,350 second-feet); minimum discharge estimated at 154 second-feet January 28, during ice season.

1910–1915: Maximum stage recorded, 6.0 feet June 12, 1911 (discharge, 11,400 second-feet); minimum discharge estimated at 150 second-feet March 10, 1911, from gage reading of doubtful accuracy and observer's statement that river fell to a very low stage.

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

ACCURACY.—Stage-discharge relation permanent, affected by ice for short periods. Results excellent except during ice season.

Discharge measurements of Stehekin River at Stehekin, Wash., during 1910–1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1910.		*Feet.*	*Sec.-ft.*	1913.		*Feet.*	*Sec.-ft.*
Dec. 7	F. C. Ebert	[a] 1.00	665	Sept. 26	F. B. Storey	1.10	538
1911.				1914.			
Aug. 15	G. L. Parker	1.75	1,010	July 4	C. O. Brown	4.29	4,090
Sept. 28	R. C. Pierce	.93	446	4	do	4.18	3,960
1912.				Sept. 17	do	.86	416
Feb. 7	W. W. Clifford	.42	205	1915.			
June 4	R. C. Pierce	3.57	2,900	June 5	J. T. Hartson	3.03	2,270
5	do	3.93	3,540	6	do	3.30	2,680
Sept. 19	G. L. Parker	1.01	462	Oct. 9	do	.57	260

[a] Original gage.

NOTE.—Gage heights of measurements have been corrected to datum, on basis of levels, since previously published.

Daily discharge, in second-feet, of Stehekin River at Stehekin, Wash., from May 1, 1914, to Oct. 31, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1914.						1914.					
1	2,480	4,280	4,640	1,600	782	16	3,680	6,020	2,510	1,130	398
2	4,110	6,230	4,280	1,500	782	17	3,790	6,020	2,510	1,050	398
3	3,870	5,420	5,020	1,500	770	18	3,900	5,220	2,640	1,010	640
4	3,630	3,620	3,940	1,500	757	19	4,000	4,110	2,770	1,050	745
5	3,380	3,470	3,180	1,600	745	20	4,110	3,470	2,270	1,220	640
6	3,140	3,040	3,040	1,400	710	21	4,830	2,770	1,600	1,220	540
7	2,900	3,470	2,770	1,220	782	22	4,830	2,270	1,500	1,010	605
8	2,770	3,320	3,180	1,010	605	23	5,620	2,030	1,600	1,010	605
9	2,770	3,040	3,040	1,050	510	24	5,220	2,030	1,600	1,010	675
10	3,040	3,320	2,770	1,220	572	25	4,110	2,270	1,600	1,010	745
11	3,150	3,040	3,040	1,310	540	26	3,320	2,270	1,500	1,010	1,220
12	3,250	3,470	3,180	1,400	452	27	2,770	2,510	1,500	970	782
13	3,360	3,470	3,180	1,310	425	28	2,510	2,640	1,400	1,050	640
14	3,470	4,110	2,900	1,400	398	29	2,510	3,040	1,400	1,010	572
15	3,580	5,020	2,770	1,400	398	30	2,510	3,940	1,400	932	640
						31	3,320	.....	1,600	782	.....

Daily discharge, in second-feet, of Stehekin River at Stehekin, Wash., from May 1, 1914, to Oct. 31, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1914–15.													
1	572	1,220	782	311	.....	194	1,220	1,600	1,500	1,700	1,220	1,050	510
2	540	1,220	782	306	.....	197	3,040	1,500	1,500	1,920	1,310	1,050	452
3	480	1,310	745	302	.....	204	3,040	1,500	1,500	1,920	1,400	970	398
4	452	1,400	710	275	194	200	2,390	1,600	1,700	2,030	1,400	782	311
5	425	1,310	675	271	194	210	2,270	1,810	2,270	2,030	1,260	675	425
6	398	1,130	640	271	204	210	2,150	2,270	2,640	1,810	1,130	540	293
7	398	1,010	640	271	204	214	1,700	3,040	2,640	1,500	1,050	540	271
8	370	895	572	267	204	218	1,920	3,040	2,030	1,600	1,050	572	263
9	452	895	572	263	204	228	1,700	3,320	1,920	1,400	1,050	540	255
10	510	858	510	267	204	232	1,810	2,900	1,700	1,130	1,050	480	232
11	425	1,050	480	267	197	239	1,920	2,150	1,600	970	1,050	452	221
12	480	932	425	247	194	243	1,920	1,810	1,400	1,050	1,050	398	263
13	510	895	398	251	188	251	2,030	1,810	1,600	970	1,050	370	293
14	540	858	.....	235	176	316	1,810	1,810	1,700	1,050	1,050	320	294
15	510	782	.....	232	188	345	2,030	1,600	1,810	858	1,130	370	295
16	760	782	.....	232	188	510	2,150	1,400	2,030	858	1,310	370	296
17	1,010	710	.....	232	188	452	2,770	1,500	1,700	932	1,400	370	297
18	895	675	.....	232	182	452	3,040	1,810	1,500	895	1,220	425	298
19	895	710	.....	218	179	480	3,040	1,700	1,310	858	1,310	398	298
20	745	932	.....	200	176	510	2,770	1,810	1,310	1,050	1,220	425	293
21	640	895	.....	200	179	572	2,510	1,700	1,310	1,050	1,500	398	306
22	605	858	.....	188	182	710	2,150	1,700	1,400	1,070	1,600	425	345
23	605	820	.....	179	188	1,010	2,030	1,600	1,600	1,090	1,500	398	306
24	572	782	.....	162	194	1,050	1,810	1,600	1,810	1,110	1,500	398	958
25	540	782	.....	162	197	970	1,700	1,600	1,700	1,130	1,130	398	820
26	540	1,050	.....	.....	194	895	1,810	1,500	1,600	1,220	1,130	370	970
27	540	932	.....	.....	194	858	1,810	1,810	1,500	1,130	1,220	345	745
28	572	932	311	.....	194	858	1,810	2,270	1,400	1,220	1,400	320	782
29	572	895	311	.....	.....	895	2,030	1,700	1,310	1,220	1,400	311	782
30	895	858	311	.....	.....	895	1,810	1,600	1,400	1,400	1,220	311	710
31	820	.....	311	.....	.....	858	.....	1,600	.....	1,310	1,130	.....	710

NOTE.—Discharge May 1 to Sept. 30, 1914, revised as values published in Water-Supply Paper 392 were based on incorrect assumption that gage had been disturbed. Discharge ascertained from rating curve well defined between 150 and 5,000 second-feet. May 3–6, 11–19, Aug. 24, Sept. 3, 4, 2a, Oct. 16, 1914; Feb. 7, 8, July 22–24, and Aug. 5 and 12, 1915, gage not read; discharge interpolated. Discharge estimated from observer's notes and records of precipitation and temperature, Dec. 14–18, 385 second-feet; Dec. 19–23, 350 second-feet; Dec. 24–27, 325 second-feet; Jan. 26–31, 160 second-feet; Feb. 1–3, 180 second-feet.

Monthly discharge of Stehekin River at Stehekin, Wash., for the period May 1, 1914, to Oct. 31, 1915.

[Drainage area, 368 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1914.							
May	5,620	2,480	3,550	9.65	11.12	218,000	A.
June	6,230	2,030	3,630	9.86	11.00	216,000	A.
July	5,020	1,400	2,590	7.04	8.12	159,000	A.
August	1,600	782	1,190	3.23	3.72	73,200	A.
September	1,220	398	636	1.73	1.93	37,800	A.
The period						704,000	
1914-15.							
October	1,010	370	589	1.60	1.84	36,200	A.
November	1,400	675	946	2.57	2.87	56,300	A.
December	782		456	1.24	1.43	28,000	C.
January	311		226	.614	.71	13,900	B.
February	204		190	.516	.54	10,600	B.
March	1,050	194	499	1.36	1.57	30,700	A.
April	3,040	1,220	2,140	5.82	6.49	127,000	A.
May	3,320	1,400	1,890	5.14	5.93	116,000	A.
June	2,640	1,310	1,680	4.57	5.10	100,000	A.
July	2,030	858	1,270	3.45	3.98	78,100	A.
August	1,600	1,050	1,240	3.37	3.88	76,200	A.
September	1,050	311	492	1.34	1.50	29,300	A.
The year	3,320		971	2.64	35.84	702,000	
1915.							
October	970	221	433	1.18	1.36	26,600	A.

LAKE CHELAN AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at Forest Service boat landing at Chelan, in Chelan County, a quarter of a mile above highway bridge at outlet.

DRAINAGE AREA.—951 square miles.

RECORDS AVAILABLE.—September 1 to October 15, 1897; January 1, 1898, to December 31, 1899; January 1 to June 30, 1905; December 5, 1910, to September 30, 1915.

GAGE.—Vertical staff on pile at landing installed December 5, 1910; datum 1,076.15 feet above sea level. 1897–1899, gage was at Lakeside, about 1 mile west of Chelan; datum 1,070.18 feet above sea level. In 1905 gage was on a bent of the upper bridge at Chelan; elevation of datum not determined. Observers, H. M. White, O. F. Ericson, and W. E. Naylor.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3.8 feet at 8.30 a. m. November 9, 16, and April 4; minimum stage recorded, 2.85 feet at 8.30 a. m. February 15.

1898–99 and 1911–1915: Maximum stage recorded, 6.70 feet at 9 a. m. June 9, 1913; minimum stage recorded, 6.60 feet January 27–28, and December 2–5, 1898.

REGULATION.—The height of water in the lake is controlled by operation of gates in the dam at outlet.

COOPERATION.—Gage-height record since December, 1910, furnished by United States Forest Service.

Daily gage-height, in feet, of Lake Chelan at Chelan, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1					3.14	2.94						
2		3.68									3.22	
3								3.10				
4				3.33			3.80					
5	3.40		3.75		2.94					3.48		
6												
7									3.22			3.13
8					3.20	3.00						
9		3.80									3.25	
10								3.40				
11				3.18								
12	3.30		3.60				3.45			3.23		
13												2.90
14									3.25			
15					2.85	3.00						
16		3.80									3.23	
17								3.28				
18				3.05								
19	3.50		3.45				3.50			2.92		
20												2.32
21									3.32			
22					2.90	3.10						
23		3.78									3.30	
24								3.15				
25				2.95								
26	3.45						3.45			3.03		
27												2.95
28			3.32						3.22			
29						3.50						
30		3.70									3.45	
31								3.10				

CHELAN RIVER AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at lower highway bridge in town of Chelan, 800 feet below the flashboard dam at the outlet of Chelan Lake, and 4 miles northwest of Chelan Falls, in Chelan County.

RECORDS AVAILABLE.—November 6, 1903, to September 30, 1915.

DRAINAGE AREA.—951 square miles (measured on topographic maps).

GAGE.—Vertical staff gage; read once daily to hundredths October 1 to December 3 and December 22 to March 20, by H. M. White; December 4–21 and March 21 to May 4, by O. F. Ericson; May 5 to September 30, by W. E. Naylor. Gage is attached to fourth bent of left approach to lower highway bridge.

DISCHARGE MEASUREMENTS.—Made from upper highway bridge about 1,000 feet above gage or by wading at low stages.

CHANNEL AND CONTROL.—Control, approximately 200 feet below the gage, is well defined and consists of boulders and gravel, likely to shift. Banks high and not subject to overflow. Channel sharply curved 100 feet above gage but practically straight for some distance below.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.05 feet at 8.30 a. m. April 7 (discharge, 3,980 second-feet); minimum stage recorded, 4.50 feet February 5, 12, 17, 18, and 20–24 (discharge, 403 second-feet).

1903–1915: Maximum stage recorded, 10.7 feet May 14, 1910 (discharge, 8,350 second-feet, revised value); minimum stage recorded, 4.35 feet December 17, 1910 (discharge, 245 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice.

DIVERSIONS.—Several ditches divert a very small percentage of the run-off for irrigation from tributaries of Chelan Lake.

REGULATION.—A flashboard dam 800 feet above the gage controls the lake level at low water for navigation.

ACCURACY.—No diurnal fluctuation; results considered excellent except for short periods when repairs or adjustments to flashboard dam cause unnatural fluctuation.

COOPERATION.—Gage-height record furnished by United States Forest Service.

Discharge measurements of Chelan River at Chelan, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 4	J. T. Hartson	4.68	422	June 3	J. T. Hartson	7.33	2,930
4	do	4.55	389	Aug. 19	C. O. Brown	6.20	1,540

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	818	1,040	1,160	648	482	433	1,360	3,280	2,990	2,330	1,440	1,580
2	818	1,160	1,160	624	465	433	1,470	3,280	2,990	2,330	1,470	1,470
3	786	1,160	1,210	613	433	433	2,460	3,280	2,850	2,330	1,470	727
4	786	1,260	1,160	602	403	433	2,870	3,280	2,850	2,400	1,470	727
5	786	1,160	1,210	558	403	433	3,280	3,130	2,720	2,460	1,470	727
6	727	1,310	1,180	602	465	433	3,900	3,130	2,860	2,460	1,470	727
7	727	1,260	1,160	579	442	433	3,900	3,130	2,990	2,460	1,580	727
8	700	1,360	1,160	648	418	433	3,900	3,280	3,130	2,460	1,520	727
9	673	1,360	1,120	602	433	433	3,740	3,580	3,130	2,460	1,470	727
10	700	1,360	1,070	580	433	433	3,580	3,580	3,130	2,460	1,470	624
11	714	1,420	1,120	558	418	433	3,500	3,580	2,990	2,400	1,470	500
12	727	1,420	990	624	403	433	3,430	3,580	2,720	2,330	1,580	482
13	727	1,470	920	579	433	449	3,580	3,740	2,720	2,200	1,580	465
14	727	1,360	850	624	433	457	3,430	3,740	2,720	2,200	1,470	465
15	727	1,310	885	602	433	465	3,360	3,580	2,460	2,070	1,470	465
16	700	1,260	850	538	433	465	3,280	3,580	2,460	1,940	1,470	465
17	756	1,260	786	528	403	500	3,280	3,430	2,460	1,820	1,580	449
18	803	1,260	786	519	403	482	3,430	3,280	2,330	1,760	1,580	465
19	850	1,260	850	519	403	500	3,580	3,280	2,330	1,700	1,470	465
20	786	1,260	850	500	403	482	3,900	3,280	2,330	1,700	1,260	465
21	850	1,160	850	500	403	520	3,740	3,280	2,330	1,580	1,310	465
22	850	1,160	727	465	403	558	3,900	3,280	2,330	1,260	1,340	465
23	885	1,160	648	465	403	602	3,740	3,280	2,330	1,260	1,360	465
24	850	1,260	673	465	403	700	3,740	3,280	2,460	1,210	1,420	449
25	834	1,160	700	465	418	727	3,820	3,280	2,460	1,240	1,470	465
26	818	1,160	727	433	418	786	3,900	3,130	2,460	1,260	1,700	482
27	818	1,210	664	418	433	818	3,580	3,130	2,400	1,260	1,700	500
28	818	1,260	602	418	433	834	3,580	3,280	2,330	1,360	1,700	449
29	818	1,210	602	433	.....	850	3,580	3,280	2,330	1,360	1,760	433
30	786	1,160	648	433	.....	1,260	3,580	3,140	2,330	1,420	1,820	418
31	920	.....	673	458	.....	1,310	.....	2,990	.....	1,420	1,700	.....

NOTE.—Discharge ascertained from rating curve well defined between 350 and 9,000 second-feet. Gage not read on Sunday; discharge interpolated. Discharge values subject to some uncertainty for the following days: Mar. 29, Apr. 3, 5, and Aug. 25, when flashboards were removed for dam; June 20, Aug. 2, and Sept. 3, when flashboards were inserted in dam; Aug. 10, when a portion of dam went out; Aug. 19 to Sept. 2, when the dam was repaired.

Monthly discharge of Chelan River at Chelan, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	920	673	783	48,100	A.
November	1,470	1,040	1,250	74,400	A.
December	1,210	602	903	55,500	A.
January	648	418	535	32,900	A.
February	482	403	423	23,500	A.
March	1,310	433	579	35,600	A.
April	3,900	1,360	3,410	203,000	A.
May	3,740	2,990	3,330	205,000	A.
June	3,130	2,330	2,630	156,000	A.
July	2,460	1,210	1,900	117,000	A.
August	1,820	1,260	1,520	93,500	B.
September	1,580	418	601	35,800	A.
The year	3,900	403	1,490	1,080,000	

ENTIAT RIVER AT ENTIAT, WASH.

LOCATION.—In sec. 18, T. 25 N., R. 21 E., one-eighth mile below power house of the Wenatchee Valley Gas & Electric Co., threee-fourths mile above Entiat, in Chelan County, and about a mile above mouth.

DRAINAGE AREA.—419 square miles (measured on topographic map).

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1915.

GAGE.—Inclined staff on left bank one-eighth mile below power house, read once daily to hundredths by L. C. Asher.

DISCHARGE MEASUREMENTS.—Made from private bridge 200 feet below power house or by wading.

CHANNEL AND CONTROL.—Gravel and bowlders, shifting during extremely high water. One channel at all stages. Left bank high, not subject to overflow. Right bank slopes gradually.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.00 feet at 5 p. m. April 20, and at 11 a. m. May 10 (discharge, 1,510 second-feet); minimum stage recorded, 0.78 foot September 28–30 (discharge, 83 second-feet).

1910–1915: Maximum stage recorded, 4.4 feet June 3–4, 1913 (discharge, 3,800 second-feet); minimum flow estimated at 65 second-feet February 7, 1914, from temperature record and observer's notes during period when stage-discharge relation was affected by ice.

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

DIVERSIONS.—Entiat Irrigation Co.'s high-line canal (capacity about 20 second-feet) diverts above the gage.

REGULATION.—Flow affected somewhat by changes in load when the power plant is in operation.

ACCURACY.—Results good except during winter season. Some diurnal fluctuation at extremely low water.

COOPERATION.—Gage-height record furnished by Wenatchee Valley Gas & Electric Co.

Discharge measurements of Entiat River at Entiat, Wash., during the yaer ending Sept, 30, 1915.

[Made by J. T. Hartson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Jan. 28	3.24	106	Feb. 6	1.00	129
Feb. 5	1.02	126	June 7	2.64	1,070

Daily discharge, in second-feet, of Entiat River at Entiat, Wash., for the year ending Sept. 30,1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	158	215	246	144	108	112	250	915	915	360	246	142
2	158	268	250	146	112	120	446	915	915	388	238	120
3	154	250	246	151	116	128	740	870	870	415	231	116
4	154	242	238	148	114	133	660	870	825	545	235	112
5	156	238	231	146	112	133	582	825	870	511	225	112
6	158	261	225	141	112	135	620	780	960	511	196	100
7	158	264	228	137	112	135	620	825	1,110	388	188	108
8	158	261	212	137	114	128	620	870	1,110	336	185	104
9	156	253	196	132	114	128	620	1,160	1,110	311	185	106
10	146	246	168	134	112	128	582	1,510	1,110	302	179	104
11	185	242	134	134	112	128	582	1,450	915	285	171	102
12	161	246	132	134	108	131	700	1,270	620	246	171	100
13	158	238	.....	134	108	131	740	1,110	620	238	158	102
14	158	231	.....	134	104	133	740	1,010	620	225	156	97
15	154	205	.....	.....	108	156	740	960	620	218	156	95
16	156	212	.....	.....	104	158	870	915	620	199	151	93
17	166	218	.....	.....	108	166	960	915	660	196	154	90
18	179	231	.....	.....	110	171	1,220	870	660	185	154	90
19	199	228	.....	.....	108	171	1,390	870	660	179	156	88
20	199	231	.....	.....	104	185	1,510	915	660	179	154	90
21	185	238	.....	.....	106	193	1,390	915	545	182	148	90
22	185	250	.....	.....	108	215	1,270	915	511	185	151	90
23	179	231	.....	.....	110	231	1,160	915	511	188	148	90
24	179	235	.....	.....	124	311	960	960	545	185	148	90
25	171	231	.....	.....	120	290	915	960	545	179	148	88
26	158	231	.....	.....	116	250	870	870	446	182	128	88
27	158	235	.....	.....	116	253	870	870	446	185	128	85
28	158	242	.....	.....	114	250	870	960	415	257	124	83
29	158	250	.....	.....	.....	253	870	1,060	360	261	128	83
30	171	246	.....	.....	.....	253	825	1,060	360	257	133	83
31	199	.....	.....	.....	.....	253	.....	1,060	.....	250	133	.....

NOTE.—Discharge ascertained from well-defined rating curves. Discharge estimated, because of ice, from observer's notes, records of precipitation and temperature, and one discharge measurement, Dec. 13–31, 130 second-feet; Jan. 1–2, and 4–5, as in table; Jan. 15–22, 125 second-feet; Jan. 23–31, 110 second-feet; Feb. 1–2, and 17, as in table.

Monthly discharge of Entiat River at Entiat, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	199	146	167	10,300	B.
November	268	205	239	14,200	B.
December	250	.....	161	9,900	D.
January	151	.....	127	7,810	D.
February	124	104	111	6,160	B.
March	311	112	179	11,000	B.
April	1,510	250	840	50,000	B.
May	1,510	780	980	60,300	B.
June	1,110	360	704	41,900	B.
July	545	179	275	16,900	B.
August	246	124	168	10,300	B.
September	142	83	98.0	5,830	B.
The year	1,510	83	338	245,000	

WENATCHEE RIVER NEAR LEAVENWORTH, WASH.

LOCATION.—In the SW. ¼ sec. 12, T. 26 N., R. 17 E., below county highway bridge, half a mile below Beaver Creek, and about 14 miles north of Leavenworth, in Chelan County.

DRAINAGE AREA.—591 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 28, 1910, to September 30, 1915.

GAGE.—Since September 6, 1913, inclined and vertical staff on left bank a quarter of a mile below county highway bridge; read once a day to hundredths by Robert E. Nickles. From November 28, 1910, to September 5, 1913, a vertical staff 15 feet downstream at same datum.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths of a mile above gage.

CHANNEL AND CONTROL.—Stream bed composed of gravel and small boulders, likely to shift during extreme floods. One channel at all stages; banks high and not subject to overflow. Zero flow would occur at gage height 1.5 feet ± 0.2 foot, as determined February 8 and October 3, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 7.30 a. m. April 3 (discharge, 6,020 second-feet); minimum stage recorded, 2.58 feet at 12 m. September 29 (discharge, 316 second-feet).

1910–1915: Maximum stage recorded, 9.6 feet at 6 p. m. June 3 and at 8 a. m. and 6 p. m. June 4, 1913 (discharge, 14,500 second-feet); minimum stage recorded, September 29, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice December 17–30 and February 13–15; flow estimated from observer's notes and records of precipitation and temperature.

DIVERSIONS.—The Wenatchee Park Land & Irrigation Co. diverted a maximum of approximately 10 second-feet from Chiwawa Creek for short periods during irrigation season.

REGULATION.—None. Natural storage in Lake Wenatchee 8 miles above gage.

ACCURACY.—Results excellent for periods of open channel. Practically no diurnal fluctuation.

COOPERATION.—Gage-height record furnished by Quincy Valley Irrigation District.

Discharge measurements of Wenatchee River near Leavenworth, Wash., during the year ending Sept. 30, 1915.

[Made by J. T. Hartson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 8	2.78	441
June 10	4.38	2,050

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	745	2,270	1,640	658	460	432	2,140	2,540	2,270	1,400	930	575
2	745	2,400	1,520	658	460	429	4,140	2,400	2,140	1,520	930	528
3	745	3,610	1,460	615	460	426	6,020	2,400	2,010	1,640	882	520
4	700	3,610	1,400	615	460	460	5,540	2,400	2,010	1,640	835	535
5	745	3,610	1,340	575	460	460	4,900	2,400	2,400	1,640	790	575
6	680	3,280	1,290	575	456	460	4,140	2,540	2,820	1,640	790	514
7	615	2,680	1,240	575	453	460	4,140	3,120	2,970	1,460	790	453
8	575	2,540	1,180	575	446	460	3,780	3,610	2,680	1,290	790	419
9	575	2,340	1,080	555	439	468	3,280	3,780	2,270	1,240	745	419
10	615	2,140	930	535	432	479	3,120	3,960	2,140	1,180	745	405
11	745	2,140	880	535	426	490	2,970	3,460	1,880	980	745	385
12	745	2,400	790	535	412	498	3,070	2,970	1,760	930	745	366
13	835	2,270	745	535	432	512	3,180	2,680	1,760	835	745	347
14	835	2,140	790	535	432	575	3,280	2,680	1,880	835	745	328
15	835	1,880	790	520	412	930	3,280	2,270	2,010	790	745	328
16	858	1,760	700	498	398	1,080	3,280	2,270	2,140	790	790	328
17	880	1,640	658	482	412	1,030	3,780	2,140	1,880	790	745	353
18	1,180	1,520	615	439	412	1,080	4,320	2,270	1,880	745	745	341
19	1,520	2,680	658	419	412	1,080	4,700	2,400	1,640	745	745	385
20	1,520	1,640	615	419	412	1,080	4,900	2,270	1,460	790	745	372
21	1,400	2,010	615	391	412	1,180	3,960	2,270	1,460	835	745	378
22	1,290	1,880	658	419	426	1,340	3,780	2,270	1,520	930	790	378
23	1,180	1,760	658	426	419	1,760	3,280	2,270	1,580	880	790	398
24	1,130	1,640	700	412	419	1,880	2,970	2,200	1,640	880	790	391
25	1,080	1,640	700	391	426	2,010	2,820	2,140	1,520	880	768	360
26	1,080	1,880	700	372	426	1,880	2,820	2,140	1,340	880	745	360
27	1,030	2,010	658	360	422	1,760	2,680	2,270	1,180	930	702	347
28	1,030	2,010	658	353	419	1,760	2,820	2,970	1,130	930	658	322
29	980	1,880	700	372	.....	1,760	2,970	2,970	1,180	930	658	316
30	1,080	1,460	658	412	.....	1,880	2,820	2,540	1,290	880	658	316
31	1,460	.....	658	460	.....	1,760	.....	2,400	.....	880	658	.....

NOTE.—Discharge ascertained from well-defined rating curve. Discharge estimated, because of ice, from observer's notes and records of precipitation and temperature, Jan. 17–30 and Feb. 13–15. Gage not read; discharge interpolated as follows: Oct. 6, 16, 21; Nov. 4, 9, 13; Jan. 9, 13; Feb. 4, 6, 18, 27; Mar. 2, 10, 24; Apr. 12, 13, 28; May 11, 21, 24; June 23; July 1, 7; Aug. 3, 25, 27; Sept. 6 and 13.

Monthly discharge of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 591 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,520	575	949	1.61	1.86	58,400	A.
November	3,610	1,520	2,230	3.77	4.21	133,000	A.
December	1,640	615	893	1.51	1.74	54,900	A.
January	658	.....	491	.831	.96	30,200	C.
February	460	398	431	.729	.76	23,900	B.
March	2,010	426	1,030	1.74	2.01	63,300	A.
April	6,020	2,140	3,630	6.14	6.85	216,000	A.
May	3,960	2,140	2,610	4.42	5.10	160,000	A.
June	2,970	1,130	1,860	3.15	3.51	111,000	A.
July	1,640	745	1,060	1.79	2.06	65,200	A.
August	930	658	764	1.29	1.49	47,000	A.
September	575	316	402	.680	.76	23,900	A.
The year	6,020	316	1,360	2.30	31.31	987,000	

WENATCHEE RIVER AT DRYDEN, WASH.

LOCATION.—In the SW. ¼ sec. 26, T. 24 N., R. 18 E., at Wenatchee Valley Gas & Electric Co.'s hydroelectric plant, one-fourth mile north of Dryden, in Chelan County, a mile below intake of Wenatchee Valley canal, 2 miles below Peshastin Creek, and 4 miles above Cashmere.

DRAINAGE AREA.—1,200 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 29, 1909 to December 31, 1910 (gage heights only); October 1, 1911, to September 30, 1915. Records were obtained at Cashmere, July 26, 1904 to September 30, 1911.

GAGE.—Vertical staff attached to log cribbing at upstream side of tailrace; read twice daily to hundredths by Percy Burrow.

DISCHARGE MEASUREMENTS.—Made from highway bridge 3 miles below gage.

CHANNEL AND CONTROL.—Solid rock and bowlders, practically permanent. Left bank high; right bank slopes gradually and is moderately high. Channel curved above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 6 p. m. April 3 (discharge, 9,880 second-feet); minimum stage recorded, −0.3 foot, September 14–16 (discharge, 470 second-feet). Stage may have been lower during September 17–30, when gage was not read.

1911 to 1915: Maximum stage recorded, 8.8 feet at 6 p. m. June 3, and at 6 a. m. June 4, 1913 (discharge, 24,100 second-feet); minimum stage recorded September 14–16, 1915.

WINTER FLOW.—Stage-discharge relation usually not affected by ice.

DIVERSIONS.—The Wenatchee Valley canal is the most important diversion above this station. Records are kept on this canal and the results added to give total flow.

REGULATION.—A small amount of storage in the mill pond at Leavenworth.

ACCURACY.—Results prior to slide at power plant July 3, excellent; for July and August, good, as hydrographic comparison with Wenatchee River near Leavenworth shows practically no backwater from slide; for September, fair.

COOPERATION.—Gage-height record furnished by Wenatchee Valley Gas & Electric Co.

Discharge measurements of Wenatchee River at Dryden, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 27	I. L. Collier	1.16	1,440
Feb. 7	J. T. Hartson	.32	704
June 8	.....do	2.98	4,120

Daily discharge, in second-feet, of Wenatchee River at Dryden, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	975	2,190	2,110	940	710	760	2,710	3,760	3,380	1,850	1,020	760
2	975	3,060	2,110	940	660	710	6,430	3,570	3,200	2,110	1,020	760
3	1,050	5,480	1,980	880	710	760	9,200	3,380	3,030	2,110	1,110	660
4	975	5,020	1,850	880	760	820	8,560	3,380	3,030	2,250	1,020	620
5	1,220	5,020	1,850	880	760	660	7,440	3,570	3,760	2,110	1,020	710
6	780	4,800	1,730	880	760	710	6,430	3,760	4,150	2,110	940	660
7	840	3,760	1,610	880	710	710	6,190	4,800	4,580	1,980	940	660
8	840	3,200	1,610	880	710	760	5,710	5,480	4,150	1,850	880	660
9	840	3,030	1,500	880	710	820	5,250	5,950	3,380	1,610	880	580
10	840	2,870	1,400	820	710	880	4,580	6,190	2,870	1,500	820	580
11	975	2,710	1,200	820	660	820	4,580	5,250	2,710	1,400	760	580
12	1,050	3,380	1,020	820	660	880	5,250	4,580	2,400	1,200	880	580
13	1,130	3,570	1,020	820	660	1,110	5,250	3,950	2,250	1,200	880	500
14	1,220	2,870	1,020	820	660	1,020	5,020	3,760	2,400	1,200	880	470
15	1,220	2,400	1,110	820	660	1,200	4,800	3,380	2,550	1,110	880	470
16	1,220	2,250	1,020	760	660	1,610	5,020	3,200	2,710	1,020	880	470
17	1,300	2,110	940	760	660	1,610	5,710	3,380	2,710	1,020	940	.....
18	1,600	1,980	940	760	660	1,610	6,930	3,380	2,550	1,020	1,020	.....
19	1,820	1,850	940	760	710	1,610	7,180	3,380	2,110	880	940	.....
20	1,940	2,250	940	660	660	1,610	7,440	3,380	1,980	880	1,200	.....
21	1,820	2,870	940	660	660	1,730	6,430	3,380	1,850	940	940	.....
22	1,710	2,550	940	660	710	1,850	5,480	3,380	1,850	1,110	940	.....
23	1,600	2,400	940	620	820	2,400	5,020	3,200	1,980	1,110	1,020	.....
24	1,500	2,400	1,020	660	710	3,030	4,360	3,200	2,110	1,110	1,020	.....
25	1,500	2,250	1,020	660	760	3,380	4,150	3,200	1,980	1,200	940	.....
26	1,400	2,400	1,020	660	760	2,710	4,150	3,030	1,980	1,020	940	.....
27	1,400	2,710	1,020	660	710	2,250	4,150	3,030	1,610	1,020	880	.....
28	1,400	2,710	940	760	760	2,400	3,950	4,800	1,200	1,020	880	.....
29	1,400	2,400	940	880	.....	2,550	4,360	4,580	1,500	1,110	820	.....
30	1,500	2,400	940	760	.....	2,550	4,150	3,950	1,610	1,110	760	.....
31	1,820	.....	940	760	.....	2,550	.....	3,570	.....	1,020	820	.....

NOTE.—Discharge ascertained from two well-defined rating curves applicable Oct. 1 to Nov. 3, and Nov. 4 to Sept. 16. Sept. 17–30, gage not read, as channel conditions were being changed while repairing damage to power plant caused by slide of July 3; discharge estimated by hydrographic comparison with Wenatchee River near Leavenworth at 510 second-feet.

Combined monthly discharge of Wenatchee River and Wenatchee Valley canal at Dryden, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge (second-feet).					Combined run-off (total in acre-feet).	Accuracy.
	Combined.		River (mean).	Canal (mean).	Total (mean).		
	Maximum.	Minimum.					
October	1,980	824	1,290	36.2	1,330	81,800	A.
November	5,480	1,850	2,960	.0	2,960	176,000	A.
December	2,110	940	1,240	.0	1,240	76,200	A.
January	940	620	787	.0	787	48,400	A.
February	820	660	705	.0	705	39,200	A.
March	3,380	660	1,550	.0	1,550	95,300	A.
April	9,200	2,710	5,530	21.4	5,550	330,000	A.
May	6,300	3,150	3,900	113	4,010	247,000	A.
June	4,700	1,320	2,590	122	2,710	161,000	A.
July	2,250	1,010	1,360	104	1,460	89,800	B.
August	1,330	888	931	128	1,060	65,200	B.
September	888	.....	562	102	664	39,500	C.
The year	9,200	.....	1,950	52.5	2,000	1,450,000	

WENATCHEE VALLEY CANAL AT DRYDEN, WASH.

LOCATION.—In sec. 26, T. 24 N., R. 18 E., 1,300 feet below the Dryden power house, 1½ miles below the canal intake, and directly across the river from Dryden, in Chelan County.

RECORDS AVAILABLE.—Irrigation seasons since June 10, 1911.

GAGE.—Since April 29, 1915, an enameled gage section read twice a day to hundredths by ditch walker of the Wenatchee Valley Gas & Electric Co. Gage is attached to left side of flume 1,300 feet below the Dryden power house. From June 11, 1910, to April 28, 1915, a vertical staff, 300 feet above the present gage, attached to left side of flume.

DISCHARGE MEASUREMENTS.—Made from foot plank near gage.

CHANNEL AND CONTROL.—Control is a section of flume extending some distance below gage and is permanent until cross section or slope of flume is changed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and period 1911–1915, 2.85 feet from 1 p. m. July 15 to July 17 (discharge, 131 second-feet). No flow in canal from 3 p. m. October 31 to 7.30 a. m. April 12.

REGULATION.—Discharge of canal is regulated by controlling waste gates above gage. Canal is dry during nonirrigating season.

ACCURACY.—Results excellent; control permanent; times of regulating controlling gates noted in gage-height record.

COOPERATION.—Gage-height record furnished by Wenatchee Valley Gas & Electric Co.

Discharged measurements of Wenatchee Valley canal at Dryden, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 27	I. L. Collier	1.20	23.7
June 9	J. T. Hartson	a2.65	118

a Refers to gage installed Apr. 29, 1915. Old gage read 2.95 feet.

Daily discharge, in second-feet, of Wenatchee Valley canal at Dryden, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	44	.....	97	118	124	128	128
2	44	.....	97	118	124	128	128
3	44	.....	97	118	49	128	127
4	44	.....	97	118	0	128	122
5	44	.....	98	118	0	128	124
6	44	.....	103	118	0	128	124
7	44	.....	108	118	32	128	124
8	44	.....	112	118	72	128	124
9	44	.....	112	118	91	128	124
10	44	.....	112	118	97	128	115
11	44	.....	115	119	97	128	115
12	44	10	118	123	114	128	115
13	38	15	118	123	118	128	97
14	35	15	118	123	118	128	97
15	35	15	118	123	124	128	97
16	35	15	118	123	131	128	97
17	35	15	118	123	131	128	85
18	35	15	118	123	128	128	85
19	35	15	118	123	128	128	85
20	35	15	118	123	128	128	85
21	35	29	118	123	128	128	85
22	35	35	118	124	128	128	85
23	35	35	118	124	128	128	85
24	35	35	118	124	128	128	85
25	35	35	118	124	128	128	85
26	27	46	118	124	128	128	85
27	24	61	118	124	128	128	85
28	24	61	118	124	128	128	85
29	24	77	118	124	128	128	85
30	24	97	118	124	128	128	85
31	15	.....	118	.....	128	128	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Apr. 28, from rating curve well defined between 18 and 140 second-feet; Apr. 29 to Sept. 30, from rating curve well defined between 60 and 130 second-feet; Oct. 13, 26, and 31, Apr. 12, 21, 26, and 29, May 5, 6, 7, and 11, June 11 and 21, July 3, 7, 8, 9, 12, and 15, Sept. 3 and 4, by weighting discharge for change in gate openings.

Monthly discharge of Wenatchee Valley canal at Dryden, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	44	15	36.2	2,230	A.
April 12-30	97	10	33.7	1,270	A.
May	118	97	113	6,950	A.
June	124	118	122	7,260	A.
July	131	0	104	6,400	A.
August	128	128	128	7,870	A.
September	128	85	102	6,070	A.

KEECHELUS LAKE NEAR MARTIN, WASH.

LOCATION.—At outlet of lake, 1¼ miles northeast of Meadow Creek station on Chicago, Milwaukee & St. Paul Railway, 3½ miles northwest of Martin, in Kittitas County, 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 12, 1906, to September 30, 1915.

GAGE.—Vertical staff; site changed frequently during 1914 and 1915 to avoid interference due to construction of new dam; read to hundredths twice daily by employees of United States Reclamation Service. Since August 19, 1914, gages have been set to sea-level datum. Prior to that date zero of gages at same height as gate sill in temporary crib dam, elevation 2,457 feet.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 2,455.76 October 20–21 (storage, 40,080 acre-feet); minimum stage recorded, 2,434.50 feet May 5 (storage, 11,970 acre-feet).

1906–1915: Maximum stage recorded, 2,471.38 feet November 23, 1909 (storage, referred to gate sill of new reservoir, 62,910 acre-feet); minimum stage, 2,434.50 feet May 5, 1915 (storage, 11,970 acre-feet).

STORAGE.—Capacity of new reservoir, 152,000 acre-feet; elevation gate sill and spillway crest 2,425 feet and 2,515 feet, respectively. Storage or release each month used for determining discharge, without storage, for gaging station below dam

COOPERATION.—Computations of storage furnished by United States Reclamation Service.

Storage, in acre-feet, of Keechelus Lake near Martin, Wash., for the year ending Sept 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	38,660	33,300	31,220	28,920	27,360	27,000	13,710	12,250	17,170	19,840	19,400	18,930
2	38,550	33,840	31,000	28,650	27,290	27,010	15,390	12,120	17,530	19,790	19,400	18,930
3	38,420	35,550	30,880	28,470	27,260	27,040	16,380	12,080	17,800	19,760	19,350	18,930
4	38,300	35,180	30,750	28,300	27,220	27,060	16,150	12,010	18,160	19,720	19,320	18,930
5	38,220	34,950	30,650	28,210	27,250	27,100	15,400	11,970	18,460	19,690	19,320	18,930
6	38,120	34,570	30,630	28,170	27,170	27,120	14,730	12,000	18,850	19,660	19,290	18,930
7	38,030	34,090	30,470	28,130	27,100	27,130	14,300	12,120	19,110	19,630	19,270	18,930
8	37,940	33,740	30,430	28,100	27,040	27,140	14,030	12,210	19,400	19,590	19,240	19,000
9	37,850	33,410	30,340	28,110	27,010	27,140	13,710	12,300	19,660	19,570	19,230	19,190
10	37,920	33,140	30,260	28,110	26,960	27,170	13,390	12,470	19,940	19,550	19,220	19,200
11	38,040	33,260	30,220	28,110	26,930	27,200	13,210	12,500	20,150	19,530	19,190	19,230
12	38,240	33,470	30,180	28,110	26,930	27,220	13,160	12,460	20,390	19,530	19,160	19,220
13	38,410	33,450	30,140	28,130	26,920	27,250	13,240	12,400	20,670	19,520	19,150	19,260
14	38,480	33,220	30,100	28,150	26,930	27,400	13,280	12,330	20,830	19,530	19,140	19,320
15	38,520	32,960	30,100	28,230	26,900	27,700	13,140	12,260	20,730	19,530	19,120	19,320
16	38,570	32,660	30,060	28,170	26,900	28,250	13,080	12,200	20,570	19,550	19,100	19,250
17	38,710	32,470	30,040	28,210	26,930	28,370	13,220	12,180	20,490	19,680	19,090	19,380
18	39,010	32,310	29,920	28,110	26,930	28,550	13,350	12,230	20,410	19,710	19,060	19,410
19	39,720	32,150	29,960	28,100	26,930	27,580	13,520	12,300	20,330	19,680	19,060	19,410
20	40,080	32,310	30,120	28,070	26,930	28,610	13,520	12,380	20,280	19,700	19,060	19,410
21	40,080	32,390	30,260	27,990	26,930	28,710	13,340	12,460	20,230	19,670	19,050	19,450
22	39,670	32,340	30,260	27,990	26,930	28,800	13,080	12,510	20,200	19,630	19,050	19,450
23	38,460	32,290	30,150	28,010	26,930	29,080	12,830	12,500	20,140	19,580	19,030	19,450
24	37,770	32,260	30,020	27,990	26,930	29,460	12,600	12,560	20,060	19,580	19,020	19,450
25	37,150	32,210	29,990	27,980	26,980	29,540	12,480	12,820	20,000	19,530	19,020	19,450
26	36,740	32,020	29,920	27,940	26,980	27,120	12,390	13,200	19,970	19,480	18,980	19,450
27	36,200	31,910	29,830	27,890	26,960	19,780	12,340	13,710	19,970	19,450	18,980	19,450
28	35,740	31,800	29,790	27,890	27,010	16,470	12,520	14,720	19,940	19,450	18,980	19,420
29	34,880	31,590	29,750	27,730	.....	15,120	12,330	15,490	19,930	19,450	18,960	19,420
30	34,110	31,400	29,560	27,560	.....	14,200	12,300	16,080	19,890	19,420	18,940	19,420
31	33,600	.....	29,150	27,440	.....	13,660	.....	16,520	.....	19,420	18,930	.....

YAKIMA RIVER NEAR MARTIN, WASH.

LOCATION.—Below dam at outlet of Keechelus Lake, 1½ miles east of Meadow Creek station on Chicago, Milwaukee & St. Paul Railway, 3½ miles northwest of Martin, in Kittitas County, and 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 18 to November 14, 1903; January 28, 1904, to September 30, 1915.

GAGES.—Four vertical and one inclined staff used after September 11, 1914, all differing in datum and site from previous gage; frequent changes to avoid interference due to construction work for new dam. Only two gages at same site and datum. Stevens water-stage recorder in operation January 25 to March 26. Gage read to hundredths twice daily by employees of United States Reclamation Service. Gage in use October 18 to November 14, 1903, on right bank 800 feet below crib

dam; January 28, 1904, to October 7, 1912, vertical staff on right bank, 75 feet above previous gage and at a datum 0.07 foot lower; previous gage heights corrected to new datum; October 8, 1912, to September 11, 1914, vertical staff on right bank anchored to bent of highway bridge at same site and datum as previous gage.

DISCHARGE MEASUREMENTS.—Made from cable 1¼ miles below dam or by wading.

CHANNEL AND CONTROL.—Gravel; shifts during floods; logs and brush lodging on riffle control below gage sometimes affect stage-discharge relation.

EXTREMES OF DISCHARGE.—Gage destroyed March 26, by washing out of temporary crib dam. Maximum discharge, 7,370 second-feet at 10.45 a. m. March 26, determined from hourly gage heights of lake surface and estimated natural inflow to lake; minimum stage recorded, 3.42 feet June 1 (discharge approximately, 1 second-foot).

1904–1915: Maximum discharge, 7,370 second-feet, at 10.45 a. m. March 26, 1915, determined as described above. Gates in Keechelus reservoir dam closed frequently, resulting in practically no flow.

WINTER FLOW.—Stage-discharge relation not affected by ice. Water from Keechelus reservoir above freezing temperature.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Keechelus reservoir. Monthly discharge, without storage, determined from records of stage at reservoir.

ACCURACY.—Results for April, May, and July, good; for remainder of year, fair.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River near Martin, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height for gage in use.				Discharge.
		Oct. 1 to Dec. 7.	Dec. 8 to Mar. 25.	Mar. 29 to July 19.	July 20 to Sept. 30.	
		Feet.	*Feet.*	*Feet.*	*Feet.*	Sec.-ft.
Oct. 2	F. E. Moxley	1.70				165
6	Tuttle and Taylor	1.50				127
Nov. 5	Moxley and Van Mavern	3.72	4.72			964
13	F. E. Moxley	3.06	4.06			700
Jan. 11	Thomas and Ralston	a 1.10	1.91			112
Feb. 9	F. E. Moxley	a 1.06	1.87			89
Mar. 28	R. I. Thomas			7.44		1,560
29	do			6.94		1,230
30	do			6.49		879
Apr. 2	do			7.12		1,350
5	F. E. Moxley			7.01		1,210
10	R. I. Thomas			6.01		611
13	F. E. Moxley			6.00		576
26	R. I. Thomas			5.46		391
May 3	Parker and Taylor			5.20		266
25	Thomas and Ray			4.40	2.01	72
June 16	F. E. Moxley			5.00	2.63	169
16	do			5.00	2.63	169
18	R. I. Thomas			b 4.90	a 2.52	143
July 7	F. E. Moxley			4.50	a 2.11	82
Sept. 30	Moxley and Calland			4.04	1.64	30

a Gage height determined by curve of relation. b Observer's gage height for 4 p. m. June 18.

Daily discharge, in second-feet, of Yakima River near Martin, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	200	341	359	344	118	76	750	283	3	97	67	42
2	165	360	324	191	111	76	1,280	283	3	94	67	41
3	165	1,220	258	111	96	76	1,580	265	4	90	65	41
4	165	1,110	258	151	126	82	1,420	248	7	87	64	44
5	165	1,000	229	134	134	82	1,210	283	20	83	62	48
6	127	950	243	126	126	82	1,080	283	32	81	60	29
7	136	800	243	111	118	82	880	300	36	80	60	34
8	120	620	203	118	103	89	815	300	3	80	59	43
9	112	620	191	118	96	89	690	300	3	79	58	46
10	112	500	180	111	89	89	605	318	2	76	56	49
11	120	580	170	108	75	96	535	318	2	79	56	43
12	127	660	161	103	72	96	535	318	2	77	56	43
13	127	715	142	103	75	96	580	300	2	79	56	50
14	127	590	134	111	74	118	580	279	1	76	55	54
15	127	511	134	103	72	180	535	261	185	79	54	56
16	127	395	126	96	71	276	535	244	171	80	52	56
17	136	359	82	76	71	316	580	224	159	84	52	56
18	165	290	15	89	72	330	605	208	147	91	50	56
19	256	290	82	89	71	358	630	192	139	90	48	56
20	400	359	103	89	70	358	630	190	135	89	48	57
21	420	395	76	82	71	373	605	165	129	87	48	56
22	900	395	161	82	70	403	512	163	127	84	47	62
23	660	359	180	82	69	499	445	178	123	83	47	62
24	580	414	191	82	71	568	405	181	116	82	46	63
25	500	472	134	76	74	604	370	72	113	79	46	64
26	420	452	134	75	75	4,240	353	22	109	77	44	79
27	440	433	126	71	75	2,990	335	12	109	73	43	53
28	420	452	151	82	76	1,650	318	8	109	69	44	31
29	705	433	89	180	.....	1,210	318	4	106	67	44	31
30	460	395	103	161	.....	815	300	4	102	67	43	31
31	420	.....	344	142	.....	690	.....	4	.....	67	43	.....

NOTE.—Discharge ascertained from six rating curves not well defined, applicable as follows: Oct. 1 to Nov. 12; Nov. 13 to Dec. 7; Dec. 8 to Mar. 25; Mar. 29 to May 12; June 15 to July 19; and July 20 to Sept. 30. Mar. 26–28, gages washed out, discharged determined by adding flow equivalent to released storage and estimated natural inflow to lake on these days. Flow equivalent to storage released was determined from hourly readings of lake gage during interval. Discharge May 13 to June 14, ascertained by method devised for shifting control.

Monthly discharge of Yakima River near Martin, Wash., for year ending Sept. 30, 1915.

[Drainage area, 55 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	900	112	294	18,100	− 5,290	12,800	208	3.78	4.36	C.
November	1,220	290	549	32,700	− 2,200	30,500	513	9.33	10.41	C.
December	359	15	172	10,600	− 2,250	8,350	136	2.47	2.85	C.
January	344	71	116	7,120	− 1,720	5,400	87.8	1.60	1.84	C.
February	134	69	86.5	4,800	− 425	4,380	78.9	1.43	1.49	C.
March	4,240	76	551	33,900	−13,400	20,500	333	6.05	6.98	C.
April	1,580	300	667	39,700	− 1,300	38,300	644	11.71	13.07	B.
May	318	4	200	12,300	+ 4,220	16,500	268	4.87	5.62	B.
June	185	1	73.3	4,360	+ 3,370	7,730	130	2.36	2.63	C.
July	97	67	80.8	4,970	− 468	4,500	73.2	1.33	1.53	B.
August	67	43	52.9	3,250	− 494	2,760	44.9	.82	.94	C.
September	79	29	49.2	2,930	+ 494	3,420	57.5	1.05	1.17	C.
The year	4,240	1	241	175,000	−19,500	155,000	214	3.89	52.89	

YAKIMA RIVER AT EASTON, WASH.

LOCATION.—In sec. 11, T. 20 N., R. 13 E., at highway bridge one-fourth mile northwest of Easton, in Kittitas County, 1½ miles below Kachess River.

DRAINAGE AREA.—184 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 12 to November 28, 1904; February 5, 1910, to October 9, 1915, when station was discontinued.

GAGE.—After October 12, 1914, a vertical and inclined staff on left bank 20 feet above highway bridge; read to hundredths once a day by H. Robertson, before March 1; H. B. Battenfield after March 1. From May 12 to November 28, 1904, a vertical staff on left bank 20 feet below highway bridge, datum in respect to present gage not known. February 5 to June 21, 1910, a vertical staff on right bank on center pile of support for bridge approach, at datum 0.98 foot higher than present gage. June 22, 1910, to July 28, 1914, a chain gage on upstream side of bridge, same datum as previous gage. July 29 to October 11, 1914, a vertical staff on left downstream caisson of bridge, same datum as previous two gages, but 0.98 foot higher than present gage.

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

CHANNEL AND CONTROL.—Gravel; shifts at high stages. Low-water control formed by gravel riffle 30 feet below bridge; high-water control formed by section of stream bed extending considerable distance downstream. One channel at all stages. Zero flow would occur at gage height of about 0.4 foot, as determined September 29, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1914, to October 9, 1915, 7.18 feet at 7 p. m. March 26 (discharge, 7,280 second-feet); minimum discharge, 38 second-feet September 30, estimated from summation of flow for Yakima River near Martin, Wash., Kachess River near Easton, Wash., and Cabin Creek. 1904; 1910–1915: Maximum stage recorded on March 26, 1915; minimum flow estimated at 25 second-feet, September 22, 1913, when gates of Keechelus and Kachess reservoirs were closed.

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

DIVERSIONS.—None.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus and Kachess reservoirs. Monthly discharge, without storage, determined from records of stage at reservoirs.

ACCURACY.—Observer's record only fairly reliable. Results good prior to March flood, except when stage-discharge relation was affected by ice (January 19 to February 1), and excellent for remainder of year, except for extremely low water.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River at Easton, Wash., from Oct. 1, 1914, to Oct. 9, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Oct. 2	F. E. Moxley	2.31	588	Apr. 14	F. E. Moxley	2.69	937
7	Taylor and Tuttle	1.37	146	May 4	Taylor and Parker	2.05	413
1915.				June 15	F. E. Moxley	2.32	602
Jan. 26	F. E. Moxley	a 2.30	106	15	do	1.91	341
Feb. 8	do	1.50	124	July 2	do	2.90	1,110
Mar 11	do	1.57	156	6	do	2.89	1,090
26	Paul Taylor	7.02	6,960	Sept. 29	Calland and Moxley	1.10	48
27	do	5.35	4,000	Oct. 7	do	1.49	151
Apr. 6	F. E. Moxley	3.37	1,550				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Yakima River at Easton, Wash., from Oct. 1, 1914, to Oct. 9, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	586	643	646	366	130	98	1,110	477	108	1,110	630	142	41
2	578	710	646	319	128	110	1,780	443	102	1,110	585	136	82
3	578	1,600	615	319	122	122	2,570	437	97	1,110	548	130	102
4	180	1,320	584	234	128	128	2,100	418	92	1,110	511	124	113
5	180	1,240	525	226	128	128	1,780	406	87	1,110	477	175	119
6	142	1,150	525	226	128	128	1,480	406	97	1,110	431	108	119
7	147	1,070	525	161	128	128	1,380	406	100	1,020	406	102	148
8	578	921	525	154	122	128	1,200	406	92	930	370	108	142
9	547	921	416	154	122	141	1,060	406	77	930	347	119	139
10	404	779	275	141	116	148	975	412	72	930	336	108	.....
11	404	921	234	141	110	154	930	418	72	975	325	105	.....
12	458	995	211	135	104	161	930	406	72	975	325	97	.....
13	441	1,070	196	135	98	161	930	418	310	1,020	315	102	.....
14	406	958	234	135	98	196	930	370	305	1,020	315	100	.....
15	378	849	275	128	98	366	885	347	443	1,020	305	97	.....
16	365	779	234	116	110	416	840	315	585	1,020	300	97	.....
17	379	711	204	116	104	442	885	325	585	1,020	315	95	.....
18	354	646	189	116	98	469	930	294	750	986	284	92	.....
19	447	646	168	114	93	491	975	269	750	985	274	87	.....
20	516	711	319	112	93	469	930	265	750	1,020	256	87	.....
21	516	711	343	111	93	525	885	256	750	1,020	237	84	.....
22	354	711	366	110	93	584	840	246	895	1,020	228	82	.....
23	997	745	366	109	93	615	707	246	1,110	930	220	82	.....
24	851	745	366	108	93	711	795	274	1,110	885	212	80	.....
25	643	745	366	107	93	711	840	174	1,110	885	204	77	.....
26	643	745	366	106	98	3,240	930	124	1,110	885	196	74	.....
27	404	745	319	105	98	4,010	585	113	1,110	840	188	119	.....
28	458	779	234	140	98	2,000	548	154	1,110	840	174	44	.....
29	780	779	211	194	.....	1,580	511	130	1,110	750	168	43	.....
30	643	779	211	175	.....	1,200	511	119	1,110	750	157	38	.....
31	643	.....	275	152	.....	1,020	.....	113	.....	707	148	.....	.....

NOTE.—Discharge determined as follows: Oct. 1 to Nov. 3, 1914, and Nov. 4 to Mar. 25, 1915, from two rating curves, neither of which is well defined; Jan. 19 to Feb. 1, 1915, estimated, because of ice, from observer's notes, current-meter measurements, and records of temperature and precipitation; Mar. 26 to Oct. 9, 1915, from a well-defined rating curve. For record of daily discharge Sept. 20-30, 1914, published in Water-Supply Paper 392, page 145, the following figures (obtained by indirect method for shifting control) should be substituted:

	Sec.-ft.		*Sec.-ft.*		*Sec.-ft.*		*Sec-ft.*
Sept. 20	733	Sept. 23	619	Sept. 26	542	Sept. 29	593
21	658	24	554	27	605	30	586
22	625	25	548	28	665		

Monthly discharge of Yakima River at Easton, Wash., for the period Sept. 1, 1914, to Sept. 30, 1915.

(Drainage area, 184 square miles.)

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.[a]	Without storage.	Mean.	Per square mile.		
1914.										
September	990	423	693	41,200	−34,200	7,000	118	0.641	0.72	
1914–15.										
October	997	142	484	29,700	−12,700	17,000	276	1.50	1.73	B.
November	1,600	643	871	51,800	+ 6,880	58,700	986	5.36	5.98	B.
December	646	168	354	21,800	− 5,000	16,800	273	1.48	1.71	B.
January	366	105	160	9,850	+ 2,360	12,200	198	1.08	1.24	C.
February	130	93	108	5,980	+ 4,750	10,700	193	1.05	1.09	B.
March	4,010	98	670	41,200	− 1,400	39,800	647	3.52	4.06	B.
April	2,570	511	1,060	63,000	+30,600	93,600	1,570	8.53	9.52	A.
May	477	113	309	19,000	+20,200	39,200	638	3.47	4.00	A.
June	1,110	72	536	31,900	−12,700	19,200	323	1.76	1.96	A.
July	1,110	707	968	59,500	−48,700	10,800	176	.957	1.10	A.
August	630	148	316	19.400	−16,100	3,300	53.7	.292	.34	A.
September	142	38	97.8	5,820	− 1,670	4,150	69.7	.379	.42	B.
The year	4,010	38	496	359,000	−33,500	325,000	449	2.44	33.15	

[a] Combined storage of Keechelus and Kachess reservoirs.

YAKIMA RIVER AT CLE ELUM, WASH.

LOCATION.—In sec. 27, T. 20 N., R. 15 E., at highway bridge at Cle Elum, in Kittitas County, just above Roslyn Creek, 3 miles below Cle Elum River, and 6½ miles above Teanaway River.

DRAINAGE AREA.—500 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 24, 1906, to September 30, 1915.

GAGE.—Friez water-stage recorder installed July 12, 1911, on right bank under highway bridge; inspected daily by T. J. Denny. Since August 12, 1910, vertical and inclined staff on right bank 30 feet below bridge. Prior to August 12, 1910, chain gage attached to upstream handrail of bridge at datum varying from 0.14 foot higher to 0.12 foot lower than that of present gage.

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

CHANNEL AND CONTROL.—Gravel and cobblestones; fairly permanent. One channel at all stages. Control at low water formed by broad riffle about 1,200 feet below gage, at high water by a section of stream bed extending about one-fourth mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.63 feet at 8 a. m. March 27 (discharge, 7,360 second-feet); minimum stage from recorder, 1.11 feet at 6 p. m. September 30 (discharge, 192 second-feet).

1906–1915: Maximum stage, estimated from high-water marks, 12.5 feet November 14, 1906 (discharge, approximately 25,600 second-feet); minimum stage recorded, 1.11 feet at 6 p. m. September 30, 1915 (discharge, 192 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSION.—None.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs. Monthly discharge, without storage, determined from records of stage at reservoirs.

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ACCURACY.—Results excellent except at extremely low water and when stage-discharge relation may have been slightly affected by ice. Rating curve well defined above 300 second- feet.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River at Cle Elum, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	F. E. Moxley	2.37	800	Mar. 27	F. E. Moxley	6.48	6,980
5	Taylor and Tuttle	1.61	353	Apr. 6	do	5.23	4,270
8	do	2.13	645	14	do	4.70	3,300
Nov. 9	F. E. Moxley	3.98	2,390	May 5	G. L. Parker	3.21	1,490
Feb. 11	do	1.38	321	June 17	F. E. Moxley	3.14	1,400
Mar. 11	do	1.60	387	July 8	do	3.35	1,590

Daily discharge, in second-feet, of Yakima River at Cle Elum, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	791	889	1,890	663	319	331	2,470	1,680	1,180	1,780	1,060	388
2	846	910	1,830	620	314	348	4,120	1,590	1,100	1,780	984	379
3	819	1,500	1,780	579	306	361	6,360	1,550	976	1,780	947	366
4	554	2,400	1,680	540	298	398	6,360	1,590	579	1,780	860	353
5	393	3,120	1,590	518	294	417	5,340	1,550	700	1,780	825	339
6	379	3,430	1,550	508	302	426	4,400	1,460	832	1,780	785	327
7	361	3,190	1,290	497	302	421	3,850	1,500	984	1,730	758	310
8	591	2,680	984	481	302	417	3,600	1,640	1,140	1,500	712	314
9	752	2,400	947	426	298	407	3,270	1,780	1,260	1,340	675	331
10	765	2,190	1,060	417	294	375	2,960	1,890	1,060	1,340	650	323
11	681	2,190	1,020	403	290	375	2,750	1,890	984	1,380	650	319
12	675	2,400	947	393	283	388	2,820	1,780	1,020	1,420	626	306
13	669	2,610	846	393	275	413	2,890	1,640	1,060	1,420	614	302
14	663	2,610	669	388	275	639	3,040	1,550	984	1,420	603	294
15	656	2,190	557	384	267	798	2,960	1,460	1,220	1,420	603	283
16	669	1,940	529	384	267	984	2,680	1,340	1,420	1,420	597	271
17	681	1,780	603	370	275	1,020	2,750	1,300	1,460	1,420	597	267
18	700	1,730	574	361	275	1,020	3,040	1,260	1,550	1,420	585	264
19	812	1,730	540	357	275	984	3,270	1,260	1,550	1,420	568	256
20	984	1,730	1,020	357	275	1,100	3,350	1,260	1,550	1,420	551	256
21	1,100	1,830	1,100	361	283	1,340	3,190	1,260	1,590	1,380	540	249
22	1,060	1,890	867	384	286	1,590	2,960	1,220	1,420	1,380	529	249
23	1,680	1,940	700	403	290	2,060	2,610	1,180	1,500	1,300	508	245
24	1,780	1,940	694	388	302	2,470	2,260	1,220	1,590	1,260	502	242
25	1,680	1,890	681	388	314	2,540	2,120	1,140	1,640	1,220	492	239
26	1,550	1,890	681	393	327	2,580	2,060	1,060	1,730	1,220	481	239
27	1,460	1,890	669	436	323	5,900	1,890	1,180	1,730	1,220	466	235
28	1,100	1,890	540	524	327	3,850	1,830	1,180	1,780	1,180	446	218
29	965	1,940	529	426	.....	2,820	1,780	1,340	1,780	1,180	426	202
30	1,380	1,890	546	357	.....	2,540	1,780	1,340	1,780	1,180	417	199
31	1,140	.....	694	348	.....	2,260	.....	1,260	.....	1,100	403	.....

Monthly discharge of Yakima River at Cle Elum, Wash., for year ending Sept. 30, 1915.

[Drainage area, 500 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.[a]	Without storage.	Mean.	Per square mile.		
October	1,780	361	914	56,200	− 7,620	48,600	790	1.58	1.82	A.
November	3,430	889	2,090	124,000	+17,700	142,000	2,390	4.78	5.33	A.
December	1,890	529	955	58,700	−10,100	48,600	790	1.58	1.82	B.
January	663	348	434	26,700	− 459	26,200	426	.852	.98	B.
February	327	267	294	16,300	+ 5,200	21,500	387	.774	.81	A.
March	5,900	331	1,340	82,400	+ 8,470	90,900	1,480	2.96	3.41	A.
April	6,360	1,780	3,160	188,000	+29,500	218,000	3,660	7.32	8.17	A.
May	1,890	1,060	1,430	87,900	+19,800	108,000	1,760	3.52	4.06	A.
June	1,780	579	1,300	77,400	−22,900	54,500	916	1.83	2.04	A.
July	1,780	1,100	1,430	87,900	−56,600	31,300	509	1.02	1.18	A.
August	1,060	403	628	38,600	−17,500	21,100	343	.686	.79	A.
September	388	199	286	17,000	− 2,800	14,200	239	.478	.53	A.
The year	6,360	199	1,190	861,000	−37,300	825,000	1,140	2.28	30.94	

[a] Combined storage of Keechelus, Kachess and Cle Elum reservoirs.

YAKIMA RIVER AT UMTANUM, WASH.

LOCATION.—In sec. 20, T. 16 N., R. 19 E., at Umtanum, in Kittitas County, half a mile above Umtanum Creek, and 10 miles south of Ellensburg.

DRAINAGE AREA.—1,620 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—August 25, 1906, to May 20, 1907; August 10, 1907, to September 30, 1915.

GAGE.—Since July 10, 1914, Stevens water-stage recorder referred to vertical staff gage on right bank 100 feet east of Northern Pacific Railway section house at Umtanum; inspected daily by Tom Letos. Barrett & Lawrence water-stage recorder in use September 28, 1911, to July 9, 1914. Vertical staff gage, at same location but at datum 0.16 foot higher than present gage, in use prior to June 26, 1908. From June 26, 1908, to July 9, 1914, cantilever chain gage, at datum 0.13 foot higher than present gage prior to January 1, 1911, and at approximately same datum as present gage thereafter.

DISCHARGE MEASUREMENTS. Made from cable 100 feet above gage or by wading.

CHANNEL AND CONTROL.—Rocks and gravel, slightly shifting; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.41 feet at 11 a. m. April 4 (discharge, 9,350 second-feet); minimum stage from recorder, 2.95 feet at 3 p. m. September 21 (discharge, 154 second-feet).

1906–1915: Maximum stage estimated from high-water marks, 14.2 feet November 15 or 16, 1906 (discharge, approximately 41,000 second-feet); minimum stage from water-stage recorder on September 21, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow determined from discharge measurements and record of temperature.

DIVERSIONS.—Water diverted above gage for irrigation of about 40,000 acres in Kittitas valley.

REGULATION.—Flow partly regulated by diversions and by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs.

ACCURACY.—Results excellent except when flow was below 250 second-feet and when stage-discharge relation was affected by ice.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River at Umtanum, Wash., during the year ending, Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct 6	R. S. Calland	3.55	591	Apr 7	F. E. Moxley	6.38	5,670
9	Tuttle and Taylor	3.52	535	May 6	Taylor and Parker	4.48	1,670
Feb 13	F. E. Moxley	3.43	473	June 5	F. E. Moxley	3.67	670
Mar 17	.....do	4.80	2,060	18	.....do	4.21	1,250
27	.....do	6.74	7,020	July 9	.....do	4.22	1,240

Daily discharge, in second-feet, of Yakima River at Umtanum, Wash., from Sept. 1, 1914 to Sept. 30, 1915.

Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,220	1,010	1,300	2,300	1,160	.....	1,020	3,280	1,910	1,370	1,550	931	284
2	1,280	1,040	1,140	2,300	941	.....	1,070	4,920	1,840	1,190	1,540	882	271
3	1,280	1,040	1,620	2,220	853	.....	1,120	8,050	1,740	1,080	1,540	824	299
4	1,280	1,010	2,390	2,060	824	.....	1,340	9,310	1,660	913	1,530	756	306
5	1,280	843	3,060	1,910	795	569	1,400	8,230	1,630	680	1,550	709	246
6	1,280	662	3,620	1,840	756	550	1,230	6,810	1,580	662	1,550	662	234
7	1,230	487	3,620	1,770	728	532	1,170	5,820	1,530	737	1,580	624	221
8	1,210	487	3,280	1,430	718	541	1,120	5,360	1,600	785	1,500	587	205
9	1,160	624	2,860	1,250	709	541	1,090	4,920	1,770	954	1,240	578	194
10	1,090	843	2,670	1,190	662	541	1,070	4,370	1,990	1,000	1,160	541	199
11	1,030	872	2,570	1,330	633	523	1,030	3,980	2,060	892	1,160	487	205
12	1,020	882	2,670	1,370	624	523	1,040	3,980	1,990	892	1,220	478	205
13	1,020	911	2,960	1,230	624	487	1,020	4,110	1,910	901	1,230	469	216
14	1,060	901	3,170	1,120	624	496	1,110	4,110	1,840	901	1,250	451	216
15	1,100	882	2,860	1,110	624	505	1,560	4,110	1,770	921	1,240	425	205
16	1,160	853	2,570	1,110	633	478	1,990	3,980	1,640	1,050	1,250	425	205
17	1,150	862	2,300	990	596	496	2,060	3,740	1,690	1,180	1,230	425	189
18	1,140	853	2,140	862	633	514	1,990	3,620	1,730	1,250	1,180	425	178
19	1,180	901	2,220	795	709	514	1,910	4,110	1,630	1,320	1,200	392	167
20	1,180	1,040	2,140	862	633	505	1,840	4,110	1,580	1,370	1,170	366	183
21	1,170	1,180	2,300	1,400	596	569	2,060	3,980	1,530	1,380	1,160	358	167
22	1,160	1,240	2,480	1,630	514	624	2,570	3,740	1,460	1,330	1,130	358	205
23	1,160	1,390	2,480	1,300	578	671	3,060	3,390	1,420	1,270	1,110	358	178
24	1,150	1,840	2,390	1,380	569	699	3,740	3,060	1,430	1,360	1,030	351	189
25	1,140	1,840	2,390	1,420	560	843	3,860	3,060	1,460	1,400	1,000	328	178
26	1,130	1,770	2,390	1,500	.....	970	3,390	3,060	1,340	1,490	970	314	172
27	1,130	1,700	2,390	1,290	.....	921	5,400	2,640	1,280	1,500	970	299	194
28	1,120	1,550	2,390	1,220	.....	941	5,360	1,990	1,250	1,580	961	306	183
29	1,010	1,220	2,390	1,300	.....	.....	3,980	1,910	1,420	1,580	961	291	183
30	1,010	1,300	2,390	1,320	.....	.....	3,620	1,910	1,500	1,560	990	284	178
31	.....	1,500	.....	1,140	.....	.....	3,390	.....	1,510	.....	990	284	.....

NOTE.—Discharge determined as follows: Sept. 7-27, 1914 (revised since publication in Water-Supply Paper 392), by method devised for shifting control; Sept. 28, 1914, to Sept. 30, 1915, from rating curve well defined above and fairly well defined below 250 second-feet. Stage-discharge relation seriously affected by ice during winter; flow estimated from current-meter measurements and records of temperature as follows: Jan. 26-30, 625 second-feet; Jan. 31-Feb. 4, 600 second-feet.

Monthly discharge of Yakima River at Umtanum, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,840	487	1,080	66,400	A.
November	3,620	1,140	2,500	149,000	A.
December	2,300	795	1,420	87,300	B.
January	1,160	514	678	41,700	B.
February	970	478	605	33,600	B.
March	5,400	1,020	2,180	134,000	A.
April	9,310	1,910	4,320	257,000	A.
May	2,060	1,250	1,640	101,000	A.
June	1,580	662	1,150	68,400	A.
July	1,580	961	1,230	75,600	A.
August	931	284	483	29,700	A.
September	306	167	208	12,400	B.
The year	9,310	167	1,460	1,060,000	

NOTE.—Revised mean discharge for September, 1914, 1,150 second-feet; run-off, 68,500 acre-feet.

YAKIMA RIVER NEAR WAPATO, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., below Sunnyside diversion dam, 2 miles below Union Gap, 3 miles north of Wapato, in Yakima County, and 11 miles below Naches River.

DRAINAGE AREA.—3,560 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—April 25, 1908, to September 30, 1915.

GAGE.—From February 18, 1909, to October 23, 1914, cantilever chain gage on left bank about 600 feet below Sunnyside diversion dam; datum lowered 2.00 feet January 1, 1914. After October 23, inclined staff at same site and datum. Stevens water-stage recorder installed August 17, 1915; prior to that date gage read to hundredths two or three times daily by Henry Hanson. From September 25, 1908, to February 17, 1909, hook gage in stilling well anchored to retaining wall on left bank, 25 feet above head gate of Sunnyside canal; datum at same elevation as crest of diversion dam.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet above gage or by wading.

CHANNEL AND CONTROL.—Solid rock, large boulders, and gravel. One channel at all stages. Control formed by diagonal riffle just below Oregon-Washington Railroad & Navigation Co.'s bridge and about 250 feet below gage; may shift slightly during extreme floods. Supports of railway bridge form partial control at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.44 feet at 6.15 a. m. April 4 (discharge, 15,500 second-feet); minimum stage from water-stage recorder, 1.23 feet August 27 and 28 (discharge, practically zero).

1908–1915: Maximum stage recorded, 9.82 feet November 25, 1909 (discharge, 33,400 second-feet); minimum stage recorded, −0.65 foot October 26, 1911, and 1.23 feet August 27 and 28, 1915 (discharge, practically zero).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—Water diverted above gage for irrigation of about 250,000 acres of land.

REGULATION.—Flow partly regulated by diversions and by storage and release of water at Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Results excellent except at low water and when stage-discharge relation may have been affected by ice.

COOPERATION.—Records of discharge and measurements, furnished by United States Reclamation Service.

Discharge measurements of Yakima River near Wapato, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	H. W. Humphrey	3.75	921	June 11	F. E. Moxley	2.11	79
Nov. 11	do	5.99	3,720	14	do	1.58	10
Jan. 29	Calland and Moxley	4.01	1,130	28	do	2.19	102
Mar. 22	F. E. Moxley	6.00	4,010	Aug. 10	do	1.62	14
Apr. 3	do	9.07	13,600	19	do	1.62	13
May 8	Taylor and Paulsen	3.99	1,190	Sept. 24	R. S. Calland	1.63	18
June 7	Moxley and Calland	2.77	333	24	Calland and Moxley	1.62	16

Daily discharge, in second-feet, of Yakima River near Wapato, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	651	2,060	4,040	1,680	1,100	1,800	5,300	1,680	1,450	86	24	2
2	684	2,200	3,850	1,680	1,130	1,800	8,280	1,680	1,130	55	11	14
3	751	2,960	4,040	1,450	1,130	1,800	13,300	1,680	823	53	12	5
4	684	4,860	3,660	1,560	1,030	2,060	15,300	1,340	620	237	8	7
5	499	5,080	3,480	1,450	1,130	2,490	12,800	1,230	340	350	24	6
6	417	5,530	3,300	1,340	1,030	2,200	10,800	1,080	310	401	6	10
7	370	5,760	3,300	1,340	1,030	2,060	9,300	985	281	320	6	7
8	267	5,300	3,130	1,280	1,030	2,060	8,610	1,130	272	209	7	4
9	355	4,650	2,640	1,280	1,030	1,930	7,960	1,450	114	30	15	6
10	684	4,240	2,340	1,230	1,030	1,930	7,350	2,200	228	7	8	8
11	860	4,040	2,060	1,180	1,030	1,930	6,510	2,200	102	8	12	19
12	860	4,040	2,060	1,180	985	1,930	6,510	1,930	39	10	13	17
13	1,030	4,650	1,930	1,180	940	1,930	6,780	1,800	12	34	15	24
14	940	5,080	1,800	1,180	940	1,930	6,510	1,680	12	136	5	22
15	940	4,650	1,800	1,080	900	2,640	6,250	1,450	12	64	3	14
16	1,080	4,240	1,680	985	940	2,800	6,000	1,230	8	84	7	28
17	1,080	4,040	1,560	985	1,030	3,660	5,760	1,340	246	109	25	12
18	1,130	3,660	1,230	1,030	1,030	3,480	6,250	1,680	201	64	23	6
19	1,280	3,480	1,340	1,080	985	3,300	6,780	1,450	119	48	19	9
20	1,560	3,480	1,560	1,080	985	3,300	6,510	1,450	111	22	15	9
21	1,680	4,040	1,930	985	1,130	3,480	6,000	1,230	150	35	5	16
22	1,680	4,240	2,200	860	1,180	4,040	4,650	1,080	109	58	18	12
23	1,680	4,240	2,640	860	1,280	5,530	4,040	985	18	73	6	18
24	2,200	4,240	2,340	940	1,340	6,000	3,300	1,030	13	37	2	18
25	2,340	4,040	2,340	860	1,560	6,250	2,800	985	88	22	0	12
26	2,340	4,040	2,200	786	1,680	5,760	2,490	860	58	13	0	17
27	2,340	4,040	2,060	860	1,560	5,760	2,060	823	93	13	0	12
28	2,340	4,040	1,930	940	1,560	7,960	1,680	1,280	102	44	0	13
29	1,930	4,040	1,680	1,180	.....	6,250	1,680	1,560	114	25	1	14
30	1,560	4,040	1,560	1,340	.....	5,530	1,680	1,450	95	62	5	17
31	1,930	.....	1,560	1,230	.....	5,530	.....	1,560	.....	88	1	.....

NOTE.—Discharge Oct. 1-20, ascertained from a well-defined rating curve; Oct. 21 to Sept. 30, from a rating curve poorly defined below 75 second-feet, fairly well defined from 75 to 350 second-feet, and well defined above that point.

Monthly discharge of Yakima River near Wapato, Wash., New Reservation, Old Reservation, and Sunnyside canals, for the year ending Sept. 30, 1915.

Month.	Discharge (second-feet).							Run-off in acre-feet.	
	River.			New Reservation canal (mean).	Old Reservation canal (mean).	Sunnyside canal (mean.)	Total mean.[a]	River.	Total.[a]
	Maximum.	Minimum.	Mean.						
October	2,340	267	1,230	70.5	36.3	357	1,690	75,600	104,000
November	5,760	2,060	4,170	.....	.....	18.3	4,190	248,000	249,000
December	4,040	1,230	2,360	.....	.....	.....	2,360	145,000	145,000
January	1,680	786	1,160	.....	.....	.....	1,160	71,600	71,300
February	1,680	900	1,130	.....	.....	.....	1,130	63,000	62,800
March	7,960	1,800	3,520	.....	.....	184	3,700	216,000	228,000
April	15,300	1,680	6,440	269	130	671	7,510	383,000	447,000
May	2,200	823	1,400	596	236	852	3,080	86,300	189,000
June	1,450	8	242	541	152	891	1,830	14,400	109,000
July	401	7	90.2	469	134	913	1,610	5,550	99,000
August	25	0	9.55	315	43.3	473	841	587	51,700
September	28	2	12.6	120	5.1	248	386	750	23,000
The year	15,300	0	1,810	.....	.....	.....	2,460	1,310,000	1,780,000

[a] Totals are comparable with monthly values previously determined for Yakima River at Union Gap, near Yakima, Wash.

NOTE.—For records of flow of the three canals see pp. 239–243.

YAKIMA RIVER NEAR PROSSER, WASH.

LOCATION.—In the SE. ¼ sec. 36, T. 9 N., R. 24 E., 1¼ miles northeast of Prosser, in Benton County, 40 miles above mouth.

DRAINAGE AREA.—5,340 square miles (measured on project map of United States Reclamation Service).

RECORDS AVAILABLE.—June 1 to October 10, 1904; June 8 to December 30, 1905; February 1 to October 12, 1906; and August 4 ,1913, to September 30, 1915.

GAGE.—Since August 4, 1913, Stevens water-stage recorder referred to vertical and inclined staff on right bank, 1¼ miles below Prosser and Prosser Falls; inspected once daily by T. Martinson. From June 1, 1904, to December 30, 1905, chain gage on highway bridge 600 feet below Prosser Falls. From February 1 to October 12, 1906, inclined staff at approximately same site as present gage but at different datum.

DISCHARGE MEASUREMENTS.—Made from cable 1,000 feet above gage or from a boat.

CHANNEL AND CONTROL.—Rock and large boulders; will not change except during floods. Control formed by broad riffle about 800 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.12 feet at 1 p. m. April 5 (discharge, 14,200 second-feet); minimum stage from recorder, 0.64 foot at 6 p. m. September 29 (discharge, 272 second-feet).

1904–1906 and 1914–15: Maximum flow measured by floats (not referred to gage) at 3 p. m. November 17, 1906 (discharge, 62,800 second-feet); maximum stage occurred at 9 a. m. on same date at stage three-fourths inch above that of measurement; minimum stage recorded, 2.60 feet August 19, 26, 30, 31 and September 30, 1906 (discharge, approximately 40 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSION.—Water diverted above gage for irrigation of about 250,000 acres of land.

REGULATION.—Flow partly regulated by diversions and by storage and release of water of Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Rating curve well defined above 600 second-feet and fairly well defined below. Results excellent October to May except for short intervals during December and January, when stage-discharge relation may have been slightly affected by ice; good for remainder of year.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River near Prosser, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	Tuttle and Taylor	2.47	1,170	Mar. 26	F. E. Moxley	6.35	6,880
15	H. W. Humphrey	2.73	1,370	29	Paul Taylor	6.99	8,350
Nov. 12	do	4.91	3,920	May 7	Parker and Taylor	3.18	1,870
Jan. 23	do	2.57	1,260	June 25	F. E. Moxley	1.28	433
Feb. 13	do	2.82	1,310	25	do	1.27	432
Mar. 9	F. E. Moxley	3.86	2,580	Sept. 30	Calland and Moxley	1.05	369

Daily discharge, in second-feet, of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,230	2,500	4,140	2,060	1,620	2,330	6,350	2,330	1,890	395	353	343
2	1,190	2,440	4,140	2,170	1,570	2,440	6,560	2,330	1,840	395	380	351
3	1,170	2,550	4,140	2,060	1,570	2,390	9,920	2,330	1,620	364	380	348
4	1,190	3,800	4,140	1,890	1,520	2,500	13,200	2,280	1,320	375	377	321
5	1,160	5,150	3,890	1,780	1,520	2,920	13,800	2,110	1,090	461	389	301
6	1,090	5,550	3,730	1,840	1,570	2,920	12,900	2,000	904	453	380	336
7	948	5,950	3,580	1,950	1,520	2,730	11,300	1,840	828	458	380	343
8	911	5,750	3,510	1,840	1,470	2,670	10,200	1,670	776	506	348	343
9	841	5,150	3,240	1,840	1,520	2,610	9,400	1,780	751	510	372	340
10	855	4,770	2,980	1,780	1,520	2,610	8,630	2,060	698	461	369	340
11	1,190	4,410	2,790	1,730	1,620	2,550	7,890	2,440	586	395	367	336
12	1,370	4,060	2,550	1,670	1,520	2,550	7,430	2,500	515	428	361	314
13	1,370	4,320	2,110	1,670	1,470	2,550	7,430	2,390	497	410	361	328
14	1,420	4,770	2,110	1,670	1,470	2,610	7,660	2,280	510	395	353	340
15	1,420	5,150	2,060	1,620	1,470	2,920	7,210	2,110	488	392	330	346
16	1,470	4,770	2,280	1,520	1,420	3,660	6,770	1,950	480	392	356	340
17	1,570	4,410	2,280	1,420	1,420	4,410	6,560	1,890	457	392	351	343
18	1,570	4,060	2,060	1,420	1,470	4,410	6,350	1,950	434	356	358	343
19	1,620	3,810	1,950	1,420	1,520	4,410	6,770	2,060	445	389	348	321
20	1,780	3,730	1,840	1,470	1,520	4,140	7,210	2,000	414	407	346	336
21	2,000	3,660	2,170	1,470	1,570	3,970	6,990	1,890	438	404	343	346
22	2,100	4,230	2,170	1,370	1,620	4,320	6,350	1,780	431	395	307	346
23	2,170	4,500	2,280	1,280	1,670	4,960	5,350	1,670	417	392	330	338
24	2,170	4,410	2,500	1,280	1,780	5,750	4,500	1,620	407	383	364	312
25	2,610	4,320	2,330	1,230	2,060	6,770	3,730	1,570	410	356	361	307
26	2,790	4,230	2,170	1,190	2,170	6,770	3,370	1,520	424	380	351	319
27	2,730	4,230	2,280	1,160	2,390	6,560	2,980	1,420	410	383	330	336
28	2,730	4,230	2,330	1,140	2,220	7,660	2,670	1,230	401	377	340	351
29	2,730	4,230	2,220	1,320	.....	8,380	2,440	1,620	407	375	310	314
30	2,440	4,320	2,110	1,520	.....	6,990	2,330	2,000	389	372	343	312
31	2,220	.....	2,000	1,670	.....	6,560	.....	1,950	.....	377	351	.....

Monthly discharge of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,790	841	1,680	103,000	A.
November	5,950	2,440	4,320	257,000	A.
December	4,140	1,840	2,710	167,000	B.
January	2,170	1,140	1,600	98,100	B.
February	2,390	1,420	1,630	90,800	A.
March	8,380	2,330	4,160	256,000	A.
April	13,800	2,330	7,140	425,000	A.
May	2,500	1,230	1,950	120,000	A.
June	1,890	389	689	41,000	B.
July	510	356	404	24,800	B.
August	389	307	354	21,800	B.
September	351	301	333	19,800	B.
The year	13,800	301	2,240	1,620,000	

YAKIMA RIVER AT KIONA, WASH.

LOCATION.—In sec. 19, T. 9 N., R. 27 E., at highway bridge at Kiona, in Benton County, about 3½ miles below intake of Kiona canal, and about 25 miles above mouth.

DRAINAGE AREA.—5,520 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—August 20, 1895, to March 31, 1915, when station was discontinued.

GAGE.—Chain gage on upstream guardrail of bridge about 1,800 feet northwest of Northern Pacific Railway station at Kiona; read to hundredths once daily by J. H. Kennedy.

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

CHANNEL AND CONTROL.—Gravel and boulders; slightly shifting at high stages. One channel at all stages. Control formed by broad riffle about 1,000 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1914, to March 31, 1915, 9.20 feet at 9 a. m., March 29 (discharge, 8,980 second-feet); minimum stage recorded, 4.00 feet at 9 a. m. October 11 (discharge, 725 second-feet).

1896–1915: Maximum stage recorded, 19.78 feet, November 17, 1906 (discharge, 63,500 second-feet); minimum stage recorded, 2.35 feet, September 11, 1906 (discharge, 105 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curves assumed applicable.

DIVERSIONS.—Water diverted above gage for irrigation of about 260,000 acres of land.

REGULATION.—Flow partly regulated by diversions and by storage and release of water at Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Stage-discharge relation possibly affected slightly by ice for short periods in December and January. Results fair for October, good November to March.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Yakima River at Kiona, Wash., during the period Oct. 1, 1914, to Mar. 31, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	H. W. Humphrey.....	4.37	1,160	Feb. 15	H. W. Humphrey.....	4.66	1,410
Nov. 9	.....do.....	7.51	5,360	Mar. 9	F. E. Moxley.....	5.75	2,740
Dec. 14	.....do.....	5.29	1,780	25	.....do.....	8.27	6,750
Jan. 21	.....do.....	4.72	1,510				

Daily discharge, in second-feet, of Yakima River at Kiona, Wash., from Oct. 1, 1914, to Mar. 31, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	1,210	2,300	4,160	1,820	1,580	2,270	16	1,320	4,860	1,710	1,480	1,390	3,330
2	1,210	2,300	4,160	1,930	1,580	2,270	17	1,320	4,500	1,930	1,480	1,390	4,500
3	1,160	2,300	4,160	1,930	1,580	2,540	18	1,320	4,160	1,710	1,390	1,480	4,500
4	1,210	3,170	4,160	1,710	1,580	2,400	19	1,320	3,820	1,710	1,390	1,480	4,680
5	1,260	4,680	3,820	1,710	1,480	2,680	20	1,500	3,820	1,600	1,480	1,480	4,160
6	1,160	5,040	3,820	1,600	1,580	3,100	21	1,820	3,650	1,410	1,390	1,480	4,160
7	1,000	5,600	3,650	1,710	1,480	3,100	22	1,930	4,160	1,500	1,390	1,580	4,160
8	1,000	5,800	3,490	1,820	1,480	2,820	23	1,930	4,500	1,820	1,210	1,580	4,500
9	920	5,410	3,170	1,780	1,480	2,680	24	1,930	4,500	2,170	1,210	1,680	5,040
10	843	4,860	2,860	1,780	1,480	2,680	25	2,300	4,330	2,300	1,160	1,780	5,600
11	725	4,500	2,570	1,680	1,480	2,680	26	2,710	4,160	2,300	1,160	2,140	6,800
12	1,050	4,160	2,300	1,580	1,480	2,680	27	2,710	3,820	2,050	1,000	2,140	6,400
13	1,230	4,330	1,820	1,580	1,480	2,680	28	2,570	4,330	2,170	1,160	2,140	7,000
14	1,230	4,860	1,930	1,580	1,480	2,820	29	2,570	4,330	2,300	1,300	.....	8,980
15	1,230	5,220	1,600	1,580	1,480	2,820	30	2,300	4,330	2,050	1,580	.....	7,840
							31	2,050	.....	1,820	1,680	.....	6,800

NOTE.—Discharge ascertained from two fairly well defined curves applicable Oct. 1–10, Jan. 9 to Mar. 15; and Oct. 11 to Jan. 8, Mar. 16–31.

Monthly discharge of Yakima River at Kiona, Wash., for the period Oct. 1, 1914, to Mar. 31, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2,710	725	1,550	95,200	C.
November	5,800	2,300	4,260	253,000	B.
December	4,160	1,410	2,520	155,000	B.
January	1,930	1,000	1,520	93,700	B.
February	2,140	1,390	1,590	88,100	B.
March	8,980	2,270	4,150	255,000	B.
The period	.....	.....	.....	940,000	

KACHESS LAKE NEAR EASTON, WASH.

LOCATION.—In sec. 34, T. 21 N., R. 13 E. (unsurveyed), at lake outlet, 2½ miles northwest of Easton, in Kittitas County.

DRAINAGE AREA.—63 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 20, 1905, to September 30, 1915.

GAGE.—In three sections; datum, mean sea level; read to hundredths twice daily by I. Pennington. Highest section, installed October 6, 1914, is inclined and is anchored to rock paving on upstream face of storage dam, between outlet conduit and east end of dam; middle section, installed October 31, 1914, is inclined and is anchored to rock paving on upstream face of back fill dam at former outlet of lake; lowest section, installed September 28, 1915, is set vertically in dredged

channel about half way between back fill dam and open water in lake. Original gage used until September 5, 1911, was a vertical staff on east side of lake, at boat landing, 400 feet above temporary timber crib dam at outlet; zero at elevation 2,226.02 feet. From September 6, 1911, until installation of present sections, a vertical staff on face of gate tower at outlet through new storage dam.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 2,227.55 feet June 12 (storage, 99,860 acre-feet); minimum stage recorded, 2,197.73 feet September 26–27 (storage, 13,730 acre-feet).

1906–1915: Maximum stage recorded, 2,235.50 feet at 6 p. m. November 15, 1906 (storage, present storage plane, 128,620 acre-feet); minimum stage recorded, 2,197.73 feet, September 26–27, 1915 (storage, 13,730 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 221,000 acre-feet (revised). Elevation of gate sill and spillway crest, 2,192.75 feet and 2,258.00 feet, respectively. Storage or release each month used for determining discharge, without storage, for gaging station below dam.

COOPERATION.—Computations of storage furnished by United States Reclamation Service.

Storage in acre-feet of Kachess Lake near Easton, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	27,240	20,500	29,580	26,990	31,180	36,220	49,160	80,550	96,530	78,100	30,620	15,920
2	26,410	20,640	29,580	27,130	31,460	36,220	50,850	81,270	96,880	76,520	29,470	15,700
3	25,450	22,290	29,440	27,270	31,740	36,360	52,830	81,840	97,230	74,650	28,390	15,500
4	25,590	23,520	29,300	27,270	32,300	36,360	55,090	82,280	97,580	72,780	27,770	15,390
5	25,860	24,900	29,160	27,270	32,860	36,500	56,790	82,710	97,930	71,210	27,130	15,280
6	26,140	25,720	29,020	27,270	33,420	36,640	58,210	83,140	98,280	69,340	26,350	15,170
7	26,280	26,550	28,890	27,270	33,420	36,780	59,630	83,720	98,630	67,620	25,680	15,030
8	25,450	26,820	28,480	27,270	33,560	36,780	60,770	84,300	98,980	66,050	25,070	15,030
9	24,630	27,380	28,200	27,550	33,560	36,920	61,910	84,880	99,330	64,760	24,450	15,090
10	24,080	27,920	28,340	27,690	33,700	36,920	63,050	85,600	99,510	62,910	24,030	14,920
11	23,800	28,200	28,480	27,830	33,700	37,060	64,190	86,040	99,680	61,340	23,560	14,810
12	23,250	28,750	28,680	28,110	33,700	37,200	65,050	86,620	99,860	59,920	23,110	14,700
13	22,840	29,160	28,890	28,390	33,840	37,340	66,190	87,200	99,680	58,070	22,610	14,670
14	22,420	29,850	29,020	28,660	33,840	37,620	67,050	87,780	99,330	56,510	22,140	14,610
15	22,150	29,850	29,020	28,940	33,980	38,460	68,050	88,210	98,980	54,950	21,530	14,480
16	21,880	29,850	29,020	29,220	33,980	38,740	69,050	88,500	98,280	53,390	20,950	14,390
17	21,600	29,850	29,020	29,360	33,980	39,160	70,060	89,080	97,580	51,840	20,360	14,390
18	21,460	29,580	29,020	29,500	34,260	39,590	70,920	89,520	96,530	50,140	20,110	14,360
19	21,880	29,580	28,890	29,500	34,400	40,150	72,070	89,960	95,650	48,450	19,610	14,280
20	21,740	29,580	28,610	29,640	34,400	40,710	73,220	90,390	94,780	46,900	19,330	14,200
21	21,740	29,580	28,060	29,640	34,540	41,270	74,220	90,680	93,920	45,210	19,000	14,120
22	22,150	29,580	27,650	29,780	34,820	41,690	75,080	91,150	92,700	43,520	18,690	14,000
23	21,320	29,580	27,380	29,780	35,100	42,120	75,940	91,670	91,320	42,120	18,390	13,980
24	20,910	29,440	27,100	29,780	35,520	42,680	76,520	92,180	89,810	40,710	18,080	13,840
25	20,500	29,580	26,820	29,780	35,800	43,520	77,090	92,700	88,210	39,300	17,780	13,780
26	20,090	29,580	26,550	29,920	35,940	44,360	77,520	93,050	86,620	37,760	17,470	13,730
27	19,810	29,580	26,280	30,060	35,940	45,070	78,100	93,570	85,020	36,220	17,140	13,730
28	20,640	29,580	26,550	30,340	36,080	45,630	78,680	94,440	83,290	35,100	16,860	13,920
29	20,500	29,580	26,550	30,620	.....	46,480	79,400	94,960	81,560	33,860	16,580	13,920
30	20,500	29,580	26,820	30,760	.....	47,320	79,970	95,480	79,970	32,690	16,330	13,980
31	20,500	.....	26,820	30,900	.....	48,030	.....	96,000	.....	31,710	16,140	.....

KACHESS RIVER NEAR EASTON, WASH.

LOCATION.—In sec. 3, T. 20 N., R. 13 E., one-fourth mile below Kachess storage dam, three-fourths mile above mouth, and 2 miles northwest of Easton, in Kittitas County.

DRAINAGE AREA.—63 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 20, 1903, to September 30, 1915.

GAGE.—Since July 22, 1913, Stevens water-stage recorder; inspected once each day by I. Pennington. Inclined staff on left bank, one-fourth mile below Kachess storage dam, in use since station was established. It was reconstructed at same site and datum January 10, 1906.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below gage or by wading.

CHANNEL AND CONTROL.—Light gravel and sand; shifts frequently. One channel at all stages. Control formed by broad riffle 125 feet below gage. Prior to construction work for new dam in 1911 and 1912, control was formed by large bowlders and was fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.72 feet at 2 p. m. July 2 (discharge, 985 second-feet); minimum flow occurred frequently when gates in dam were closed (discharge, practically zero).

1904–1915: Maximum stage recorded, 8.0 feet at 8.30 a. m. November 16, 1906 (discharge, 1, 760[a] second-feet); minimum flow occurs when gates in dam are closed (discharge, practically zero).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice. Gates closed during part of frozen season.

DIVERSIONS.—None.

REGULATION.—Flow controlled by storage and release of water in Kachess reservoir. Monthly discharge, without storage, determined from records of stage of reservoir.

ACCURACY.—Record of discharge for September doubtful, owing to uncertain date for change in rating.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Kachess River near Easton, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	F. E. Moxley	5.06	422	June 15	F. E. Moxley	4.80	373
Dec. 14	do	3.86	89	July 2	do	6.60	945
May 4	Parker and Taylor	3.20	[b].8	13	do	6.49	895

[a] Revised from original data. A stage of 7.5 feet was reached Nov. 25, 1909, and the discharge of 1,790 second-feet published for this data in Water-Supply Paper 272, p. 174. and Water-Supply Paper 369, p. 62, is probably too large.

[b] Estimated.

Daily discharge, in second-feet, of Kachess River near Easton, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	430	132	243	76	.....	7	8	.....	944	550	134
2	445	132	240	76	.....	10	8	.....	978	520	132
3	318	134	240	76	.....	9	9	.....	978	460	125
4	2	140	240	76	.....	7	8	.....	978	415	130
5	2	145	240	76	.....	6	7	.....	978	385	120
6	2	147	240	76	.....	4	5	.....	944	361	113
7	125	147	240	76	.....	4	5	.....	859	316	109
8	430	147	234	27	.....	4	4	.....	808	289	109
9	385	150	234	.....	.....	2	4	.....	808	283	109
10	361	150	83	.....	.....	2	4	.....	825	274	107
11	325	150	.....	.....	.....	2	4	.....	876	253	102
12	299	150	.....	.....	.....	2	4	85	876	247	100
13	282	196	.....	.....	.....	2	4	217	910	242	98
14	254	243	46	.....	.....	2	4	354	910	236	94
15	226	243	87	.....	1	1	3	271	876	228	92
16	213	243	87	.....	1	1	3	370	876	228	92
17	199	243	87	.....	2	1	3	475	876	222	90
18	189	243	87	.....	3	1	3	550	876	217	87
19	191	243	147	.....	3	1	3	550	876	209	87
20	189	243	226	.....	2	1	3	550	876	206	87
21	149	243	226	.....	2	1	3	612	876	192	83
22	156	243	226	.....	2	1	.....	708	825	190	81
23	311	243	226	.....	2	24	.....	859	774	185	79
24	308	243	223	.....	3	88	.....	910	774	179	79
25	291	243	223	.....	3	129	.....	910	774	174	77
26	279	243	221	.....	2	175	.....	910	774	169	77
27	109	243	132	.....	2	9	.....	944	741	162	53
28	79	240	78	.....	2	9	.....	944	708	154	0
29	127	240	76	.....	2	9	.....	944	660	152	0
30	127	243	76	.....	2	8	.....	944	628	142	0
31	132	.....	76	.....	3	.....	.....	.....	581	137	.....

NOTE.—Discharge Oct. 1 to Apr. 26, ascertained from fairly well defined rating curve; Apr. 27 to Sept. 30, from rating curve fairly well defined between 75 and 300 second-feet, well defined above and poorly defined below those limits. Practically no flow Dec. 11–13, Jan. 9 to Mar. 14, and May 22 to June 11.

Monthly discharge of Kachess River near Easton, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 63 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	445	2	224	13,800	− 7,420	6,380	104	1.65	1.90	B.
November	243	132	202	12,000	+ 9,080	21,100	355	5.63	6.28	B.
December	243	0	154	9,490	− 2,750	6,740	110	1.75	2.02	B.
January	76	0	18	1,110	+ 4,070	5,180	84.2	1.34	1.54	C.
February	0	0	0	0	+ 5,180	5,180	93.3	1.48	1.54	
March	3	0	1.19	73	+12,000	12,100	197	3.13	3.61	D.
April	175	1	17.4	1,040	+31,900	32,900	553	8.78	9.80	C.
May	7	0	3.19	196	+16,000	16,200	263	4.17	4.81	C.
June	944	0	404	24,000	−16,000	8,000	134	2.13	2.38	A.
July	978	581	840	51,600	−48,300	3,300	53.7	.85	.98	A.
August	550	137	257	15,800	−15,600	200	3.25	.05	.06	B.
September	134	0	88.2	5,250	− 2,160	3,090	51.9	.82	.92	C.
The year	978	0	186	134,000	−14,000	120,000	166	2.63	35.84	

CLE ELUM LAKE NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., at lake outlet, 4 miles northwest of Roslyn in Kittitas County, and about 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 4 to June 9, 1906; October 1, 1906, to September 30, 1915.

GAGE.—Since June 17, 1907, vertical staff on left abutment of temporary crib dam, zero at elevation of gate sills, 2,122.75 feet. Considerable fall between lake and dam for stages below 5.0 feet. Auxiliary gages installed October, 1907, and July 16, 1915, at same datum about 200 feet above dam used to obtain true lake elevations at low stages; read to hundredths twice daily by A. D. Nichols. Prior to June 17, 1907, vertical staff in lake above outlet at datum 0.45 foot lower than present gage. Simultaneous readings on this and present gage July 7 to October 31, 1907.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 14.31 feet April 3 (storage, 31,150 acre-feet); minimum stage recorded, 2.11 feet September 30 (storage, 4,380 acre-feet).

1907–1915: Maximum stage recorded, 16.70 feet November 24, 1909 (storage, 37,050 acre-feet); minimum stage estimated, 1.15 feet August 31, 1906 (storage, 2,380 acre-feet).

STORAGE.—Capacity of reservoir, at crest of spillway (gage height, 11.3 feet), 24,100 acre-feet. Storage or release each month used for determining discharge, without storage, for gaging station below dam.

COOPERATION.—Storage records furnished by United States Reclamation Service.

Storage, in acre-feet, of Cle Elum Lake near Roslyn, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8,630	15,130	24,260	18,800	16,380	16,900	26,960	25,420	24,810	13,660	6,840	5,470
2	9,260	16,880	24,210	18,740	16,470	16,920	29,210	25,210	24,540	12,830	6,770	5,430
3	9,310	21,810	22,700	18,630	16,510	17,010	31,150	25,120	24,420	12,100	6,730	5,430
4	9,560	26,080	21,670	18,630	16,550	17,070	30,670	24,810	24,900	11,250	6,560	5,340
5	9,600	27,520	20,720	18,610	16,770	17,030	29,640	24,580	25,300	10,470	6,520	5,340
6	9,730	27,910	20,120	18,610	16,770	17,110	28,880	24,670	25,810	9,510	6,460	5,300
7	9,820	27,570	20,100	18,610	16,770	17,370	28,500	24,980	26,040	8,140	6,370	5,280
8	9,890	27,090	20,880	18,610	16,770	17,570	29,160	25,420	25,900	9,830	6,180	5,180
9	9,950	26,710	21,090	18,610	16,680	17,760	27,980	25,710	25,190	10,360	6,140	5,200
10	10,220	26,470	20,580	18,560	16,680	18,060	27,680	25,940	24,510	10,320	5,910	5,200
11	10,570	26,420	20,490	18,500	16,680	18,350	27,590	25,810	24,380	10,280	5,830	5,200
12	11,030	26,760	20,100	18,480	16,680	18,670	27,700	25,580	23,070	10,170	5,830	5,180
13	11,650	26,950	19,800	18,410	16,680	19,020	27,890	25,260	22,930	10,040	5,740	5,090
14	12,060	26,710	19,470	18,370	16,680	19,060	27,730	25,030	22,710	9,600	5,720	5,090
15	12,390	26,370	19,930	18,280	16,700	19,920	27,150	24,900	22,330	9,300	5,720	5,090
16	12,610	26,040	20,300	18,280	16,680	20,770	26,820	24,580	21,380	9,870	5,720	4,930
17	12,860	25,700	20,600	18,280	16,680	21,740	27,010	24,440	20,900	9,730	5,720	4,860
18	13,140	25,390	20,760	18,110	16,640	23,070	27,750	24,540	20,350	9,350	5,720	4,760
19	13,910	24,620	20,850	18,020	16,640	24,440	28,270	24,580	19,760	9,110	5,680	4,680
20	14,800	24,310	19,340	17,720	16,600	25,260	28,500	24,560	19,110	8,820	5,640	4,680
21	15,580	24,400	17,960	17,610	16,600	25,880	28,270	24,540	18,390	8,540	5,640	4,680
22	15,660	24,790	17,040	17,520	16,640	26,220	27,330	24,440	18,200	8,200	5,640	4,680
23	15,330	24,760	17,040	17,480	16,640	26,870	26,450	24,400	18,110	7,910	5,560	4,680
24	14,460	24,570	17,500	17,460	16,680	27,330	25,850	24,400	18,110	7,740	5,560	4,680
25	14,050	24,480	18,050	17,390	16,640	27,330	25,550	24,400	17,590	7,530	5,530	4,680
26	13,340	24,450	18,140	17,160	16,680	27,100	25,460	24,380	17,090	7,490	5,510	4,570
27	12,790	24,450	18,190	16,700	16,770	26,820	25,440	24,290	16,470	7,360	5,510	4,470
28	13,300	24,450	18,230	16,420	16,810	26,610	25,490	24,760	16,020	7,150	5,510	4,430
29	13,890	24,500	18,300	16,250	.....	26,570	25,530	25,300	15,520	7,090	5,510	4,430
30	13,230	24,310	18,720	16,320	.....	26,640	25,550	25,260	14,840	7,000	5,510	4,380
31	13,520	.....	19,180	16,360	.....	26,680	.....	25,060	.....	6,960	5,510	.....

CLE ELUM RIVER NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., below temporary crib dam at outlet of Cle Elum Lake, 4 miles northwest of Roslyn, in Kittitas County, and 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 10, 1903, to September 30, 1915.

GAGE.—Stevens water-stage recorder, installed October 14, 1913 inspected daily by A. D. Nichols. Since May 17, 1906, vertical and inclined staff on left bank 800 feet below temporary crib dam. Prior to August 28, 1905, inclined gage at same site and datum as present gage. From August 28, 1905, to March 16, 1906, inclined staff at same site but at datum 0.56 foot higher than present gage. Gage height corrected to true datum.

DISCHARGE MEASUREMENTS.—Made from cable about 350 feet below gage or by wading.

CHANNEL AND CONTROL.—Coarse gravel and boulders; shifting at high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.75 feet at 1 p. m. April 3 (discharge, 4,220 second-feet); minimum stage from recorder, 0.54 foot at 10.30 a. m. October 10 (discharge, 41 second-feet).

1904–1915: Maximum stage recorded, 14.05 feet at 2 p. m. November 15, 1906 (discharge, 18,700 second-feet); minimum stage recorded, zero at 6 p. m. September 28, 1914 (discharge, practically zero).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice. Water from Cle Elum reservoir above freezing temperature.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Cle Elum reservoir. Monthly discharge, without storage, determined from records of stage at reservoir.

ACCURACY.—Rating curve well defined. Results excellent.

COOPERATION.—Computed discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Cle Elum River near Roslyn, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 8	Tuttle and Taylor	1.30	166	June 17	F. E. Moxley	3.04	806
Feb. 10	F. E. Moxley	1.24	129	July 3	do	2.86	706
Mar. 13	do	1.02	88	14	do	2.16	385
May 5	Parker and Taylor	3.22	902				

Daily discharge, in second-feet, of Cle Elum River near Roslyn, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	98	183	1,000	216	130	130	1,220	1,060	950	732	307	211
2	111	188	950	216	130	132	2,650	1,000	895	706	300	206
3	123	225	923	216	130	134	4,030	1,000	678	706	291	196
4	137	830	868	213	130	132	3,670	1,060	385	706	285	190
5	147	1,630	840	211	130	130	2,860	950	555	706	279	188
6	155	1,840	785	208	130	132	2,300	895	706	706	276	181
7	161	1,620	416	203	128	134	2,050	978	813	680	273	176
8	161	1,360	200	203	130	136	1,950	1,150	966	483	267	181
9	165	1,180	211	203	130	113	1,780	1,280	1,060	381	264	183
10	92	1,060	442	203	130	94	1,660	1,390	868	385	259	181
11	61	1,060	598	203	130	94	1,540	1,360	840	385	253	171
12	90	1,220	564	203	130	94	1,620	1,250	840	385	250	166
13	114	1,280	506	203	130	168	1,700	1,120	706	385	247	164
14	136	1,150	294	203	130	291	1,780	1,030	647	385	247	160
15	188	1,000	174	203	130	273	1,990	950	813	385	242	153
16	215	868	174	203	130	291	1,580	895	807	389	242	146
17	220	758	176	203	130	279	1,550	868	813	385	239	138
18	261	929	176	200	130	226	1,880	868	813	389	242	134
19	333	895	323	200	130	201	2,100	895	813	389	245	134
20	403	895	628	198	130	385	2,200	895	813	385	242	136
21	467	950	706	198	130	608	2,100	868	758	385	245	134
22	507	1,000	680	198	130	840	2,000	868	560	385	242	134
23	662	1,000	396	198	130	1,120	1,580	813	560	385	242	132
24	783	950	211	196	130	1,360	1,280	813	564	349	239	130
25	733	923	206	193	130	1,390	1,150	813	603	323	239	130
26	733	923	206	190	130	1,250	1,120	813	654	329	239	126
27	708	923	206	272	130	1,090	1,090	813	680	326	236	124
28	359	923	211	303	130	1,000	1,090	895	706	329	231	120
29	314	923	218	216	.....	978	1,120	1,000	706	329	226	120
30	593	895	218	128	.....	1,000	1,120	1,060	732	329	221	113
31	583	.....	216	126	.....	1,030	.....	1,000	.....	319	213	.....

NOTE.—Discharge ascertained from well-defined rating curves applicable Oct. 1 to Nov. 6, and Nov. 7 to Sept. 30.

Monthly discharge of Cle Elum River near Roslyn, Wash., for year ending Sept. 30, 1915.

[Drainage area, 202 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	783	61	317	19,500	+ 5,090	24,600	400	1.98	2.28	A.
November	1,840	183	986	58,700	+10,800	69,500	1,170	5.79	6.46	A.
December	1,000	174	443	27,200	− 5,130	22,100	359	1.78	2.05	A.
January	303	126	204	12,600	− 2,820	9,780	159	.79	.91	A.
February	130	128	130	7,210	+ 451	7,660	138	.68	.71	A.
March	1,390	94	491	30,200	+ 9,870	40,100	652	3.23	3.72	A.
April	4,030	1,090	1,860	110,000	− 1,130	109,000	1,830	9.06	10.11	A.
May	1,390	813	989	60,800	− 499	60,300	981	4.86	5.60	A.
June	1,060	385	743	44,200	−10,200	34,000	571	2.83	3.16	A.
July	732	319	446	27,400	− 7,870	19,500	317	1.57	1.81	A.
August	307	213	252	15,500	− 1,450	14,000	228	1.13	1.30	A.
September	211	113	155	9,240	− 1,130	8,110	136	.67	.75	A.
The year	4,030	61	585	423,000	− 4,020	419,000	579	2.87	38.86	

NACHES RIVER AT OAK FLAT, NEAR NILE, WASH.

LOCATION.—In sec. 34, T. 15 N., R. 16 E., just above Oak Flat, three-fourths mile above intake of Selah Valley canal, 2 miles above Tieton River, and 8 miles southeast of Nile, in Yakima County.

DRAINAGE AREA.—640 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 25, 1904, to September 30, 1915.

GAGE.—Stevens water-stage recorder after November 29, 1914. Barrett and Lawrence water-stage recorder September 20, 1911, to November 29, 1914. Water-stage recorder inspected daily during year by Lafe Little. Since September 22, 1914, inclined staff on left bank. Prior to flood of November 15, 1906, inclined staff on left bank 800 feet below present gage and at different datum. From November 16, 1906, to January 27, 1907, temporary inclined gage at same site, gage heights corrected to datum of original gage. From January 28, 1907, to April 12, 1909, vertical and inclined staff at same site and datum as original gage. From April 13, 1909, to September 14, 1914, cantilever chain gage at same site and datum as present gage.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; steep gradient; shifting at medium and high water, One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.05 feet at 7 a. m. April 3 (discharge, 4,430 second-feet); minimum stage from recorder, 3.47 feet at 2 a. m. September 25 (discharge, 141 second-feet).

1904–1915: Maximum stage recorded, 10.3 feet during morning of November 15, 1906, water over gage, determined from high-water marks (discharge, 21,900 second feet); minimum stage recorded, 3.47 feet at 2 a. m. September 25, 1915 (discharge 141 second-feet).[1]

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—Numerous small tracts irrigated above station; aggregate depletion less than 5 per cent of flow.

REGULATION.—Flow partly controlled by storage and release of water at Bumping reservoir. Monthly discharge, without storage, determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation possibly slightly affected by ice for short periods in December and January. Results excellent for October, November, and February to May; good for remainder of year.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Naches River at Oak Flat, near Nile, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	Taylor and Tuttle	4.24	353	June 2	F. E. Moxley	5.53	1,210
Nov. 30	F. E. Moxley	5.52	1,130	14	Moxley and Taylor	4.78	706
Feb. 1	do	4.13	276	Aug 7	F. E. Moxley	5.09	838
Mar. 19	do	4.97	721	Sept. 16	do	3.61	157
Apr. 9	do	6.69	2,320	27	R. S. Calland	3.47	146
May 10	Parker and Taylor	5.94	1,500				

[1] Minimum stage, 3.0 feet, recorded Sept. 18–21, 1904, not considered reliable. Discharge, 139 second-feet, published p. 97, Water-Supply Paper 135, too small. Correct discharge Sept. 18–21, 1904, probably 180 second-feet.

Daily discharge, in second-feet, of Naches River at Oak Flat, near Nile, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	297	256	1,120	344	277	243	1,710	1,160	1,160	470	619	271
2	289	753	1,080	344	269	250	3,490	1,200	1,200	459	656	263
3	280	2,480	1,040	335	265	261	4,340	1,240	1,160	465	735	235
4	280	1,660	978	318	254	285	3,900	1,120	1,200	503	854	221
5	183	1,370	962	301	246	297	3,330	1,080	1,160	486	797	198
6	163	1,160	917	335	246	297	3,030	1,080	1,120	399	847	167
7	157	962	902	293	221	297	2,750	1,200	1,040	399	891	149
8	157	887	887	269	214	301	2,540	1,330	980	353	950	141
8	280	814	843	277	218	322	2,350	1,510	861	357	913	167
10	360	843	743	269	211	335	2,280	1,510	783	486	491	173
11	351	858	637	269	201	339	2,350	1,370	729	571	439	176
12	360	1,020	611	261	197	344	2,410	1,280	702	600	418	188
13	369	1,040	551	261	208	344	2,480	1,160	722	631	366	182
14	379	1,120	551	269	184	399	2,280	1,080	715	576	349	182
15	369	1,080	675	261	178	689	2,220	978	702	547	357	170
16	341	1,160	611	232	225	872	2,220	902	847	600	362	161
17	389	1,080	551	246	225	771	2,410	978	936	553	362	161
18	408	1,120	551	246	214	757	2,680	1,040	729	542	357	164
19	608	917	540	239	211	729	2,820	1,080	676	542	349	161
20	645	993	551	232	211	716	2,890	1,030	631	565	344	158
21	608	1,370	517	191	225	814	2,160	993	619	619	344	149
22	560	1,280	517	153	225	1,020	1,710	925	619	600	335	141
23	428	1,240	599	153	225	1,330	1,510	887	619	576	335	144
24	369	1,370	599	211	235	1,460	1,370	880	613	644	335	144
25	360	1,200	495	147	258	1,410	1,280	850	588	670	335	141
26	389	1,200	394	153	258	1,370	1,200	843	600	676	327	147
27	379	1,240	394	293	246	1,330	1,200	880	576	702	331	149
28	379	1,330	443	246	246	1,330	1,200	1,160	530	696	331	149
29	289	1,200	394	301	.....	1,330	1,280	1,120	508	742	319	149
30	264	1,120	394	301	.....	1,460	1,240	1,200	486	676	298	149
31	341	.....	348	285	.....	1,460	.....	1,160	.....	644	310	.....

NOTE.—Discharge Oct. 1 to Nov. 2 and Nov. 3 to June 1, ascertained from two well-defined rating curves; June 2 to Sept. 26, by method for shifting control; Sept. 27–30 from well-defined rating curve.

Monthly discharge of Naches River at Oak Flat, near Nile, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 640 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	645	157	356	21,900	+ 1,860	23,800	387	0.605	0.70	A.
November	2,480	256	1,140	67,700	+ 9,430	77,100	1,290	2.02	2.25	A.
December	1,120	348	658	40,400	−11,500	28,900	470	.734	.85	B.
January	344	147	259	15,900	+ 1,230	17,100	278	.434	.50	B.
February	277	178	228	12,700	− 32	12,700	229	.358	.37	A.
March	1,460	243	747	45,900	+ 2,640	48,500	789	1.23	1.42	A.
April	4,340	1,200	2,290	136,000	+ 9,510	146,000	2,450	3.83	4.27	A.
May	1,510	843	1,100	67,900	+18,600	86,500	1,410	2.20	2.54	A.
June	1,200	486	794	47,200	+ 3,560	50,800	854	1.33	1.48	B.
July	742	353	560	34,400	−13,400	21,000	342	.534	.62	B.
August	950	298	486	29,900	−19,700	10,200	166	.259	.30	B.
September	271	141	172	10,200	− 1,740	8,500	143	.223	.25	B.
The year	4,340	141	732	530,000	+ 458	531,000	733	1.15	15.55	

BUMPING LAKE NEAR NILE, WASH.

LOCATION.—Above storage dam at outlet of Bumping Lake, 12 miles above American River, and 19 miles west of Nile, in Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 27 to November 22, 1909; November 3, 1910, to September 30, 1915.

GAGE.—Vertical staff on face of gate tower, datum mean sea level; read to hundredths twice daily by J. H. Nelson. Prior to November 3, 1910, vertical staff on north shore of lake, one-fourth mile above outlet; arbitrary datum.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 3,428.28 feet July 9 (storage, 36,730 acre-feet); minimum stage recorded, 3,393.10 feet October 3 (storage, 985 acre-feet).

1911–1915: Maximum stage recorded, 3,428.28 feet July 9, 1915 (storage, 36,730 acre-feet); minimum stage recorded, 3,392.50 feet March 7, 1911 (storage, 775 acre-feet).

STORAGE.—Capacity of reservoir, at crest of spillway, 33,700 acre-feet. Elevation of gate sill and spillway crest, 3,389 feet and 3,426 feet, respectively. Storage or release each month used for determining discharge, without storage, for gaging station below dam.

COOPERATION.—Storage table furnished by United States Reclamation Service.

Storage, in acre-feet, of Bumping Lake near Nile, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,120	3,540	11,900	2,770	2,250	2,220	4,910	14,990	33,060	36,630	22,510	3,130
2	1,050	4,760	11,430	2,620	2,220	2,190	6,030	15,680	33,120	36,560	21,630	2,830
3	985	7,290	10,940	2,570	2,220	2,150	7,180	16,370	33,120	36,520	20,770	2,510
4	1,290	9,610	10,480	2,540	2,230	2,190	8,080	17,040	33,060	36,420	19,690	2,220
5	1,350	11,140	9,940	2,480	2,280	2,220	8,270	17,650	33,060	36,360	18,550	2,220
6	1,430	12,450	9,400	2,440	2,280	2,220	8,200	18,380	33,320	36,420	17,360	2,220
7	1,450	13,480	8,860	2,380	2,310	2,220	8,160	19,100	33,710	36,560	16,080	2,150
8	1,230	14,220	8,320	2,380	2,280	2,220	8,010	19,900	34,160	36,690	14,710	2,150
9	1,120	14,820	7,810	2,400	2,280	2,200	7,740	20,770	34,620	36,730	13,290	2,150
10	1,110	15,200	7,160	2,400	2,280	2,200	7,420	21,660	34,960	36,380	12,720	2,150
11	1,090	15,550	6,680	2,380	2,250	2,200	7,150	22,420	35,260	35,930	12,250	2,090
12	1,090	15,880	6,120	2,360	2,250	2,220	7,040	23,180	35,530	35,490	11,680	2,030
13	1,130	16,700	5,560	2,380	2,250	2,230	7,010	23,760	35,790	34,820	11,260	2,030
14	1,140	16,880	5,100	2,380	2,220	2,330	6,840	24,360	36,060	34,430	10,850	2,030
15	1,130	17,250	4,580	2,350	2,220	2,830	6,630	24,880	36,330	34,030	10,400	1,950
16	1,130	17,250	4,100	2,350	2,190	3,540	6,540	25,360	36,250	33,580	10,000	1,910
17	1,120	17,080	3,680	2,310	2,220	3,840	6,540	25,860	36,090	33,160	9,610	1,900
18	1,170	16,820	3,290	2,330	2,220	3,490	6,700	26,570	36,160	32,740	9,220	1,870
19	1,440	16,520	2,990	2,310	2,220	4,450	6,940	27,100	36,220	32,130	8,800	1,870
20	1,540	16,400	2,650	2,280	2,220	4,720	7,170	27,670	36,290	31,620	8,400	1,830
21	1,560	16,220	2,470	2,280	2,220	5,080	8,080	28,200	36,360	30,920	7,960	1,830
22	1,540	16,020	2,120	2,280	2,220	5,420	9,030	28,760	36,380	30,270	7,550	1,830
23	1,790	15,580	1,900	2,280	2,200	5,820	9,530	29,220	36,490	29,620	7,170	1,800
24	1,890	15,100	1,680	2,250	2,200	6,310	10,320	29,650	36,490	28,760	6,770	1,800
25	1,960	14,700	1,570	2,220	2,190	6,490	11,000	30,120	36,490	27,880	6,320	1,800
26	2,000	14,250	1,430	2,220	2,190	6,380	11,690	30,620	36,490	27,100	5,400	1,800
27	2,000	13,880	1,260	2,220	2,220	6,040	12,370	31,210	36,490	26,210	5,410	1,770
28	2,020	13,420	1,170	2,220	2,220	5,720	13,030	32,060	36,490	25,250	4,940	1,770
29	2,160	13,000	1,110	2,220	.....	5,490	13,710	32,830	36,560	24,400	4,520	1,770
30	2,610	12,480	1,050	2,220	.....	5,120	14,370	32,930	36,560	23,790	4,000	1,770
31	3,050	.....	1,020	2,250	.....	4,860	.....	33,000	.....	23,180	3,510	.....

BUMPING RIVER NEAR NILE, WASH.

LOCATION.—One-fourth mile below spillway of Bumping Lake dam, half a mile below outlet conduit through storage dam, 11½ miles above American River, and 19 miles west of Nile, in Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 13 to July 31, 1906; April 27, 1909, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed June 17, 1913, inspected daily by J. H. Nelson. Since June 17, 1913, vertical staff, on left bank, one-fourth mile below spillway of storage dam, reconstructed at same site and datum April 27, 1915. During 1906 vertical staff on left bank at dam site, half a mile above present gage and at different datum. April 27 to September 16, 1909, and June 26, 1912, to June 13, 1913, vertical staff near downstream end of right pier of highway bridge, about three-eighths mile above present gage and at different datum; readings on this gage April 27 to August 6, 1909, reduced to datum of succeeding gage by relation curve. Discharge over spillway crest, June 24 to July 30, 1912, determined and added to flow past gage. August 7, 1909, to June 25, 1912, vertical and inclined staff on right bank, about 1,300 feet above present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from cable about 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Large angular rocks and gravel; fairly permanent. Riffle control 60 feet below gage. Zero flow would occur at about gage height 0.6 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.12 feet at 9 a. m. August 8 (discharge, 932 second-feet); minimum stage from recorder, 1.03 feet October 4–6 (discharge, about 2 second-feet).

1906 and 1909–1915: Maximum stage recorded, 7.0 feet November 14, 1906 (discharge, 4,300 second-feet); minimum flow occurs frequently when gates in outlet conduit are closed (discharge, practically zero).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Bumping reservoir. Monthly discharge, without storage, determined from records of stage at reservoir.

ACCURACY.—Results good at low water and excellent at higher stages.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Bumping River near Nile, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Tuttle and Taylor	2.30	140	May 13	Parker and Moxley	1.44	20.4
Apr. 27	Moxley and Taylor	1.40	14.8	Oct. 8	Paul Taylor	1.71	42.7

Daily discharge, in second-feet, of Bumping River near Nile, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	133	5	542	113	76	63	410	14	314	99	496	197
2	124	9	519	117	73	62	496	17	314	121	566	160
3	76	18	452	113	73	60	590	17	314	160	666	126
4	2	17	519	109	73	64	692	15	314	160	719	103
5	2	18	496	105	76	63	692	15	261	66	692	89
6	2	17	496	101	79	62	719	14	21	33	774	79
7	62	15	474	99	76	62	692	14	21	28	831	71
8	163	39	474	99	75	62	666	15	22	55	890	69
9	137	103	474	96	75	62	640	18	23	180	542	66
10	137	174	452	96	75	63	615	19	24	314	370	62
11	131	244	452	94	73	62	590	21	22	390	370	59
12	132	296	431	94	71	63	590	21	21	410	332	60
13	142	351	410	94	71	64	566	19	20	390	314	60
14	142	431	390	94	67	80	566	18	19	332	314	59
15	131	431	390	90	64	39	566	18	76	370	314	54
16	135	452	370	85	66	5	566	17	296	370	314	49
17	140	474	370	84	69	5	566	17	168	351	314	45
18	160	474	351	84	69	5	566	16	105	370	314	43
19	228	452	332	84	69	4	590	17	105	410	314	41
20	244	566	314	80	67	5	370	17	105	452	314	40
21	244	615	261	79	67	5	34	17	105	474	314	39
22	163	615	314	76	66	5	29	15	105	452	314	40
23	66	590	296	75	64	5	26	15	107	474	314	39
24	92	590	261	73	64	75	23	16	107	542	314	38
25	137	590	228	71	64	244	22	16	135	542	314	36
26	137	590	197	70	64	351	20	15	142	566	296	35
27	137	566	180	70	64	452	17	16	94	566	296	34
28	38	566	158	70	64	431	15	18	94	590	296	33
29	2	566	140	70	.....	410	15	80	96	542	279	33
30	4	542	131	63	.....	410	15	314	97	452	279	33
31	5	.....	124	71	.....	390	.....	314	.....	431	244	.....

NOTE.—Discharge ascertained from rating curve fairly well defined from 25 to 125 second-feet; well defined above and poorly defined below those limits.

Monthly discharge of Bumping River near Nile, Wash., for year ending Sept. 30, 1915.

[Drainage area, 68 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	244	2	111	6,840	+ 1,860	8,700	141	2.07	2.39	B.
November	615	5	347	20,700	+ 9,430	30,100	506	7.44	8.30	A.
December	542	124	355	21,800	−11,500	10,300	168	2.47	2.85	A.
January	117	63	87.7	5,390	+ 1,230	6,620	108	1.59	1.83	B.
February	79	64	69.8	3,870	− 32	3,840	69.2	1.02	1.06	B.
March	452	4	120	7,400	+ 2,640	10,000	163	2.40	2.77	B.
April	719	15	399	23,700	+ 9,510	33,200	558	8.21	9.16	A.
May	314	14	37.9	2,330	+18,600	20,900	340	5.00	5.76	B.
June	314	19	122	7,230	+ 3,560	10,800	182	2.68	2.99	B.
July	590	28	345	21,200	−13,400	7,800	127	1.87	2.16	A.
August	890	244	420	25,800	−19,700	6,100	99.3	1.46	1.68	A.
September	197	33	63.1	3,750	− 1,740	2,010	33.8	.50	.56	B.
The year	890	2	207	150,000	+ 458	150,000	207	3.04	41.51	

AMERICAN RIVER NEAR NILE, WASH.

LOCATION.—At highway bridge three-fourths mile above mouth, 17 miles northwest of Nile, in Yakima County.

DRAINAGE AREA.—80 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 25 to October 30, 1909; May 26 to November 15, 1910; May 18 to September 30, 1911; July 1 to September 30, 1913; June 26 to September 5, 1914; and June 30 to September 11, 1915.

GAGE.—Vertical staff near downstream end of right bridge abutment; read to half-tenths daily by Purdy Crosno, except on days listed in footnote to table of daily discharge.

DISCHARGE MEASUREMENTS.—Made from bridge at gage or by wading.

CHANNEL AND CONTROL.—Large boulders; steep gradient; shifts slightly at high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.22 feet at 11 a. m. June 30 (discharge, 186 second-feet); minimum stage recorded, 1.52 feet September 6–10 (discharge, 47 second-feet).

1909–1911 and 1913–1915: Maximum stage recorded,[1] 4.55 feet June 2, 1909 (discharge, 1,580 second-feet); minimum stage recorded, 1.60 feet October 16–19, 1909 (discharge, 45 second-feet).

WINTER FLOW.—Station not maintained during frozen season.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Results fair for July and poor for remainder of period.

COOPERATION.—Gage-height record furnished by United States Forest Service, discharge computed by United States Reclamation Service.

Discharge measurements of American River near Nile, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 22	Moxley and Taylor	3.02	476
May 14	Parker and Moxley	2.65	338

Daily discharge of American River near Nile, Wash., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		177	77	48	16		113	60	
2		168	77	49	17		113	59	
3		159	76	48	18		113	59	
4		154	75	48	19		113	57	
5		149	75	48	20		113	56	
6		145	74	47	21		113	54	
7		140	73	47	22		113	53	
8		135	73	47	23		113	52	
9		135	72	47	24		113	59	
10		135	71	47	25		113	52	
11		135	71	48	26		76	49	
12		113	70		27		78	50	
13		113	69		28		78	50	
14		113	69		29		78	50	
15		113	68		30	186	78	50	
					31		78	49	

NOTE.—Discharge ascertained from fairly well-defined rating curve. July 1, 2, 4–7, Aug. 1–11, 22, 29, and Sept. 5, gage not read; discharge interpolated.

[1] Records available for only a few months each summer.

Monthly discharge, in second-feet, of American River near Nile, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
July	177	76	119	7,300	C.
August	77	49	62.9	3,860	D.
September	49	47	47.6	1,040	.....
The period	.....	.....	.....	12,200	

NORTH FORK OF TIETON RIVER BELOW CLEAR CREEK, NEAR NACHES, WASH.

LOCATION.—In sec. 12, T. 13 N., R. 12 E. (unsurveyed), below Clear Creek dam of the United States Reclamation Service, a quarter of a mile below Clear Creek, a quarter of a mile above Cold Creek, and 7 miles above South Fork, about 30 miles southwest of Naches, in Yakima County.

DRAINAGE AREA.—61 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 5 to October 31, 1914; July 1 to September 19, 1915.

GAGE.—Vertical staff on left bank 1,000 feet below Clear Creek dam; read to hundredths four times daily by O. B. Vaughn October 1–31, and twice daily by J. W. Douglas July 1 to September 19. Prior to May 21 gage at same site but at datum 0.68 foot higher; all gage heights reduced to present datum.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed of stream at gage composed of solid rock. Control, about 100 feet below gage, is formed by rock ledge and should be permanent. Channel curves sharply to right a short distance below gage. Banks high but right bank is subject to overflow at gage height of about 10 feet. A log jam about 200 feet below gage may cause slight backwater effect at extremely high stages. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded for period, 2.00 feet from 6 to 10 a. m. July 3 (discharge, 310 second-feet); minimum stage, 0.88 foot at 6 a. m. July 16–17 (discharge, 126 second-feet).

1914–15, for period of record: Maximum stage recorded, 3.70 feet at 7.30 p. m. June 1, and 7 a. m. June 2, 1914 (discharge, 780 second-feet); minimum stage recorded, 0.62 foot at 2 p. m. and 7 p. m. September 13, 1914 (discharge, 106 second-feet).

WINTER FLOW.—Observations discontinued during winter.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Clear Creek reservoir. Monthly discharge, without storage, determined from records at reservoir.

ACCURACY.—Results excellent, October 1–31; good, July 1 to September 19.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of North Fork of Tieton River below Clear Creek, near Naches, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Aug. 3	Moxley and Calland	1.41	204
Sept. 10	F. E. Moxley	1.14	168

Daily discharge, in second-feet, of North Fork of Tieton River below Clear Creek, near Naches, Wash., for the periods Oct. 1–31, 1914, and July 1 to Sept. 19, 1915.

Day.	Oct.	July.	Aug.	Sept.	Day.	Oct.	July.	Aug.	Sept.
1	135	264	246	203	16	178	126	237	165
2	178	282	220	172	17	218	150	228	165
3	131	291	203	157	18	218	157	180	203
4	128	282	246	157	19	263	157	165	203
5	132	273	195	157	20	245	220	157	.....
6	129	273	165	157	21	202	228	187	.....
7	129	237	211	157	22	186	237	264	.....
8	129	264	237	157	23	170	211	246	.....
9	123	246	220	172	24	163	195	220	.....
10	163	180	195	165	25	163	195	195	.....
11	170	187	180	165	26	163	195	195	.....
12	218	195	172	172	27	156	203	195	.....
13	227	195	180	165	28	156	195	195	.....
14	227	187	195	165	29	156	180	195	.....
15	186	150	237	165	30	210	157	195	.....
					31	260	203	237	.....

NOTE.—Discharge Oct. 1–30 ascertained from well-defined rating curve; July 1 to Sept. 19, from fairly well defined rating curve. Oct. 31 gage not read; discharge estimated by comparison with Tieton River at headworks of Tieton canal.

Monthly discharge of North Fork of Tieton River below Clear Creek, near Naches, Wash., for the periods Oct. 1 to 31, 1914, and July 1 to Sept. 19, 1915.

[Drainage area, 60 square miles.]

Month.	Observed discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy of observed discharge.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
October	263	123	178	10,900	0	10,900	178	2.92	3.37	A.
July	291	126	210	12,900	− 113	12,800	208	3.41	3.93	B.
August	264	157	206	12,700	− 82	12,600	205	3.36	3.87	B.
September 1–19	203	157	170	6,380	−1,600	4,780	127	2.08	1.47	B.

TIETON RIVER AT HEADWORKS OF TIETON CANAL, NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below intake of Tieton canal, 15 miles above mouth, and about 16 miles southwest of Naches, in Yakima County.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17 to September 17, 1906, fragmentary gage heights; July 5, 1907, to September 30, 1915.

GAGE.—Friez water-stage recorder installed July 8, 1911; inspected twice daily during irrigation season and once or twice weekly during winter by employees of United States Reclamation Service. From July 5 to October 26, 1907, August 26 to December 12, 1908, and since April 9, 1909, vertical staff on right bank about 1,000 feet below intake of Tieton canal; reconstructed November 2, 1912, and August 28, 1914; all published gage heights at approximately the same datum. Bristol water-stage recorder in use July 28, 1909, to July 7, 1911. From April 17 to September 17, 1906, vertical staff on left bank about three-fourths mile below present gage. From October 27, 1907, to April 8, 1909, cantilever arm and graduated sticks for measuring down to water surface at Weisberger's power plant about 1½ miles below present gage. Gage heights January 1 to April 8, 1909, referred to datum of present gage by curve of relation. Records at all sites comparable.

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

CHANNEL AND CONTROL.—Gravel and boulders; steep gradient; shifts slightly at high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.92 feet at 2 a. m. April 3 (discharge, 1,550 second-feet); minimum stage from recorder, 1.30 feet at 8 p. m. July 15 (discharge, 19 second-feet).

1907–1915: Maximum stage from water-stage recorder, 7.15 feet at 4 a. m. November 24, 1909 (discharge, approximately 5,400 second-feet); minimum stage from recorder, 1.30 feet at 8 p. m. July 15, 1915 (discharge, 19 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow determined from discharge measurement and records of temperature.

DIVERSION.—Tieton canal has diverted water above the gage since 1910. Diversion through canal added to mean monthly flow to determine natural monthly discharge.

REGULATION.—Flow slightly regulated by storage and release of water at Clear Creek reservoir about 15 miles above gage. Purpose of regulation to obviate diurnal fluctuation during irrigation season.

ACCURACY.—Stage-discharge relation probably changed November 3; date of change doubtful.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Tieton River at headworks of Tieton canal, near Naches, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	Taylor and Tuttle.....	2.85	255	June 29	Moxley and Taylor.....	2.38	124
Feb. 4	F. E. Moxley.....	[a] 2.56	160	Aug. 4	Moxley and Calland....	2.36	113
May 20	Moxley and Greer.....	3.13	350	4	Calland and Moxley....	2.29	107
11	Taylor and Parker.....	3.49	533				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tieton River at headworks of Tieton canal, near Naches, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	241	505	333	198	162	173	631	482	467	203	121	74
2	254	622	333	198	165	176	1,440	527	384	230	114	62
3	260	1,090	326	198	168	181	1,400	497	326	261	93	45
4	244	842	311	195	159	195	1,100	406	318	294	112	48
5	241	762	304	195	170	195	945	368	372	458	100	•57
6	244	696	301	192	168	192	842	372	434	286	66	52
7	244	644	290	187	168	195	798	434	482	224	97	51
8	244	598	280	184	168	198	756	527	380	195	121	54
9	235	554	270	181	168	201	696	615	277	198	102	112
10	282	512	253	181	168	203	661	610	233	95	71	149
11	278	296	235	184	162	206	702	502	195	70	59	127
12	320	266	218	187	162	206	762	453	203	69	56	171
13	400	644	192	184	170	206	762	411	215	68	56	159
14	356	649	168	181	154	264	655	364	236	61	145	157
15	328	533	181	181	157	389	604	326	255	37	246	159
16	309	477	168	165	154	376	638	294	273	25	97	159
17	332	438	154	165	154	364	702	373	287	31	84	168
18	332	352	154	165	154	376	792	467	245	37	50	195
19	420	287	168	162	168	360	842	448	178	30	41	277
20	405	389	168	162	168	352	842	411	141	74	36	230
21	360	467	170	159	168	384	690	380	141	99	106	224
22	328	393	173	154	168	446	565	364	154	110	287	215
23	306	356	176	151	168	538	472	340	195	105	103	203
24	295	340	178	146	176	538	420	333	215	73	92	184
25	292	336	181	144	178	482	393	329	146	68	65	206
26	289	336	184	141	176	434	368	311	103	74	58	201
27	289	336	187	141	176	398	360	428	79	76	58	195
28	285	364	189	154	173	402	380	810	68	65	165	173
29	285	360	189	157	.....	415	448	593	104	54	209	176
30	320	340	192	159	.....	434	708	472	164	62	89	181
31	400	.....	195	162	.....	415	.....	434	.....	82	105	.....

NOTE.—Discharge Oct. 1 to Nov. 3 ascertained from fairly well defined rating curve; Nov. 4 to Sept. 30, from rating curve well defined from 120 to 400 second-feet and fairly well defined above and below those limits. Stage-discharge relation affected by ice during winter, discharge estimated from records of temperature Dec. 13 to Jan. 1, Jan. 18 to Feb. 4, Feb. 16 to 18.

Combined monthly discharge of Tieton River and canal at headworks of Tieton canal, near Naches, Wash., for the year ending Sept. 30, 1915.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.						Combined run-off.		Accuracy.
	Combined.		River (mean).	Canal (mean).	Total.		Depth in inches on drainage area.	Total in acre-feet.	
	Maximum.	Minimum.			Mean.	Per square mile.			
October	420	235	304	0.0	304	1.27	1.46	18,700	B.
November	1,180	266	493	34.1	527	2.20	2.46	31,400	B.
December	333	154	220	.0	220	.917	1.06	13,500	C.
January	198	141	171	.0	171	.713	.82	10,500	C.
February	178	154	166	.0	166	.692	.72	9,220	B.
March	538	173	319	.0	319	1.33	1.53	19,600	A.
April	1,440	598	712	90.2	802	3.34	3.73	47,700	B.
May	995	496	441	199	640	2.67	3.08	39,400	B.
June	702	340	242	244	486	2.02	2.25	28,900	A.
July	566	300	123	257	380	1.58	1.82	23,400	A.
August	415	209	103	221	324	1.35	1.56	19,900	B.
September	295	154	149	83.9	233	.971	1.08	13,900	B.
The year	1,440	141	287	95.0	382	1.59	21.57	276,000	

TIETON CANAL NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below canal intake and about 16 miles southwest of Naches, in Yakima County.

RECORDS AVAILABLE.—Irrigation seasons, 1910 to 1915.

GAGE.—Float gage installed in a stilling well about 500 feet below canal intake; read to hundredths twice daily by G. G. Girdner.

DISCHARGE MEASUREMENTS.—Made from a gaging bridge 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Earth section merging into concrete-lined section 1,000 feet below gage. Stage-discharge relation practically permanent, except for influence of brush and weeds growing on sides of earth section.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and also for irrigation seasons 1910–1915, 4.46 feet June 30 and July 1, 1914, July 13–19, 1915 (discharge, 275 second-feet); no water in canal, during year, from October 1 to November 17, November 29 to April 11, and September 19–30.

ACCURACY.—Results excellent.

COOPERATION.—Records of discharge and measurements furnished by United States Reclamation Service.

Discharge measurements of Tieton canal near Naches, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 11	Parker and Taylor	3.93	230	June 23	A. Philpott	4.25	253
18	A. Philpott	3.75	216	Aug. 4	Moxley and Calland	4.13	253

Daily discharge, in second-feet, of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1915.

Day.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1			100	196	272	250	220
2			103	200	272	250	210
3			118	207	272	250	210
4			161	209	272	250	210
5			188	209	0	239	195
6			210	216	246	230	190
7			230	220	254	230	182
8			234	242	254	230	100
9			234	242	263	236	100
10			234	242	270	245	100
11			234	246	270	250	100
12		7	234	246	272	250	100
13		15	234	246	275	250	100
14		76	234	246	275	250	100
15		100	234	246	275	0	100
16		101	234	246	275	250	100
17		101	233	246	275	250	100
18	93	102	215	250	275	250	100
19	93	104	203	252	275	250	
20	93	121	203	252	270	250	
21	93	142	203	254	270	250	
22	93	171	203	258	270	0	
23	93	198	203	258	260	250	
24	93	204	190	266	260	250	
25	93	226	185	270	260	250	
26	93	232	185	270	260	250	
27	93	238	185	272	260	250	
28	93	238	185	272	260	250	
29		238	185	272	260	0	
30		93	185	272	260	221	
31			185		250	221	

NOTE.—Discharge ascertained from rating curve well defined above 75 second-feet.

Monthly discharge of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November 18–28	93	93	93	2,030	A.
April 12–30	238	7	142	5,370	A.
May	234	100	199	12,200	A.
June	272	196	244	14,500	A.
July	275	0	257	15,800	A.
August	250	0	221	13,600	A.
September 1–18	220	100	140	4,990	A.

NOTE.—No flow in canal Oct. 1 to Nov. 17, Nov. 29 to Apr. 11, and Sept. 19–30.

NORTH FORK OF AHTANUM CREEK NEAR TAMPICO, WASH.

LOCATION.—In the NW. ¼ sec. 2, T. 12 N., R. 15 E., at George Prior's ranch, about 100 feet below Nasty Creek, and about 3½ miles northwest of Tampico, in Yakima County.

DRAINAGE AREA.—69 square miles, measured on topographic maps.

RECORDS AVAILABLE.—August 26, 1907, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed April 2, 1913, on left bank about 300 feet southeast of ranch house; inspected once a week by F. W. Schott. Prior to April 2, 1913, vertical staff at same site and datum as present gage. Water-stage recorder used until August 19, 1915.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel and boulders; shifting at high stages. Banks high; not subject to overflow. One channel at all stages. Riffle control 100 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.0 feet at 10 p. m. April 2 (discharge, 272 second-feet); minimum stage recorded, 1.41 feet September 5 (discharge, 14 second-feet).

1907–1915: Maximum stage recorded, 3.3 feet March 2, 1910 (discharge, 684 second-feet); minimum stage recorded, 1.32 feet at 3 p. m. December 25, 1914 (discharge, 11.8 second-feet).

WINTER FLOW.—Stage-discharge relation probably not affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Results excellent, except when recorder was not operating in August and September. Staff-gage record fragmentary. Practically no diurnal fluctuation.

Discharge measurements of North Fork of Ahtanum Creek near Tampico, Wash., during the year ending September 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 14	G. L. Parker	1.90	56.9	May 7	C. G. Paulsen	2.35	132
Apr. 22	C. G. Paulsen	2.50	159	July 12	.....do	1.66	29.6
May 7	.....do	2.36	131	Aug. 12	.....do	1.51	19.5

Daily discharge, in second-feet, of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending September 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	22	37	32	28	27	22	146	130	122	39	24	16
2	24	49	35	27	26	23	239	136	118	37	23	17
3	24	52	33	28	24	23	244	144	116	36	22	16
4	23	83	34	28	23	27	206	120	116	36	22	15
5	22	64	34	27	21	29	184	118	124	36	22	14
6	22	52	28	25	20	28	171	124	126	36	21	15
7	27	48	32	24	20	28	167	140	118	37	21	16
8	23	41	27	24	20	30	154	152	113	38	21	16
9	22	39	27	24	20	31	142	178	102	37	21	16
10	23	39	22	24	20	32	142	169	99	35	20	16
11	21	39	22	24	20	35	150	154	94	33	20	16
12	20	38	23	23	21	37	162	146	92	31	19	17
13	19	38	32	24	20	38	158	142	86	30	19	18
14	19	38	49	23	24	53	150	132	82	31	18	18
15	19	29	62	23	34	74	150	122	78	30	18	17
16	24	39	59	28	23	83	160	118	78	29	18	16
17	21	37	54	22	21	84	180	136	76	28	19	16
18	19	34	61	23	20	86	204	138	71	27	18	16
19	19	35	59	33	20	83	217	134	67	27	18	16
20	18	45	51	23	20	84	208	130	60	26	18	16
21	20	47	47	29	20	94	184	126	54	24	17	16
22	22	44	42	51	20	111	164	124	53	23	17	16
23	25	41	39	26	20	140	150	122	54	23	16	16
24	27	39	36	78	21	136	140	116	52	22	16	15
25	28	40	32	136	22	113	134	113	52	22	16	15
26	28	38	32	110	21	97	134	111	49	24	16	15
27	30	38	31	84	20	86	134	126	48	23	17	15
28	30	37	30	57	21	88	138	134	44	24	17	15
29	30	35	28	31	.....	96	152	128	42	27	16	15
30	30	34	27	30	.....	100	136	122	40	33	16	15
31	32	.....	28	29	.....	100	.....	120	.....	27	16	.....

NOTE.—Discharge ascertained from two well-defined rating curves applicable Oct. 1 to Jan. 25, and Jan. 29 to Sept. 30. Oct. 21–23, Nov. 10–13, Jan. 26–28, 30–31, Feb. 1–5, Aug. 5, 6, 8, and 10, water stage recorder stopped; discharge interpolated. Aug. 20 to Sept. 30, water below intake; outside gage at same datum read three times a week; discharge interpolated for days when gage was not read.

Monthly discharge of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending September 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	32	18	23.6	1,450	A.
November	83	29	42.3	2,520	A.
December	62	22	37.0	2,280	A.
January	136	22	37.6	2,310	A.
February	34	20	21.8	1,210	A.
March	140	22	67.5	4,150	A.
April	244	134	167	9,940	A.
May	178	111	132	8,120	A.
June	126	[a] 40	80.9	4,810	A.
July	[a] 39	22	30.0	1,840	A.
August	24	16	18.8	1,160	A.
September	18	14	15.9	946	A.
The year	244	14	56.3	40,700	

[a] Interpolated value.

SOUTH FORK OF AHTANUM CREEK AT CONRAD RANCH, NEAR TAMPICO, WASH.

LOCATION.—In the W. ½ sec. 23, T. 12 N., R. 15 E., at Conrad ranch, 2½ miles above the North Fork, and 2¾ miles southwest of Tampico, in Yakima County.

DRAINAGE AREA.—26 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 15 to September 30, 1915.

GAGE.—Vertical staff on left bank about 75 feet from observer's house; read twice daily to hundredths by Mrs. W. B. Conrad.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and sand; shifting at high stages. One channel at all stages. Banks high and wooded. Zero flow would occur at zero gage height ±0.2 foot, as determined March 16, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.50 feet at 6 p. m. April 3 (discharge, 62 second-feet); minimum stage recorded, 0.60 foot September 25–26 (discharge, 4.3 second-feet).

WINTER FLOW.—Station discontinued during winter.

DIVERSIONS.—Small ditch diverting above gage supplies water to Conrad's hop fields.

REGULATION.—None.

ACCURACY.—Results fair for March and excellent for remainder of year, except for extremely low stage.

Discharge measurements of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., during the year ending September 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 16	G. L. Parker	1.18	33.1	July 13	C. G. Paulsen	.72	9.66
Apr. 23	C. G. Paulsen	1.23	41.0	13	do	.72	9.44
May 6	do	1.07	31.0	Aug. 12	do	.66	6.61

Daily discharge, in second-feet, of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	39	33	25	11	8.1	6.0
2	.....	58	33	25	10	8.1	6.0
3	.....	62	32	24	10	7.7	5.6
4	.....	54	31	24	10	7.7	5.6
5	.....	50	31	23	10	7.7	5.6
6	.....	46	31	23	11	6.8	5.1
7	.....	43	31	22	10	6.8	5.1
8	.....	42	32	21	10	7.2	5.1
9	.....	38	33	21	10	7.2	4.7
10	.....	38	35	21	10	6.8	5.1
11	.....	39	36	20	10	6.8	5.1
12	.....	39	36	20	9.5	6.8	5.1
13	.....	41	36	20	9.5	6.8	5.6
14	.....	41	33	19	9.5	6.8	5.1
15	39	39	31	18	9.5	6.8	5.1
16	38	42	31	16	9.5	6.8	5.1
17	38	44	33	16	9.5	6.8	5.1
18	38	46	33	15	9.5	6.8	5.1
19	36	49	32	15	9.0	6.8	5.1
20	36	52	32	15	8.5	6.8	4.7
21	38	48	31	14	7.7	6.0	5.1
22	40	44	26	13	7.7	6.0	5.1
23	46	40	26	13	7.7	6.0	5.1
24	46	38	26	13	7.7	6.0	5.1
25	40	36	29	13	7.7	6.0	4.3
26	35	35	28	12	7.2	6.0	4.3
27	31	33	28	12	6.8	5.6	5.1
28	32	35	28	11	7.2	5.6	5.1
29	33	35	28	11	7.7	5.6	5.1
30	35	36	27	11	10	5.6	5.1
31	35	.....	26	.....	9.5	5.1	.....

NOTE.—Discharge ascertained from rating curve well defined below 50 second-feet.

Monthly discharge of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 15–31	46	31	37.4	1,260	C.
April	62	33	42.7	2,540	A.
May	36	26	30.9	1,900	A.
June	25	11	17.5	1,040	A.
July	11	6.8	9.13	561	A.
August	8.1	5.1	6.63	408	B.
September	6.0	4.3	5.15	306	B.
The period				8,020	

NEW RESERVATION CANAL NEAR PARKER, WASH.

LOCATION.—In sec. 20, T. 12 N., R. 19 E., three-fourths mile below intake of canal, three-fourths mile northwest of Parker, in Yakima County, and 5½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904–1915.

GAGE.—Vertical staff on left side three-fourths mile below intake, read to hundredths twice daily by George M. Baugher. Prior to April 1, 1911, vertical staff on upstream side, left abutment of highway bridge, one-fourth mile below present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from bridge at gage and from highway bridge one-fourth mile below gage.

CHANNEL AND CONTROL.—Gravel and small stones. Growth of aquatic plants causes variable obstruction in channel. Operation of checks below gage renders control unstable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.31 feet May 12–14 (discharge, 672 second-feet); no water in canal October 15 to April 6.

1904–1915: Maximum stage recorded, 4.31 feet May 12–14, 1915 (discharge, 672 second-feet); no water in canal during nonirrigating seasons.

ACCURACY.—Stage-discharge relation seriously affected by growth of aquatic plants and by operation of checks below gage. Frequent measurements render results good.

COOPERATION.—Computed discharge furnished by United States Reclamation Service. Measurements furnished by United States Office of Indian Affairs and United States Reclamation Service.

Discharge measurements of New Reservation canal near Parker, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	R. S. Skillin	0.78	60	July 20	R. S. Skillin	3.60	461
14	do	2.46	252	26	do	3.18	363
May 3	do	4.08	608	Aug. 2	do	3.35	384
10	do	4.18	644	6	F. E. Moxley	3.37	381
17	do	3.85	560	9	R. S. Skillin	3.47	406
18	Parker and Taylor	3.68	523	11	do	3.67	447
26	R. S. Skillin	3.98	600	16	do	2.99	333
June 3	do	3.79	539	17	do	.62	46
3	F. E. Moxley	3.76	543	20	do	.60	44
7	R. S. Skillin	3.76	531	20	F. E. Moxley	.61	45
12	F. E. Moxley	3.99	588	25	R. S. Skillin	3.76	482
14	R. S. Skillin	4.18	608	28	do	3.50	450
17	do	3.78	504	30	do	.37	34
18	do	3.78	505	Sept. 7	do	.30	30
19	F. E. Moxley	3.94	532	7	F. E. Moxley	.27	29
23	R. S. Skillin	4.03	559	8	R. S. Skillin	2.10	222
29	do	4.00	529	14	do	1.09	94
July 1	F. E. Moxley	3.98	527	15	do	1.57	144
8	R. S. Skillin	4.26	599	17	F. E. Moxley	1.54	139
12	do	3.60	462	21	R. S. Skillin	1.53	143
12	F. E. Moxley	3.60	448	27	do	2.12	218

Daily discharge, in second-feet, of New Reservation canal near Parker, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	173	.....	584	491	531	383	33
2	177	.....	582	498	531	373	33
3	169	.....	609	536	533	365	32
4	167	.....	615	529	533	365	30
5	158	.....	615	519	531	365	30
6	154	.....	615	527	531	387	29
7	154	36	620	529	567	393	29
8	154	48	628	527	607	419	215
9	154	77	647	510	563	409	206
10	157	123	647	557	460	419	212
11	154	130	647	561	456	466	210
12	154	156	672	573	456	492	206
13	189	118	672	594	456	477	83
14	71	143	672	596	487	435	96
15	.....	222	653	612	519	385	145
16	.....	257	573	628	487	335	143
17	.....	311	538	542	519	173	139
18	.....	319	529	500	460	46	136
19	.....	359	617	536	458	44	136
20	.....	431	615	544	460	44	141
21	.....	447	592	419	460	44	141
22	.....	473	599	525	439	45	143
23	.....	502	590	554	419	45	141
24	.....	508	617	552	419	496	141
25	.....	510	594	552	407	481	140
26	.....	569	578	552	367	458	134
27	.....	582	546	552	377	441	118
28	.....	582	502	552	377	454	118
29	.....	588	498	531	397	454	117
30	.....	586	500	533	363	34	117
31	.....	.....	498	.....	373	34	.....

NOTE.—Discharge ascertained by method for shifting control. June 15, gage washed out; discharge estimated. Aug. 31 to Sept. 6, no gage-height record; discharge interpolated.

Monthly discharge of New Reservation canal near Parker, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 1–14	189	71	156	4,330	B.
April 7–30	588	36	337	16,000	B.
May	672	498	596	36,600	B.
June	628	419	541	32,200	B.
July	607	363	469	28,800	B.
August	496	34	315	19,400	B.
September	215	29	120	7,130	B.

OLD RESERVATION CANAL NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., about 300 feet below intake, 500 feet above controlling waste of first lateral, 1 mile east of Parker, in Yakima County, and 3½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904–1915.

GAGE.—Vertical staff on left side about 10 feet upstream from private farm bridge; read to hundredths twice daily by Frank Sutton. Prior to June 23, 1908, vertical staff on downstream end, right retaining wall of Northern Pacific Railway Co. bridge, about half a mile below present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL.—In bed of old slough; velocities high; no obstruction from growth of aquatic plants; fairly permanent for each irrigation season.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.71 feet May 11 (discharge, 277 second-feet); no water in canal October 15 to March 31.

1904–1915: Maximum stage recorded, 4.20 feet June 17, 1914 (discharge, 332 second-feet). No water diverted during nonirrigating seasons.

ACCURACY.—Rating curve well defined between 15 and 300 second-feet. Operation of checks below gage may influence stage-discharge relation slightly. Results excellent above and good below 100 second-feet except for extremely low water.

COOPERATION.—Records of discharge furnished by United States Reclamation Service. Measurements furnished by United States Office of Indian Affairs and United States Reclamation Service.

Discharge measurements of Old Reservation canal near Parker, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	R. S. Skillin	0.95	58	July 8	R. S. Skillin	2.47	172
May 3	do	3.48	257	12	do	2.00	131
10	do	3.70	276	12	F. E. Moxley	2.00	126
17	do	3.21	237	20	R. S. Skillin	1.89	130
17	Parker and Taylor	3.21	227	22	do	1.92	131
25	R. S. Skillin	2.99	219	26	do	1.86	119
June 3	do	2.79	196	Aug. 2	do	1.84	116
3	F. E. Moxley	2.83	206	6	F. E. Moxley	1.65	101
7	R. S. Skillin	2.30	155	11	R. S. Skillin	0.59	37
12	F. E. Moxley	1.97	127	17	do	−0.05	11
14	R. S. Skillin	1.91	126	20	do	−0.12	10
19	F. E. Moxley	2.21	146	20	F. E. Moxley	−0.11	8.0
23	R. S. Skillin	2.01	130	30	R. S. Skillin	−0.11	13
29	do	2.26	150	Sept. 7	F. E. Moxley	−0.09	7.6
July 1	F. E. Moxley	2.22	147	14	R. S. Skillin	.....	4.6
6	R. S. Skillin	2.54	175	17	F. E. Moxley	−0.20	5.3

Daily discharge, in second-feet, of Old Reservation canal near Parker, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	87	33	255	236	146	121	9
2	87	33	254	218	146	116	9
3	87	33	258	196	146	116	9
4	87	33	244	184	160	114	9
5	81	38	233	162	170	120	9
6	66	46	224	160	179	105	9
7	90	46	220	156	171	100	9
8	94	46	229	156	162	99	24
9	84	46	245	146	134	108	12
10	86	48	276	152	122	74	11
11	87	48	277	138	124	37	10
12	70	77	265	124	130	18	8
13	60	82	258	116	130	12	6
14	60	84	251	124	130	12	5
15	.....	89	242	121	124	12	5
16	.....	100	226	128	130	22	5
17	.....	134	232	158	130	17	5
18	.....	156	245	157	127	10	.....
19	.....	174	238	149	121	9	.....
20	.....	202	233	148	121	8	.....
21	.....	217	222	155	125	8	.....
22	.....	222	212	151	127	8	.....
23	.....	226	208	133	127	8	.....
24	.....	226	209	134	122	26	.....
25	.....	226	209	138	122	9	.....
26	.....	229	202	136	117	9	.....
27	.....	240	196	147	124	9	.....
28	.....	247	222	148	120	9	.....
29	.....	258	245	149	120	9	.....
30	.....	258	240	149	126	9	.....
31	.....	.....	239	.....	127	9	.....

NOTE.—Discharge ascertained from rating curve well defined between 15 and 300 second-feet. Sept. 12, 13, 15, and 16 gage not read; discharge interpolated.

Monthly discharge of Old Reservation canal near Parker, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October 1–14	94	60	80.4	2,230	B.
April	258	33	130	7,730	A.
May	277	196	236	14,500	A.
June	236	116	152	9,060	A.
July	179	117	134	8,250	A.
August	121	8	43.3	2,660	B.
September 1–17	24	5	9.06	305	C.

SUNNYSIDE CANAL NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., about 600 feet below intake, 1½ miles east of Parker, and 3½ miles northwest of Wapato, in Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1904–1915.

GAGE.—Lietz water-stage recorder since April 20, 1909, on right side about 600 feet below intake; inspected several times daily by Henry Hanson. Vertical staff at same site as water-stage recorder since April 6, 1908. Prior to that date vertical staff on left side about 200 feet above present gage and at different datum. An inclined staff gage, installed April 6, 1907, at approximately same site as present gage, in use during 1907, but gage heights referred to datum of original gage.

DISCHARGE MEASUREMENTS...Made from gaging bridge about 30 feet below gage.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Operation of flashboards at drop No. 1 renders control unstable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.05 feet July 3 (discharge, 1,030 second-feet); no water in canal November 7 to March 9.

1904–1915: Maximum stage recorded, 5.05 feet July 3, 1915 (discharge, 1,030 second-feet); no water in canal during nonirrigating seasons.

ACCURACY.—Stage-discharge relation affected by variable velocity of approach due to different gate openings at headworks and by operation of flashboards at drop No. 1. Frequent discharge measurements render results excellent except for August and September, when stage-discharge relation was more unstable than for remainder of year.

COOPERATION.—Records of discharge and discharge measurements furnished by United States Reclamation Service.

Discharge measurements of Sunnyside canal near Parker, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	H. W. Humphrey	3.13	448	July 13	G. D. Hall	4.59	886
14	do	2.95	390	21	do	4.54	860
22	do	2.85	371	Aug. 2	do	4.46	824
31	Humphrey and Bates	1.49	125	10	F. E. Moxley	3.69	579
Mar. 21	Moore and Hall	2.32	303	14	G. D. Hall	2.18	196
Apr. 6	Hall and Moore	3.10	474	17	do	2.87	384
16	G. D. Hall	3.71	649	19	F. E. Moxley	3.33	462
27	do	4.41	887	23	G. D. Hall	3.63	565
May 8	Parker and Taylor	4.46	894	25	Moxley and Taylor	1.07	55
11	Hall and Noble	4.41	883	31	G. D. Hall	3.29	453
24	Hall and Moore	4.21	808	Sept. 7	do	2.85	335
June 3	do	4.19	781	10	do	1.94	120
19	G. D. Hall	4.88	982	16	do	2.19	206
30	do	4.94	991	24	do	2.29	230

Daily discharge, in second-feet, of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	502	109	.....	454	939	770	1,010	846	431
2	492	88	.....	456	952	770	1,020	856	431
3	479	88	.....	466	952	799	1,030	856	386
4	459	88	.....	479	952	809	1,010	852	373
5	454	88	.....	474	956	822	1,020	859	328
6	449	88	.....	471	928	842	1,020	777	315
7	449	.....	.....	474	907	849	1,020	736	315
8	446	.....	.....	492	904	883	1,020	745	189
9	444	.....	.....	500	897	893	932	819	127
10	439	.....	87	510	893	890	839	549	121
11	429	.....	87	543	883	883	846	342	124
12	422	.....	85	571	886	822	914	226	136
13	410	.....	82	585	869	767	911	205	202
14	393	.....	81	602	846	806	911	195	295
15	381	.....	118	634	842	780	903	234	251
16	375	.....	153	658	839	839	907	319	239
17	378	.....	200	690	809	942	880	476	226
18	378	.....	243	727	815	956	876	510	224
19	368	.....	261	761	815	970	880	502	217
20	366	.....	282	783	809	973	876	497	245
21	366	.....	288	819	809	973	880	456	269
22	366	.....	295	839	809	956	866	484	232
23	366	.....	315	869	809	897	859	563	236
24	366	.....	328	880	809	914	856	189	220
25	288	.....	351	880	806	981	859	59	220
26	209	.....	368	883	789	977	856	74	228
27	173	.....	391	883	780	987	852	63	215
28	82	.....	393	900	783	991	846	64	213
29	109	.....	417	921	777	991	806	363	220
30	109	.....	439	921	773	998	886	495	222
31	109	.....	452	.....	770	.....	900	452	.....

NOTE.—Discharge ascertained by method for shifting control.

Monthly discharge of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	502	82	357	22,000	A.
November 1–6	109	88	91.5	1,090	B.
March 10–31	452	81	260	11,300	A.
April	921	454	671	39,900	A.
May	956	770	852	52,400	A.
June	998	767	891	53,000	A.
July	1,030	803	913	56,100	A.
August	859	59	473	29,100	B.
September	431	121	248	14,800	B.

TOPPENISH CREEK NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 26, T. 10 N., R. 16 E., at Olney's ranch, about 1½ miles below highway bridge, 3½ miles southeast of Fort Simcoe, and about 5 miles southwest of White Swan, in Yakima County.

DRAINAGE AREA.—124 square miles (measured on Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—February 27, 1909, to September 30, 1915.

GAGE.—Since August 19, 1915, Stevens water-stage recorder on left bank, half a mile east of Olney ranch house. February 27, 1909, to July 22, 1913, chain gage on left bank, a quarter of a mile above present gage. July 23, 1913, to August 18, 1915, vertical staff attached to cottonwood tree on right bank, 150 feet above present gage; read to hundredths daily by Thomas Haynes.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Since August 19, 1915, artificial concrete control 18 feet below gage; before that date gravel and small bowlders, which shifted at high stages. Banks covered with brush; subject to overflow in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.0 feet at 9.45 a. m. March 31 (discharge, 336 second-feet); minimum stage recorded, 0.95 foot at 9.20 a. m. January 17 (discharge, 3.5 second-feet).

1909–1915: Maximum stage recorded, 5.21 feet March 3, 1910 (discharge, 1,190 second-feet); minimum stage recorded January 17, 1915.

WINTER FLOW.—Stage-discharge relation probably not affected by ice; open-channel rating curve assumed applicable.

DIVERSIONS.—A small irrigating ditch diverts above station.

REGULATION.—None at present. Diversion of spring run-off into a reservoir on Simcoe Creek for use in irrigating Indian lands is proposed.

ACCURACY.—Results obtained prior to installation of artificial control, fair; later results excellent.

Discharge measurements of Toppenish Creek near Fort Simcoe, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 3	I. L. Collier	1.92	32	May 5	C. G. Paulsen	2.68	79.1
Mar. 17	G. L. Parker	3.48	233	Aug. 19	.....do	[a] 1.55	7.8
18	.....do	3.45	235	19	.....do	[a] 1.55	7.7

[a] New gage read 0.57 foot.

Daily discharge, in second-feet, of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	May.	June.	July.	Aug.	Sept.
1	21.7	32	37	22.5	32	104	83	49	25.0	13.0	6.7
2	22.0	38	38	19.0	27	118	83	47	22.0	11.0	7.2
3	25.6	37	32	18.6	33	118	83	44	22.0	11.0	7.2
4	24.0	39	32	23.0	34	111	83	44	22.0	11.0	7.2
5	23.2	38	36	23.5	34	111	83	40	20.0	9.0	7.2
6	22.8	34	37	23.5	32	104	83	37	17.0	9.0	7.7
7	23.2	36	39	23.5	35	104	73	37	15.0	8.0	8.3
8	23.2	33	46	23.0	34	104	73	37	15.0	8.0	8.8
9	24.0	36	39	19.0	35	92	73	37	13.0	8.0	8.8
10	25.2	37	32	14.3	35	92	78	34	11.0	8.0	8.8
11	28	38	32	14.6	35	86	73	34	11.0	8.0	10.0
12	28	38	26	11.6	36	92	83	40	11.0	8.0	10.0
13	28	39	39	9.2	36	92	83	40	11.0	8.0	10.7
14	27	59	39	8.4	52	131	83	37	11.0	8.0	10.7
15	26	59	32	5.0	51	118	73	37	9.0	8.0	10.0
16	27	43	32	4.0	52	131	73	34	9.0	8.0	9.3
17	28	42	26	3.5	82	238	68	31	9.0	8.0	8.8
18	28	37	32	3.6	84	220	64	31	9.0	7.8	8.8
19	45	38	32	3.7	118	220	64	28	9.0	7.7	8.3
20	42	36	30	3.8	118	238	60	28	9.0	7.2	8.3
21	34	37	23.5	3.7	131	256	55	28	8.0	7.7	8.3
22	32	37	26	3.7	131	256	55	28	8.0	7.2	8.3
23	30	38	24	3.6	131	256	60	28	8.0	7.2	8.3
24	29	39	26	14.6	131	256	55	28	8.0	7.2	8.8
25	29	39	32	7.0	118	276	55	28	8.0	6.7	8.8
26	29	46	38	9.4	118	276	55	28	8.0	5.9	8.8
27	28	37	29	7.0	118	296	55	28	8.0	5.9	8.3
28	29	38	25.5	9.0	92	276	51	28	8.0	5.9	8.8
29	29	36	23.0	13.1	.....	296	51	28	11.0	5.9	8.8
30	28	37	23.0	14.6	.....	316	51	28	22.0	5.9	9.3
31	29	.....	23.0	33	.....	336	51	.....	20.0	6.3	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to Nov. 15, 1914, by method for shifting control; Nov. 16, 1914, to Mar. 31, 1915, from rating curve fairly well defined between 30 and 250 second-feet; May 5 to Aug. 18, 1915, from rating curve fairly well defined below 100 second-feet; Aug. 19 to Sept. 30, 1915, from rating curve well defined for the range of stage during the period. May 1-4, no record; discharge interpolated. Aug 9-12, 18, and Sept 6, 7, no record; discharge interpolated.

Monthly discharge of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	45	21.7	28.0	1,720	C.
November	59	32	39.1	2,330	C.
December	46	23	31.6	1,940	C.
January	33	3.5	12.8	787	C.
February	131	27	70.2	3,900	C.
March	336	86	185.0	11,400	C.
May	83	51	68.2	4,190	C.
June	49	28	34.2	2,040	C.
July	25	8	12.8	787	C.
August	13	5.9	7.95	489	B.
September	10.7	6.7	8.64	514	A.

SIMCOE CREEK NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 34, T. 11 N., R. 16 E., just above Spring Creek, at site of a proposed reservoir, 4 miles northeast of Fort Simcoe, in Yakima County.

DRAINAGE AREA.—77 square miles (measured on Plate 1, Water-Supply Paper 369).

RECORDS AVAILABLE.—February 28, 1909, to November 20, 1915, when station was discontinued.

GAGE.—Vertical staff attached to cottonwood tree on right bank about 100 yards above Spring Creek; read to hundredths twice each week, October to March; three to five times a week, April to June; and once a week July to September, by J. E. Bowlin. Prior to March 24, 1910, a chain gage at same site and datum.

DISCHARGE MEASUREMENTS.—Made from foot log or by wading.

CHANNEL AND CONTROL.—Sand and gravel; shifts during high stages. Control 30 feet below gage. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.2 feet at 3 p. m. March 1 (discharge, 192 second-feet); minimum stage recorded, 0.99 foot August 21, 28, and September 2, 25 (discharge, 0.4 second-foot).

1909–1915: Maximum stage recorded, 6.5 feet March 2, 1910 (discharge, 1,340 second-feet). No flow September 13 to October 10, 1909.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open channel rating curve assumed applicable.

ACCURACY.—Practically no diurnal fluctuation. Results fair, except when gage was not read frequently.

Discharge measurements of Simcoe Creek near Fort Simcoe, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 3	I. L. Collier	1.30	2.95	May 4	C. G. Paulsen	1.79	27.4
Mar. 18	G. L. Parker	2.34	65.9	Aug. 19	....do	1.00	.40
May 4	C. G. Paulsen	1.78	26.4				

Daily discharge, in second-feet, of Simcoe Creek near Fort Simcoe, Wash., from Oct. 1, 1914, to Nov. 20, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	0.8	3.5	9.0	4.2	7.4	192	85	45	15	3.6	0.8	0.4	0.5	0.6
2	.6	3.4	6.0	4.2	8.0	166	85	30	16	3.8	.8	.4	.5	.6
3	.4	3.3	3.0	6.3	8.5	140	74	28	16	3.6	.8	.4	.5	.6
4	.4	3.2	3.1	8.4	9.0	114	148	27	15	3.4	.8	.4	.5	.6
5	.4	3.1	3.2	7.0	9.5	89	86	26	12.3	3.2	.7	.4	.5	.6
6	.4	3.0	3.3	5.6	10	64	89	25	9.6	3.1	.7	.4	.5	.6
7	.4	3.0	3.4	4.2	10	65	92	30	6.6	3.0	.7	.4	.5	.6
8	.5	2.8	3.5	4.2	10	67	98	36	7.6	2.9	.6	.4	.5	.6
9	.6	2.6	3.6	4.2	10	69	104	32	8.5	2.8	.6	.4	.5	.5
10	.7	2.5	3.8	4.2	10	79	95	27	10.2	2.7	.6	.4	.5	.5
11	.7	2.4	4.0	4.2	10	89	86	24	12.0	2.7	.5	.4	.5	.5
12	.8	3.1	4.2	4.2	10	99	84	21	10.1	2.8	.5	.4	.5	.5
13	.9	3.8	3.9	4.2	10	110	81	20	8.2	2.8	.5	.4	.6	.5
14	1.0	4.5	3.6	4.2	12	102	84	20	7.3	2.9	.5	.4	.6	.5
15	1.0	5.3	3.3	4.2	15	93	86	21	6.4	3.0	.5	.4	.6	.5
16	1.1	5.3	3.0	4.2	17	85	84	22	5.6	3.1	.5	.4	.6	.5
17	1.1	5.3	2.8	4.2	20	77	81	23	4.9	2.6	.5	.4	.6	.5
18	4.2	5.3	2.6	4.2	36	69	66	22	4.9	2.1	.4	.4	.6	.5
19	3.7	5.3	2.4	4.2	52	69	62	21	4.9	1.6	.4	.4	.6	.5
20	3.3	5.3	2.6	4.2	69	69	58	21	3.8	1.2	.4	.4	.6	.5
21	2.9	5.3	2.8	4.2	86	70	72	21	3.6	1.2	.4	.4	.6	.....
22	2.5	5.3	3.0	4.2	104	71	86	20	3.4	1.2	.4	.4	.6	.....
23	2.1	5.3	3.3	4.2	122	72	74	19	3.2	1.2	.4	.4	.6	.....
24	1.7	5.3	3.6	4.3	140	74	61	16	3.0	1.1	.4	.4	.6	.....
25	1.9	9.0	3.9	4.4	154	77	43	12	2.8	1.1	.4	.4	.6	.....
26	2.1	12	4.2	4.5	168	80	70	11.8	2.7	1.1	.4	.4	.5	.....
27	2.3	16	4.2	4.7	183	66	98	11.5	2.8	1.1	.4	.4	.5	.....
28	2.6	20	4.2	4.9	188	53	87	14	3.0	1.1	.4	.4	.5	.....
29	2.9	16	4.2	5.1	.....	54	76	17	3.2	1.0	.4	.4	.5	.....
30	3.2	12	4.2	5.3	.....	55	60	16	3.4	1.0	.4	.5	.5	.....
31	3.5	.....	4.2	6.8	.....	70	.....	14	.....	.9	.4	.....	.6	.....

NOTE.—Discharge ascertained as follows: Oct. 1 to May 4, from rating curve well defined below 150 second-feet; May 5 to Nov. 20, from rating curve fairly well defined below 160 second-feet. Discharge interpolated for days when gage was not read.

Monthly discharge of Simcoe Creek near Fort Simcoe, Wash., for the period Oct. 1, 1914, to Nov. 20, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914-15.					
October	4.2	0.4	1.64	101	
November	20	2.4	6.07	361	D.
December	a 9.0	2.4	3.75	231	D.
January	8.4	4.2	4.75	292	D.
February	a 188	a 7.4	53.2	2,950	C.
March	192	53	85.5	5,260	C.
April	148	58	81.8	4,870	C.
May	45	11.5	22.4	1,380	C.
June	16	2.7	7.20	428	C.
July	3.8	.9	2.22	136	
August	.8	.4	.523	32	
September	.5	.4	.403	23.8	
The year	192	.4	22.2	16,100	
1915.					
October	.6	.5	.545	33.5	
November 1-20	.6	.5	.540	21.4	

a Interpolated value.

RESERVATION DRAIN AT ALFALFA, WASH.

LOCATION.—In sec. 29, T. 10 N., R. 21 E., at the highway bridge one-fourth mile southeast of Alfalfa, in Yakima County, and about 2 miles above the mouth of drain.

RECORDS AVAILABLE.—December 5, 1912, to September 30, 1915, miscellaneous measurements 1911 and 1912.

GAGE.—Vertical staff on right bank under highway bridge; read once daily to hundredths by Nellie Ide.

DISCHARGE MEASUREMENTS.—Made from footbridge just above highway bridge at mouth of drain 2 miles below gage.

CHANNEL AND CONTROL.—Composed of gravel; shifts at all stages. Banks high; current swift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet October 13 (discharge, 254 second-feet); minimum stage recorded, 1.8 feet July 3, August 12, 15–31, September 1–14, and 19 (discharge, 145 second-feet).

1913–1915: Maximum stage recorded, 1.65 feet May 9 and 11, 1913 (discharge, 264 second-feet); minimum stage recorded in 1915.

WINTER FLOW.—Ice does not form at this station.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Gage-height record not reliable October to March. Periods of shifting control short and defined by frequent measurements. Results October to March, good; April to September, excellent.

COOPERATION.—Station maintained in cooperation with United States Indian Service.

The discharge includes the return water from irrigation by the reservation canals and the underflow of Toppenish Valley. During the low-water period practically the whole flow of Toppenish Creek is carried into this canal by underground seepage.

Discharge measurements of Reservation drain at Alfalfa, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	R. S. Skillin [a]	1.51	227	Apr. 20	R. S. Skillin	2.06	178
11	do	1.56	231	24	do	2.02	167
23	Darr and Skillin [a]	1.47	217	May 1	do	2.00	171
31	Skillin and Stevens [a]	1.44	210	8	C. G. Paulsen	1.99	173
Nov. 7	do	1.41	202	8	R. S. Skillin	1.99	168
14	do	1.42	208	15	do	2.09	182
21	do	1.41	201	22	do	2.08	181
28	do	1.41	205	28	do	2.22	191
Dec. 2	I. L. Collier	1.40	194	June 5	do	2.09	176
4	R. S. Skillin	1.41	202	12	do	2.06	173
12	do	1.41	202	19	do	1.97	166
19	do	1.37	189	28	do	1.91	155
26	do	1.35	182	July 3	do	1.85	154
Jan. 2	do	1.36	183	10	do	1.87	163
9	do	1.37	186	11	C. G. Paulsen	1.87	165
16	do	1.39	189	17	R. S. Skillin	1.93	172
23	do	2.03	187	24	do	1.86	161
30	do	2.05	178	31	do	1.91	159
Feb. 6	do	2.08	186	Aug. 6	do	1.87	152
13	do	2.16	195	6	do	1.87	150
20	do	2.23	205	11	C. G. Paulsen	1.87	156
27	do	2.23	206	14	R. S. Skillin	1.87	151
Mar. 6	do	2.23	205	21	do	1.82	148
10	G. L. Parker	2.18	182	23	do	1.80	150
10	do	2.18	184	27	do	1.79	141
13	R. S. Skillin	2.15	192	Sept. 3	do	1.77	136
20	do	2.11	191	11	do	1.80	146
27	do	2.07	186	21	do	1.86	151
Apr. 3	do	2.06	183	21	do	1.86	149
10	do	2.06	184	27	do	1.86	148

[a] Engineers, U. S. Indian Service.

Daily discharge, in second-feet, of Reservation drain at Alfalfa, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	223	213	210	193	189	211	178	167	189	156	167	145
2	223	203	194	183	189	211	189	167	189	156	167	145
3	223	203	199	193	189	208	189	178	189	145	167	145
4	234	203	202	193	189	206	178	167	189	151	167	145
5	234	203	202	193	189	203	189	178	178	152	167	145
6	234	213	202	193	189	200	189	167	178	154	156	145
7	234	203	202	193	200	196	189	167	167	156	156	145
8	234	203	202	193	200	192	178	167	167	162	156	145
9	234	203	202	183	200	187	178	178	167	160	156	145
10	234	203	204	193	200	183	189	178	178	167	156	145
11	234	203	204	193	200	188	189	178	167	167	156	145
12	244	213	202	203	200	193	189	178	178	167	145	145
13	254	203	202	193	200	200	189	178	167	156	156	145
14	244	203	203	193	200	200	178	178	178	167	156	145
15	234	203	203	193	200	200	178	178	167	167	145	156
16	234	203	204	193	200	200	178	178	167	178	145	156
17	223	213	204	193	200	200	178	178	167	167	145	156
18	223	213	205	203	200	189	178	178	167	167	145	156
19	223	203	183	178	200	189	189	178	167	167	145	145
20	223	203	193	178	200	189	189	178	167	167	145	156
21	234	203	193	178	211	189	186	178	167	167	145	156
22	234	203	193	178	211	189	172	178	167	167	145	167
23	213	203	193	178	211	189	167	178	167	156	145	167
24	223	203	193	178	211	189	167	178	167	167	145	156
25	223	213	193	178	211	189	167	189	167	164	145	156
26	223	213	183	178	200	189	167	189	167	160	145	156
27	223	203	193	178	200	189	167	189	156	158	145	156
28	223	203	193	178	200	178	167	189	156	156	145	156
29	223	213	193	178	.....	189	167	189	156	157	145	156
30	223	213	193	178	.....	178	167	189	156	155	145	156
31	213	.....	193	189	.....	178	.....	189	.....	156	145	.....

NOTE.—Discharge ascertained from four well-defined rating curves applicable as follows: Oct. 1 to Nov. 28; Dec. 19 to Jan. 18; Jan. 19 to Mar. 6, Mar. 13 to Apr. 20, July 10–24; and Apr. 24 to July 3, July 31 to Sept. 30; and by method for shifting control from Nov. 29 to Dec. 18, Mar. 7–12, Apr. 21–23, July 4–9, and July 25–30. Discharge interpolated, gage heights unreliable, Mar. 3–5, 7–9, and Apr. 25.

Monthly discharge of Reservation drain near Alfalfa, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	254	213	229	14,100	B.
November	213	203	206	12,300	B.
December	210	183	198	12,200	B.
January	203	178	187	11,500	B.
February	211	189	200	11,100	B.
March	211	178	193	11,900	B.
April	189	167	179	10,700	A.
May	189	167	178	10,900	A.
June	189	156	170	10,100	A.
July	178	145	161	9,900	A.
August	167	145	151	9,280	A.
September	167	145	151	8,980	A.
The year	254	145	184	133,000	

SATUS CREEK BELOW DRY CREEK, NEAR TOPPENISH, WASH.

LOCATION.—In sec. 24, T. 9 N., R. 19 E., at dam site about a mile below mouth of Dry Creek, and 9 miles southwest of Toppenish, in Yakima County.

DRAINAGE AREA.—427 square miles (measured on topographic and Yakima Indian Reservation maps).

RECORDS AVAILABLE.—June 22, 1913, to September 30, 1915.

GAGE.—Stevens water-stage recorder on left bank at dam site.

DISCHARGE MEASUREMENTS.—Made from cable, or by wading.

CHANNEL AND CONTROL.—Small boulders and gravel; shifting at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 4.5 feet at 4 a. m. March 16 (discharge, 1,000 second-feet); minimum stage from recorder, 0.28 foot at 10 p. m. August 28 and at 4 a. m. August 30 (discharge, 6.6 second-feet).

1913–1915: Maximum stage from water-stage recorder, 4.86 feet at 7 p. m. February 27, 1914 (discharge, 997 second-feet); minimum stage from recorder. August 28 and 30, 1915.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice.

DIVERSION.—Entire flow of Satus Creek above Lazy Creek is diverted for irrigation during July and August, and the records for low-water summer months show the run-off of Lazy and Dry creeks and the seepage return from upper Satus Creek.

REGULATION.—None.

ACCURACY.—Results excellent during periods when water-stage recorder was operating.

Discharge measurements of Satus Creek below Dry Creek, near Toppenish, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 1	I. L. Collier	0.89	34.0	May 9	C. G. Paulsen	1.65	116
Mar. 11	G. L. Parker	2.47	267	July 10	do	.57	15.0
12	do	2.45	261	Aug. 10	do	.35	7.9

Daily discharge, in second-feet, of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	25	29	31	34	265	274	124	55	16	12	8.2
2	14	30	30	31	41	300	354	122	52	15	11	8.4
3	16	28	31	31	40	325	373	115	50	15	9.4	8.9
4	16	33	31	31	38	320	330	112	46	15	9.2	8.7
5	16	31	31	31	39	310	292	106	43	14	8.9	8.4
6	16	29	31	31	42	300	266	109	37	14	8.7	8.7
7	16	30	29	31	44	294	259	106	34	14	8.2	9.4
8	16	29	29	31	45	290	250	106	32	16	8.2	9.7
9	16	29	29	31	46	286	228	112	35	15	8.4	9.7
10	20	28	23	31	47	284	218	112	37	14	8.2	9.7
11	24	28	20	31	48	271	208	116	40	14	8.0	10
12	24	28	18	32	50	252	214	116	40	13	8.0	11
13	24	39	15	33	56	245	232	116	40	13	8.2	12
14	22	46	18	34	59	524	220	106	34	15	8.2	12
15	18	40	20	34	57	748	206	98	31	14	8.2	11
16	19	37	25	30	60	708	199	91	29	15	8.2	11
17	20	37	23	29	60	541	195	98	27	15	8.2	11
18	20	35	22	30	77	490	195	101	26	15	8.2	10
19	35	34	25	33	85	392	193	92	26	14	8.2	10
20	32	34	28	34	86	339	189	86	26	13	8.0	9.7
21	29	34	29	27	91	316	180	82	24	12	8.2	9.7
22	25	33	29	26	245	310	168	78	22	11	8.2	9.7
23	24	32	29	28	412	327	156	76	20	11	8.0	10
24	23	31	29	31	325	348	150	82	19	11	7.7	11
25	22	31	29	28	300	310	146	78	19	11	7.7	10
26	22	31	29	28	265	262	138	72	19	10	7.7	10
27	22	31	29	29	244	226	135	69	19	10	7.7	9.7
28	21	31	29	31	220	226	134	72	19	11	7.5	10
29	21	30	28	36	.....	252	138	68	18	11	7.2	11
30	21	30	28	34	.....	262	130	63	17	13	7.5	11
31	21	.....	28	34	.....	264	.....	59	.....	14	7.7	.....

NOTE.—Discharge ascertained from rating curve well defined between 8 and 1,400 second-feet. Oct. 5–27 and Feb. 22 to Mar. 10, discharge estimated, by comparative hydrographs with Toppenish Creek near Fort Simcoe, as in table. Discharge interpolated Nov. 28–31, June 9–10.

Monthly discharge of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum	Minimum.	Mean.		
October	35	13	20.9	1,290	C.
November	46	25	32.1	1,910	A.
December	31	15	26.5	1,630	A.
January	36	26	31.0	1,910	A.
February	412	34	113	6,280	C.
March	748	226	342	21,000	B.
April	373	130	212	12,600	A.
May	124	59	94.9	5,840	A.
June	55	17	31.2	1,860	A.
July	16	10	13.4	824	B.
August	12	7.2	8.35	513	B.
September	12	8.2	9.99	594	B.
The year	748	7.2	77.7	56,300	

MISCELLANEOUS MEASUREMENTS.

The following discharge measurements are arranged in the same order of drainage basins as the regular stations:

Miscellaneous discharge measurements in drainage basins in Washington for the year ending Sept. 30, 1915.

Nisqually River drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 8	Nisqually River	Puget Sound	Former gaging station, ½ mile below Mount Rainier National Park boundary.	4.42	276

Sultan River drainage basin.

Aug. 4	Sultan River	Skykomish River	Camp Habecker, 9½ miles above mouth in NE. ¼ NE. ¼, sec. 5, T. 28, R. 8 E., Snohomish County.	5.16	122
4	do	do	do	5.16	126
Sept. 26	do	do	Mouth		77.8

Stilaguamish River drainage basin.

June 10	Canyon Creek	South Fork of Stilaguamish River.	Mouth		119
Sept. 4	do	do	do		43.5

Kettle River drainage basin.

Aug. 6	Sherwood Creek	Kettle River	Highway bridge near Boyds, Wash., ¼ mile above mouth.		18.1

Miscellaneous discharge measurements in drainage basins in Washington for the year ending Sept. 30, 1915—Continued.

Nespelem River drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
Mar. 22	Little Nespelem River...	Nespelem River.....	¾ mile south of the agency, at highway bridge.	1.37	17.1
Apr. 9	.....do.....	.....do.....	.....do.....	1.53	20.6
9	.....do.....	.....do.....	.....do.....	.99	15.2
June 26	.....do.....	.....do.....	.....do.....	.75	8.3

Okanogan River drainage basin.

May 25	Okanogan River.....	Columbia River.....	Highway bridge, at Oroville, Wash.	.....	1,470
June 1	.....do.....	.....do.....	.....do.....	.....	1,490
Aug. 7	.....do.....	.....do.....	.....do.....	.....	872

Methow River drainage basin.

Aug. 13	Methow River.....	Columbia River.....	Winthrop, Wash.....	.....	279
13	Clark-Dodd canal.....	Methow River.....	1 mile below intake and above all diversions.	.....	6.2
13	F. Thompson ditch.....	Wolf Creek.....	300 feet below intake and above all diversions.	.....	2.2
13	Geo. Thompson ditch...	.....do.....	10 feet below intake.....	.....	4.2
13	Little-Wetsell canal....	.....do.....	½ mile below intake and above all diversions.	.....	3.0
13	Banker-Wetsell canal....	Methow River.....	¼ mile below intake and above all diversions.	.....	7.1
13	Foghorn canal.....	.....do.....	.....do.....	.....	22.9
13	Chewack Creek.....	.....do.....	Winthrop, Wash.....	1.49	165
13	Chewack canal.....	Chewack Creek.....	½ mile north of Winthrop, above nearly all diversions.	.....	11.5
13	Fulton canal.....	.....do.....	1 mile below intake and above all diversions.	.....	15.8
14	Barclay canal.....	Methow River.....	1½ miles below intake and above nearly all diversions.	.....	28.6
15	Twisp River.....	.....do.....	1 mile above mouth and and below all diversions.	.....	11.5
14	Methow Canal Co.'s ditch (Blythe ditch).	Twisp River.....	1 mile west of Twisp and above all diversions.	.....	42.2
14	Burke Lehman canal....	.....do.....	2 miles below intake and above all diversions.	.....	11.5
14	Byrnes ditch.....	.....do.....	20 feet below intake.....	.....	2.8
14	Josh Risley canal.....	.....do.....	100 feet below intake....	.....	9.0
14	Garrison ditch.....	Methow River.....	50 feet below intake.....	.....	3.3
16	Beaver Creek.....	.....do.....	2 miles below intake of Batties canal and about 7 miles above mouth.	.....	6.2
16	Battie ditch.....	Beaver Creek.....	2 miles below intake and above all diversions.	.....	4.8
16	Filer-Sampson ditch.....	.....do.....	1 mile below intake and above all diversions.	.....	4.8
16	Watson ditch.....	.....do.....	¼ mile below intake and above nearly all diversions.	.....	2.5
16	Gold Creek canal (north).	Gold Creek.....	1 mile below intake and above all diversions.	.....	8.4
16	Gold Creek canal (south).	.....do.....	½ mile below intake and above all diversions.	.....	4.4
16	Bollinger canal.....	Methow River.....	.....do.....	.....	3.1
12	Steiner (Sexsmith canal).	.....do.....	3 miles below intake and above nearly all diversions.	.....	8.8
12	Starr canal.....	.....do.....	¼ mile west of Pateros, Wash.	.....	9.5
11	Parker ditch.....	.....do.....	2½ miles below intake and above all diversions.	.....	2.4

Miscellaneous discharge measurements in drainage basins in Washington for the year ending September 30, 1915—Continued.

Yakima River drainage basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 19	Nicol ditch	Toppenish Creek	Near new gaging station on Toppenish Creek.	0.70	3.4
May 4	Spring Creek	Simcoe Creek	Mouth, near Simcoe Creek gage.		1.5
Aug. 19	do	do	do		.7

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XII.—NORTH PACIFIC SLOPE BASINS

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, monographs, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

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

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Topeka, Kans., 25 Federal Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Phoenix, Ariz., 417 Fleming Building.
Austin, Tex., Old Post Office Building.
Honolulu, Hawaii, 14 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,800 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September, 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 2	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1915.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table following gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1915. The data for any particular station will, as a rule, be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1915, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, and 401, which contain records for the New England streams from 1903 to 1915. Results of miscellaneous measurements are published by drainage basins.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are presented in order of the streams around the rim of the lake.

Numbers of water-supply papers containing results of stream measurements, 1899–1915.

Year.	I. North Atlantic slope basins (St. John River to York River).	II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	III. Ohio River basin.	IV. St. Lawrence River basin.	V. Hudson Bay and upper Mississippi River basins.	VI. Missouri River basin.	VII. Lower Mississippi River basin.	VIII. Western Gulf of Mexico basins.	IX. Colorado River basin.	X. Great Basin.	XI. Pacific slope basins in California.	XII. North Pacific slope basins.		
												Pacific slope basins in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [f] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[h] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope drainage basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

NORTH PACIFIC SLOPE DRAINAGE BASINS.

PRINCIPAL STREAMS.

The largest rivers discharging into the Pacific Ocean in Oregon and Washington are Rogue, Umpqua, and Columbia rivers and streams that reach the ocean through Puget Sound. The principal tributaries of the Columbia are Kootenai, Clark Fork, Spokane, Wenatchee, Yakima, Snake, Walla Walla, Umatilla, John Day, Deschutes, Klickitat, Willamette, and Lewis rivers. Nisqually, Puyallup, White, Snohomish, and Skagit rivers flow into Puget Sound. The streams of this division drain wholly or in part the States of Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations (see pp. XXXI–XXXII).

GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained September 30, 1915. Period after a date indicates discontinuance.

BETWEEN COLUMBIA RIVER AND PUGET SOUND.

Chehalis River at Centralia, Wash., 1910–11.
Quinault River at Quinault Lake, Wash., 1911–
Soleduck River near Quillayute, Wash., 1897–1901.
Kalawa River near Forks, Wash., 1897–1901.

PUGET SOUND DRAINAGE BASINS.

Elwha River at McDonald, Wash., 1897–1901.
Elwha River near Port Angeles, Wash., 1911–12.
Dungeness River at Sequin, Wash., 1897–98.
Dungeness River at Dungeness, Wash., 1898–1901.
Dosewallips River at Brinnon, Wash., 1910–11.
Duckabush River near Duckabush, Wash., 1910–11.
Skokomish River, North Fork (head of Skokomish River), near Hoodsport, Wash., 1910–11.
Nisqually River near Ashford, Wash., 1910–1914.
Nisqually River near La Grande, Wash., 1906–1911.
Puyallup River near Electron, Wash., 1909–
Puyallup River at Alderton, Wash., 1914–
Puyallup River at Puyallup, Wash., 1914–
Carbon River at Fairfax, Wash., 1910–1912.
White River below Forks, near Enumclaw, Wash., 1911–12.

Nooksack River,[1] North Fork (head of Nooksack River), near Glacier, Wash., 1910–11.
Nooksack River near Deming, Wash., 1910–11.
Middle Fork of Nooksack River at ranger station near Deming, Wash., 1910–11.
Middle Fork of Nooksack River near Deming, Wash., 1910–11.

COLUMBIA RIVER BASIN.

Columbia River at Wenatchee, Wash., 1910.
Columbia River near Julia, Wash., 1905.
Columbia River at Hanford, Wash., 1910.
Columbia River at Pasco, Wash., 1904–1910.
Columbia River at Cascade Locks and The Dalles, Oreg., 1878–
Kootenai River at Libby, Mont., 1910–
Kootenai River at Crossport, Idaho, 1904.
Kootenai River near Bonners Ferry, Idaho, 1904.
Kootenai River near Porthill, Idaho, 1904.
Callahan Creek at Troy, Mont., 1911–
Yaak River near Troy, Mont., 1910–
Moyie River at Snyder, Idaho, 1911–
Clark Fork at Missoula, Mont., 1898–1907.
Clark Fork at St. Regis, Mont., 1910–
Clark Fork near Plains, Mont., 1910–
Pend Oreille Lake at Sandpoint, Idaho, 1914–
Clark Fork at Priest River, Idaho, 1903–1905.
Clark Fork at Newport, Wash., 1904–1910.
Clark Fork at Metaline Falls, Wash., 1908–1910; 1912–
Racetrack Creek near Anaconda, Mont., 1911–12; 1914–
Little Blackfoot River and ditch near Elliston, Mont., 1910–
Rock Creek near Quigley, Mont., 1910–1912.
Big Blackfoot River at Bonner, Mont., 1898–1905.
Rattlesnake Creek at Missoula, Mont., 1898–1900.
Bitterroot River, West Fork (head of Bitterroot River), near Darby, Mont., 1910–
Bitterroot River near Grantsdale, Mont., 1902–1907.
Bitterroot River near Missoula, Mont., 1898–1901; 1903–4.
East Fork of Bitterroot River near Darby, Mont., 1910–
Lolo Creek near Lolo, Mont., 1910–
St. Regis River near St. Regis, Mont., 1910–
Flathead River near Columbia Falls, Mont., 1910–
Flathead River at Demersville, near Kalispell, Mont., 1910–1912.
Flathead River at Damon's ranch, near Kalispell, Mont., 1910–1912.
Flathead River at Keller's ranch, near Holt, Mont., 1910–1912.
Flathead Lake (on Flathead River) near Holt, Mont., 1900.
Flathead Lake at Polson, Mont., 1908–
Flathead River near Polson, Mont., 1907–
Middle Fork Flathead River at Belton, Mont., 1910–
Lake McDonald outlet at Lake McDonald, Mont., 1912–1914.
South Fork of Flathead River near Columbia Falls, Mont., 1910–
Swan River near Big Fork, Mont., 1910–11.
Stillwater River near Kalispell, Mont., 1906–7.
Whitefish River near Kalispell, Mont., 1906.
Little Bitterroot River near Marion, Mont., 1910–
Little Bitterroot River near Hubbart, Mont., 1909–

[1] Revised decision of United States Geographic Board rendered Oct. 3, 1917.

[1] Yakima; city and precinct, Yakima County, Wash.; not North Yakima. Decision of U. S. Geographic Board rendered Jan. 2, 1918.

Columbia River tributaries—Continued.
Yakima River near Richland, Wash., 1906–1911.
Cabin Creek near Easton, Wash., 1909–1911.
Kachess Lake (on Kachess River) near Easton, Wash., 1905–
Kachess River near Easton, Wash., 1903–
Big Creek near Cle Elum, Wash., 1909.
Cle Elum River, North Fork (head of Cle Elum River), at Galena, Wash., 1907; 1911.
Cle Elum Lake near Roslyn, Wash., 1906–
Cle Elum River near Roslyn, Wash., 1903–
Teanaway River below Forks, near Cle Elum, Wash., 1911–12.
Teanaway River near Cle Elum, Wash., 1909–1911; 1912–1914.
Swauk Creek near Cle Elum, Wash., 1909–1912.
Cascade canal near Ellensburg (Thorp), Wash., 1905–6; 1909–1911.
West Kittitas canal near Thorp, Wash., 1904–1906; 1909–1911.
Ellensburg Water Co.'s canal near Ellensburg, Wash., 1904–5; 1909–1911.
Taneum Creek near Thorp, Wash., 1909–1912.
Manastash Creek near Ellensburg, Wash., 1909–1914.
Wilson Creek near Thrall, Wash., 1911.
Selah Moxee canal near Selah, Wash., 1904–5; 1909–1911.
Wenas Creek near Selah, Wash., 1909–1912.
Naches River at Anderson's ranch, near Nile, Wash., 1909–1914.
Naches River at Oak Flat, near Nile, Wash., 1904–
Naches River below Tieton River, near Naches, Wash., 1905; 1909–1912.
Naches River near Yakima,[1] Wash., 1893–1897; 1898–1912.
Bumping Lake (on Bumping River) near Nile, Wash., 1909; 1910–
Bumping River at Bumping Lake, near Nile, Wash., 1906; 1909–
American River near Nile, Wash., 1909; 1910; 1911; 1913; 1914; 1915.
Selah Valley canal near Naches, Wash., 1904–1906; 1909–1913.
Tieton River, North Fork, below Clear Creek, near Naches, Wash., 1914–
Tieton River at McAllister Meadows, near Naches, Wash., 1908–1914.
Tieton River at headworks of Tieton canal, near Naches, Wash., 1906–
Tieton River at Cobb's ranch, near Naches, Wash., 1902–1913.
Tieton canal near Naches, Wash., 1910–
Wapatox canal near Naches, Wash., 1904–5; 1909–11.
Naches Canal Co.'s (Gleed) canal near Naches, Wash., 1904–1906; 1909–1911.
Yakima Valley (Congdon) canal near Naches, Wash., 1904–1906; 1909–1911.
Naches–Cowiche canal near Naches, Wash., 1904–5; 1909–1911.
Yakima [1] power canal near Yakima,[1] Wash., 1904–1906; 1909–10.
Schanno canal near Yakima, Wash., 1904–5; 1909–1911.
Yakima [1] power waste at Yakima, Wash., 1909–1912.
Yakima [1] mill waste at Yakima, Wash., 1909–1912.
Naches Avenue Union canal at Yakima, Wash., 1904–1906; 1909–1911.
Old Union canal near Yakima, Wash., 1904–1906; 1909–1911.
Moxee Co.'s canal near Yakima, Wash., 1904–1906; 1909–1911.
Fowler canal near Yakima, Wash., 1904–1906; 1909–1911.
Ahtanum Creek, North Fork (head of Ahtanum Creek), near Tampico, Wash., 1907–
Ahtanum Creek at The Narrows, near Tampico, Wash., 1908–1913.

[1] Decision of U. S. Geographic Board; formerly called North Yakima.

Columbia River tributaries—Continued.
Yakima River tributaries—Continued.
Ahtanum Creek near Union Gap,[1] Wash., 1904; 1907–1912.
South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., 1915–
South Fork of Ahtanum Creek near Tampico, Wash., 1907–1914.
New Reservation canal near Parker (Union Gap), Wash., 1904–
Old Reservation canal near Parker (Wapato), Wash., 1904–
Sunnyside canal near Wapato, Wash., 1904–
Toppenish Creek near Fort Simcoe, Wash., 1909–
Toppenish Creek near White Swan (Wapato), Wash., 1909–1912.
Toppenish Creek at railway bridge, near Toppenish, Wash., 1894–1896.
Toppenish Creek near Toppenish, Wash., 1908–9.
Toppenish Creek at Alfalfa, Wash., 1909–1912.
Simcoe Creek near Fort Simcoe, Wash., 1909–
Reservation drain at Alfalfa, Wash., 1912–
Satus Creek near Toppenish, Wash., 1908–1913.
Satus Creek below mouth of Dry Creek, near Toppenish, Wash., 1913–
Satus Creek near Alfalfa, Wash., 1905.
Satus Creek near Satus, Wash., 1894–1896.
Kiona canal near Kiona, Wash., 1904–1906; 1908–1911.
Kennewick canal near Richland(Kennewick), Wash., 1904–5; 1910–11.
Lower Yakima canal near Kiona, Wash., 1905; 1910–11.
Snake River at south boundary at Yellowstone National Park, 1913–
Jackson Lake (Snake River) at Moran, Wyo., 1909–10 (fragmentary); 1911–
Snake River [2] near Moran, Wyo., 1903–
Snake River [2] at Grovont, Wyo., 1899.
Snake River [2] near Lyon, Idaho, 1903–1911.
Snake River [2] near Heise, Idaho, 1910–
Snake River at Idaho Falls, Idaho, 1889–1890; 1892–1894.
Snake River near Shelley, Idaho, 1915–
Snake River near Firth, Idaho, 1915.
Snake River near Blackfoot, Idaho, 1910–
Snake River at Neeley, Idaho, 1906–
Snake River at Howells Ferry, near Minidoka, Idaho, 1910–
Snake River at Montgomery Ferry, near Minidoka, Idaho, 1895–1899; 1901–1910.
Lake Milner (on Snake River) at Milner, Idaho, 1911–
Snake River at Milner, Idaho, 1909–
Snake River near Twin Falls, Idaho, 1911–
Snake River near Hagerman, Idaho, 1912–
Snake River at King Hill, Idaho, 1909–
Snake River near Murphy, Idaho, 1912; 1913–
Snake River at Weiser, Idaho, 1910–
Snake River at Lewiston, Idaho, 1910.
Snake River near Burbank, Wash., 1907–
Pacific Creek near Moran, Wyo., 1906.
Buffalo River near Elk, Wyo., 1906.
Henrys Fork [3] at Warm River, Idaho, 1910–1915.
Henrys Fork near Ora, Idaho, 1902–1909.
Henrys Fork in canyon above Fall River, Idaho, 1890–91.

[1] Revised decision of U. S. Geographic Board rendered Jan. 2, 1918; formerly called Yakima City.
[2] Decision of United States Geographic Board; formerly called South Fork of Snake River.
[3] Decision of United States Geographic Board; formerly called North Fork of Snake River.

Columbia River tributaries—Continued.
Snake River tributaries—Continued.
North Side Twin Falls canal at Milner, Idaho, 1909–
South Side Twin Falls canal at Milner, Idaho, 1909–
Big Cottonwood Creek near Oakley, Idaho, 1909–
Dry Creek near Artesian City, Idaho, 1912.
Rock Creek near Rock Creek, Idaho, 1909–1913.
McMullen Creek near Rock Creek, Idaho, 1910; 1912.
Salmon Falls Creek above upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below High Line canal, near San Jacinto, Nev., 1914.
Salmon Falls Creek near San Jacinto, Nev., 1909–
Salmon Falls Creek near Twin Falls, Idaho, 1909–10.
Upper Vineyard ditch near Contact, Nev., 1914.
Lower Vineyard ditch near Contact, Nev., 1914.
Jakes Creek above Hubbard ranch, near Contact, Nev., 1914.
Jakes Creek below Hubbard ranch, near Contact, Nev., 1914.
Willow Creek near Contact, Nev., 1914.
Bird's Nest ditch near Contact, Nev., 1914.
Harrell ditch near Contact, Nev., 1914.
High Line ditch near San Jacinto, Nev., 1914.
San Jacinto ditch near San Jacinto, Nev., 1914.
Island ditch near San Jacinto, Nev., 1914.
West Boar's Nest ditch near San Jacinto, Nev., 1914.
Trout Creek near San Jacinto, Nev., 1914.
East Boar's Nest ditch near San Jacinto, Nev., 1914.
Shoshone Creek near San Jacinto, Nev., 1914–15.
North Side ditch near San Jacinto, Nev., 1914.
Cedar Creek near Roseworth, Idaho, 1909–
Devil Creek near Three Creek, Idaho, 1912–1914.
Big Wood River near Gimlet, Idaho, 1904–5.
Big Wood River at Hailey, Idaho, 1889; 1915–
Big Wood Slough at Hailey, Idaho, 1915–
Big Wood River near Bellevue, Idaho, 1911–
Big Wood River below Magic dam, near Richfield, Idaho, 1911–
Big Wood River below North Gooding canal, near Shoshone, Idaho, 1911; 1912–
Big Wood River near Shoshone, Idaho, 1905–6; 1908–1913.
Big Wood River at Toponis, Idaho, 1896–1899.
Big Wood River near Bliss, Idaho, 1899.
Camas Creek near Blaine, Idaho, 1912–
Little Wood River near Carey, Idaho, 1904–5.
Little Wood River near Richfield, Idaho, 1911–
Little Wood River at Toponis [Gooding], Idaho, 1896–1899.
Dry Creek near Blanche, Idaho, 1911–1914.
King Hill Creek near King Hill, Idaho, 1913.
Little Canyon Creek at Glenns Ferry, Idaho, 1909–1913.
Alkali Creek near Glenns Ferry, Idaho, 1909–1913.
Cold Springs Creek near Hammett, Idaho, 1909–1913.
Bennett Creek near Hammett, Idaho, 1909–1913.
Bruneau River near Rowland, Nev., 1913–
Bruneau River near Tindall, Idaho, 1910–1912.
Bruneau River near Hot Spring, Idaho, 1909–1915.

Columbia River tributaries—Continued.
Deschutes River tributaries—Continued.
Metolius River at Rigg's ranch, near Sisters, Oreg., 1908–1912.
Lake Creek near Sisters, Oreg., 1911–1913; 1915–
First Creek, near Sisters, Oreg., 1915–
Jack Creek near Sisters, Oreg., 1915–
Canyon Creek near Sisters, Oreg., 1915-
Whitewater River near Grandview, Oreg., 1911–1913.
Shitike Creek at Warmspring, Oreg., 1911–
Trout Creek near Antelope, Oreg., 1915.
Trout Creek near Gateway, Oreg., 1915.
Hay Creek near Hay Creek, Oreg., 1915.
Warm Springs River near Warmspring, Oreg., 1911–
Mill Creek near Warmspring, Oreg., 1915.
White River near Tygh Valley, Oreg., 1911–
Tygh Creek at Tygh Valley, Oreg., 1911–1913.
Klickitat River above Pearl Creek, near Glenwood, Wash., 1910.
Klickitat River above Big Muddy Creek, Wash., 1905.
Klickitat River below Big Muddy Creek, Wash., 1905; 1907–8.
Klickitat River at Camp Klickitat, Wash., 1907–1908.
Klickitat River near Glenwood, Wash., 1909–
Klickitat River below Glenwood, Wash., 1914.
Klickitat River at Hanson's cable, near Klickitat, Wash., 1908–9.
Klickitat River at Klickitat (Wright), Wash., 1909–1912.
Klickitat River at Wols Ferry, near Lyle, Wash., 1907–1910.
Klickitat River at Lyle, Wash., 1912.
West Fork of Klickitat River near Glenwood, Wash., 1910.
Big Muddy River above mouth of Cougar Creek, near Wright, Wash., 1905; 1908.
Little Klickitat River near Goldendale, Wash., 1910–1912.
Hood River at Dee, Oreg., 1913–
Hood River at Winans, Oreg., 1905–1907; 1910–1912; 1913.
Hood River at Tucker Bridge, Oreg., 1897–1899; 1913–
Hood River at Powerdale, near Hood River, Oreg., 1913–
East Fork of Hood River above intake, near Mount Hood, Oreg., 1915–
East Fork of Hood River near Mount Hood, Oreg., 1913–14.
East Fork irrigation district canal near Mount Hood, Oreg., 1913–
West Fork of Hood River near Dee, Oreg., 1913–
Pacific Light & Power Co. tailrace near Hood River, Oreg., 1914.
White Salmon River at splash dam near Trout Lake, Wash., 1912–
White Salmon River at Husum, Wash., 1909–
White Salmon River at Condit dam, near Underwood, Wash., 1912–13.
Trout Creek at Guler, Wash., 1909–1911.
Little White Salmon River below Lava Creek, near Cook, Wash., 1903–1906.[1]
Little White Salmon River near Cooks, Wash., 1909.
Latourell Creek at Latourell, Oreg., 1912–13.
Sandy River above Salmon River, at Brightwood, Oreg., 1910–1914.
Sandy River below Salmon River, near Brightwood, Oreg., 1907–1911.
Sandy River near Marmot, Oreg., 1911–
Sandy River above Bull Run River, near Bull Run, Oreg., 1910–1912.

[1] Records published in U. S. Geol. Survey Water-Supply Paper 272, pp. 428–429.

Columbia River tributaries—Continued.
Willamette River tributaries—Continued.
Molalla River near Molalla, Oreg., 1905–1909–
Clackamas River near Cazadero, Oreg., 1909–
Clackamas River at Estacada, Oreg., 1908–1911.
Clackamas River near Barton, Oreg. (replaced by Estacada station), 1905–1908.
Clackamas River at Park Place, Oreg., 1911–12.
Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., 1913–
Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg. 1909–
Lewis River above Muddy River near Cougar, Wash., 1909.
Lewis River near Cougar, Wash., 1909–1912.
Lewis River near Amboy, Wash., 1911–
Lewis River at Ariel, Wash., 1909.
Muddy River at mouth, near Cougar, Wash., 1909.
Pine Creek at mouth, near Cougar, Wash., 1909.
Swift Creek at mouth, near Cougar, Wash., 1909.
Kalama River near Kalama, Wash., 1911–1913.
Ohanapecosh River near Lewis, Wash., 1907–
Cowlitz River at Lewis, Wash., 1911–
Cowlitz River at Mossy Rock, Wash., 1912–
Cowlitz River at Randle, Wash., 1910–1912.
Cowlitz River at Mayfield, Wash., 1910–11.
Clear Fork near Lewis, Wash., 1907–
Coal Creek near Lewis, Wash., 1911–
Lake Creek at outlet of Packwood Lake, near Lewis, Wash., 1911–
Lake Creek at mouth, near Lewis, Wash., 1907–
Johnson Creek below West Fork, near Lewis, Wash., 1911; 1913–14.
Johnson Creek at mouth, near Lewis, Wash., 1907–1914.
Glacier Creek near Lewis, Wash., 1911.
Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
North Fork of Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
Cispus River near Randle, Wash., 1910–1912.
Toutle River at St. Helen, Wash., 1909.
Toutle River near Castle Rock, Wash., 1909–1912.

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER.

Rogue River near Prospect, Oreg., 1907–1912.
Rogue River below Prospect, Oreg., 1913–
Rogue River near Trail, Oreg., 1910–1913.
Rogue River near Tolo, Oreg., 1905–
Rogue River near Galice, Oreg., 1906.
Mill Creek near Prospect, Oreg., 1910.
Butte Creek, South Fork (head of Butte Creek), at Butte Falls, Oreg., 1910–11; 1915–
Little Butte Creek, South Fork (head of Little Butte Creek), near Lake Creek, Oreg., 1910–1913.
Little Butte Creek near Eagle Point, Oreg., 1907–
Rogue River Valley canal at intake, near Lake Creek, Oreg., 1914; 1915–
Rogue River Valley canal near Brownsboro, Oreg., 1913; 1915.
North Fork of Little Butte Creek, near Lake Creek, Oreg., 1911–1913.

REPORTS ON WATER RESOURCES OF THE NORTH PACIFIC SLOPE DRAINAGE BASINS.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, Washington, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*4. A reconnaissance in southeastern Washington, by I. C. Russell, 1897. 96 pp., 7 pls. 15c.

Describes an area "bordered on the south by Oregon, on the east by Idaho, on the north by Snake River, and on the west by the Columbia," and "briefly designated as lying south of Snake River"; discusses climate, vegetation, topography and drainage, geologic formations—including the river terraces and soils—irrigation, and the artesian water supply, and gives an outline of the geological history of the region.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along Columbia, Willamette, Flathead, and Snake rivers.

*53. Geology and water resources of Nez Perce County, Idaho, Part I, by I. C. Russell. 1901. 85 pp., 10 pls. 10c.

*54. Geology and water resources of Nez Perce County, Idaho, Part II, by I. C. Russell. 1901. 55 pp. (87–141).

Nos. 53 and 54 relate to an area "in western Idaho, bordered on the west by portions of Washington and Oregon," drained through Snake River to the Columbia; they describe the topography, geology, and soils of the region, discuss the relation of the surface features—plateaus, canyons, streams, etc.—to the geology and the climate, the source and quantity of the water supply, including springs and artesian wells, and refer briefly to the occurrence of building stones, lignite, gold, silver, and copper. They include also a short bibliography of artesian waters and two appendixes—one giving list of elevations, and the other notes concerning Portland cement.

55. Geology and water resources of a portion of Yakima County, Wash., by G. O. Smith. 1901. 68 pp., 7 pls. 10c.

Describes topography, climate, soil, agriculture, geology, and surface and ground waters of an area comprising about 50 square miles in the vicinity of North Yakima; discusses in some detail the artesian basins and wells.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 5c.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second, revised, edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

*78. Preliminary report on artesian basins in southwestern Idaho and southeastern Oregon, by I. C. Russell. 1903. 53 pp., 2 pls. 5c.

Discusses briefly the rocks and geologic structure of a part of the Snake River Plains in Canyon and Owyhee counties, Idaho, and Malheur and Harney counties, Oreg.; describes briefly the conditions on which artesian flow depends, and in some detail the springs and drilled wells in the Lewis, Otis, Harney, and Whitehorse artesian basins; also describes artesian wells in alluvial deposits and discusses the size of drill holes, casings, etc., the preservation of well records, and the importance of laws to control the use of artesian waters; gives list of publications bearing on artesian waters.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer, 1904. 361 pp. 25c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

Investigations in Idaho, by D. W. Ross. Describes the irrigable lands in the area drained by Snake River.

Investigations in Oregon, by J. T. Whistler. Mentions the Umatilla, Malheur, and Harney projects.

Work in Washington, by T. A. Noble. Describes the plains of Columbia River.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Gives an account of a flood (commonly spoken of as the "Heppner disaster") on Willow Creek, a tributary of Columbia River, in Morrow County, Oreg.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. [Superseded by No. 152, q. v.]

Cites statutory restrictions of water pollution in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

111. Preliminary report on the underground waters of Washington, by Henry Landes. 1905. 85 pp., 1 pl. 10c.

Describes, by counties, the municipal water supplies, deep wells, and springs in the State, giving also for each county a brief account of the climate, rainfall, topography, drainage, and geology.

118. Geology and water resources of a portion of east-central Washington, by F. C. Calkins. 1905. 96 pp., 4 pls. 5c.

Describes briefly the topography, geology, climate, vegetation, grazing, and agriculture on the Columbia Plains and in Kittitas Valley; discusses the streams, springs, and shallow and deep wells.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Cites legislative acts relating to ground waters in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates (p. 85) of flood discharge and frequency for Boise River at Boise and Weiser River at Weiser, Idaho.

*231. Geology and water resources of the Harney Basin region, Oregon, by G. A. Waring. 1909. 93 pp., 5 pls. 25c.

The greater part of the area covered by this report is in the Great Basin, but a small tract in the northeastern corner is drained by a number of small streams that are tributary to Malheur River.

253. Water powers of the Cascade Range, Part I, Southern Washington, by J. C. Stevens. 1910. 94 pp., 21 pls. 40c.

Discusses conditions governing hydraulic development, water laws of Washington, and variations in streams; describes the drainage basins of Klickitat, White Salmon, Little White Salmon, Lewis, and Toutle rivers; gives results of observations at gaging stations, and estimates of average minimum discharge and of the available horsepower at the power sites.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Boise, Malheur, Payette, and Palouse rivers, and Salmon Creek

313. Water powers of the Cascade Range, Part II, Cowlitz, Nisqually, Puyallup, White, Green, and Cedar drainage basins, by F. F. Henshaw and G. L. Parker. 1913. 170 pp., 16 pls. 55c.

Describes the geologic features and history of the drainage basins, topography and drainage, soils and vegetation, and precipitation; gives stream-flow records and discusses water powers storage, and power sites; discusses also natural resources and harbors of the Pacific coast, central electric stations, and power utilization, and gives commercial and residential rates. See also 253.

316. Geology and water resources of a portion of south-central Washington, by G. A. Waring. 1913. 46 pp., 1 pl. 5c.

Describes settlements, climate and vegetation, agriculture, grazing, geographic provinces, relation of surface features and structure, and geology; discusses shallow and artesian waters and irrigation enterprises in Sunnyside and Reservation valleys, Horse Heaven Plateau, and the Columbia River Plains, and irrigation along lower Yakima River; gives tabulated data concerning wells and springs.

339. Quality of the surface waters of Washington, by Walton Van Winkle. 1914. 105 pp., 2 pls. 15c.

Discusses briefly the natural and economic features of the State, the constituents and uses of the natural waters, purification of water, methods of analysis, and industrial and geochemical interpretation of the results of analysis; describes the general features of the principal drainage basins and gives the results of an investigation of the character of the river waters; treats briefly of the average chemical composition of river water, the economic value of the rivers, denudation, and the influence of natural features on the character of the waters.

344. Deschutes River, Oregon, and its utilization, by F. F. Henshaw, John H. Lewis, and E. J. McCaustland. 1914. 200 pp., 28 pls. 50c.

A report, prepared in cooperation with the State of Oregon, containing the results of measurements of stream flow, a discussion of the economic distribution of the water, and chapters on the quailty of the water, the availability of the water supply, the developed water powers, undeveloped power sites, water rights and appropriations, the relation of the Federal Government to the development of water power, and Government permits for power and reservoir sites.

346. Profile surveys in the basin of Clark Fork of Columbia River, Montana-Idaho-Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 6 pp., 3 pls. (22 sheets). 50c.

347. Profile surveys in Snake River basin, Idaho, prepared under the direction of R. B. Marshall, chief geographer. 1914. 12 pp., 3 pls. (37 sheets). 55c.

348. Profile surveys in Hood and Sandy River basins, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 2 pls. (6 sheets). 30c.

349. Profile surveys in Willamette River, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 3 pls. (16 sheets). 30c.

363. Quality of the surface waters of Oregon, by W. Van Winkle. 1914. 137 pp., 2 pls. 20c.

Describes the topography, drainage, rocks and soils, climate, population, and industries of the State, the constituents of natural waters, water for domestic and industrial uses, and purification of water, methods of analysis, and interpretation of results of analysis; describes the general features of the river basins and the character of the river waters; discusses the conditions influencing the quality of the surface waters, average chemical composition, geochemical character, denudation, industrial value, and value for irrigation.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of Soap and Omak lakes, Wash., and of mine waters from Butte, Mont.

366. Profile surveys of Snoqualmie, Sultan, and Skykomish rivers, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 3 pls. (12 sheets). 20c.

368. Profile surveys in Wenatchee River basin, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 1 pl. (8 sheets). 20c.

369. Water powers of the Cascade Range, Part III, Yakima River basin, by G. L. Parker and F. B. Storey, 1916. 169 pp., 20 pls 45c.

Describes the geography of the basins, the geologic history, physiography and river history, climate, settlement, and development, population, and transportation; gives stream-flow records and discusses natural conditions affecting stream flow, storage reservoirs, developed and undeveloped power sites; treats also of the industrial development of the region, discussing irrigation by gravity systems and by pumping, the production of coal and other minerals, and manufacturing; presents a scheme of development and utilization of stored water. The report was prepared under the direction of the Washington State Board of Geological Survey, and is based on data consisting of "stream-flow records, river plans and profiles, reservoir surveys, and field reconnaissances of the rivers and their various tributaries," obtained by the United States Geological Survey and the United States Reclamation Service, supplemented by a large amount of information furnished by private parties.

370. Surface water supply of Oregon, 1878–1910, by F. F. Henshaw and H. J. Dean. 1915. 829 pp., 1 pl. 45c.

Describes briefly the natural features of Oregon and in greater detail the general features of the river basins; consists principally of records of stream flow that have been carefully studied and recomputed when necessary to insure their best possible interpretation.

376. Profile surveys in Chelan and Methow River basins, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 5 pls. 15c.

377. Profile surveys in Spokane River basin, Washington, and John Day River basin, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 10 pls. 15c.

378. Profile surveys in 1914 on Middle Fork of Willamette River and White River, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 6 pls. 15c.

379. Profile surveys in 1914 in Umpqua River basin, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 13 pls. 20c.

*400. Contributions to the hydrology of the United States, 1916, Nathan C. Grover, chief hydraulic engineer, 1917. 108 pp., 7 pls. 15c. Contains:

(*b*) Artesian water for irrigation in Little Bitterroot Valley, Mont., by O. E. Meinzer.

419. Profile surveys in 1915 in Skagit River basin, Washington, prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 12 pls. 15c.

420. Profile surveys along Henrys Fork, Idaho, and Logan River and Blacksmith Fork, Utah. prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 10 pls. 10c.

425. Contributions to the hydrology of the United States, 1917, N. C. Grover, chief hydraulic engineer, 1918. Contains:

(*e*) Ground water in Quincy Valley, Wash., by A. T. Schwennesen and O. E. Meinzer.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*199. Geology and water resources of the Snake River Plains of Idaho, by I. C. Russell. 1902. 192 pp., 25 pls. 25c.

Describes the topography, geology, climate, vegetation, fauna, and soils of an area extending entirely across the southern part of Idaho; discusses streams, springs, water powers, irrigation and agriculture, industries, and routes of transportation and highways; treats of the origin of surface and subsurface waters, the requisite conditions for artesian wells and the quantity of water available.

252. Preliminary report on the geology and water resources of central Oregon, by I. C. Russell. 1905. 138 pp., 24 pls. 15c.

Describes a portion of the extreme northern part of the Great Basin and a part of the drainage area of Deschutes River and its principal tributary, Crooked River; gives an account of the topography, drainage, rainfall and temperature, winds, and forests; describes the volcanicsedimentary rock formations, and discusses by counties the geology and topography, the surface and ground waters; treats of artesian conditions in the Deschutes basin and makes suggestions concerning artesian-well records.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 give an account of progress in the collection of well records and samples, and contain tabulated records of wells in Idaho, Montana, Nevada, Oregon, Washington, and Wyoming. No. 298 gives detailed records of wells in Flathead County, Mont., and Benton, Jefferson, and Walla Walla counties, Wash. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the Director of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II. Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation, xiv, 395 pp. 30 pls. and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the survey in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Irrigation literature, pp. 345–388. Gives a list of books and pamphlets on irrigation and allied subjects, mainly contained in the library of the United States Geological Survey.

Twelfth Annual Report of the Director of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, Pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River basin.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III. Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, Pls. 147–182. Describes structures on the Pocatello canal, Idaho.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 43 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, Pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant, and swamp lands, and private miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xvii, 400 pp., 110 pls. $1.25. 16 maps in separate case, 75c. Contains:

*Priest River Forest Reserve, by J. B. Leiberg, pp. 217–252, Pls. 48–61.

*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 253–282, Pls. 62–73.

*Washington Forest Reserve, by H. B. Ayres, pp. 283–313, Pls. 76–100.

*Eastern part of Washington Forest Reserve, by M. W. Gorman, pp. 315–350, Pl. 101.

*Forest conditions of northern Idaho, by J. B. Leiberg, pp. 373–386, Pls. 109–110.

These reports describe the topography and the streams of the forest reserves.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Pts. II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The Flathead Forest Reserve, by H. B. Ayres, pp. 245–316, Pls. 77–113.

*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 317–409, Pls. 115–142. Contains brief descriptions of the streams and lakes in the reserves.

Twenty-first Annual Report of the United States Geological Survey, 1899–1900, Charles D. Walcott, Director. 1900. (Pts. III, IV, VI, VI continued, and VII, 1901.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, 711 pp., 143 pls., 39 maps in separate case. $3.85. Contains:

*Mount Rainier Forest Reserve, Washington, by F. G. Plummer, pp. 81–143, Pls. 33–50.

*Olympic Forest Reserve, Washington, from field notes by Arthur Dodwell and T. F. Rixon, pp. 145–208, Pls. 51–70.

*Cascade Range Forest Reserve, Oregon, from T. 28 S. to T. 37 S., inclusive, together with the Ashland Forest Reserve and adjacent forest regions from T. 28 S. to T. 41 S., inclusive, and from R. 2 W. to R. 14 E., Willamette meridian, inclusive, by J. B. Leiberg, pp. 209–498, Pls. 71–84. Contains descriptions of many of the streams flowing through the forest reserves.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but the folios are usable and are sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy except folio 193, which sells for 75 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*45. Boise, Idaho.

Describes geography and geology, cold springs and cold artesian waters, and hot springs and hot artesian waters.

103. Nampa, Idaho-Oregon. 5c.

Describes the relief, drainage, climate, and vegetation of the area; discusses the geologic history and geologic formations, and, under "Economic geology," the surface waters available for irrigation, the springs and shallow wells, and the artesian wells; indicates areas of possible artesian flow.

[1] Index maps showing areas in the North Pacific slope basins covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

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104. Silver City, Idaho. 5c.

Describes the relief, drainage, climate, vegetation, and culture of the Silver City quadrangle; discusses the geologic history and the geologic formations, and, under "Economic geology," the surface waters available for irrigation or water-power development, warm springs, and artesian wells; notes possible chances for artesian waters; gives records of wells near Enterprise and Guffey; see also Water-Supply Paper 78.

*139. Snoqualmie, Washington.

Describes the relief and drainage of an area including portions of Kittitas, Yakima, Pierce, and King counties; the statigraphic, structural, and historical geology, and, under "Economic geology," includes a brief paragraph on the utilization of the water supply.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the northern Pacific coast drainage basins are the reports of the commissioner of conservation of the State of Montana; the State land commission; the State engineer of Idaho; the Bureau of Industry, Agriculture, and Irrigation of Nevada; the State engineers of Nevada, Oregon, Utah, and Washington; the annual reports of the United States Reclamation Service; and the reports of the Chief of Engineers, U. S. Army. The following reports deserve special mention:

The Oregon system of water titles, by John H. Lewis: Oregon State Engineer Bull. 2, 1912.

State and National water laws, with a detailed statement of the Oregon system of water titles, by John H. Lewis, with a discussion by Clarence T. Johnston and L. J. Le Conte: Am. Soc. Civil Eng. Trans., vol. 76, pp. 637–758, 1913.

Report of the commission on conservation [State of Montana] on bills relating to public lands, water rights, and the protection and preservation of the forests: Helena, 1911; also report of the governor of the State of Montana on the same subject.

How to appropriate the public waters of the State of Nevada, compiled by W. M. Kearney, State engineer, 1911.

Requirements and regulations, including suggestions and instructions in relation to the appropriation, use, and measurement of water in the State of Nevada: State engineer of Nevada, 1912.

Irrigation pumping in Nevada, etc., by Charles Norcross: Nevada Bur. of Industry, Agr., and Irr. Bull. 8, 1913.

The water resources of Washington: Potable and mineral water, by H. G. Byers; artesian water, by C. A. Ruddy; water power, by R. E. Heine: Washington Geol. Survey Ann. Rept. for 1901, vol. 1, pt. 5, 1902.

Preliminary report on the Quincy Valley irrigation project, by Henry Landes and others: Washington Geol. Survey Bull. 14, 1912.

Biennial Report of the State Commissioner of Arid Lands [Washington], 1895–96 and 1897–98.

The irrigated lands of the State of Washington, by George M. Allen, deputy commissioner: State Bureau of Statistics and Immigration, 1910.

Irrigation laws of the State of Wyoming, prepared for publication in the office of the State engineer, 1909.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 56 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood, 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls., (15–16). 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing well; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effects of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this paper should be addressed to the U. S. Reclamation Service.]

Contains, in addition to an account of the organization of the hydrographic [water-resources] branch of the United States Geological Survey and the reports of the conference, the following papers of more or less general interest:

Limits of an irrigation project, by D. W. Ross.

Relation of Federal and State laws to irrigation, by Morris Bien.

Electrical transmission of power for pumping, by H. A. Storrs.

Correct design and stability of high masonry dams, by Geo. Y. Wisner.

Irrigation surveys and the use of the plane table, by J. B. Lippincott.

The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiments relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological. Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y., gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton.. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15 c. [Inquiries concerning this report should be addressed to the U. S. Reclamation Service.]

Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged by R. E. Horton

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thos. H. Means.

Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuation changes due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to ground waters, and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation; treatment of slop; sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amount and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvements of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States.

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall; water-bearing rocks; amount of ground water; artesian conditions; oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well waters and methods of prevention, tests of capacity and measurement of depth, and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water and municipal water softening.

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(*e*) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method of correcting river discharge for a changing stage, by B. E. Jones, pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Three papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916; N. C. Grover, chief hydraulic engineer. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by Arthur J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

425. Contributions to the hydrology of the United States, 1917, N. C. Grover, chief hydraulic engineer. 1918. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. 21. Scope indicated by title.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111 to 146. Discusses the economical aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6 to 16. Discusses the amount of waters stored in sandstone, in soil, and in other rocks, and the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades, the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 1908. 44 pp., 7 pls. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.

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