DEPARTMENT OF THE INTERIOR
ALBERT B. FALL, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 482

SURFACE WATER SUPPLY OF THE UNITED STATES

1918

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS

A. PACIFIC BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

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WASHINGTON and MONTANA

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SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN, 1918.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of streams in the United States during the year ending September 30, 1918.

The data presented in these reports were collected by the United States Geological Survey under the following authority contained in he 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, 1895–1919.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10

In this work many private and State organizations have cooperated, either by furnishing data or by assisting in their collection. Acknowledgments 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 page 5.

Measurements of stream flow have been made at about 4,510 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1918, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were 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 the water-supply papers from time to time.

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 work of a certain class. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, miner's inches, and discharge in second-feet per square mile, and (2) those that represent the actual quantity of water, as run-off in 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, and acre-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.

"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.

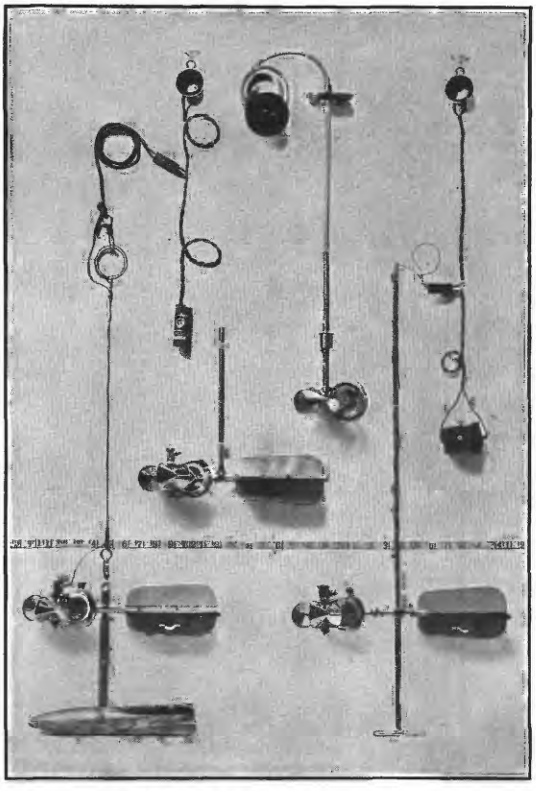
"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in inches.

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.

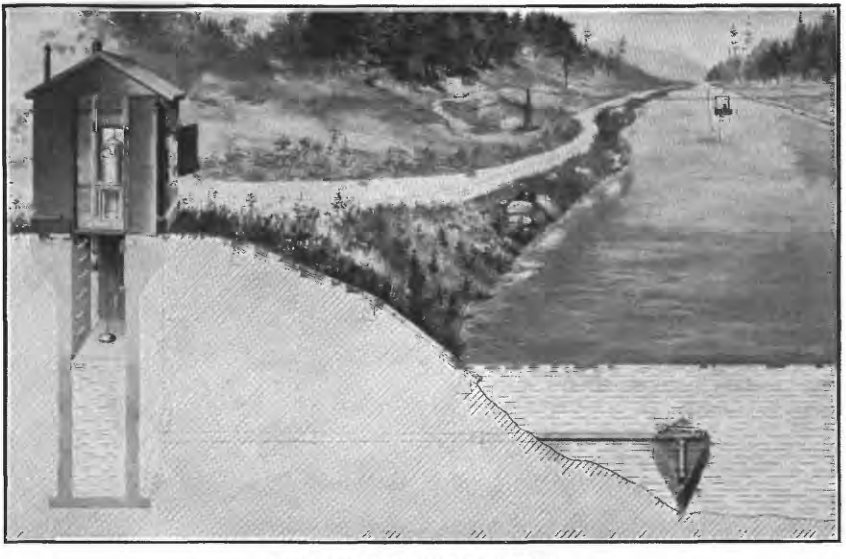
The following terms not in common use are here defined:

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

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



A. PRICE CURRENT METERS



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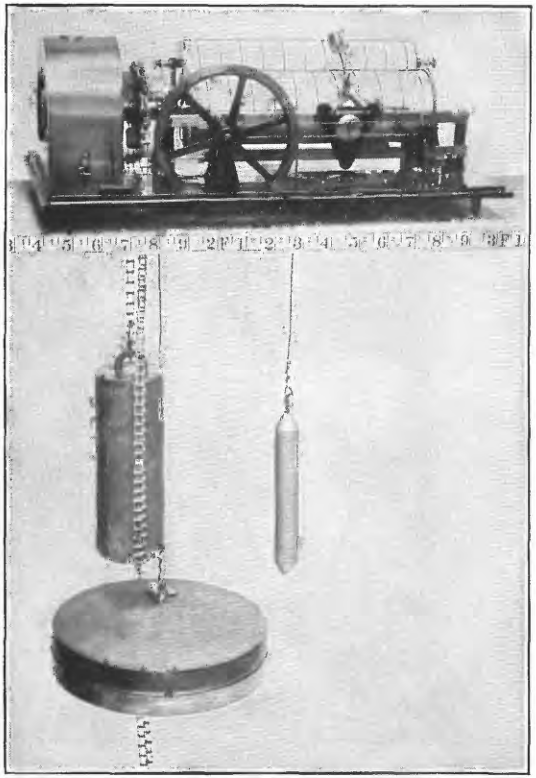

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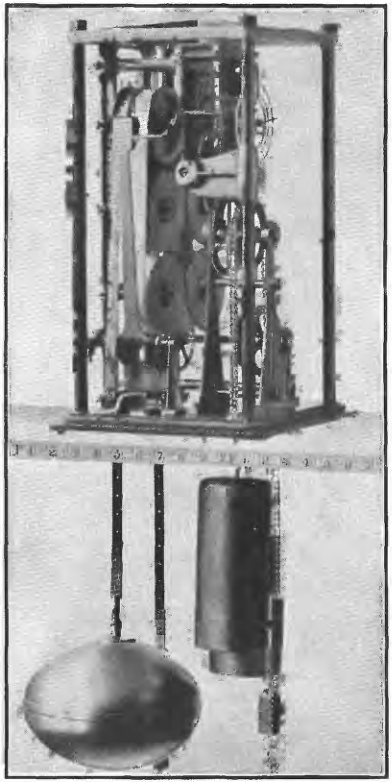

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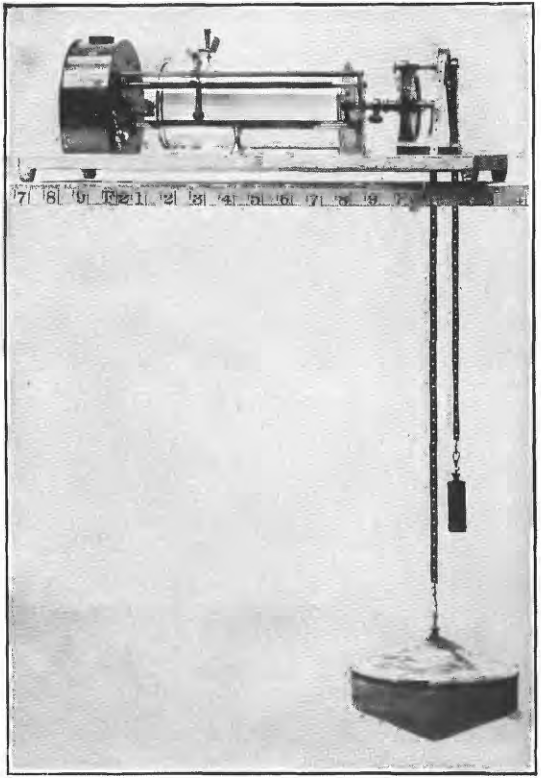

C. FRIEZ.

WATER-STAGE RECORDERS.

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 stream falls when the discharge is reduced to zero.

EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1917, and ending September 30, 1918. 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 a 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. (See Pls. I, II.) The general methods are outlined in standard textbooks on the measurement of river discharge.

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

The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records 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 height and records 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 permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of control, and the cause and effect of backwater; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, 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 is obtained by averaging discharge at regular intervals during the day or by using the discharge integrator, an intrument 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 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 2 are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

A paragraph in the description of the station gives information regarding (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge. 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 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 in inches may be subject to gross errors caused by the inclusion of large noncontributing 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 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 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 table of daily discharge allows more detailed study 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.

The work in Washington and Montana was carried on 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 United States Geological Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys.

The work in Washington was carried on in cooperation with the Board of Geological Survey, composed of Ernest Lister, governor, chairman; L. F. Hart, lieutenant governor, vice chairman; W. W. Sherman, State treasurer, secretary; Henry Suzzallo, president of the University of Washington; and E. O. Holland, president of the State College. The board was efficiently represented in the cooperative investigations by Henry Landes, State geologist.

Acknowledgments are due to Mr. A. W. Mahon, State engineer of Montana, for the efficient manner in which he represented his State in the cooperative investigations.

Acknowledgments are due to the United States Reclamation Service, the United States Forest Service, and the United States Office of Indian Affairs for assistance, suggestions, and the freest use of data gathered exclusively for them and paid for by them. Acknowledgments are also due to the United States Weather Bureau for hydrographic and climatologic data.

Acknowledgments are due to the Hydrometric Survey of British Columbia, for complete records of Columbia River at Trail, B. C.

Acknowledgment for gage-height records and discharge measurements furnished by cooperating parties is made in the descriptions of gaging stations.

DIVISION OF WORK.

The data for stations in Washington were collected under the direction of G. L. Parker, district engineer, assisted by Lasley Lee, James E. Stewart, D. J. Calkins, L. D. Carson, T. G. Bedford, T. R. Newell, and R. B. Kilgore; and prepared for publication by W. E. Dickinson, Lasley Lee, E. C. Howard, and L. D. Carson.

The data for stations in Montana were collected and prepared for publication under the direction of W. A. Lamb, district engineer, assisted by A. H. Tuttle.

The data for stations in the Yakima River basin, exclusive of stations in Yakima Indian Reservation, were collected by and prepared for publication in cooperation with Paul Taylor, engineer in charge of hydrometric work, United States Reclamation Service, assisted by F. E. Moxley.

The manuscript was prepared by W. E. Dickinson and A. H. Tuttle.

GAGING-STATION RECORDS.

QUINAULT RIVER BASIN.

QUINAULT RIVER AT QUINAULT LAKE, WASH.

LOCATION.—In sec. 25, T. 23 N., R. 10 W., at outlet of Quinault Lake, 4 miles southwest of Quinault and 33 miles north of Hoquiam, in Grays Harbor County.

DRAINAGE AREA.—264 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—October 29, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank 350 feet below Olympic highway crossing at outlet of Quinault Lake, installed September 27, 1916, at different datum from previous gage; inspected by C. S. Locke and Fred Halbert. Previous gages as follows: Prior to January 1, 1913, staff gage on south shore of lake 3 miles northeast of present site; January 1, 1913, to September 30, 1916, staff gage on Canoe Creek 400 feet above its mouth, 4 miles northeast of present site at datum 1.05 feet higher than datum of original gage. All readings prior to October 1, 1916, have been referred to datum of gage on Canoe Creek.

DISCHARGE MEASUREMENTS.—Made from boat or from cable 700 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders. Well-defined control 600 feet below gage. Left bank high and wooded; not subject to overflow; right bank high, wooded, and subject to overflow at about gage height 20 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.8 feet at 3 p. m. December 18 (discharge, 32,300 second-feet); minimum stage recorded, 0.90 foot at 8 a. m. September 28 (discharge, 425 second-feet).

1911–1918: Maximum stage recorded, 16.3 feet at 8 a. m. January 6, 1914 (discharge, 32,500 second-feet); minimum stage recorded, 0.4 foot at 7 a. m. October 1, 1915 (discharge, 395 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder unsatisfactory as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph or, for days of

considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good except during periods when recorder was not operating, for which they are fair.

Discharge measurements of Quinault River at Quinault Lake, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 15	Parker and Locke	8.26	12,000	Dec. 17	Parker and Locke	10.69	20,000
16	do	12.58	24,400	Aug. 19	G. L. Parker	2.05	1,120
16	do	12.22	24,700	23	do	1.85	900

Daily discharge, in second-feet, of Quinault River at Quinault Lake, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	998	571		21,000	2,380	1,640	3,430	2,240	1,500	1,220	641	636
2	1,460	558		14,700	2,310	1,520	2,990	2,240	1,470	1,190	658	625
3	2,240	1,050	2,370	11,600	2,840	1,470	2,640	2,500	1,520	1,140	674	595
4	2,180	2,180		11,100	6,030	1,420	2,380	2,920	1,640	1,120	652	585
5	1,930	3,340		9,360	8,000		2,180	2,850	1,870	1,070	636	576
6	1,640	4,380	2,710	9,130	8,220		2,050	2,570	1,990	1,050	615	548
7	1,470	3,730	2,570	9,130	8,000	1,300	1,930	2,380	1,990	1,020	590	540
8	1,310	2,920	2,340	7,360	6,360		1,990	2,190	2,440	989	599	527
9	1,170	2,440	2,180	5,980	7,170		3,100	1,990	3,060	989	625	519
10	1,070	2,050	2,120	5,070	10,800		3,730	1,870	2,920		733	518
11	980	2,050	2,620	4,720	8,670		3,430	1,870	2,710		855	515
12	912	2,240	3,660	4,890	6,750		3,130	1,870	2,570	950	891	511
13	855	2,310	7,020	4,550	5,250		2,850	1,930	2,380		780	503
14	822	2,120	15,100	4,380	4,380	1,250	2,640	1,930	2,120		739	490
15	773	1,870	13,300	4,380	3,580		2,500	1,870	1,930		745	495
16	745		21,300	4,130	3,130		2,380	1,810	1,810		839	495
17	715		18,700	5,320	2,780		2,240		1,690		1,040	488
18	685	1,470	27,800	8,220	2,500		2,120		1,640	840	1,120	484
19	658		21,300	6,750	2,240		2,050	1,660	1,640		1,130	481
20	641		13,600	5,250	2,120	5,300	2,240		1,690		1,060	470
21	630		8,220	4,210	1,930		2,710		1,750		972	470
22	625		10,600	3,660	1,810		3,060		1,750		946	467
23	605	2,050	8,900	3,360	1,750	7,570	2,990	1,480	1,750		946	460
24	625		6,750	3,130	1,640	9,740	2,850		1,640	750	904	453
25	658		5,250	3,060	1,810	10,800	2,640		1,580		855	446
26	663		4,720	2,850	1,990	8,000	2,440		1,470		808	442
27	668		8,330	2,710	1,870	5,980	2,240		1,470	703	766	436
28	658	1,950	13,900	2,640	1,690	5,430	2,180		1,360	685	721	423
29	641		27,800	2,920	.....	4,720	2,180	1,480	1,310	674	685	432
30	620		19,900	2,780	.....	4,210	2,180		1,260	652	663	432
31	590		18,700	2,500	.....	3,890	.....		.....	641	641	.....

NOTE.—Water-stage recorder not operating during periods inclosed by braced figures. These figures represent mean daily discharge for the priods indicated, being based on range of stage and weather records, except beginning with March, when estimates are based on comparison with flow of North Fork of Skokomish River.

Monthly discharge of Quinault River at Quinault Lake, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 264 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	2,240	590	975	3.69	4.25	60,000
November	4,330	558	2,040	7.73	8.62	121,000
December	27,800	2,120	9,720	36.8	42.43	598,000
January	21,000	2,500	6,160	23.3	26.86	379,000
February	10,800	1,640	4,210	15.9	16.56	234,000
March	10,800	.....	3,660	13.9	16.03	225,000
April	3,730	1,930	2,580	9.77	10.90	154,000
May	2,920	.....	1,870	7.08	8.16	115,000
June	3,060	1,260	1,860	7.05	7.87	111,000
July	1,220	641	888	3.36	3.87	54,600
August	1,130	590	789	2.99	3.45	48,500
September	636	428	502	1.90	2.12	29,900
The year	27,800	428	2,940	11.1	151.12	2,130,000

SOLEDUCK RIVER BASIN.

SOLEDUCK RIVER NEAR FAIRHOLM, WASH.

LOCATION.—In lot 4, sec. 35, T. 30 N., R. 10 W., 300 feet below South Fork and 7 miles southwest of Fairholm (on Crescent Lake), in Clallam County.

DRAINAGE AREA.—79 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by T. F. Rixon.

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

CHANNEL AND CONTROL.—Bed composed of bedrock and boulders; apparently permanent. No well-defined control. One channel at all stages. Banks high and wooded.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.7 feet at 6 a. m. December 18 (discharge, 18,600 second-feet); minimum stage recorded, 0.48 foot at 8 a. m. September 29 (discharge, 58 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 8,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for periods estimated for which they are good.

COOPERATION.—Station maintained in cooperation with Straits Power Co.

Discharge measurements of Soleduck River near Fairholm, Wash., during the period Aug. 29, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 29	Parker and Langloe	1.14	164	May 4	G. L. Parker	2.56	758
30	G. L. Parker	1.16	163	5	do	2.31	635
Nov. 4	Rixon and Ahlvers	1.79	388	July 29	Parker and Rixon	.92	122
Dec. 16	do	6.08	5,290	Aug. 29	Parker and Kilgore	.77	94
20	Lasley Lee	3.70	1,640	Sept. 27	R. B. Kilgore	.52	62
22	do	5.05	3,400				

Daily discharge, in second-feet, of Soleduck River near Fairholm, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		110	424	4,730	566	361	732	575	388	231	111	
2		222	331	2,440	527	335	630	630	348	222	118	
3	250	494	295	2,760	1,370	327	556	759	298	204	130	84
4		379	420	2,440	3,180	302	513	842	310	199	114	
5		542	366	1,800	2,070	279	489	630	379	196	108	
6		397	424	2,360	1,800	268	461	537	475	196	100	
7	150	241	348	1,900	1,420	261	452	503	513	190	97	
8		188	314	1,510	1,190	258	581	466	484	185	106	76
9		155	406	1,190	4,410	251	1,630	429	583	188	116	
10	92	151	348	1,070	3,030	241	1,040	438	1,070	210	199	
11	97	145	811	1,150	1,560	231	786	438	605	196	207	
12	103	151	860	1,240	1,190	216	680	452	537	172	138	
13	108	149	3,590	1,040	934	210	605	475	537	160	116	74
14	112	130	4,580	1,150	786	276	570	484	452	158	109	
15	114	119	4,230	1,070	706	360	518	479	383	160	158	
16	119	114	8,410	967	655	842	498	443	361	158	160	
17	123	106	3,760	2,720	605	1,120	475	433	370	158	142	
18	121	101	11,500	2,380	542	1,280	438	415	344	160	140	71
19	123	101	3,230	1,370	494	902	494	406	340	158	134	
20	119	304	1,750	1,040	456	934	732	392	348	165	119	
21	121	401	1,770	872	433	2,190	842	348	397	167	118	
22	118	231	4,110	814	420	2,380	814	327	392	151	153	
23	114	177	1,700	786	401	1,460	732	323	361	140	153	63
24	123	158	1,240	814	370	3,730	655	302	348	134	123	
25	128	155	1,040	732	429	2,190	570	291	298	134	111	60
26	136	140	1,030	680	410	1,240	503	279	287	138	108	62
27	132	433	3,350	630	366	967	484	283	291	130	108	62
28	123	537	5,480	759	352	902	503	331	261	123	98	60
29	118	415	11,000	706	.....	872	537	406	237	118	95	59
30	114	605	3,150	630	.....	934	556	580	231	116	94	59
31	114	.....	5,910	580	.....	814	.....	484	.....	111	91	.....

NOTE.—Water-stage recorder installed Oct. 10; discharge Oct. 1–9 estimated from gage-height record at Schneider's ranch. Braced figures show estimated mean discharge for periods indicated. During September estimates based on flow of Lyre River and weather records.

Monthly discharge of Soleduck River near Fairholm, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 79 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	92	143	1.81	2.09	8,790
November	605	101	252	3.19	3.56	15,000
December	11,500	295	2,780	35.2	40.58	171,000
January	4,730	580	1,430	18.1	20.87	87,900
February	4,410	352	1,100	13.9	14.47	61,100
March	3,730	210	869	11.0	12.68	53,400
April	1,630	438	636	8.05	8.98	37,800
May	842	279	457	5.78	6.66	28,100
June	1,070	231	408	5.16	5.76	24,300
July	231	111	165	2.09	2.41	10,100
August	207	91	125	1.58	1.82	7,690
September	.....	59	71.3	.903	1.01	4,240
The year	11,500	59	703	8.90	120.89	509,000

LYRE RIVER BASIN.

LYRE RIVER AT PIEDMONT, WASH.

LOCATION.—In NE. ¼ sec. 15, T. 30 N., R. 9 W., 1,300 feet below outlet of Crescent Lake and half a mile west of Piedmont, in Clallam County.

DRAINAGE AREA.—49.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; referred to inside and outside staff gages; inspected by T. F. Rixon.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 1,000 feet above gage.

CHANNEL AND CONTROL.—Channel composed of bedrock and boulders. Banks medium high and wooded. Control was a series of rapids over bedrock at and below gage, until September 25, when construction of railroad trestle 125 feet below gage was begun. Material dumped into the stream changed control, at least temporarily.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.91 feet at noon January 4 (discharge, 1,080 second-feet); minimum discharge, 32 second-feet by meter measurement at noon September 29 (stage-discharge relation affected by backwater from construction of trestle below gage).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—Flow is very uniform because of natural regulation in Crescent Lake.

ACCURACY.—Stage-discharge relation permanent from November 30 to September 24, after which there was backwater from construction of railroad trestle below gage. October 15 to November 16, 1917, gage was referred to a datum differing an unknown amount from that used thereafter. Rating curves well defined below 800 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent after December 22; good prior to that date except for estimated periods.

COOPERATION.—Station maintained in cooperation with Straits Power Co.

Discharge measurements of Lyre River at Piedmont, Wash., during the period Aug. 31, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug 31	G. L. Parker	c2.13	68	May 2	G. L. Parker	2.90	243
Oct. 19	Rixon and Ahlvers	b.98	68	July 27	do	2.10	67
Nov. 5	do	b1.05	77	Aug. 28	Kilgore and Parker	2.07	56
30	do	c2.21	86	Sept. 11	R. B. Kilgore	1.96	44
Dec. 21	Lee and Rixon	4.32	623	22	do	1.88	36
May 1	G. L. Parker	2.92	253	29	do	1.98	32

a Referred to present datum.
b Referred to arbitrary datum; exact relation to present datum not determined.
c This and succeeding measurements referred to present datum.

Daily discharge, in second-feet, of Lyre River at Piedmont, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		50	86	1,020	348	330	414	250	169	102	61	56
2		54	90	990	343	314	400	250	164	102	64	53
3		63	96	990	348	312	374	250	159	100	63	51
4		66	100	1,020	387	314	361	252	157	98	61	50
5	72	73	102	1,020	414	306	348	252	154	98	58	49
6		69	102	990	440	299	340	255	152	96	57	49
7		69	102	931	440	293	335	250	149	94	57	48
8		69	102	873	440	288	330	248	152	90	56	45
9		69	102	786	535	286	400	242	154	92	51	45
10		71	102	729	659	278	379	240	169	96	53	45
11	70	73		687	673	273	358	232	169	90	51	45
12		76		659	687	268	338	230	166	88	50	44
13		76		603	645	260	317	225	164	86	49	44
14		73		576	617	258	319	222	159	82	50	44
15	68	73	238	562	576	258	314	220	154	82	61	44
16	68	73		522	548	268	306	220	149	80	63	44
17	66	73		548	522	278	301	220	149	78	66	44
18	66	73	374	617	481	291	296	218	142	78	68	42
19	66	73	603	589	440	296	291	215	138	78	66	40
20	66	73	673	562	414	306	286	212	136	78	66	39
21	65	73	659	522	387	332	280	205	131	77	69	38
22	65	73	701	494	374	374	278	200	129	73	77	36
23	65	73	673	454	361	387	275	195	126	71	69	35
24	62	73	617	454	348	494	273	190	124	68	71	35
25	61	73	589	427	348	535	270	185	120	68	69	34
26	59	73	576	414	348	535	268	181	117	66	68	34
27	56	75	576	387	345	535	262	176	117	64	64	33
28	53	78	631	387	335	508	260	171	111	63	63	33
29	53	80	844	374	.....	481	255	171	109	61	61	32
30	51	82	902	361	.....	454	250	171	104	61	58	32
31	51	.....	960	348	.....	427	.....	169	.....	60	57	.....

NOTE.—No gage-height record Oct. 1–14 and Nov. 17–29; discharge estimated from precipitation records. Dec. 11–17 and Apr. 10–12, discharge interpolated because of defective gage-height record. Sept. 25–30, backwater; discharge Sept. 29 from meter measurement; Sept. 30 estimated same as Sept. 29; Sept. 25–28, interpolated.

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Monthly discharge of Lyre River at Piedmont, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 49.5 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	51	65.6	1.33	1.53	4,030
November	82	50	71.4	1.44	1.61	4,250
December	960	86	388	7.84	9.04	23,900
January	1,020	348	642	13.0	14.99	39,500
February	687	335	457	9.23	9.61	25,400
March	535	258	350	7.07	8.15	21,500
April	414	250	316	6.38	7.12	18,800
May	255	169	217	4.38	5.05	13,300
June	169	104	143	2.89	3.22	8,510
July	102	60	81.3	1.64	1.89	5,000
August	77	49	61.2	1.24	1.43	3,760
September	56	32	42.1	.851	.95	2,510
The year	1,020	32	235	4.75	64.59	170,000

PUGET SOUND BASINS.

SKOKOMISH RIVER BASIN.

NORTH FORK OF SKOKOMISH RIVER NEAR HOODSPORT, WASH.

LOCATION.—In SW. ¼ sec. 5, T. 22 N., R. 4 W., at footbridge on Forest Service trail to South Fork of Skokomish River, 4 miles below Lake Cushman and 4 miles northwest of Hoodsport, in Mason County.

DRAINAGE AREA.—91 square miles (measured on Plate I, Professional Paper 7).

RECORDS AVAILABLE.—Aug. 17, 1910, to Sept. 22, 1911, fragmentary; February 1, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank just below trail bridge; inspected by L. L. Dickinson and Phillip Abbey. Datum raised 5.0 feet September 2, 1918. (Vertical staff 25 feet below bridge used 1910–11.)

DISCHARGE MEASUREMENTS.—Made from cable about a mile above gage or by wading.

CHANNEL AND CONTROL.—Composed of rock and gravel; slightly shifting. Banks high, not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 19.60 feet at 1 p. m. December 18 (discharge, 9,580 second-feet); minimum stage, from recorder, 0.77 foot September 28 (discharge, 89 second-feet).

1913–1918: Maximum stage estimated at 23.5 feet January 6, 1914, during part of day when recorder was not operating (discharge, estimated, 14,000 second-feet); minimum stage recorded in 1918.

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

DIVERSIONS.—None.

REGULATION.—Flow subject to natural regulation at Lake Cushman.

ACCURACY.—Stage-discharge relation changed December 18 during high water. Drift in stream resulting from forest fire on September 10 caused backwater during remainder of year. Rating curves prior to September 10 well defined; curve after that date poorly defined. Operation of water-stage recorder excellent except for periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except during period September 10 to 30 for which they are fair.

COOPERATION.—Station maintained in cooperation with city of Tacoma.

Discharge measurements of North Fork of Skokomish River near Hoodsport, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 27	G. L. Parker	8.01	650	Aug. 25	G. L. Parker	5.98	143
28	do	8.02	651	Sept. 4	do	a.79	115
Aug. 9	Parker and Taylor	6.00	147				

a Gage established Sept. 2, at datum 5.00 feet higher than previous datum.

Daily discharge, in second-feet, of North Fork of Skokomish River near Hoodsport, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	162	144	448	4,410	583	467	1,000	730	495		164	127
2	188	166	406	3,010	568	453	872	765	439		162	124
3	280	511	406	2,660	761	439	782	908	399	280	160	123
4	271	747	582	2,660	2,000	439	747	1,000	399		158	117
5	242	2,120	566	2,280	2,340	412	662	872	439		155	117
6	218	1,190	521	2,340	2,660	386	630	730	495	251	153	116
7	204	713	462	2,460	2,280	373	630	662	568	246	151	113
8	198	506	406	1,920	1,620	358	713	646	553	242	149	113
9	190	392	392	1,570	1,720	360	1,520	568	553	242	149	113
10	184	366	366	1,320	2,660	350	1,420	553	730	264	157	109
11	182	420	462	1,240	1,820	350	1,080	553	679	264	166	104
12	178	735	679	1,200	1,420	350	927	598	583	242	159	102
13	171	764	1,400	1,080	1,160	338	818	630	553	225	147	102
14	168	582	4,020	1,080	1,000	360	747	614	510	217	142	102
15	166	462	2,850	1,040	890	399	662	583	453	213	142	102
16	160	392	7,000	1,000	836	439	630	553	426	215	177	104
17	150	353	4,200	1,770	765	671	583	538	412	217	240	104
18	146	319	7,770	2,810	713	1,620	553	510	399	217	227	102
19	141	292	4,310	1,720	630	1,160	568	495		211	197	99
20	138	302	2,280	1,280	614	1,000	713	467		208	177	100
21	133	379	1,720	1,080	553	1,640	927	439		197	161	100
22	132	366	2,520	983	524	2,660	1,000	426		190	154	99
23	130	322	2,040	890	524	1,870	927	412		186	152	98
24	130	290	1,470	854	495	3,220	854	412		182	147	96
25	132	273	1,240	800	510	3,260	782	399	360	178	144	93
26	135	255	1,280	747	524	1,920	696	386		178	144	93
27	133	300	2,700	696	495	1,420	662	386		176	139	90
28	132	448	3,560	679	467	1,200	662	399		174	134	89
29	138	448	6,280	679	.....	1,160	696	481		171	130	90
30	144	448	3,780	630	.....	1,160	713	583		169	127	93
31	143	.....	4,850	598	.....	1,160	.....	583	.....	167	127	.....

NOTE.—Braced figures show estimated daily discharge for periods indicated. July 27 to Aug. 7, discharge interpolated.

Monthly discharge of North Fork of Skokomish River near Hoodsport, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	280	130	168	1.85	2.13	10,300
November	2,120	144	500	5.49	6.12	29,800
December	7,770	366	2,290	25.2	29.05	141,000
January	4,410	598	1,530	16.8	19.37	94,100
February	2,660	467	1,110	12.2	12.70	61,600
March	3,260	338	1,010	11.1	12.80	62,100
April	1,520	553	806	8.86	9.88	48,000
May	1,000	386	577	6.34	7.31	35,500
June	730	.....	447	4.91	5.48	26,600
July	.....	167	221	2.43	2.80	13,600
August	240	127	158	1.74	2.01	9,720
September	127	89	104	1.14	1.27	6,190
The year	7,770	89	744	8.18	110.92	539,000

PUYALLUP RIVER BASIN.

PUYALLUP RIVER NEAR ELECTRON, WASH.

LOCATION.—In 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, a quarter of a mile below Mowich River, and 10 miles southeast of Electron, Pierce County.

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

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1918.

GAGE.—Freiz water-stage recorder on left bank on downstream side of gaging bridge; inspected by William Chambers. Datum lowered 1.00 foot March 9, 1918.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL.—Bed composed of boulders and glacial débris; shifting at all stages owing to steep gradient.

EXTREMES OF DISCHARGE.—Maximum stage during year (estimated from incomplete gage-height record) 6.4 feet at noon December 18 (discharge, 4,800 second-feet); minimum stage recorded, 0.71 foot at 2 p. m. November 19 (discharge, 152 second-feet).

1909–1918: Maximum stage on December 18, 1917; minimum discharge on December 24, 1914, estimated at 112 second-feet (stage-discharge relation affected by ice).

ICE. Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently. Indirect method for shifting control, based on two standard rating curves, well defined below 1,500 second-feet, one used until December 18 and the other for remainder of year. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table, mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made discharge measurements.

Discharge measurements of Puyallup River near Electron, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 14	Barber and Chambers..	1.36	389	Apr. 5	Barber and Chambers..	1.12	270
30	.....do.....	.83	182	21	.....do.....	1.79	486
Nov. 11	.....do.....	.91	200	May 5	.....do.....	2.00	639
22	.....do.....	1.26	352	20	.....do.....	1.63	463
Dec. 8	Lee and Barber.....	.81	176	June 2	.....do.....	1.56	430
8	Barber and Chambers..	.82	178	28	.....do.....	1.91	566
Jan. 8	.....do.....	2.69	985	July 7	.....do.....	1.96	607
21	.....do.....	2.03	626	23	.....do.....	2.00	611
Feb. 3	.....do.....	1.64	466	Aug. 6	.....do.....	1.87	591
19	.....do.....	1.18	287	23	.....do.....	2.24	854
Mar. 12	.....do.....	.79	166	Sept. 8	.....do.....	1.71	495
26	.....do.....	1.73	500	23	Barber and Brev.....	1.20	292

NOTE.—Gage datum lowered 1.00 foot, effective at noon, Dec. 18, 1917.

Daily discharge, in second-feet, of Puyallup River near Electron, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	321	190	228	2,370	417	228	381	450	522	675	1,070	675
2	359	204	198	1,590	381	216	334	505	450	651	881	608
3	383	588	218	1,500	438	219	300	700	405	604	627	558
4	373	390	269	1,360	910	204	282	828	479	548	566	522
5	393	330	212	1,160	1,060	198	265	651	675	576	589	535
6	340	251	222	1,130	1,080	190	255	518	937	589	675	518
7	349	215	190	1,220	937	187	262	471	1,100	627	651	514
8	423	196	178	1,020	725	192	293	450	1,070	750	651	544
9	388	183	198	828	608	176	486	409	1,190	854	544	585
10	359	204	183	675	882	168	463	357	1,340	750	636	590
11	313	204	326	1,150	750	171	397	342	1,160	613	651	562
12	296	209	499	1,400	622	168	365	381	1,240	544	522	580
13	330	201	2,410	1,020	535	158	330	417	1,340	576	596	622
14	383	178	2,330	935	463	161	286	454	1,070	675	618	599
15	305	166	1,320	802	421	166	276	417	802	881	609	627
16	234	163	1,780	802	401	179	265	450	750	1,040	484	627
17	196	159	2,260	1,030	381	220	248	488	776	1,280	448	589
18	185	163	3,990	1,280	353	326	232	484	700	1,400	599	518
19	201	159	2,540	935	304	235	265	458	700	984	501	627
20	196	217	1,680	750	282	225	361	471	750	675	434	589
21	251	288	1,360	651	265	251	505	425	956	580	468	442
22	222	335	1,850	669	255	490	566	393	1,040	675	750	353
23	212	280	1,660	664	272	444	501	373	962	651	891	330
24	276	225	1,280	776	245	750	475	357	828	651	881	315
25	326	196	1,100	700	245	675	417	330	725	651	801	361
26	288	178	1,690	594	255	518	369	315	750	700	750	425
27	310	198	2,860	544	232	434	361	304	750	536	618	458
28	209	212	2,890	576	228	381	373	338	618	627	589	580
29	196	261	3,110	514	.....	381	409	458	553	750	675	651
30	185	349	2,500	463	.....	430	438	675	627	828	750	622
31	190	.....	2,200	421	.....	413	.....	651	.....	935	776	.....

NOTE.—Recorder not in operation Dec. 18-25, and Dec. 27 to Jan. 2; staff gage read daily during this period.

Monthly discharge of Puyallup River near Electron, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 91 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	423	185	290	3.19	3.68	17,800
November	588	159	236	2.59	2.89	14,000
December	3,990	178	1,410	15.5	17.87	86,700
January	2,370	421	953	10.5	12.11	58,600
February	1,080	228	498	5.47	5.70	27,700
March	750	158	295	3.24	3.74	18,100
April	566	232	359	3.95	4.41	21,400
May	828	304	462	5.08	5.86	28,400
June	1,340	405	842	9.25	10.32	50,100
July	1,400	536	738	8.11	9.35	45,400
August	1,070	434	655	7.20	8.30	40,300
September	675	315	537	5.90	6.58	32,000
The year	3,990	158	608	6.68	90.81	440,000

PUYALLUP RIVER AT ALDERTON, WASH.

LOCATION.—On township line between sec. 25, T. 20 N., R. 4 E., and sec. 30, T. 20 N., R. 5 E., at county bridge No. 78, 1 mile north of Alderton, Pierce County, and 1½ miles above Stuck River.

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

RECORDS AVAILABLE.—November 20, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on downstream side of bridge pier on right bank; read by Mrs. C. E. Bearney and Mrs. H. D. Foster. Datum of gage lowered 1.00 foot, August 5, 1918.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Bed composed of silt and gravel; shifting. No well-defined control. Right bank is overflowed at gage height about 8 feet; left bank high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.6 feet at 8 p. m. December 18 (discharge, 19,300 second-feet); minimum stage recorded, 0.63 foot at 1.30 p. m. November 17, and 8 a. m. November 19 (discharge, 409 second-feet).

1915–1918: Maximum stage recorded, December 18, 1917; minimum stage recorded, 1.90 feet December 22 and 24, 1914, September 29–30 and October 12, 1915 (discharge, 390 second-feet).

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None.

REGULATION.—Operation of the Puget Sound Traction, Light & Power Co.'s plant at Electron does not materially affect natural flow, as pondage utilized is small.

ACCURACY.—Stage-discharge relation permanent until high water on December 18; shifting during remainder of year. Standard rating curve well defined below 4,000 second-feet and fairly well defined above. Gage read to hundredths twice daily during November, July, August, and September, and once daily during remainder of year. Slight diurnal fluctuation. Daily discharge ascertained by applying daily mean gage height to rating table; shifting-control method used December 19 to September 30. Records good.

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

Discharge measurements of Puyallup River at Alderton, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	L. D. Carson	0.98	535	Apr. 5	A. T. Brown	1.81	1,170
Dec. 3	Lasley Lee	1.54	869	May. 9	L. D. Carson	1.93	1,290
19	E. I. Anderson	7.19	12,900	June 24	Anderson and Roberts.	2.47	1,830
Jan. 2	R. F. Bullard	4.70	6,600	Aug. 5	Carson and Bedford	2.98	1,140
Feb. 9	Brown and Bullard	2.91	2,350	Sept. 26	T. G. Bedford	2.45	682
Mar. 5	L. D. Carson	1.71	1,060				

NOTE.—Gage datum lowered 1.00 foot at noon, Aug. 5, 1918, before measurement made on that date.

Daily discharge, in second-feet, of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	895	550	895	12,400	2,110	1,040	1,430	1,340	1,430	1,520	1,700	1,110
2	830	528	798	6,690	2,110	1,040	1,340	1,340	1,340	1,520	1,600	1,040
3	895	575	830	6,690	2,330	1,110	1,260	1,600	1,180	1,520	1,260	965
4	895	1,110	1,800	4,260	2,330	1,110	1,180	2,110	1,180	1,340	1,110	895
5	830	765	895	5,200	4,410	1,040	1,180	1,700	1,600	1,340	1,110	895
6	830	735	798	4,410	3,380	965	1,040	1,520	2,000	1,340	1,110	965
7	765	650	735	6,010	3,520	965	1,040	1,260	2,330	1,340	1,180	965
8	765	575	678	5,040	2,700	895	1,040	1,260	2,330	1,430	1,180	895
9	830	550	650	4,560	2,330	895	1,180	1,260	2,220	1,700	1,040	965
10	830	505	705	2,330	3,240	895	1,520	1,180	2,830	1,700	1,180	965
11	798	528	600	3,660	4,110	965	1,340	1,110	2,570	1,340	1,180	965
12	895	550	1,430	6,520	3,100	895	1,260	1,110	2,330	1,180	895	965
13	705	575	6,350	4,880	2,570	830	1,260	1,180	2,830	1,180	1,040	1,040
14	735	550	12,200	4,110	2,220	830	1,180	1,180	2,330	1,340	1,040	965
15	765	505	5,680	4,260	2,000	895	1,180	1,340	1,900	1,600	1,180	965
16	735	485	4,560	3,960	1,800	895	1,110	1,260	1,700	1,900	1,040	965
17	550	430	6,860	3,660	1,800	965	1,110	1,430	1,700	2,220	798	965
18	550	448	15,900	5,360	1,700	1,260	1,040	1,340	1,600	2,330	1,110	830
19	528	448	15,900	3,960	1,520	1,180	965	1,430	1,700	1,900	1,180	895
20	550	528	11,000	3,380	1,520	1,040	1,110	1,600	1,700	1,430	830	965
21	528	678	6,860	3,100	1,340	1,040	1,520	1,600	1,800	1,180	895	765
22	528	735	10,600	2,830	1,430	1,340	1,700	1,340	2,220	1,260	1,110	678
23	528	705	8,430	2,960	1,260	1,800	1,520	1,260	2,110	1,260	1,430	650
24	528	600	6,180	2,960	1,260	2,330	1,430	1,180	1,800	1,180	1,430	600
25	600	528	5,200	3,380	1,180	2,570	1,340	1,180	1,700	1,260	1,260	600
26	735	550	4,720	2,960	1,340	2,830	1,180	1,110	1,600	1,520	1,180	678
27	600	650	10,800	2,960	1,180	2,000	1,180	1,180	1,700	1,260	965	678
28	625	600	12,900	2,700	1,110	1,800	1,180	1,110	1,520	1,260	1,040	798
29	600	625	13,500	3,100	.....	1,600	1,180	1,180	1,340	1,340	965	965
30	550	1,340	6,180	2,570	.....	1,600	1,260	1,340	1,340	1,520	1,260	1,040
31	505	.....	7,710	2,330	.....	1,600	.....	1,800	.....	1,520	1,180	.....

Monthly discharge of Puyallup River at Alderton, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	895	505	694	1.69	1.95	42,700
November	1,340	430	620	1.51	1.68	36,900
December	15,900	600	5,880	14.3	16.49	362,000
January	12,400	2,330	4,300	10.5	12.11	264,000
February	4,410	1,110	2,180	5.32	5.54	121,000
March	2,830	830	1,300	3.17	3.66	79,900
April	1,700	965	1,240	3.02	3.37	73,800
May	2,110	1,110	1,350	3.29	3.79	83,000
June	2,830	1,180	1,860	4.54	5.06	111,000
July	2,330	1,180	1,480	3.61	4.16	91,000
August	1,700	798	1,140	2.78	3.20	70,100
September	1,110	600	888	2.17	2.42	52,800
The year	15,900	430	1,920	4.68	63.43	1,390,000

PUYALLUP RIVER AT PUYALLUP, WASH.

LOCATION.—In sec. 21, T. 20 N., R. 4 E., 1,000 feet upstream from Puget Sound Electric Railway bridge, 1 mile north of Puyallup, Pierce County, and 2 miles below mouth of Stuck River.

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

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by engineers of Inter-County River Improvement Commission and of U. S. Geological Survey.

DISCHARGE MEASUREMENTS.—Made from highway bridge three-quarters of a mile above gage.

CHANNEL AND CONTROL.—Bed of stream composed of light alluvial silt; shifting at all stages. Control formed by section of stream bed extending some distance downstream.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 34.15 feet at 4.45 p. m. December 18 (discharge, 40,500 second-feet); minimum stage, 17.36 feet at 8 p. m. November 18 (discharge, 726 second-feet).

1914–1918: Maximum and minimum stages given above.

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

DIVERSIONS.—Two hydroelectric plants, owned by Puget Sound Traction, Light & Power Co., divert water above station. Water for Electron plant is diverted from Puyallup River 10 miles above Electron into equalizing basin having capacity of 185 acre-feet; water used at this plant is returned directly to the river. Water for Dieringer plant is diverted from White River near Buckley into Lake Tapps (capacity, 51,000 acre-feet), and after use is discharged into Stuck River.

REGULATION.—See "Diversions."

ACCURACY.—Stage-discharge relation changed December 19 to March 10 and April 20 to May 20; constant at other times. Rating curves well defined below 30,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. For period of high water with marked range of stage during December, daily discharge was determined by averaging results obtained by applying mean

gage heights for shorter intervals. Shifting-control method used December 19 to March 10, and April 20 to May 20. Records good.

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

Discharge measurements of Puyallup River at Puyallup, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	L. D. Carson	18.42	1,540	Mar. 26	L. D. Carson	21.06	5,220
27	do	17.81	1,020	Apr. 8	A. T. Brown	19.13	2,230
Dec. 19	Carson and Bullard	28.87	25,200	19	L. D. Carson	19.23	2,300
26	Bullard and Webster	21.25	7,260	May 21	do	19.94	3,950
29	do	28.52	26,000	28	A. T. Brown	19.38	3,080
Jan. 8	L. D. Carson	22.23	9,280	June 24	Anderson and Roberts	20.56	5,080
10	do	21.08	6,450	July 12	L. D. Carson	18.76	2,240
Feb. 8	Bullard and Brown	20.77	5,260	Aug. 13	do	19.00	2,690
21	L. D. Carson	19.60	2,460	Sept. 15	Anderson and Baird	17.97	1,300
Mar. 11	A. T. Brown	18.90	2,030	25	T. G. Bedford	18.42	1,770

Daily discharge, in second-feet, of Puyallup River at Puyallup, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1,390	1,620	20,000	4,300	1,970	3,550	3,240	3,980	2,160		1,900
2		1,390	1,220	13,800	4,040	2,080	3,310	3,550	3,270	2,220		1,900
3	1,630	1,740	1,390	11,000	3,790	1,860	3,240	4,040	2,100	2,100	2,670	2,220
4		1,860	1,810	10,500	5,200	2,080	2,790	4,830	1,900	1,840		2,030
5		1,710		8,690	7,610	1,970	2,720	4,300	2,360	2,030	2,160	2,100
6		1,570		8,030	7,190	1,970	2,450	3,710	2,980	2,100	2,160	2,100
7		1,480	1,460	9,350	6,770	1,970	2,140	3,390	4,060	2,100	2,220	2,100
8	1,540	1,390		8,910	5,200	1,970	2,200	3,310	5,540	3,050	2,220	1,660
9		1,390		7,400	4,470	1,920	2,650	3,160	4,880	3,340	2,220	2,030
10		1,390		6,370	6,520	1,620	3,470	2,860	6,120	3,420	2,160	2,160
11		1,100		7,190	7,610	2,200	3,310	2,720	5,920	a 2,860	1,900	2,160
12		1,300		9,810	5,970	1,860	3,240	2,450	5,730	2,290	1,960	2,100
13	1,450	1,480		8,030	4,830	1,810	3,080	2,650	6,320	2,290	2,160	2,220
14		1,480		7,400	4,300	1,760	2,650	2,720	5,730	2,980	2,160	2,160
15		1,440	10,200	6,980	3,880	1,660	2,720	2,720	4,780	3,120	2,220	1,440
16		1,340		6,770	3,710	1,660	2,650	2,580	3,810	3,890	2,100	1,900
17		1,300		6,570	3,470	1,340	2,580	2,940	4,230	3,810	1,900	2,030
18		930	35,600	8,030	3,390	1,970	2,380	3,310	3,980	4,880	1,660	1,900
19	1,340	1,040	28,100	6,770	2,940	2,260	2,260	3,710	4,590	3,890	2,290	1,960
20		1,040	14,600	5,770	2,520	2,140	2,380	3,960	4,500	2,700	2,100	2,160
21		1,070	10,200	5,580	2,320	2,020	2,940	3,810	4,970	2,490	1,900	1,900
22		1,140	16,100	5,200	2,140	2,940	4,040	3,570	5,540	2,490	2,160	a 1,870
23	1,440	1,140	13,200	5,200	2,380	3,710	3,960	3,420	5,160	2,490	2,490	a 1,840
24	1,440	1,070	8,920	5,580	2,580	4,650	3,790	3,500	4,880	2,490	2,630	a 1,800
25	1,440	870	6,570	5,970	2,650	5,770	3,470	3,340	4,590	2,420	2,360	1,770
26	1,480	1,000	7,560	5,390	2,260	5,200	3,160	2,840	4,230	2,420	2,490	1,660
27	1,390	1,000	16,300	5,200	2,140	4,220	2,940	2,980	4,410	2,360	2,220	1,660
28	1,100	1,070	21,400	5,580	2,020	3,710	2,580	2,980	4,060	2,360	1,960	1,780
29	1,260	930	27,000	5,770	.....	3,390	2,940	3,270	3,570	2,420	2,160	1,600
30	1,390	1,730	26,700	5,200	.....	3,790	3,080	3,730	1,960	2,400	2,220	2,030
31	1,440	.....	27,200	4,470	.....	3,630	.....	4,590	.....	2,400	2,290	.....

a Interpolated.

NOTE.—Braced figures show estimated mean discharge for periods when recorder did not operate. Discharge based on records at Buckley and Alderton.

Monthly discharge of Puyallup River at Puyallup, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	1,450	89,200
November	1,860	870	1,290	76,800
December	35,600	1,220	11,200	689,000
January	20,000	4,470	7,630	469,000
February	7,610	2,020	4,150	230,000
March	5,770	1,340	2,620	161,000
April	4,040	2,140	2,960	176,000
May	4,830	2,450	3,360	207,000
June	6,320	1,900	4,340	258,000
July	4,880	1,840	2,700	166,000
August	.....	1,660	2,230	137,000
September	2,220	1,440	1,940	115,000
The year	35,600	870	3,830	2,770,000

WHITE RIVER AT BUCKLEY, WASH.

LOCATION.—In SE. ¼ sec. 34, T. 20 N., R. 6 E., at Northern Pacific Railway bridge 1 mile northeast of Buckley, Pierce County.

DRAINAGE AREA.—424 square miles (measured on Plate 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; January 18, 1913, to September 30, 1918.

GAGE.—Stevens water-stage recorder on left bank 40 feet below railway bridge, installed January 9, 1917; inspected by O. E. Osgood. For description of previous gages see Water-Supply Paper 462.

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

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; slightly shifting; gradient steep. No well-defined control. One channel at all stages. Right bank low and flat; left bank protected by concrete wing wall.

EXTREMES OF DISCHARGE.—Maximum combined daily discharge of river and flume during year from water-stage recorder, 18,100 second-feet on December 18; minimum combined daily discharge during year, 349 second-feet November 19.

1899–1903; 1910–1911; 1913–1918; maximum and minimum discharge same as above.

ICE.—Stage discharge relation not affected by ice.

DIVERSIONS.—White River flume diverts water from river half a mile above gage. Total monthly discharge is computed from determinations of combined flow of river and flume.

ACCURACY.—Stage-discharge relation changed at high water on December 18. Rating curve used prior to the change fairly well defined throughout; rating curve used after the change well defined above 100 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph or, for days of considerable fluctuation, by averaging results obtained by applying the gage heights for shorter intervals. Operation of water-stage recorder not satisfactory for several periods. See footnote to table of daily discharge. Records good above 100 second-feet except during periods when intake was clogged, for which they are fair; below 100 second-feet, poor.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made some measurements.

Discharge measurements of White River at Buckley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	O. E. Osgood	24.06	3.1	Mar. 25	Osgood and Wolslegel	25.11	1,940
Dec. 30	G. L. Parker	28.89	11,100	Apr. 10	Osgood and Rhodes	24.47	1,130
30	do	28.75	10,400	25	do	24.64	1,260
31	do	28.14	9,040	May 10	do	24.22	879
Jan. 21	Lee and Osgood	25.02	1,870	25	do	24.74	1,390
22	Osgood and Lee	24.78	1,390	June 10	do	25.56	2,600
22	Lee and Osgood	25.18	2,070	26	do	25.01	1,790
Feb. 14	Osgood and Wolslegel	(a)	1,110	July 10	do	23.91	639
14	do	(a)	659	Sept. 25	Osgood and Rogers	(a)	2.7
25	do	(a)	138	25	do	(a)	2.9
Mar. 11	do	22.72	122				

a Correct gage height not available, as intake was clogged or water was below intake.

Daily discharge, in second-feet, of White River at Buckley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3.2	3.5	5.9	9,690		100	1,100	1,210	1,860	
2	3.5	3.5	5.9	6,320		163	963	1,320	1,260	
3	3.8	44	5.9	4,990		179	860	1,630	203	
4	3.5	80	7.7	4,650	1,500	144	698	1,950	185	70
5	3.8	78	6.2	4,110		150	600	1,750	381	
6	3.5	50	5.9	3,700		166	521	1,410	636	
7	3.8	11	5.6	4,430		163	435	1,220	1,320	460
8	3.8	10	5.6	4,000		160	344	1,130	2,740	840
9	3.8	10	5.9	3,030		141	772	1,030	2,170	774
10	3.8	9.7	5.9	2,500	1,800	141	1,100	884	2,590	806
11	3.8	9.7	21	3,140			1,060	811	2,500	394
12	3.3	9.3	48	4,540			1,020	722	2,420	268
13	2.8	8.9	3,190	3,600			967	665	2,760	390
14	2.5	8.5	9,170				868	542	2,500	992
15	3.0	7.3	3,910			100	790	445	1,820	932
16	3.0	5.3	2,640	2,600	1,050		744	434	1,560	706
17	3.0	5.6	4,960				692	724	1,640	752
18	2.5	5.6	17,900			278	634	1,050	1,660	998
19	2.2	5.0	10,000			318	570	1,540	2,040	556
20	2.2	3.8	5,400			270	665	1,630	2,060	285
21	2.2	4.7	3,670		450	258	1,190	1,560	2,250	653
22	2.2	4.1	7,220	1,800		656	1,570	1,460	2,420	163
23	2.5	3.8	5,320			832	1,480	1,460	2,340	276
24	3.0	4.1	3,350		967	1,320	1,420	1,520	2,090	257
25	3.0	4.7	2,380		420	1,980	1,260	1,420	1,990	140
26	3.5	5.0	2,700			1,380	1,090	1,350	1,980	
27	3.8	5.3	6,300		50	868	1,010	1,290	1,840	350
28	3.5	5.6	8,540	1,400		750	994	1,350	1,680	
29	3.5	6.2	12,400			1,000	1,060	1,520	1,120	
30	3.5	7.3	11,200			1,180	1,130	1,960	111	351
31	3.5		8,380			1,250		2,090		157

NOTE.—Braced figures show estimated mean discharge for periods indicated; during February, March, and July, discharge estimated from flow of adjacent stream, weather records, and approximate rating of dam at head of flume. Daily discharge not computed during August and September.

Monthly discharge of White River and flume at Buckley, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 424 square miles.]

Month.	Discharge in second-feet.						Run-off (combined).	
	Maximum. (combined).	Minimum. (combined).	Mean.			Per square mile. (combined).	Inches.	Acre-feet.
			River	Flume	Combined.			
October	658	413	3.19	508	511	1.21	1.40	31,400
November	769	349	14.0	429	443	1.04	1.16	26,400
December	18,100	452	4,150	857	5,010	11.8	13.60	308,000
January	10,500	.....	3,020	696	3,720	8.77	10.11	229,000
February	.....	.....	1,070	674	1,740	4.10	4.27	96,600
March	2,220	.....	469	684	1,150	2.71	3.12	70,700
April	2,250	1,170	920	636	1,560	3.68	4.11	92,800
May	2,660	1,290	1,260	446	1,710	4.03	4.65	105,000
June	3,600	1,600	1,730	632	2,360	5.57	6.21	140,000
July	1,790	.....	418	906	1,320	3.11	3.58	81,200
August	.....	.....	50.0	860	910	2.15	2.48	56,000
September	.....	.....	10.0	672	682	1.61	1.80	40,600
The year	18,100	349	1,100	667	1,770	4.17	56.49	1,280,000

NOTE.—Monthly mean discharge at gaging station on river for August and September estimated by detailed study of flow of adjacent streams, weather records, and approximate rating of dam at headworks of White River flume.

WHITE RIVER FLUME AT BUCKLEY, WASH.

LOCATION.—In sec. 35, T. 20 N., R. 6 E., on left side of white River, 800 feet below intake, half a mile above Northern Pacific Railway crossing, and 1 mile northeast of Buckley, Pierce County.

RECORDS AVAILABLE.—January 18, 1913, to September 30, 1918.

GAGE.—Stevens long-distance water-stage recorder with transmitter at stilling well on right side of flume 800 feet below headgate, and recorder in gate house; installed January 12, 1918; inspected by O. E. Osgood. Prior to January 12, Fuller water-stage recorder at stilling well.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Control formed by long section of flume bottom below gage. A rock spill a quarter of a mile below gage is partial control also. Stage-discharge relation affected by variable quantity of rocks which work their way from intake to rock spill.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 6.15 feet at 8 a. m. June 7 (discharge, 2,000 second-feet); no flow in flume February 24, May 20–31, and June 1, and 20–28.

1913–1918: Maximum stage in 1918; flume dry at various times.

ICE.—Stage-discharge relation not affected by ice during year.

REGULATION.—Gates at intake operated frequently to control flow.

ACCURACY.—Stage-discharge relation affected by rocks washed into flume. Four well-defined rating curves used respectively, October 9 to December 19, December 20 to June 1, June 2 to September 22, and September 23 to 30. Shifting-control method used October 1 to 8. Operation of water-stage recorder excellent. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent.

COOPERATION.—Puget Sound Traction, Light & Power Co. furnished gage-height record and made discharge measurements.

Flume diverts water from left bank of White River in the SE. ¼ sec. 35, T. 20 N., R. 6 E. Water is used for the development of power at Dieringer and is discharged into Stuck River.

Discharge measurements of White River flume at Buckley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	O. E. Osgood	3.60	609	Mar. 11	Osgood and Wolslegel	3.25	d07
31	do	2.78	405	25	do	1.78	244
Nov. 10	do	2.75	402	Apr. 10	Osgood and Rhodes	3.27	608
Jan. 21	Osgood and Lee	2.93	528	25	do	3.34	638
21	Lee and Osgood	.42	22.1	May 10	do	3.14	570
21	Osgood and Lee	.40	21.8	June 10	do	3.60	827
21	do	1.21	132	July 10	do	3.80	918
21	Lee and Osgood	3.50	696	25	Osgood and Eastman	3.96	1,000
22	Osgood and Lee	.78	62	Aug. 10	O. E. Osgood	3.94	973
22	Lee and Osgood	2.02	295	Sept. 10	do	3.12	727
Feb. 25	Osgood and Wolslegel	3.84	820	25	Osgood and Rogers	2.50	470

Daily discharge, in second-feet, of White River flume at Buckley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	578	400	570	785	790	806	636	636	0	1,540	1,000	856
2	588	388	494	819	774	727	543	651	494	1,540	804	839
3	618	601	507	881	886	727	466	681	1,470	1,440	651	738
4	610	636	763	636	528	712	562	712	1,520	1,350	573	690
5	598	507	583	606	154	681	610	712	1,650	1,350	788	674
6	583	520	557	562	158	636	651	681	1,910	1,300	958	690
7	539	482	494	606	832	636	739	651	1,720	803	924	674
8	569	434	446	502	1,240	636	856	636	274	509	958	690
9	583	411	520	692	1,150	636	704	621	839	731	924	722
10	583	400	494	577	632	636	636	606	856	732	890	706
11	544	422	711	651	437	656	636	592	856	879	958	738
12	507	446	1,080	644	712	696	621	688	839	920	833	738
13	507	446	1,120	583	666	681	606	858	839	666	770	788
14	532	400	496	802	684	681	606	1,170	822	162	958	754
15	520	388	1,080	739	606	712	577	1,280	788	431	994	754
16	470	366	972	822	577	758	577	1,240	788	1,050	856	722
17	422	366	1,160	790	577	831	562	867	788	1,040	839	690
18	411	355	248	822	562	819	548	518	473	728	823	658
19	411	344	717	774	702	758	637	26	53	1,040	890	674
20	411	355	1,260	644	790	758	790	0	0	856	754	722
21	422	400	1,150	513	758	758	732	0	0	428	805	626
22	422	388	1,430	519	822	708	681	0	0	958	924	532
23	411	377	1,520	677	630	606	681	0	0	874	1,030	498
24	434	366	1,320	774	0	525	666	0	0	820	950	513
25	501	366	1,110	806	544	240	666	0	0	965	547	498
26	655	344	1,190	727	924	574	636	0	0	889	1,030	498
27	557	355	1,570	681	890	822	606	0	0	667	890	513
28	482	422	1,290	685	856	806	606	0	0	522	788	558
29	434	434	190	712	.....	698	621	0	492	1,050	805	648
30	422	762	366	729	.....	636	636	0	1,490	813	856	760
31	411	.....	1,150	806	.....	636	.....	0	.....	1,040	890	.....

Monthly discharge of White River flume at Buckley, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	655	411	508	31,200
November	762	344	429	25,500
December	1,570	190	857	52,700
January	881	502	696	42,800
February	1,240	0	674	37,400
March	831	240	684	42,100
April	856	466	636	37,800
May	1,280	0	446	27,400
June	1,910	0	632	37,600
July	1,540	162	906	55,700
August	1,030	547	860	52,900
September	856	498	672	40,000
The year	1,910	0	667	483,000

DUWAMISH RIVER BASIN.

CEDAR RIVER AT CEDAR FALLS, WASH.

LOCATION.—In sec. 4, T. 22 N., R. 8 E., below Seattle municipal power plant at Cedar Falls, King County, and 3½ miles above Taylor Creek.

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

RECORDS AVAILABLE.—April 9, 1914, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank installed April 8, 1914, 0.7 mile below power plant; inspected by G. H. Moore.

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

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifts during high water. No well-defined control. Banks high. One channel at all stages. Stage of zero flow, according to measurements made September 17, 1918, 3.0 feet ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 11.4 feet at 9 a. m. December 19 (discharge, 6,290 second-feet); minimum stage from recorder, 3.32 feet at 4 p. m. November 25 (discharge, 0).

1914–1918: Maximum and minimum stages same as above.

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

DIVERSIONS.—Seattle municipal power plant diverts water direct from Cedar Lake through pressure pipe and returns it to river at plant. Practically entire low flow is carried through plant.

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

ACCURACY.—Stage-discharge relation changed December 13. Rating curves well defined; one used prior to shift not checked by measurement during period. Operation of water-stage recorder satisfactory except for periods, December 24–28, and July 14–28. Daily discharge ascertained by use of discharge integrator except for periods of defective gage-height record and for periods December 13–23 and December 29 to January 8, for which mean daily gage heights or mean gage heights for shorter intervals were applied to rating table. Records good October to December; excellent January to September.

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

Discharge measurements of Cedar River at Cedar Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 19	Moore and Scone	11.30	6,160	May 8	Benedict and Thom	5.77	623
Jan. 28	Parker and Benedict	6.32	890	9	J. E. Stewart	6.56	1,060
29	do	6.33	926	10	do	5.35	417
Apr. 26	Benedict and Thom	6.54	1,040	Sept. 17	Calkins and Parker	4.60	122
May 8	do	5.78	637				

Daily discharge, in second-feet, of Cedar River at Cedar Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	181	159	158	4,340	615	358	652	372	556	349	83	158
2	186	181	52	3,110	539	353	610	900	484	355	101	138
3	197	176	168	2,160	480	323	510	587	489	353	94	155
4	168	123	213	1,860	532	354	383	342	460	294	81	133
5	170	187	174	1,900	693	349	425	557	412	339	83	126
6	165	199	231	1,860	916	355	475	674	351	306	95	124
7	142	190	190	1,950	1,040	343	322	631	386	296	85	123
8	127	178	209	1,900	993	345	412	923	504	330	83	123
9	136	213	235	1,580	867	348	365	1,110	516	335	65	123
10	133	215	219	1,220	965	290	445	390	648	328	84	119
11	135	136	280	1,100	1,110	334	490	365	654	326	94	124
12	132	184	293	1,430	1,020	340	375	191	634	327	74	123
13	136	151	793	1,510	871	338	499	295	620	240	60	123
14	108	166	4,640	1,330	741	339	307	311	585		73	123
15	137	154	4,460	1,150	652	348	525	348	519		85	123
16	130	181	3,110	960	582	345	357	398	416		105	123
17	132	157	3,060	930	478	305	606	470	427		106	123
18	140	61	5,480	1,200	473	343	349	507	410		95	123
19	175	140	5,900	1,080	432	349	493	519	379		123	123
20	145	150	3,950	912	397	350	569	594	362		170	123
21	170	121	2,380	808	385	356	571	573	352	145	166	123
22	138	135	2,430	704	362	362	594	535	340		167	106
23	139	133	2,780	656	373	370	902	497	309		170	126
24	146	124		890	315	346	356	468	349		168	123
25	158	43		1,270	357	381	735	442	350		164	123
26	198	113	2,050	1,160	365	380	830	372	351		162	117
27	164	122		940	364	376	371	414	342		162	113
28	125	142		898	360	361	301	394	348		158	110
29	162	104	5,710	890	.....	413	780	393	344	86	155	93
30	161	167	5,840	797	.....	539	754	430	305	93	154	113
31	191	.....	4,890	696	.....	553	.....	546	.....	81	154	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from comparison with Landsberg records.

Monthly discharge of Cedar River at Cedar Falls, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	198	108	152	9,350
November	215	43	150	8,930
December	5,900	52	2,200	135,000
January	4,340	656	1,390	85,500
February	1,110	315	617	34,300
March	553	290	363	22,300
April	902	301	512	30,500
May	1,110	191	502	30,900
June	654	305	440	26,200
July	355	81	213	13,100
August	170	60	117	7,190
September	158	93	123	7,320
The year	5,900	43	567	411,000

CEDAR RIVER NEAR LANDSBERG, WASH.

LOCATION.—In sec. 17, T. 22 N., R. 7 E., 1¾ miles above intake of Seattle water-supply system at Landsberg, 3 miles northeast of Ravensdale, 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, 1918. July 25, 1895, to September 30, 1898, at Clifford Bridge, 2 miles below present gage; March 24, 1901, to April 30, 1912, at intake of Seattle water-supply system, 1¾ miles below present gage. Early records not exactly comparable with those at present site because of a small difference in drainage area.

GAGE.—Stevens continuous water-stage recorder installed April 29, 1914; inspected by G. H. Moore.

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

CHANNEL AND CONTROL.—Bed composed of large boulders and gravel. Control formed by section of stream bed and by broad riffle about 1,200 feet below gage; shifting during high water. Logs may lodge on riffle. One channel at all stages. Stage of zero flow, according to measurements made August 27, 1916, about gage height 2.5 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.55 feet at 10 p. m. December 29 (discharge, 7,500 second-feet); minimum stage from water-stage recorder, 4.45 feet for part of each day November 21 and 25 (discharge, 191 second-feet).

1914–1918: Maximum stage same as above; minimum stage recorded, 4.35 feet at 1 a. m. October 15, 1914 (discharge, 162 second-feet).

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

DIVERSIONS.—None above the station (see Cedar River at Cedar Falls, Wash.).

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

ACCURACY.—Stage-discharge relation changed December 13. Rating curve used before change well defined; curve used after change well defined below 2,000 second-feet, but above, based on one discharge measurement at Cedar Falls, and estimated intervening inflow. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator except January 4–25 and September 12–16 and as indicated in footnote to table of daily discharge. Records excellent except during periods when recorder was out of order, for which they are good.

COOPERATION.—Gage-height records and a number of discharge measurements furnished by city engineer of Seattle.

Discharge measurements of Cedar River near Landsberg, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 18	Moore and Beals	4.61	220	Mar. 10	J. E. Stewart	5.71	691
Jan. 29	Parker and Beals	7.38	1,600	Sept. 16	Parker and Calkins	4.51	260
30	do	7.13	1,490				

Daily discharge, in second-feet, of Cedar River near Landsberg, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			409	5,020	1,220	810	1,080	680	840	515		306
2			306	3,660	1,140	786	1,030	965	760	520	260	293
3	350		394	2,800	1,130	770	910	1,130	750	422		294
4			605	2,460	1,230	762	761	666	720	468	245	288
5		350	475	2,460	1,490	760	758	800	670	510	239	278
6	326		550	2,460	1,710	754	842	979	600	479	245	275
7	314		455	2,600	1,810	746	870	985	613	475	248	269
8	274	320	467	2,530	1,700	734	755	1,170	727	502	242	273
9	293	369	595	2,320	1,550	735	745	1,540	740	523	260	278
10	288	379	546	2,120	1,350	689	815	782	890	524	269	274
11	292	313	642	1,980	1,930	718	825	654	900	530	297	277
12	288	332	705	2,250	1,780	720	765	442	852	508	290	272
13	283	317	1,670	2,250	1,590	707	863	571	852	449	239	267
14	268	323	6,020	2,130	1,410	704	736	596	709	336	246	264
15	281	313	5,540	2,110	1,290	705	887	633	727	313	264	262
16	281	332	3,840	1,980	1,200	702	792	744	621	386	282	262
17	279	316	3,780	1,920	1,160	675	993	793	626	324	290	258
18	270	238		2,110		715	770	851	695	298	297	260
19	321	276		1,980		715	800	879	576	353	384	258
20		289		1,860		743	980	955	549	375	390	257
21		270		1,800	930	744	1,040	915	535	306	365	256
22		278		1,680		828	998	862	517	283	404	247
23		278	3,450	1,620		830	1,370	812	489	303	415	255
24		265		1,800		906	735	780	511	300	394	253
25	326	223		2,110		1,020	1,000	745	520	297	363	252
26		244		1,940	812	941	1,400	668	520	274	345	246
27		263		1,880	787	895	693	694	510	264	343	242
28		331	4,930	1,830	785	861	601	677	520		333	238
29		298	6,820	1,680	.....	858	830	670	504	300	321	229
30		486	6,620	1,470	.....	970	1,260	705	472		320	240
31		.....	5,080	1,220	.....	970	.....	815	.....		319	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, during which time recorder did not operate satisfactorily; discharge estimated from record of precipitation and comparison with record at Cedar Falls, except for period Dec. 18–27 when comparison was made with record at Landsberg dam. Discharge estimated for few days during year.

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Monthly discharge of Cedar River near Landsberg, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	266	313	19,200
November	486	223	317	18,900
December	.....	306	2,760	170,000
January	5,020	1,320	2,200	135,000
February	1,930	785	1,250	69,400
March	1,020	675	792	48,700
April	1,400	601	887	52,800
May	1,540	442	810	49,800
June	900	472	650	38,700
July	524	.....	389	23,900
August	415	239	304	18,700
September	306	229	264	15,700
The year	.....	223	912	661,000

SNOHOMISH RIVER BASIN.

SOUTH FORK OF SKYKOMISH RIVER NEAR INDEX, WASH.

LOCATION.—In NE. ¼ sec. 29, T. 27 N., R. 10 E., 300 feet above Sunset Falls and 2 miles above town of Index and mouth of North Fork, 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, 1918.

GAGE.—Inclined and vertical staff gage on right bank; installed April 19, 1914; read by C. A. McFarland. October 7, 1902, to September 30, 1905, vertical staff at site of present gage but at datum 0.39 foot higher. April 26, 1911, to February 25, 1914, vertical staff at site of present gage but at datum 1.00 foot higher.

DISCHARGE MEASUREMENTS.—Made from cable or by wading 1 mile below gage or from bridge 100 feet below.

CHANNEL AND CONTROL.—Bed at measuring section composed of gravel and small boulders. Sunset Falls, 300 feet below gage, forms rock control; changed by blasting at falls in July, 1914, and by shifting of channel above, during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 22.6 feet at 9 a. m. December 18 (discharge, 47,000 second-feet); minimum stage recorded, 0.97 foot September 26 (discharge, 346 second-feet).

1902–1905, 1911–1918: Maximum stage same as above; minimum stage recorded, 0.54 foot September 30, 1915 (discharge, 262 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 during flood. Rating curve used October 1 to December 17, well defined; curve used December 18 to September 30 well defined below 12,000 second-feet, but somewhat uncertain above. Gage read once daily to quarter-tenths at medium and high stages, and to hundredths at low stages; read several times a day at extremely high stages. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

Discharge measurements of South Fork of Skykomish River near Index, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	McCombs and Carson	2.16	753	June 1	L. D. Carson	5.93	3,940
Jan. 14	T. R. Newell	5.60	3,440	5	do	6.48	4,550
16	do	5.24	3,110	6	do	7.61	6,180
Feb. 14	L. D. Carson	4.03	1,970	Sept. 20	Parker and Calkins	1.20	420
June 1	do	6.09	4,040	21	G. L. Parker	1.15	400

Daily discharge, in second-feet, of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	656	772	1,320	18,100	1,500	920	2,740	3,940	4,060	2,640	920	600
2	732	694	1,210	10,400	1,640	930	2,190	4,700	3,250	2,460	1,130	560
3	1,110	1,500	1,110	8,040	1,640	920	1,940	5,550	2,840	2,190	970	560
4	852	2,180	1,860	8,230	2,100	920	1,780	7,320	3,140	1,940	920	520
5	772	1,640	1,320	9,000	4,440	820	1,710	5,850	4,440	2,100	775	520
6	694	1,780	1,440	7,860	4,180	820	1,570	4,180	6,160	2,020	820	483
7	584	1,320	1,160	7,860	4,700	775	1,780	3,470	7,150	2,020	775	483
8	550	1,110	1,070	6,320	3,250	775	2,020	3,250	6,810	1,940	730	483
9	550	936	1,440	4,980	2,460	730	3,250	3,040	8,040	2,020	1,020	483
10	518	852	1,500	3,940	3,250	730	3,820	2,740	7,680	2,280	1,940	483
11	488	812	4,020	3,700	4,060	730	2,740	2,740	6,480	1,860	1,710	483
12	460	812	6,000	4,980	3,140	730	1,500	3,250	7,680	1,640	1,250	483
13	460	852	16,000	3,560	2,460	730	2,740	3,700	7,150	1,570	1,070	483
14	446	772	17,400	3,470	2,020	685	2,460	3,700	5,550	1,570	920	449
15	432	694	10,200	3,140	2,100	730	2,100	3,360	4,180	1,570	920	449
16	460	656	18,400	3,040	2,460	820	2,020	3,250	5,400	1,780	920	449
17	460	620	15,400	3,940	1,500	970	2,190	3,140	4,700	1,640	920	417
18	432	584	40,300	5,850	1,370	1,710	2,020	3,250	3,820	1,640	1,020	417
19	432	550	18,300	4,570	1,250	1,430	2,100	2,840	3,820	1,570	1,570	417
20	432	584	9,800	3,250	1,130	1,710	3,140	3,250	4,060	1,310	1,130	417
21	432	1,640	7,860	2,640	1,070	1,780	4,440	2,840	4,700	1,250	1,020	417
22	480	1,110	16,500	2,280	1,020	4,310	4,980	2,840	4,700	1,130	870	387
23	432	936	8,230	2,280	1,070	3,470	4,440	2,460	4,700	1,250	1,020	359
24	518	812	6,320	5,850	970	4,300	4,440	2,370	4,180	1,070	920	359
25	584	894	4,440	4,180	970	5,120	3,580	2,100	3,700	1,020	870	359
26	1,116	772	4,980	3,040	920	3,700	3,140	2,100	3,360	1,130	820	346
27	1,110	772	20,500	2,550	970	2,740	3,040	2,460	3,000	1,250	775	359
28	936	1,440	26,200	2,740	920	2,560	3,250	2,640	2,640	1,130	685	359
29	694	1,110	36,800	2,940	.....	3,250	3,700	3,700	2,550	1,020	640	387
30	656	1,570	20,500	2,370	.....	1,640	4,180	6,980	2,460	970	685	417
31	620	.....	20,500	1,780	.....	3,360	.....	5,550	.....	920	640	.....

NOTE.—Gage not read, discharge interpolated, Oct. 14, Mar. 24, June 27, and Sept. 10.

Monthly discharge of South Fork of Skykomish River near Index, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 351 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,110	432	615	1.75	2.02	37,800
November	2,180	550	1,030	2.96	3.27	61,300
December	40,300	1,070	11,000	31.3	36.09	676,000
January	18,100	1,780	5,060	14.4	16.60	311,000
February	4,440	920	2,090	5.95	6.20	116,000
March	5,120	730	1,770	5.04	5.81	109,000
April	4,980	1,500	2,830	8.06	8.99	168,000
May	7,320	2,100	3,630	10.3	11.87	223,000
June	8,040	2,460	4,750	13.5	15.06	283,000
July	2,640	920	1,610	4.59	5.29	99,000
August	1,940	640	980	2.79	3.22	60,300
September	600	346	446	1.27	1.42	26,500
The year	40,300	346	3,000	8.55	115.84	2,170,000

MILLER CREEK AT MILLER RIVER, WASH.

LOCATION.—In NE. ¼ sec. 33, T. 26 N., R. 11 E., 1½ miles south of Miller River (formerly Berlin) and mouth of creek, King County.

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

RECORDS AVAILABLE.—May 24, 1911, to September 30, 1918, (fragmentary).

GAGE.—Inclined staff on left bank, installed August 27, 1914; read 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 cable 900 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of large boulders and gravel; shifting during high water. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, occurred during flood of December 18, estimated by observer at 7 or 8 feet (discharge not computed); minimum stage recorded, 1.02 feet September 22 and 24 (discharge, 29 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 0.07 foot August 31, 1915 (discharge, 24 second feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood on December 18. Rating curve used prior to that date well defined below 2,000 second-feet; curve used for remainder of year well defined below 1,000 second-feet. Gage read to hundredths when ranger visited station. Daily discharge ascertained by applying gage height to rating table. Records good for days when gage was read. Discharge for days when gage was not read has not been estimated.

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

Discharge measurements of Miller Creek at Miller River, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	Carson and McCombs	0.73	102	June 4	L. D. Carson	2.91	432
Feb. 3	T. R. Newell	2.09	172	8	do	3.76	882
Apr. 26	do	2.82	389	Sept. 22	Parker and Lee	1.02	29.1
June 3	L. D. Carson	2.68	334	22	Lee and Parker	1.02	29.2

Daily discharge, in second-feet, of Miller Creek near Miller River, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										88	56
2				163	132	236				152	50
3				172				344	310	107	50
4					123	222	1,120	420		86	
5				236	112					82	
6	60			660						72	42
7					87					65	42
8				484	74			909	264	62	42
9	58							909		210	
10	59							1,050		441	39
11				441			842	909		327	
12	56				67	186		979		210	34
13		3,830		278				1,050		163	
14				222	70			748	152	123	34
15		1,280				197	778	531			
16				210	78			507	249		34
17		1,180						688			
18				210	84	249		484			
19								531			
20					123			606		210	30
21				186				688			
22								717			29
23			222	174	132		660	660			
24			531					555		132	29
25				210	132			484		132	
26			441			389		462		132	
27					132	420		400			
28			420		344			381			
29							606			73	
30			249							69	
31									100	65	

NOTE.—No gage-height record for days for which no discharge is given.

NORTH FORK OF SKYKOMISH RIVER AT INDEX, WASH.

LOCATION.—In SE. ¼ sec. 17, T. 27 N., R. 10 E., at Index, Snohomish County, 1½ miles above mouth of river.

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

RECORDS AVAILABLE.—August 24, 1910, to September 30, 1918.

GAGE.—Vertical and inclined staff on right bank, one-third mile above highway bridge, installed February 1, 1918, at datum of previous gage; read by Lee Pickett. August 24 to September 2, 1910, vertical staff on left bank 100 feet above tramway bridge; destroyed in course of improvements to channel; October 26, 1910, to November 26, 1911, vertical staff on right bank at lower end of wing dam and about 100 feet below site of present gage. November 27, 1911, to December 29, 1917, vertical staff on wing dam on right bank about 200 feet upstream from present site; destroyed by flood. January 13–31, 1918, readings from a reference point at site of present gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading. Prior to flood of December, 1917, cable 600 feet below gage; reinstalled 200 feet above new gage.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and large boulders; shifting during high water; no well-defined control; right bank high, not subject to overflow; left bank slopes back gradually. Stage of zero flow, according to measurements made September 21, 1918, gage height −1.3 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.0 feet at 5 a. m. December 29 (discharge, 17,800 second-feet); minimum stage recorded, 0.50 foot September 28 (discharge, 143 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 0.45 foot at 1 p. m. September 29, 1915 (discharge, 97 second-feet).

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

DIVERSIONS.—A measured diversion of 2 second-feet was being made 400 feet above the station on May 2, 1918.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 29. Rating curves well defined below 8,000 second-feet; extended above. Staff gage read once daily to quarter-tenths at low stages and to tenths at high stages. During periods of rapidly changing stage, gage read several times a day. Slight diurnal fluctuation during the summer. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of North Fork of Skykomish River at Index, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	McCombs and Carson..	1.66	510	June 7	L. D. Carson.....	3.43	3,040
2	L. D. Carson.....	1.58	481	July 7	.....do.....	1.99	1,140
May 2	T. R. Newell.....	2.86	2,100	Sept. 21	Calkins and Parker.....	.63	178
June 2	L. D. Carson.....	2.20	1,410	21	Lee and Calkins.....	.62	190
3	.....do.....	2.16	1,330	23	Lasley Lee.....	.58	174
5	.....do.....	3.12	2,720				

Daily discharge, in second-feet, of North Fork of Skykomish River at Index, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	316	506	673		674	354	1,170	2,070	1,820	1,220	425	309
2	829	483	673		635	354	1,020	2,200	1,370	1,220	756	309
3	723	1,440	673		635	365	884	3,330	1,370	1,220	490	299
4	529	1,140	673		1,820	365	797	3,690	1,820	a1,220	458	258
5	438	1,000	624		1,820	365	797	2,070	2,490	1,220	354	258
6	354	885	624		1,820	309	714	1,700	3,330	1,170	337	258
7	354	829	576	2,650	1,940	299	756	1,700	3,150	1,170	354	249
8	280	673	506		1,590	284	1,070	1,590	3,150	1,120	425	249
9	280	624	775		674	268	1,590	1,370	3,690	1,170	1,170	236
10	247	576	775		1,120	258	1,700	1,370	5,050	1,370	1,370	236
11	247	483	1,970		1,590	249	1,590	1,590	4,070	884	840	222
12	247	506	1,070		1,120	249	1,590	1,590	3,690	797	635	222
13	232	416	6,870	1,480	930	249	1,220	1,820	3,510	840	598	222
14	202	354	10,800	1,270	797	249	1,270	1,820	2,490	975	1,370	222
15	202	354	5,490	975	674	249	1,590	1,590	1,940	1,020	884	222
16	298	316	4,070	1,170	635	249	1,270	1,590	2,490	975	797	222
17	232	316	6,870	1,590	525	395	1,020	1,590	2,340	975	635	213
18	187	280	13,800	2,490	490	714	840	1,590	2,070	884	635	194
19	187	280	4,220	2,200	490	598	1,700	1,370	2,070	797	598	194
20	187	576	3,690	2,070	425	635	2,070	1,370	2,810	756	560	194
21	187	576	3,920	2,070	425	674	2,980	1,270	3,880	635	560	186
22	a 187	576	2,380	1,820	413	756	2,070	1,220	2,980	560	560	175
23	187	576	2,600	1,700	413	1,370	2,070	1,270	2,340	560	560	169
24	416	576	2,170	2,340	395	1,590	1,940	1,170	2,070	560	525	159
25	483	1,000	2,070	1,590	365	2,490	1,590	1,070	1,940	490	1,170	159
26	216	885	5,830	1,370	425	1,270	1,480	1,070	2,070	635	425	149
27	298	885	9,050	975	354	1,270	1,590	1,370	1,590	635	413	149
28	395	775	11,000	930	354	1,270	1,590	1,370	1,370	560	365	143
29	416	576	16,600	1,120	.....	1,170	2,070	2,070	1,270	490	337	159
30	395	775	8,700	884	.....	1,590	1,940	3,150	1,270	490	320	183
31	374	.....		674	.....	1,590	.....	2,070	.....	425	320	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; based on comparison with flow of Middle Fork of Snoqualmie River near North Bend.

Monthly discharge of North Fork of Skykomish River at Index, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 143 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	829	187	327	2.29	2.64	20,100
November	1,440	280	641	4.48	5.00	38,100
December	16,600	506	4,450	31.1	35.35	274,000
January		674	1,950	13.6	15.68	120,000
February	1,940	354	841	5.88	6.12	46,700
March	2,490	249	713	4.99	5.75	43,800
April	2,980	714	1,470	10.3	11.49	87,500
May	3,690	1,070	1,750	12.2	14.07	108,000
June	5,050	1,270	2,520	17.6	19.64	150,000
July	1,220	425	872	6.10	7.03	53,600
August	1,370	320	621	4.34	5.00	38,200
September	300	143	214	1.50	1.67	12,700
The year	16,600	143	1,370	9.58	129.94	993,000

SULTAN RIVER NEAR SULTAN, WASH.

LOCATION.—In sec. 8, T. 28 N., R. 8 E., at Horseshoe Bend, 4½ miles north of Sultan and mouth of river, Snohomish County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 18, 1911, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank a quarter of a mile above Horseshoe Bend; inspected by city engineer of Everett. Prior to October 29, 1915, Lietz water-stage recorder at Camp Habecker 1½ miles upstream.

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

CHANNEL AND CONTROL.—In canyon; control formed by large rocks, boulders, and heavy gravel; not likely to change except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.6 feet at about 9 a. m. December 18 (from high-water mark in well; discharge, 20,600 second-feet); minimum stage from water-stage recorder, 0.61 foot at 7 p. m. September 29 (discharge, 77 second-feet).

1911–1918: Maximum stage same as above; minimum stage recorded, 4.52 feet at Camp Habecker September 29, 1915 (discharge, 71 second-feet).

ICE.—Stage-discharge relation seldom affected by ice. Water in stilling well freezes during very cold weather. No ice during current year.

DIVERSION.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by backwater from drift on control October 1 to December 13. Drift removed and stage-discharge relation changed on December 13 by high water. Rating curve for period October 1 to December 13 well defined below and poorly defined above 500 second-feet; curve for remainder of year well defined throughout. Operation of water-stage recorder satisfactory except for periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for a few days in November and December when amount of backwater effect is uncertain.

COOPERATION.—Gage-height record furnished by city engineer of Everett, Wash.

Discharge measurements of Sultan River near Sultan, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 20	Newell and Calkins	4.96	1,680	Jan. 15	T. R. Newell	4.27	1,220
29	Carson and Calkins	13.75	15,100	May 7	Stewart and Calkins	3.48	777
30	do	7.44	4,490	8	do	3.25	657
31	do	9.93	8,120	Sept. 19	Calkins and Parker	.79	91

Daily discharge, in second-feet, of Sultan River near Sultan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	228	354	570	5,060		274	943	863	812	382	162	164
2	512	312	472	2,160		255	718	1,090	695	354	286	186
3	622	1,750	642	2,410	1,480	247	570	1,400	590	315	198	147
4	396	1,710	1,210	3,760		227	514	1,540	674	288	164	138
5	292	1,080	659	3,700		212	495	1,090	972	315	147	131
6	238	825	781	3,100	2,590	198	460	787	1,240	283	136	125
7	210	570	553	2,640	1,540	188	532	764	1,340	285	131	122
8	182	442	526	2,040	1,210	180	889	718	1,150	304	143	118
9	166	354	1,420	1,440	1,500	176	1,940	610	1,210	328	237	114
10	153	304	916	1,000	3,190	174	1,620	590	1,580	412	1,660	112
11	142	270	2,480	1,120	1,620	171	1,180	631	1,240	315	1,090	110
12	136	259	1,590	2,120	1,180	187	1,030	695	1,210	245	551	108
13	129	259	8,370	1,400	837	179	889	740	1,180	222	354	106
14	123	228	14,100	1,120	631	174	718	610	787	231	283	104
15	120	210	a13,900	1,180	514	202	674	610	590	255	340	102
16	121	193	a 8,300	1,700		262	863	787	610	277	340	99
17	134	179	4,740	1,760		386	943	764	695	281	283	97
18	131	168	a15,600	2,690	350	1,220	674	1,240	495	277	635	94
19	125	157	a5,660	1,580		674	837	1,210	551	253	764	92
20	121	228	1,780	1,030		718	1,440	1,700	652	237	444	91
21	134	864	1,200	787	257	1,040	1,660	1,180	787	264	340	90
22	131	457	5,040	652	247	2,250	1,400	889	764	205	551	90
23	122	328	1,940		288	1,240	1,090	863	718	182	652	93
24	241	281	1,150		253	3,670	1,090	695	551	174	444	90
25	605	328	863		247	2,910	863	590	444	177	328	87
26	752	270	2,130		292	1,510	740	570	427	328	283	84
27	698	400	10,100	1,330	245	1,090	718	590	427	292	247	82
28	481	760	8,280		227	1,000	787	740	367	231	220	31
29	340	520	13,000		.....	1,090	916	1,000	304	198	202	79
30	292	718	4,810		.....	1,480	943	1,120	354	180	183	88
31	261	.....	6,900		.....	1,300	.....	1,180	.....	166	172	.....

a Estimated.

NOTE.—Braced figures show mean discharge for periods indicated, as based on comparison with flow of neighboring streams.

Monthly discharge of Sultan River near Sultan, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	752	120	270	16,600
November	1,750	157	493	29,300
December	15,600	472	4,590	277,000
January	5,060	.....	1,820	112,000
February	3,190	227	929	51,600
March	3,670	171	803	49,400
April	1,940	460	938	55,800
May	1,700	570	900	55,300
June	1,580	304	781	46,500
July	412	166	266	16,400
August	1,660	131	386	23,700
September	164	79	106	6,310
The year	15,600	79	1,020	740,000

MIDDLE FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ SE. ¼ sec. 10, T. 23 N., R. 8 E., 1 mile southeast of North Bend, King County, and 2¾ miles above junction with North Fork.

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

RECORDS AVAILABLE.—August 10, 1907, to February 29, 1908; August 25, 1908, to September 30, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Stevens continuous water-stage recorder on left bank; installed August 7, 1915; inspected by E. H. Robinson. Prior to August 7, 1915, gage was at highway bridge 2½ miles below present site.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at original station.

CHANNEL AND CONTROL.—Bed composed of large boulders. Control shifts at extremely high water. Left bank high; right bank low and heavily wooded. Stage of zero flow, according to measurements made September 15, 1918, at gage height −0.8 ±0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.16 feet at 10 a. m. December 18 (discharge, 18,300 second-feet); minimum stage recorded, 1.53 feet at 7 p. m. September 27 (discharge, 182 second-feet).

1907–1918: Maximum stage same as above; minimum stage recorded, 1.50 feet at 1 p. m. September 30, 1915 (discharge, 146 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 7,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records prior to high water in December, excellent; for periods when discharge was estimated, fair; for remainder of year good.

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

Discharge measurements of Middle Fork of Snoqualmie River near North Bend, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	E. H. Robinson	1.81	220	Jan. 3	Parker and Robinson	5.03	3,490
23	do	1.77	201	Sept. 14	Parker and Calkins	1.78	951
Jan. 2	G. L. Parker	5.26	3,810	15	Calkins and Parker	1.76	243

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	394	450	1,060	6,870	1,090	681	1,490	1,820	1,820	1,170	466	400
2	492	440	864	3,930	970	675	1,260	2,230	1,440	1,170	713	375
3	708	1,350	936	3,710	977	637	1,050	2,750	1,300	1,050	509	366
4	524	1,860	1,500	4,110	1,830	607	970	3,320	1,490	930	429	326
5	412	1,130	1,020	4,380	3,230	554	915	2,430	2,300	970	385	302
6	359	1,060	1,130	3,750	3,060	537	876	1,820	3,150	915	366	298
7	311	808	885	4,200	3,150	498	922	1,540	3,490	899	357	290
8	286	658	747	3,400	2,160	471	1,130	1,540	3,150	930	395	283
9	272	557	1,260	2,520	1,710	445	1,820	1,340	3,230	970	986	280
10	256	481	1,060	1,880	3,880	424	2,080	1,210	3,750	1,050	1,980	276
11	246	445	2,670	2,230	3,050		1,760	1,260	3,150	853	1,710	266
12	234	455	2,540	4,140			1,540	1,490	3,150	713	1,090	259
13	228	529	10,900	3,060			1,390	1,710	3,400	655	810	256
14	219	455	10,800	2,380			1,260	1,650	2,520	675	681	253
15	216	407	5,600	2,300	1,100	500	1,210	1,490	1,760	747	713	244
16	222	364	6,520	2,080			1,260	1,880	1,710	846	747	244
17	225	343	5,850	2,380			1,440	1,650	1,950	846	694	235
18	213	315	15,400	3,900			1,210	1,820	1,540	803	823	229
19	208	301	7,310	2,600			1,340	1,820	1,600	733	1,460	223
20	202	304	3,940	1,880			1,950	1,950	1,820	613	1,050	221
21	208	1,030	2,660	1,490	650		2,680	1,540	2,080	681	817	221
22	225	836	6,800	1,300			2,680	1,340	2,160	595	970	212
23	208	603	3,760	1,260		1,800	2,230	1,300	2,080	543	1,010	207
24	337	491	2,300	4,420	554		2,160	1,210	1,760	531	824	199
25	713	518	1,710	3,230	543		1,650	1,090	1,600	498	681	192
26	836	455	2,840	2,020	767		1,440	1,090	1,490	607	625	186
27	812	488	10,300	1,600	668	1,440	1,390	1,090	1,390	625	572	184
28	640	1,040	11,300	1,760	613	1,390	1,490	1,340	1,260	537	514	186
29	476	808	15,400	1,820	.....	1,440	1,760	1,950	1,090	498	466	192
30	417	2,120	7,710	1,440	.....	1,820	1,880	2,680	1,130	471	440	210
31	394	.....	8,700	1,170	.....	1,790	.....	2,830	.....	445	424	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, based on flow of North and South forks near North Bend.

Monthly discharge of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	836	202	371	2.02	2.33	22,800
November	2,120	301	703	3.82	4.26	41,800
December	15,400	747	5,020	27.3	31.47	309,000
January	6,870	1,170	2,810	15.3	17.64	173,000
February	3,880	543	1,380	7.50	7.81	76,600
March			1,030	5.60	6.46	63,300
April	2,680	876	1,540	8.37	9.34	91,600
May	3,320	1,090	1,750	9.51	10.96	108,000
June	3,750	1,090	2,130	11.60	12.94	127,000
July	1,170	445	760	4.13	4.76	46,700
August	1,930	357	763	4.15	4.78	46,900
September	400	184	254	1.38	1.54	15,100
The year	15,400	184	1,550	8.42	114.29	1,120,000

NORTH FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ sec. 26, T. 24 N., R. 8 E., at Gabriel ranch, 2½ miles above mouth and 3½ miles northeast of North Bend, King County.

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

RECORDS AVAILABLE.—July 4, 1907, to September 30, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Friez water-stage recorder on right bank 200 yards southeast of ranch house, installed September 26, 1916; inspected by E. H. Robinson. Previous gages as follows: July 21, 1907, to September 2, 1912, vertical staff at highway bridge one-eighth mile above mouth; September 2, 1912, to September 26, 1916, Fuller and Friez water-stage recorders at same site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 yards above mouth.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high stages. No well-defined control. Right bank not subject to overflow; left bank fairly high, not subject to overflow except at extremely high stages. Stage of zero flow, according to measurements made September 14, 1918, gage height -0.4 ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.80 feet at 7.30 a. m. December 18 (discharge, 9,890 second-feet); minimum stage recorded, 1.64 feet September 27 (discharge, 76 second-feet).

1907–1918: Maximum stage determined by leveling to high-water mark, 14.5 feet 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 reached in 1911. Minimum stage recorded, 1.0 foot September 26–28, 1910 (discharge, 56 second feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 4,000 second-feet; extended above. Operation of water-stage recorder excellent except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph or, for days of considerable

variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Partial clogging of intake pipe caused lag of water stage in well behind that in river. This caused slight uncertainty in daily records for periods of rapidly changing stage, but had little or no effect on monthly records. Records good.

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

Discharge measurements of North Fork of Snoqualmie River near North Bend, Wash. during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height (river gage).	Discharge.	Date.	Made by—	Gage height (river gage).	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 16	E. H. Robinson	1.92	107	Jan. 20	E. H. Robinson	3.98	1,130
22	do	2.00	121	Sept. 14	Calkins and Parker	1.84	109
Jan. 2	G. L. Parker	4.80	1,930	18	Parker and Calkins	1.79	98
3	do	4.98	2,180				

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	205	211	658	3,590	623	342	900	875	818	307	153	199
2	254	242	520	2,380	571	336	710	1,040	659	302	284	183
3	316	756	505	2,000	558	324	590	1,310	584	271	229	170
4	238	1,110	884	2,050	1,130	316	522	1,510	652	252	195	163
5	196	726	654	2,340	1,940	302	478	1,120	925	245	181	155
6	169	704	648	1,940	1,880	288	443	866	1,210	229	168	146
7	148	530	540	2,280	1,880	268	452	770	1,310	222	157	140
8	136	413	476	1,880	1,260	268	604	810	1,160	216	166	136
9	125	339	900	1,410	1,040	260	1,210	695	1,210	216	392	134
10	119	291	744	1,090	2,540	258	1,160	623	1,410	234	1,000	128
11	113	267	1,480	1,410	1,720	252	951	659	1,160	224	1,510	124
12	107	258	1,540	2,220	1,260	247	850	763	1,160	204	534	118
13	103	271	6,230	1,660	977	239	778	810	1,160	186	378	113
14	100	248	5,830	1,360	794	234	680	710	866	190	322	111
15	98	223	2,990	1,210	680	242	617	666	666	177	330	107
16	115	205	3,910	1,160	590	266	604	1,020	659	186	336	104
17	130	185	3,090	1,490	534	304	782	960	732	192	336	102
18	115	171	7,170	2,400	478	671	604	1,020	552	186	448	98
19	107	164		1,510	430	522	725	977	564	172	810	97
20	105	156		1,120	397	494	1,160	1,040	604	177	528	94
21	109	358	2,700	925	375	571	1,460	875	666	199	397	90
22	119	343		794	361	1,240	1,410	770	637	183	448	89
23	109	a323		778	371	1,020	1,110	763	617	166	494	87
24	144	a304	1,360	2,660	355	2,200	1,090	695	504	159	336	87
25	376	284	1,060	2,000	339	2,160	858	652	434	157	333	84
26	612	267	1,680	1,310	355	1,360	740	604	408	222	304	80
27	476	297	5,440	1,040	336	1,010	702	577	378	239	277	79
28	368	674	a5,700	1,040	322	925	770	680	349	219	268	80
29	284	505	a7,000	1,040	.....	968	900	900	302	195	242	80
30	235	952	3,920	826	.....	1,210	942	1,060	307	174	224	83
31	205	.....	4,460	688	.....	1,120	.....	1,160	.....	157	214	.....

a Estimated.

NOTE.—Braced figure shows mean discharge for period indicated, based on flow of Middle and South forks.

Monthly discharge of North Fork of Snoqualmie River near North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	612	98	195	1.91	2.20	12,000
November	1,110	156	393	3.85	4.30	23,400
December	7,170	476	2,670	26.2	30.21	164,000
January	3,590	688	1,600	15.7	18.10	98,400
February	2,540	322	861	8.44	8.79	47,800
March	2,200	234	652	6.39	7.37	40,100
April	1,460	443	825	8.09	9.03	49,100
May	1,510	577	871	8.54	9.85	53,600
June	1,410	302	755	7.40	8.26	44,900
July	307	157	208	2.04	2.35	12,800
August	1,510	153	389	3.81	4.39	23,900
September	199	79	115	1.13	1.26	6,840
The year	7,170	79	797	7.81	106.11	577,000

SOUTH FORK OF SNOQUALMIE RIVER AT NORTH BEND, WASH.

LOCATION.—In SE. ¼ sec. 9, T. 23 N., R. 8 E., at Cooper ranch, half a mile south of North Bend, King County, and 3½ 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, 1918. All records prior to October 1, 1915, published in Water-Supply Paper 412.

GAGE.—Friez water-stage recorder on left bank at Cooper ranch, installed October 2, 1916; inspected by E. H. Robinson. Previous gages as follows: July 6, 1907, to August 31, 1912, vertical staff at Northern Pacific Railway bridge 2½ miles above mouth; September 1, 1912, to October 1, 1916, Fuller and Friez water-stage recorders at same site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 145 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting at extremely high stages. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 10.76 feet at 9 a. m. December 18 (discharge, 5,400 second-feet); minimum stage 1.65 feet at 6 a. m. September 29 (discharge, 88 second-feet).

1907–1918: 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).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18. Rating curves well defined below 3,000 second-feet; extended above. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Partial clogging of intake pipe after December 18, caused lag of water stage in well behind that in river. This caused slight uncertainty in daily records for periods of rapidly changing stage, but had little or no effect on monthly records. Records good.

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

Discharge measurements of South Fork of Snoqualmie River at North Bend, Wash., during year ending Sept. 30, 1918.

Date.	Made by—	Gage height (river gage).	Discharge.	Date.	Made by—	Gage height (river gage).	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 15	E. H. Robinson	1.28	94	Apr. 1	E. H. Robinson	3.88	841
22	do	1.30	95	3	do	3.44	655
Jan. 2	Parker and Robinson	6.01	2,010	Sept. 14	Parker and Calkins	1.77	108
3	G. L. Parker	5.09	1,500	17	Calkins and Parker	1.73	103
19	E. H. Robinson	4.20	1,020				

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	124	138	377	3,550	660	439	863	863	748	336	145	128
2	126	138	341	1,950	638	428	748	936	638	326	185	180
3	165	258	353	1,600	617	425	660	1,080	576	307	160	170
4	145	494	594	1,290	725	417	617	1,240	617	292	137	162
5	128	332	494	1,830	1,140	403	596	1,040	793	292	137	154
6	118	295	478	1,540	1,240	389	576	840	960	282	137	150
7	114	254	430	1,830	1,270	376	576	748	1,040	276	140	142
8	109	220	377	1,490	1,010	376	617	725	960	273	147	137
9	107	196	441	1,160	887	372	770	660	911	267	226	130
10	105	184	462	960	1,410	369	936	596	1,010	288	346	124
11	105	172	746	1,040	1,240	359	887	617	911	276	439	119
12	100	174	1,160	1,540	1,040	356	816	703	887	249	307	115
13	98	196	3,540	1,240	887	346	770	770	936	232	246	109
14	96	174	4,560	1,080	793	336	748	770	770	229	212	109
15	94	163	2,740	1,010	725	346	703	725	638	226	223	107
16	94	158	2,740	960	660	362	660	748	596	240	221	106
17	96	147	3,070	936	638	396	681	748	660	232	212	104
18	93	143	5,100	1,190	596	511	638	770	576	232	243	102
19	91	138	3,590	1,010	555	503	660	748	555	221	476	102
20	91	138	1,910	863	511	515	793	770	576	215	410	100
21	93	206	1,410	748	480	576	1,010	703	596	215	320	100
22	94	226	2,980	703	458	863	1,110	660	617	199	326	100
23	91	184	2,070	681	472	863	1,010	638	596	191	343	96
24	100	165	1,300	1,310	439	1,110	985	617	535	178	307	96
25	156	163	1,040	1,390	425	1,190	840	576	484	170	276	94
26	249	156	1,090	1,040	472	985	770	555	446	172	249	93
27	223	161	3,730	887	454	840	748	555	393	175	229	91
28	218	236	4,320	911	428	793	770	617	383	160	221	90
29	168	238	4,920	985	.....	793	840	793	349	154	210	90
30	141	452	3,760	816	.....	911	887	911	343	147	202	94
31	138	.....	3,280	703	.....	936	.....	936	.....	140	193	.....

Monthly discharge of South Fork of Snoqualmie River at North Bend, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	249	91	125	1.49	1.72	7,690
November	494	138	210	2.50	2.79	12,500
December	5,100	341	2,050	24.4	28.13	126,000
January	3,550	681	1,250	14.9	17.18	76,900
February	1,410	425	745	8.87	9.24	41,400
March	1,190	336	577	6.87	7.92	35,500
April	1,110	576	776	9.24	10.31	46,200
May	1,240	555	763	9.08	10.47	46,900
June	1,040	343	670	7.98	8.90	39,900
July	336	140	232	2.76	3.18	14,300
August	476	137	246	2.93	3.38	15,100
September	128	90	118	1.40	1.56	7,020
The year	5,100	90	648	7.71	104.78	469,000

STILAGUAMISH RIVER BASIN.

DEER CREEK AT OSO, WASH.

LOCATION.—In sec. 5, T. 32 N., R. 7 W., 1¼ miles above junction with North Fork of Stilaguamish River and 1¼ miles from Oso, Snohomish County.

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

RECORDS AVAILABLE.—August 11, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank about 250 feet below mouth of 3-mile steep rock canyon; inspected successively by H. H. Tinker, H. E. Holmstad, C. L. Kamm, Z. Almy, and W. A. Palmer. Gage datum lowered 0.50 foot on August 13, 1918.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at Oso, 1¼ miles downstream.

CHANNNEL AND CONTROL.—Bed composed of boulders and gravel overlying bedrock. Control practically permanent. Banks high. One channel at all stages. Stage of zero flow, -0.2 ± 0.1 foot, determined September 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage during period of records, 10.05 feet December 18, 1917, from high-water mark in well (discharge, 9,300 second-feet); minimum stage recorded, 0.59 foot at 6 p. m. September 29, 1918 (discharge, 30 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage-height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for extreme high water and for periods when water-stage recorder was not operating.

COOPERATION.—Station maintained in cooperation with Western Power Co.

Discharge measurements of Deer Creek at Oso, Wash., during the period Aug. 4, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Aug. 4	John McCombs	1.08	153	Apr. 27	J. E. Stewart	2.04	404
12	do	.77	106	28	do	2.21	463
Oct. 1	G. L. Parker	.89	109	May 15	Lasley Lee	2.13	408
Nov. 13	Lasley Lee	1.25	182	23	do	1.95	398
Dec. 22	T. R. Newell	4.47	1,990	June 6	J. E. Stewart	2.67	668
24	do	2.23	531	7	do	2.40	554
Jan. 4	do	4.13	1,590	Aug. 13	Lee and Calkins	1.57	142
5	do	4.09	1,610	14	Calkins and Lee	1.46	126
9	do	3.07	890	Sept. 12	T. G. Bedford	.76	41
29	do	2.29	544	12	do	.76	45
Mar. 7	do	.88	118	14	do	.74	42

NOTE.—Gage datum lowered 0.50 foot on Aug. 13, 1918.

Daily discharge, in second-feet, of Deer Creek at Oso, Wash., for the period Aug. 11, 1917, to Sept. 30, 1918.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1917.			1917.			1917.		
1		53	11	98	189	21	98	51
2		52	12	98	114	22	79	51
3		51	13	97	122	23	73	49
4		50	14	93	96	24	69	48
5		49	15	89	79	25	66	72
6		54	16	87	70	26	62	591
7		69	17	83	63	27	60	418
8		60	18	79	58	28	59	518
9		59	19	77	56	29	57	216
10		63	20	111	53	30	56	137
						31	54	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	118	176	434	2,440	373		520	606	500	117	65	73
2	605	344	356	1,170	345		399	752	634	108	75	67
3	372	2,540	418	2,450	580		334	948	447	97	55	63
4	227	1,360	677	1,910	2,200		281	840	471	89	41	60
5	161	732	344	1,530	1,850	155	279	656	532	88	37	56
6	128	628	338	2,410	2,050		272	510	639	83	37	54
7	111	396	266	1,710	1,510		331	529	623	81	41	51
8	98	293	349	1,040	726	111	538	490	554	77	67	50
9	89	230	1,160	859	1,020	106	1,100	434	589	78	108	49
10	83	200	568	612	1,900	104	829	422	827	130	874	48
11	77	180	1,300	670	817	106	611	473	551	123	549	46
12	74	200	703	1,770	612	138	554	499	514	82	230	44
13	69	182	5,150	892	462	117	511	497	495	70	159	43
14	66	153		837	359	112	438	450	422	70	125	42
15	64	137		749	309	140	403	466	315	64	162	41
16	67	123		622	275	189	419	535	302	63	155	40
17	66	116		1,830	253	381	411	530	305	61	131	39
18	61	108	3,550	1,940	237	1,250	327	831	240	59	304	38
19	58	104		882	222	508	449	991	237	58	290	37
20	57	192		589	205	648	861	873	245	220	173	37
21	64	386		474	186	1,250	925	589	250	168	133	36
22	61	198		480		2,510	802	450	250	89	491	37
23	59	159	824	661		930	696	408	230	74	380	37
24	178	145	533	1,960		3,040	656	331	195	65	217	37
25	439	232	422	852	180	1,930	499	312	163	66	159	36
26	359	155	923	546		870	442	302	163	398	131	35
27	1,030	514	3,440	452		634	450	338	153	172	112	34
28	312	1,020	3,850	722		702	494	476	133	111	99	33
29	198	438	4,620	546	.....	708	600	526	120	87	90	31
30	163	606		426	.....	850	623	783	120	75	84	34
31	159	.....	3,880	396	.....	726	.....	640	.....	68	78	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, based on flow of Sultan River.

Monthly discharge of Deer Creek at Oso, Wash., for the period Aug. 11, 1917, to Sept. 30, 1918.

[Drainage area, 84 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1917.						
August 11–31	111	54	78.3	0.932	0.73	3,260
September	591	49	120	1.43	1.60	7,140
The period						10,400
1917–18.						
October	1,030	57	183	2.18	2.51	11,300
November	2,540	104	408	4.86	5.42	24,300
December		266	2,170	25.8	29.74	133,000
January	2,450	396	1,110	13.2	15.22	68,200
February	2,200		634	7.55	7.86	35,200
March	3,040	104	618	7.36	8.48	38,000
April	1,100	272	535	6.37	7.11	31,800
May	901	302	564	6.71	7.74	34,700
June	827	120	374	4.45	4.96	22,300
July	398	58	103	1.23	1.42	6,330
August	874	37	182	2.17	2.50	11,200
September	73	31	44.3	.527	.59	2,640
The year		31	579	6.89	93.55	419,000

SKAGIT RIVER BASIN.

SKAGIT RIVER AT REFLECTOR BAR, NEAR MARBLEMOUNT, WASH.

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

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 6, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, 75 feet below mouth of Canyon Diablo, installed April 13, 1914; inspected by Thomas Thompson, F. E. Davis, Glee Davis, and Mrs. L. J. Davis. Prior to April 13, 1914, inclined staff at same site but at datum 2.00 feet higher.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control 200 feet below gage composed of large boulders, gravel, and sand; may shift during floods. One channel at all stages. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 12.0 feet at 6.30 p. m. December 29 (discharge, 37,300 second-feet); minimum stage from recorder, 1.84 feet at 2 p. m. October 31 (discharge, 786 second-feet).

1913–1918: Maximum stage same as above; minimum stage recorded, 1.74 feet from 1 to 10 a. m. January 28, 1915 (discharge, 707 second-feet). Hydrographic comparison with flow of Sauk River at Darrington, Baker River near Concrete, and Skagit River near Sedro Woolley, and study of weather records indicate that discharge may have been 700 second-feet January 12, 13, and 31, 1916.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood on December 29. Rating curves well defined. Operation of water-stage recorder not entirely satisfactory, but good during critical periods. Gage-height record somewhat uncertain owing to partial clogging of intake pipe. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

COOPERATION.—Station maintained in cooperation with United States Forest Service and Skagit Power Co. until about July 1, 1918, since which date the city engineer of Seattle has furnished gage-height record.

Discharge measurements of Skagit River at Reflector Bar, near Marblemount, Wash., during the year ending Sept. 30, 1918.

[Made by J. E. Stewart.]

Date.	Gage height.[a]	Discharge.
	Feet.	*Sec.-ft.*
May 1	5.81	9,420
2	6.00	10,000
June 13	8.92	22,300
14	8.71	21,000
14	8.09	18,200
15	7.07	14,100
15	6.84	13,000

[a] Outside gage.

Daily discharge, in second-feet, of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,620	917	1,480	31,200	2,200	1,620		9,380	9,380	8,140	5,300	3,320
2	3,130	956	1,430	24,900	2,180	1,550	3,110	10,000	8,140	7,850	5,560	2,700
3	4,020	2,730	1,380	17,900	2,490	1,560		11,400	7,000	7,000	4,570	2,470
4	3,590	2,630	1,330	14,100	2,800	1,530		13,300	7,280	6,600	3,990	2,430
5	3,160	2,290	1,280	11,400	3,110	1,460	3,110	11,800	7,850	6,600	3,880	2,510
6	2,720	2,120	1,230	10,400	3,110	1,420	3,110	10,000	10,000	6,200	3,990	2,600
7	2,290	1,780	1,180	10,000	3,110	1,430	3,220	8,750	13,700	6,600	3,880	2,600
8	1,860	1,600	1,130	8,750	3,370	1,420	3,430	7,850	15,800	7,000	3,880	2,600
9	1,810	1,460	1,140	7,560	3,620	1,400	7,000	7,280	16,600	8,140	3,650	2,800
10	1,690	1,370	1,120	6,730	3,880	1,350	5,430	6,730	21,500	9,380	3,650	2,800
11	1,600	1,340	1,160	6,200	3,650	1,300	5,080	7,000	20,200	7,280	4,220	2,700
12	1,570	1,340	1,130	5,810	3,430	1,270	5,810	7,850	18,800	6,330	3,650	2,800
13	1,450	1,300	1,400	5,300	3,110	1,240	5,430	9,380	21,800	6,070	3,650	2,700
14	1,520	1,220	2,900	4,690	2,900	1,200	5,060	10,400	20,100	6,600	3,760	2,600
15	1,390	1,140	3,180	4,570	2,700	1,160	4,570	11,800	14,500	8,440	4,100	2,600
16	1,210	1,100	5,540	4,220	2,510	1,150	4,340	11,100	11,800	8,750	3,760	2,510
17	1,080	1,040	4,970	4,100	2,430	1,220	3,990	10,000	12,600	8,750	3,430	2,700
18	1,030	1,030	9,650	4,690	2,180	1,560	3,760	9,060	12,200	8,750	3,650	2,700
19	987	1,020	8,630	4,340	2,000	1,560	3,650	8,140	11,400	8,140	3,430	2,900
20	946	2,260	5,500	4,100	1,920	1,630	5,060	7,280	11,400	6,860	3,000	2,800
21	1,180	4,970	4,140	3,760	1,910	1,780	7,000	6,460	13,300	5,940	3,320	2,450
22	1,040	3,800	3,480		1,870	2,600	7,560	6,070	14,900	5,300	3,430	2,210
23	1,020	2,900	2,900		1,910	2,700	7,560	5,680	14,100	5,300	3,650	1,870
24	997	2,290	2,460		1,800	3,110	7,850	5,300	12,200	5,180	3,650	1,720
25	926	2,040	2,290		1,750	3,760	7,280	4,930	10,400	4,930	3,430	1,680
26	907	1,780	2,210	3,000	1,720	3,540	6,600	4,810	10,000	4,570	3,430	1,640
27	898	1,740	2,720		1,630	3,320	6,460	4,810	9,710	4,570	3,000	1,600
28	840	1,840	5,780		1,620	3,110	6,600	5,430	8,440	4,690	2,690	1,560
29	840	1,660	27,200		.....		7,560	7,280	7,560	5,060	2,800	1,520
30	813	1,620	24,400		.....	3,110	8,440	9,710	7,850	5,060	3,000	2,400
31	822	.....	23,500	2,230	.....		.....	10,700	.....	5,180	3,430	.....

NOTE.—Gage-height record incorrect for following periods for which discharge was interpolated or estimated from partial gage-height record and weather records, Oct. 4–7, Dec. 2–7, Jan. 22 to Feb. 10, Mar. 29 to Apr. 4, and Sept. 25–30.

Braced figures show mean discharge for periods indicated.

Monthly discharge of Skagit River at Reflector Bar, near Marblemount, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,020	813	1,580	97,200
November	4,970	917	1,840	109,000
December	27,200	1,120	5,090	313,000
January	31,200	2,230	7,220	444,000
February	3,880	1,620	2,530	141,000
March	3,760	1,150	1,980	122,000
April	8,440	3,110	5,270	314,000
May	13,300	4,810	8,380	515,000
June	21,800	7,000	12,700	756,000
July	9,380	4,570	6,620	407,000
August	5,560	2,600	3,700	228,000
September	3,320	1,520	2,420	144,000
The year	31,200	813	4,960	3,590,000

SKAGIT RIVER NEAR SEDRO WOOLLEY, WASH.

LOCATION.—In 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 Skagit County, 21 miles above mouth and 32 miles below Baker River.

DRAINAGE AREA.—2,930 square miles (measured on General Land Office and British Columbia maps).

RECORDS AVAILABLE.—May 1, 1908, to September 30, 1918.

GAGE.—Chain gage on railway bridge, installed September 27, 1916; read by E. J. Woods. Prior to September 27, 1916, vertical staff on upstream draw guard of railway bridge and temporary vertical staff, installed September 25, 1915, used when stage was below 37 feet, on downstream side of group of piles, 50 feet above third concrete pier of railway bridge from left bank; at same datum. Zero of gage set at elevation of extreme low water in Puget Sound.

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 floods.

EXTREMES OF DISCHARGE.—Maximum stage during year determined from high-water marks 54.9 feet at 4.30 a. m. December 30 (discharge, 151,000 second-feet); minimum stage recorded, 32.70 feet October 21 (discharge, 4,230 second-feet).

1908–1918: Maximum stage recorded same as above; discharge probably greater November 30, 1909, rating curve not well defined; minimum stage recorded, 32.3 feet September 29–30 and October 10–11, 1915 (discharge, 2,740 second-feet).

ICE.—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 at each visit and added to flow measured in main channel.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 19, January 3 to February 7, June 8, and July 19 to August 8. Rating curves fairly well defined. Gage read once daily to hundredths. Practically no diurnal fluctuation. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used, January 3 to February 7 and July 19 to August 8. Records good.

Discharge measurements of Skagit River near Sedro Woolley, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 23	T. R. Newell	39.20	27,500	Jan. 11	T. R. Newell	39.22	24,000
26	do	37.02	17,000	Mar. 9	do	34.04	6,460
Jan. 2	do	48.24	88,800	Apr. 30	J. E. Stewart	38.64	23,400
3	do	45.25	64,100	June 18	do	40.20	33,700

Daily discharge, in second-feet, of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,680	5,200	10,100	112,000	11,800	7,680	17,300	23,100	26,500	28,500	16,100	11,400
2	7,680	6,270	9,180	91,900	11,100	7,680	14,900	25,000	22,200	29,000	17,300	11,100
3	19,500	12,400	8,570	64,600	11,100	7,390	13,500	29,000	18,600	26,500	16,500	9,810
4	17,300	29,500	9,180	53,900	15,800	7,390	12,400	37,100	17,300	23,600	13,800	9,180
5	13,500	17,300	9,180	49,800	24,000	7,100	11,800	35,400	19,000	23,600	12,800	8,570
6	11,100	18,900	8,570	41,900	21,800	6,820	11,400	29,000	23,600	23,100	12,800	8,870
7	9,810	12,800	7,970	50,500	25,500	6,540	11,400	25,000	33,200	23,600	12,400	8,870
8	8,570	10,800	7,680	39,500	20,000	6,540	11,400	22,600	41,300	24,500	12,100	8,570
9	7,680	8,870	8,570	33,200	17,300	6,540	14,900	20,400	41,300	27,500	12,800	9,180
10	7,680	8,270	9,490	27,500	22,200	6,270	20,000	18,600	48,500	32,700	12,400	9,490
11	7,390	7,100	9,490	24,000	23,600	6,000	19,500	19,000	61,000	29,000	18,200	9,490
12	7,100	7,100	9,810	25,500	20,000	6,270	18,200	20,000	52,600	23,100	15,700	9,180
13	6,540	7,680	12,400	24,000	17,300	6,000	17,700	22,200	54,700	20,800	13,100	9,490
14	6,270	6,820	52,600	21,800	14,900	6,000	16,100	24,500	57,500	20,800	12,400	8,870
15	6,540	6,820	43,100	21,800	13,500	5,730	14,600	26,000	45,500	24,500	12,400	9,180
16	6,000	5,730	66,200	19,000	12,400	5,730	13,500	28,000	35,400	30,000	13,800	8,870
17	5,460	5,460	61,700	17,700	11,800	6,540	12,800	25,500	36,600	30,000	11,800	8,570
18	4,950	4,950	50,500	32,700	11,100	10,400	11,800	24,000	34,400	30,000	11,400	8,570
19	4,700	5,200	102,000	26,000	10,100	10,400	11,400	22,200	33,200	28,500	16,100	8,270
20	4,460	4,950	56,100	21,300	9,490	10,400	13,500	21,300	33,800	24,000	12,800	9,180
21	4,230	26,500	32,700	18,600	9,180	11,400	20,000	19,000	38,900	23,600	11,400	8,570
22	5,200	19,500	29,500	16,900	8,870	19,600	23,600	16,900	46,700	18,600	11,400	7,680
23	4,460	14,200	27,500	16,500	8,870	20,000	23,100	15,700	45,500	17,700	13,800	7,390
24	4,460	10,800	22,200	17,700	8,870	20,400	22,600	14,900	40,700	17,700	13,800	6,540
25	4,950	9,810	18,600	20,400	8,270	30,500	22,200	13,800	35,400	16,900	12,800	6,270
26	5,730	8,570	17,300	17,300	8,570	23,600	19,500	13,500	32,700	17,700	12,400	6,000
27	6,540	7,680	27,500	15,300	8,270	18,200	18,200	13,100	32,700	17,300	11,400	6,540
28	6,000	11,800	58,900	14,900	7,680	16,100	17,700	13,800	30,000	16,100	10,400	7,100
29	4,460	10,800	85,400	15,700	.....	15,300	19,000	17,700	26,500	16,100	9,810	7,680
30	4,700	10,400	140,000	13,500	.....	15,700	22,600	20,800	26,500	16,500	10,100	7,680
31	4,460	.....	84,600	12,400	.....	18,200	.....	31,000	.....	16,100	10,800	.....

Monthly discharge of Skagit River near Sedro Woolley, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 2,930 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	19,500	4,230	7,260	2.48	2.86	446,000
November	29,500	4,950	10,700	3.65	4.07	637,000
December	140,000	7,680	35,400	12.1	13.95	2,180,000
January	112,000	12,400	31,700	10.8	12.45	1,950,000
February	25,500	7,680	14,000	4.78	4.98	778,000
March	30,500	5,730	11,300	3.86	4.45	695,000
April	23,600	11,400	16,600	5.67	6.33	988,000
May	37,100	13,100	22,200	7.58	8.74	1,360,000
June	61,000	17,300	36,400	12.4	13.83	2,170,000
July	32,700	16,100	23,100	7.88	9.08	1,420,000
August	17,300	9,810	13,100	4.47	5.15	806,000
September	11,400	6,000	8,540	2.91	3.25	508,000
The year	140,000	4,230	19,200	6.55	89.14	13,900,000

NORTH FORK OF SAUK RIVER NEAR BARLOW PASS, WASH.

LOCATION.—In sec. 14, T. 30 N., R. 11 E., 500 feet below dam site, 2¼ miles above confluence with South Fork, and 7 miles northeast of Barlow Pass, Snohomish County.

DRAINAGE AREA.—76 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Vertical staff on right bank, October 1 to 8, and January 22 to September 1; on left bank, opposite, September 2 to 30. Stevens continuous water-stage recorder on right bank at same site as staff gage, October 9 to December 29, destroyed by floods and record after December 22 lost. All gages referred to same datum; staff gage read by H. W. Twa; recorder inspected by Nicolai Aall.

DISCHARGE MEASUREMENTS.—Made by wading near cable or from cable one-third mile above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; banks high; one channel at all stages. Principal control composed of boulders about 50 feet below gage; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during the year, as determined by leveling to high-water mark, 14.0 feet on December 29 (discharge, 11,000 second-feet); minimum stage recorded, 1.00 foot, probably on October 20 (discharge, 75 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed often during the fall of year and during flood of June 13, permanent for remainder of year. Rating curves well defined between 100 and 2,500 second-feet; extended to 11,000 second-feet by study of flood-peak discharge at all stations on Sauk and Skagit rivers. October 1 to 8, staff gage read twice daily to hundredths. Water-stage recorder in operation October 9 to December 22. Staff gage read three times daily to hundredths January 22 to September 30. Daily discharge ascertained by applying mean daily gage height to rating table. Records good, January 22 to September 30; fair for remainder of year.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

Discharge measurements of North Fork of Sauk River near Barlow Pass, Wash., during the period Sept. 30, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 30	Parker and Lee	1.70	150	Apr. 3	Nicolai Aall	2.93	344
Nov. 8	Lee and Aall	2.30	212	22	do	5.25	867
8	Aall and Lee	2.29	211	30	do	5.43	888
Dec. 8	Nicolai Aall	1.47	179	May 9	do	4.70	706
14	do	6.10	1,190	20	Lee and Aall	4.45	643
Jan. 17	do	.....	598	20	Aall and Lee	4.45	644
29	do	2.78	342	June 2	Nicolai Aall	4.65	694
Feb. 19	do	2.07	214	6	Aall and Twa	6.97	1,380
Mar. 2	do	1.60	144	9	Nicolai Aall	8.20	2,180
14	do	1.27	111	29	do	5.47	860
29	do	3.08	375	July 13	do	4.25	574

NOTE.—Gage heights corrected to datum established Oct. 9, 1918.

Daily discharge, in second-feet, of North Fork of Sauk River near Barlow Pass., Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	165	140	260		292	155	422	952	839	1,040	399	240
2	292		229		284	148	386	1,070	706	945	456	210
3	284		222	1,600	292	147	350	1,270	634	827	354	203
4	244		236		395	141	334	1,580	758	800	311	196
5	207	350	207		450	134	316	1,270	952	800	302	196
6	168		200		498	125	316	1,010	1,350	773	320	196
7	161		186		431	126	325	923	1,860	800	302	196
8	154		180	1,000	377	127	377	785	1,800	855	311	182
9	144	186			359	123	590	706	2,050	975	328	203
10	138	180			395	121	612	681	2,580	1,040	390	189
11	129	180	510		377	117	612	839	2,120	648	428	196
12	125	193			342	114	612	839	2,050	602	328	196
13	122	173		600	316	110	508	895	2,500	558	302	189
14	121	154			292	110	488	1,040	1,980	696	302	189
15	105	138	975		276	112	450	981	1,380	885	336	189
16	108	125	1,700		260	116	413	895	1,300	855	286	189
17	101	117	1,300		244	129	377	839	1,480	885	270	189
18	94	110	3,220		229	200	368	785	1,260	800	381	176
19		103	2,250	600	214	168	386	706	1,260	648	336	182
20		268	1,210		193	186	590	634	1,380	526	286	176
21	80	525	868		186	222	785	569	1,740	456	286	157
22		377	1,200	440	186	395	867	548	1,860	428	345	140
23		316		413	193	334	895	528	1,630	428	294	125
24		284		508	173	342	923	488	1,430	428	262	115
25		284	690	431	172	548	785	460	1,260	418	262	112
26	110	236		395	169	634	706	460	1,260	456	262	114
27		252		377	161	488	681	498	1,140	399	232	127
28		300		368	156	413	706	590	975	399	210	143
29	95	260	3,950	334	.....	377	839	812	885	399	210	151
30	88	276		316	.....	450	923	1,070	945	399	232	176
31	102	.....		292	.....	478	.....	1,040	.....	390	240	.....

NOTE.—Braced figures show mean discharge for periods indicated; for October and November based on range of stage, and for remaining periods based on comparison with flow of Sauk River.

Monthly discharge of North Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 76 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	292	.....	132	1.74	2.01	8,120
November	525	103	254	3.34	3.73	15,100
December	.....	180	1,290	17.0	19.60	79,300
January	.....	292	757	9.96	11.48	46,500
February	498	156	283	3.72	3.87	15,700
March	634	110	238	3.13	3.61	14,600
April	923	316	565	7.43	8.29	33,600
May	1,580	460	831	10.9	12.57	51,100
June	2,580	634	1,450	19.1	21.31	86,300
July	1,040	390	663	8.72	10.05	40,800
August	456	210	308	4.05	4.67	18,900
September	240	112	175	2.30	2.57	10,400
The year	.....	.....	581	7.64	103.76	420,000

SAUK RIVER ABOVE WHITECHUCK RIVER, NEAR DARRINGTON, WASH.

LOCATION.—In NW. ¼ sec. 24, T. 31 N., R. 10 E., half a mile above Whitechuck River and 9½ miles southeast of Darrington, Snohomish County.

DRAINAGE AREA.—152 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 29 to November 17, 1910 (fragmentary). October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by Nicolai Aall. Gage used in 1910 was inclined staff on left bank one-eighth mile above Whitechuck River.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 75 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting. Principal control about 150 feet below gage; shifted during high water. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 13.3 feet at 8 a. m. December 29 (discharge, 21,000 second-feet); minimum discharge estimated as 220 second-feet on September 25, when recorder was not in operation.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 5 to 20. Rating curve used October 1 to February 4 well defined below 2,500 second-feet; extended to 21,000 second-feet by form of later curve and by study of flood-peak discharge at all stations on Sauk and Skagit rivers. Rating curve used February 21 to September 30, well defined below 4,000 second-feet. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. From March 25 to June 14 intake partly clogged. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals; shifting-control method used February 5 to 20. Records good except for periods estimated and days of extreme high water, for which they are fair.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

Discharge measurements of Sauk River above Whitechuck River, near Darrington, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Lasley Lee	2.10	268	May 16	Nicolai Aall	4.07	1,610
Nov. 7	Lee and Aall	2.83	637	17	Lasley Lee	4.01	1,500
Jan. 11	Nicolai Aall	4.01	1,670	27	Nicolai Aall	3.44	919
Feb. 24	do	2.82	466	June 8	do	5.12	3,070
Mar. 11	do	2.57	307	28	do	4.09	1,620
27	do	3.66	1,120	July 5	do	3.88	1,390
Apr. 8	do	3.36	870	Aug. 10	do	3.55	987
27	do	3.84	1,390				

Daily discharge, in second-feet, of Sauk River above Whitechuck River, near Darrington, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		388	500	7,380	848	408	1,120		1,860	1,790	784	496
2		392	447	4,420	825	414	970		1,520	1,720	1,010	451
3		1,390	458	3,770	848	408	856		1,320	1,500	705	396
4		1,330	600	4,110	1,410	378	816		1,210	1,390	611	373
5	670	825	484	3,770	2,000	373	776	2,100	1,520	1,430	569	
6		871	463	3,520	1,930	356	760		2,140	1,400	576	
7		650	407	3,280	1,860	338	768		3,130	1,440	569	340
8		546	383	2,720	1,360	333	824		3,130	1,560	569	
9		479	484	2,200	1,190	327	1,320	1,330	3,050	1,790	625	
10		432	479	1,790	2,000	322	3,130	1,270	3,790	2,000	952	
11	390	417	678	1,720	1,580	317	1,570	1,300	3,450	1,300	1,010	
12		432	638	1,920	1,280	322	1,460	1,460	3,050	1,140	720	
13		417	2,580	1,660	1,040	317	1,320	1,720	3,450	1,050	618	
14		374	5,020	1,540	889	311	1,160	1,860	3,130	1,260	590	330
15		351	3,320	1,430	800	322	1,050	1,790	2,360	1,530	625	
16		321	5,620	1,330	736	361	961	1,650	2,210	1,580	604	
17		304	4,110	1,660	668	414	925	1,540	2,580	1,630	563	
18	330	284	11,600	2,580	632	683	848	1,460	2,070	1,530	752	
19		272	6,050	1,360	576	590	824	1,360	2,070	1,300	872	
20		550	3,280	1,480	536	668	1,060	1,290	2,360	1,040	661	300
21		958	2,350	1,280	503	800	1,720	1,190	2,890	934	604	
22	249	638	3,910	1,200	483	1,480	1,930	1,080	2,970	824	600	
23	230	511	2,650	1,150	490	1,170	1,860	1,040	2,810	800	713	
24	272	442	1,920	1,540	464	2,000	1,860	1,000	2,510	784	653	
25	347	432	1,540	1,380	451	2,210	1,660	952	2,210	776	590	
26	484	379	1,710	1,200	464	1,560	1,450	925	2,070	816	563	250
27	447	432	6,020	1,080	433	1,160	1,330	916	2,000	792	509	
28	369	594	8,000	1,100	421	1,010	1,340	1,000	1,720	744	458	
29	317	484	17,400	1,060	.....	970	1,550	1,500	1,560	760	439	306
30	300	540	7,810	966	.....	1,110		1,930	1,660	784	451	338
31	292	.....	7,950	871	.....	1,250	.....	2,280	.....	720	483	.....

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at near-by stations.

Monthly discharge of Sauk River above Whitechuck River, near Darrington, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	.....	421	2.77	3.19	25,900
November	1,330	272	545	3.59	4.00	32,400
December	17,400	383	3,510	23.1	26.63	216,000
January	7,380	871	2,160	14.2	16.37	133,000
February	2,000	421	954	6.28	6.54	53,000
March	2,210	311	732	4.82	5.56	45,000
April	3,130	760	1,290	8.49	9.47	76,800
May	.....	916	1,570	10.3	11.87	96,500
June	3,790	1,210	2,390	15.7	17.52	142,000
July	2,000	720	1,230	8.09	9.33	75,600
August	1,010	439	650	4.28	4.93	40,000
September	496	.....	323	2.12	2.36	19,200
The year	17,400	.....	1,320	8.68	117.77	955,000

SAUK RIVER AT DARRINGTON, WASH.

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

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

RECORDS AVAILABLE.—June 15, 1914, to September 30, 1918.

GAGE.—Vertical and inclined staff on left bank; installed January 7, 1918; read by Paul Schmidt. Previous gage, vertical staff at same site and datum; washed out December 17, 1917.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension bridge 700 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders; shifting during high water. No well-defined control. Left bank at gage high and not subject to overflow; right bank flat and subject to overflow at extremely high stages. Stage of zero flow, estimated September 13, 1918, as −1.2 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, determined by levels to high-water mark 15.0 feet at 9 a. m. December 29 (discharge, 36,000 second-feet); minimum stage recorded, 1.02 feet October 23 (discharge, 400 second-feet).

1914–1918: Maximum stage same as above; minimum stage recorded, 0.78 foot September 28–29, 1915 (discharge, 340 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during December floods. Rating curve used October 1 to December 17 well defined below 9,000 second-feet; curve used December 29 to September 30 well defined below 10,000 second-feet and extended to 50,000 second-feet by study of all known floods in the Skagit River basin. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent, except for periods estimated, for which they are fair.

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

Discharge measurements of Sauk River at Darrington, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	Lasley Lee	1.76	709	May 22	Lasley Lee	3.40	1,790
12	do	1.78	718	23	do	3.49	1,910
Jan. 8	T. R. Newell	5.17	4,570	June 7	J. E. Stewart	5.67	5,320
28	do	3.63	2,010	8	do	5.44	4,960
Mar. 6	do	1.96	648	9	do	5.54	5,120
Apr. 27	J. E. Stewart	3.79	2,200	10	do	6.41	6,990
29	do	4.06	2,610	Aug. 12	Lee and Calkins	2.78	1,220
May 16	Lasley Lee	4.05	2,590	Sept. 13	T. G. Bedford	2.00	696

Daily discharge, in second-feet, of Sauk River at Darrington, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	690	595	1,180		1,000	740	1,920	3,080	2,510	3,240	1,710	795
2	1,110	1,040	850		1,610	725	1,710	3,570	2,260	2,780	1,610	828
3	1,500	4,280	850		2,640	710	1,510	4,280	1,920	2,260	1,240	828
4	1,110	2,250	850	11,500	5,260	695	1,420	4,470	2,380	2,510	1,160	795
5	850	2,120	910		5,060	680	1,330	3,570	3,080	2,260	1,160	765
6	740	1,500	850		4,660	655	1,240	2,930	5,060	2,380	1,160	735
7	690	1,180	790	5,060	3,400	655	1,510	2,510	5,260	2,510	1,160	735
8	640	1,340	740	4,280	2,780	630	1,420	2,260	4,860	2,640	1,080	735
9	595	1,420	850	3,570	3,240	630	1,510	2,140	5,680	2,780	1,160	708
10	572	1,080	975	2,930	3,740	655	1,710	2,140	6,980	2,930	1,330	690
11	572	740	1,780	2,930	2,510	630	2,380	2,260	5,260	2,140	1,610	680
12	550	740	3,830	3,240	2,260	630	2,260	2,510	5,890	1,920	1,240	680
13	550	740	8,560	2,930	1,810	605	2,030	2,780	6,100	2,030	1,240	680
14	550	640	10,400	2,640	1,610	580	2,030	2,780	4,860	3,240	1,240	828
15	530	595	5,750	2,510	1,420	605	2,260	2,780	3,740	3,240	1,330	735
16	510	550	12,600	2,780	1,240	630	2,140	2,510	3,920	2,930	1,510	708
17	510	510	7,680	3,240	1,240	860	1,810	2,510	3,740	3,400	1,810	655
18	490	550		4,100	1,160	1,080	1,810	2,510	3,240	2,780	2,140	605
19	470	470		3,240	1,080	1,610	1,810	2,260	3,740	2,030	1,610	580
20	418	1,110		2,510	930	2,140	1,810	2,260	4,660	1,510	1,160	580
21	418	1,590	9,400	2,380	860	2,640	3,080	2,140	4,100	1,610	1,330	556
22	418	1,110		2,260	845	3,400	3,080	1,810	4,860	1,420	1,510	533
23	400	850		2,140	830	3,740	3,080	1,710	4,280	1,510	1,420	533
24	435	790		2,510	815	4,280	2,780	1,610	3,920	1,510	1,240	511
25	690	740		2,380	800	4,660	2,510	1,510	3,740	1,610	1,080	489
26	740	850		1,920	785	3,240	2,260	1,610	3,570	1,610	1,000	489
27	740	975		1,710	770	2,260	2,260	1,810	3,080	1,510	930	533
28	572	1,340	15,000	2,030	755	1,810	2,260	2,140	2,640	1,610	860	680
29	530	975		1,920	.....	2,140	2,510	2,510	2,930	1,610	828	680
30	490	1,260		1,710	.....	2,030	2,780	3,740	3,240	1,420	828	605
31	510	.....		1,420	.....	2,030	.....	3,080	.....	1,510	795	.....

NOTE.—Braced figures show mean discharge for periods indicated; based on comparison of flow at other stations in basin. Daily discharge estimated Feb. 22 to Mar. 4.

Monthly discharge of Sauk River at Darrington, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 293 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,500	400	632	2.16	2.49	38,900
November	4,280	470	1,130	3.86	4.31	67,200
December	.....	740	7,430	25.4	29.28	457,000
January	.....	1,420	4,430	15.1	17.41	272,000
February	5,260	755	1,970	6.72	7.00	109,000
March	4,660	580	1,560	5.32	6.13	95,900
April	3,080	1,240	2,070	7.06	7.88	123,000
May	4,470	1,510	2,570	8.77	10.11	158,000
June	6,980	1,920	4,050	13.8	15.40	241,000
July	3,400	1,420	2,210	7.54	8.69	136,000
August	2,140	795	1,270	4.33	4.99	78,100
September	828	489	665	2.27	2.53	39,600
The year	.....	400	2,510	8.57	116.22	1,820,000

SOUTH FORK OF SAUK RIVER NEAR BARLOW PASS, WASH.

LOCATION.—In NE. ¼ sec. 27, T. 30 N., R. 11 E., 2¾ miles above confluence with North Fork and 5 miles northeast of Barlow Pass, Snohomish County.

DRAINAGE AREA.—32.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder, on right bank; inspected by Nicolai Aall.

DISCHARGE MEASUREMENTS.—Made by wading near cable or from cable 75 feet below gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Principal control 100 feet below gage; shifting during high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year 9.1 feet at 1.30 a. m. December 29 (discharge, 5,800 second-feet); minimum discharge estimated 40 second-feet on September 25 when recorder was out of order.

ICE.—Stage discharge relation not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 29. Rating curve used October 1 to December 28, well defined below 200 second-feet, and fairly well defined to 2,000 second-feet; curve used December 29 to September 30 well defined below 1,500 second-feet; both curves extended to 5,800 second-feet by study of flood-peak discharge at all stations on Sauk and Skagit rivers. Operation of water-stage recorder satisfactory except for four short periods indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good October to December, excellent January to September.

COOPERATION.—Station maintained in cooperation with American Nitrogen Products Co.

Discharge measurements of South Fork of Sauk River near Barlow Pass, Wash., during the period Sept. 25, 1917, to Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Sept. 25	Lasley Lee	1.36	89	May 3	Nicolai Aall	3.64	666
Nov. 9	Aall and Lee	1.76	160	18	Lee and Aall	3.02	311
9	Lee and Aall	1.75	154	18	Aall and Lee	3.01	318
Jan. 5	Nicolai Aall	3.97	856	25	Nicolai Aall	2.67	208
10	do	3.13	398	June 1	do	3.20	389
23	do	2.74	209	5	do	3.28	422
Feb. 22	do	2.15	96	7	do	3.84	752
Mar. 5	do	1.94	58	10	do	4.14	848
23	do	2.88	275	26	do	3.31	447
Apr. 5	do	2.55	177	July 18	do	3.27	449
19	do	2.68	221				

Daily discharge, in second-feet, of South Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	121	132	160	1,890	148	75	287	450	425	415	252	154
2	315	140	134	990	140	72	228	498	336	405	331	140
3	360	613	140	882	152	68	201	637	291	344	217	126
4	243	540	175	1,050	382	66	187	780	323	323	183	114
5	182	424	136	934	503	60	178	600	461	349	163	109
6	149	352	123	908	471	57	176	466	643	340	161	107
7	124	250	104	794	425	55	180	381	801	358	163	105
8	109	194	98	612	295	54	236	340	752	386	163	108
9		156	136	471	277	52	462	306	787	455	187	103
10		136	123	381	509	52	471	291	1,020	461	392	107
11	100	130	163	353	372	52	410	306	851	336	372	109
12		132	163		283	51	367	353	794	272	239	109
13		126	1,050		233	48	310	420	875	259	197	107
14		112	1,410		194	48	269	410	719	319	189	105
15		100	948	350	174	52	233	381	531	420	192	105
16		90	1,500		159	62	228	353	487	461	194	103
17	70	85	1,160	412	146	98	225	382	577	487	176	105
18		79	3,300	658	132	154	199	319	466	461	258	103
19		77	1,300	440	120	150	211	302	482	381	299	101
20		247	684	332	115	172	332	306	553	295	219	99
21	65	422	502	269	109	210	509	272	686	262	189	58
22	66	252	1,160	239	103	381	520	246	706	228	222	52
23	62	178	648	233	97	283	487	242	655	217	228	
24	70	145	444	356	88	595	482	228	548	206	209	
25	116	137	358		88	599	410	206	487	206	185	
26	159	116	518		86	386	349	204	471	242	176	60
27	134	134	2,000	220	79	295	332	219	466	219	159	
28	103	204	2,490		75	265	340	281	372	211	138	
29	88	160	4,420		.....	262	395	420	327	225	132	
30	81	189	1,870		.....	332	445	542	367	225	136	
31	87	.....	2,430	152	.....	344	.....	565	.....	217	146	.....

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at other stations in basin.

Monthly discharge of South Fork of Sauk River near Barlow Pass, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 32.7 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	360	.....	118	3.61	4.16	7,260
November	613	77	202	6.18	6.90	12,000
December	4,420	98	963	29.4	33.89	59,200
January	1,890	152	498	15.2	17.52	30,600
February	509	75	213	6.51	6.78	11,800
March	599	48	176	5.38	6.20	10,800
April	520	176	322	9.85	10.99	19,200
May	780	204	376	11.5	13.26	23,100
June	1,020	291	575	17.6	19.64	34,200
July	487	206	322	9.85	11.36	19,800
August	392	132	209	6.39	7.37	12,900
September	154	.....	93.5	2.86	3.19	5,560
The year	4,420	.....	340	10.4	141.26	246,600

BAKER RIVER BELOW ANDERSON CREEK, NEAR CONCRETE, WASH.

LOCATION.—In SE. ¼ sec. 30, T. 37 N., R. 9 E., 350 feet below Anderson Creek, a quarter of a mile above Baker River ranger station, and 11 miles above Concrete, Whatcom County.

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

RECORDS AVAILABLE.—September 10, 1910, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder, on left bank, installed September 24, 1915; inspected by G. C. Burch and W. L. Stilwell. Previous gages as follows: September 10 to November 19, 1910, vertical staff at trail bridge one-eighth mile above Anderson Creek; readings reduced to datum of gage installed October 22, 1910, by means of relation curve; October 22, 1910, to September 4, 1913, vertical and inclined staff gage on left bank, 30 feet above present gage; September 30, 1913, to September 23, 1915, one inclined and two vertical sections at practically the same site as the gages previously used but at different datum. Water-stage recorder referred to datum of staff gage last used, but slight change in location changed the rating.

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

CHANNEL AND CONTROL.—Bed composed of boulders and gravel over bedrock; not likely to shift except during extremely high water. No well-defined control. Right bank high and rocky; left bank fairly high, wooded, subject to overflow at about 11-foot stage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.7 feet at 12.30 p. m. December 29 (discharge, 36,800 second-feet); minimum stage recorded 2.43 feet at 4 p. m. March 13 (discharge, 502 second-feet).

1910-1918: Maximum stage same as above; minimum stage recorded, 2.6 feet February 27 and March 1, 1911 (discharge, 410 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 29. Rating curves well defined below 10,000 second-feet; extended above. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, and for a few days during the year when there was considerable variation in stage by averaging results obtained by applying mean gage heights for shorter intervals. Records good except for September, for which they are poor.

COOPERATION.—Station maintained in cooperation with United States Forest Service.

Discharge measurements of Baker River below Anderson Creek, near Concrete, Wash., during the year ending Sept. 30, 1918.

[Made by J. E. Stewart.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 4	6.09	4,710	June 10	7.14	8,060
5	5.47	3,390	11	6.40	5,850
6	5.08	2,850	11	6.39	5,720

Daily discharge, in second-feet, of Baker River below Anderson Creek, near Concrete, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		975	1,370	20,200	1,560	620		2,780	2,780	3,510	2,580	
2		1,720	1,220	15,200	1,560	605		3,000	2,220	3,330	2,330	
3		9,110	1,140	12,200	1,560	586		4,040	1,900	2,850	2,000	
4	3,000	5,410	1,220	13,100	2,060	577	1,200	4,900	2,000	2,780	1,850	
5		3,470	1,110	13,500	2,110	555		3,710	2,640	2,850	1,900	
6		2,640	1,040	9,050	2,110	538		2,780	3,710	2,850	1,850	1,500
7		1,840	975	9,240	2,110	522		2,330	5,160	3,080	1,800	
8		1,460	911	7,260	1,700	522	1,520	2,110	5,160	3,420	1,900	
9		1,180	1,040	4,160	1,800	519		2,000	5,710	4,160		
10	1,300	1,140	1,010	2,850	2,160	516		2,000	7,780	4,400		
11		1,110	1,040	2,390	1,750	512	2,280	2,220	6,000	3,080		
12		1,140	1,010	2,580	1,480	516		2,520	5,430	2,640		
13	1,010	1,040	1,940	2,220	1,250	505	1,850	2,710	6,300	2,580	1,900	
14	1,040	943	5,410	2,110	1,090	512	a1,640	2,850	5,300	3,080		
15	943	850	5,240	2,000	987	522	1,430	2,780	3,610	4,040		
16	850	792	11,400	1,950	912	591	a1,320	2,710	3,330	4,400		1,400
17	765	765	6,660	3,960	862	760	1,210	2,450	3,930	4,520	1,480	
18	713	738	11,400	7,950	801	1,210	1,170	2,280	3,330	4,280	2,330	
19	665	765	8,760	6,610	749	1,050	a1,100	2,110	3,510	3,420	2,060	
20	665	4,380	3,980	3,820	730	1,210	a1,100	1,950	3,930	3,420	1,750	
21	850	6,290	2,710	2,520	718	1,660	3,000	1,700	5,160	2,780	1,610	
22	738	3,210	2,340	a2,330	718	2,450	2,850	1,560	5,430	2,390	1,850	
23	688	2,160	1,840	a2,140	724	2,060	2,640	1,480	4,900	2,330	1,950	
24	713	1,540	1,540	1,950	700	3,080	2,580	1,380	4,040	2,330	1,900	
25	765	1,370	1,410	2,060	688	3,240	2,220	1,300	3,510	2,450	1,800	
26	792	1,140	1,840	1,950	682	2,330	1,950	1,340	3,510	2,450	1,610	1,300
27	821	1,330	6,360	1,850	626	1,850	1,950	1,480	3,330	2,330	1,380	
28	738	1,640	12,900	1,700	615	1,660	2,060	2,000	2,850	2,390	1,300	
29	738	1,460	27,400	1,660	.....	1,610	2,390	2,580	2,850	2,450	1,430	
30	713	1,500	16,800	1,610	.....	1,900	2,640	3,330	3,240	2,390	1,560	
31	765	.....	19,200	1,560	.....	a1,800	.....	3,930	.....	2,520	1,800	.....

a Estimated or interpolated.

NOTE.—Braced figures show mean discharge for periods indicated, based on flow at stations on Sauk and Skagit rivers.

Monthly discharge of Baker River below Anderson Creek, near Concrete, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 184 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	665	1,320	7.17	8.27	81,200
November	9,110	738	2,100	11.4	12.72	125,000
December	27,400	911	5,230	28.4	32.74	322,000
January	20,200	1,560	5,280	28.7	33.09	325,000
February	2,160	615	1,240	6.74	7.02	68,900
March	3,240	505	1,180	6.41	7.39	72,600
April	3,000	.....	1,800	9.78	10.91	107,000
May	4,900	1,300	2,460	13.4	15.45	151,000
June	7,780	1,900	4,080	22.2	24.77	243,000
July	4,520	2,330	3,080	16.7	19.25	189,000
August	2,580	1,300	1,850	10.1	11.64	114,000
September	.....	.....	1,400	7.61	8.49	83,300
The year	27,400	505	2,600	14.1	191.74	1,880,000

UPPER COLUMBIA RIVER BASIN.

MAIN STREAM.

COLUMBIA RIVER AT TRAIL, BRITISH COLUMBIA.

LOCATION.—At highway bridge at Trail, 15 miles above international boundary and mouth of Clark Fork and 18 miles below mouth of Kootenai River.

DRAINAGE AREA.—34,000 square miles. (Measured by Hydrometric Survey of British Columbia).

RECORDS AVAILABLE.—April 18, 1913, to September 30, 1918.

GAGE.—Chain gage installed on bridge in June, 1913; read by C. A. Broderick.

DISCHARGE MEASUREMENTS.—Made from bridge.

CHANNEL AND CONTROL.—Riffle control below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum daily mean stage recorded during year, 38.4 feet June 26 (discharge, 274,000 second-feet); minimum daily mean stage recorded, 8.85 feet March 18 (discharge, 16,200 second-feet).

1913–1918: Maximum stage recorded, 41.6 feet June 14-15, 1913 (discharge, 312,000 second-feet); minimum stage recorded, 7.40 feet March 28, 1917 (discharge, 9,600 second-feet).

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

DIVERSIONS.—A small amount of water is diverted above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below and fairly well defined above 150,000 second-feet. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good for discharge below 100,000 second-feet and fair above.

COOPERATION.—Complete record furnished by Hydrometric Survey of British Columbia.

The following discharge measurement was made by G. K. Beeston:

April 3, 1918: Gage height, 11.02 feet; discharge, 28,100 second-feet.

Daily discharge, in second-feet, of Columbia River at Trail, British Columbia, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	56,700	36,000	30,100	24,100	23,900	18,000	26,200	67,000	113,000	243,000	140,000	93,200
2	55,400	35,200	30,600	24,600	23,600	18,400	27,000	72,000	114,000	234,000	140,000	91,000
3	54,700	34,600	31,100	25,200	23,300	18,300	27,400	77,900	116,000	222,000	139,000	89,000
4	55,500	34,000	31,200	26,100	23,000	18,200	27,700	84,500	116,000	210,000	136,000	86,800
5	56,900	33,500	30,700	27,500	22,700	18,100	28,800	90,400	116,000	205,000	135,000	84,800
6	58,000	32,900	30,300	29,100	22,500	17,400	29,800	96,000	117,000	200,000	133,000	82,800
7	60,500	32,400	29,900	30,800	22,300	17,400	30,900	102,000	119,000	196,000	131,000	81,000
8	62,800	31,800	29,400	31,400	22,100	17,200	31,900	105,000	122,000	190,000	129,000	79,900
9	63,800	31,100	29,000	31,800	21,900	17,100	33,000	109,000	126,000	188,000	127,000	79,200
10	64,400	30,800	28,600	31,700	21,700	17,000	34,200	110,000	135,000	188,000	125,000	78,300
11	64,800	30,800	28,300	31,400	21,500	16,900	35,300	111,000	148,000	189,000	124,000	77,300
12	64,200	30,400	27,900	31,000	21,300	16,800	36,500	114,000	162,000	190,000	121,000	76,200
13	63,400	29,900	27,700	30,500	21,100	16,700	37,500	116,000	183,000	190,000	116,000	75,000
14	62,400	28,700	27,500	30,100	20,900	16,600	38,700	118,000	203,000	189,000	113,000	74,200
15	60,800	28,100	27,200	29,700	20,700	16,500	39,900	128,000	216,000	188,000	109,000	73,800
16	59,200	27,700	26,900	29,400	20,500	16,400	41,400	130,000	228,000	186,000	106,000	73,400
17	57,500	27,300	26,700	29,200	20,300	16,300	42,300	131,000	236,000	185,000	104,000	73,000
18	55,600	26,900	26,500	29,000	20,000	16,200	43,500	133,000	244,000	184,000	103,000	72,500
19	53,600	26,400	26,300	28,700	19,800	16,300	44,600	134,000	252,000	182,000	102,000	72,000
20	51,600	25,900	26,000	28,300	19,600	16,500	46,100	134,000	257,000	182,000	100,000	71,600
21	49,600	25,300	25,700	27,800	19,400	16,400	47,300	134,000	262,000	182,000	98,600	71,200
22	47,900	25,700	25,200	27,400	19,200	17,400	48,500	134,000	266,000	181,000	97,200	70,700
23	46,400	26,200	24,900	27,000	19,000	18,000	50,100	134,000	268,000	179,000	88,300	70,400
24	44,900	26,700	24,700	26,500	18,800	18,700	51,600	131,000	270,000	177,000	96,000	70,000
25	50,000	27,100	24,500	26,200	18,500	19,500	53,100	125,000	272,000	173,000	96,000	69,500
26	42,500	27,600	24,200	25,900	18,400	20,400	54,700	124,000	274,000	169,000	96,000	69,000
27	41,400	28,100	24,000	25,600	18,200	21,300	56,200	120,000	272,000	164,000	98,800	68,500
28	40,300	28,700	23,900	25,200	18,200	22,300	57,700	114,000	268,000	158,000	97,600	67,900
29	39,200	29,100	23,800	24,900	.....	23,500	59,800	113,000	263,000	152,000	97,600	67,400
30	38,100	29,500	23,600	24,600	.....	24,800	62,800	112,000	252,000	148,000	97,300	67,000
31	37,000	.....	23,800	24,200	.....	26,200	.....	112,000	.....	144,000	95,200	.....

Monthly discharge of Columbia River at Trail, British Columbia, for the year ending Sept. 30, 1918.

[Drainage area, 34,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	64,800	37,000	53,500	1.57	1.81	3,290,000
November	36,000	25,300	29,600	.87	.97	1,760,000
December	31,200	23,600	27,100	.80	.92	1,670,000
January	31,800	24,100	27,900	.82	.95	1,720,000
February	23,900	18,200	20,800	.61	.64	1,160,000
March	26,200	16,200	18,400	.54	.62	1,130,000
April	62,800	26,200	41,500	1.22	1.36	2,470,000
May	134,000	67,000	113,000	3.32	3.83	6,950,000
June	274,000	113,000	200,000	5.88	6.56	11,900,000
July	243,000	144,000	186,000	5.47	6.31	11,400,000
August	140,000	88,300	113,000	3.32	3.83	6,950,000
September	93,200	67,000	75,900	2.23	2.49	4,520,000
The year	274,000	16,200	75,600	2.22	30.28	54,900,000

NOTE.—Records published as furnished by Hydrometric Survey of British Columbia.

COLUMBIA RIVER AT VERNITA, WASH.

LOCATION.—In sec. 11, T. 13 N., R. 24 E., at Richmond ferry, half a mile north of Vernita and 6 miles below Priest Rapids, Benton County.

DRAINAGE AREA.—95,500 square miles. (Areas in United States measured on topographic maps and United States Geological Survey maps, scale 1:500,000. Areas in British Columbia measured on Department of the Interior railway-belt maps, scale 1:500,000; Department of Mines, West Kootenay sheet, scale 1:253,400; and Department of Lands map, 1:1,125,000.)

RECORDS AVAILABLE.—Flood heights only, at Wenatchee, 1894 to 1903; continuous gage-height record at Wenatchee April 18, 1904, to December 31, 1916; at Beverly, January 1–13, 1917; at Vernita, January 14 to September 30, 1918; daily discharge ascertained from May 1, 1913, to September 30, 1918. Gage-height record at Wenatchee published by United States Weather Bureau.

GAGE.—Vertical staff gage in five sections installed on right bank at ferry in October, 1917. Three additional vertical sections installed at same location in March, 1918. All gage readings at Vernita refer to same datum, 388.7 feet above sea level. Gage read by J. P. Richmond.

DISCHARGE MEASUREMENTS.—Made from standard gaging car on ferry cable at Vernita or, when ice conditions are severe, from railroad bridge at Beverly.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. High-water control Coyote Rapids 6 or 7 miles below gage; low-water control riffle noticeable at low stages about three-fourths mile below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 29.15 feet at 8 p. m. June 25 (discharge, 432,000 second-feet; minimum stage recorded, 2.49 feet at 5 p. m. November 24 (discharge, 41,200 second-feet).

1913–1918: Maximum stage recorded, 45.7 feet at Wenatchee, June 15 and 16, 1913 (discharge, 528,000 second-feet). Minimum discharge, 23,900 second-feet (current-meter measurement) January 31, 1917, during period in which stage-discharge relation was affected by ice.

Maximum stage recorded at Wenatchee by Weather Bureau and Great Northern Railway Co., 58.0 feet June 7, 1894 (discharge estimated, by extending rating curve, at 710,000 second-feet).

ICE.—Stage-discharge relation affected by ice except during mild winters. Flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Some water is diverted for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage-height to rating table. Records excellent.

COOPERATION.—Maintained in cooperation with Washington Irrigation & Development Co.

Discharge measurements of Columbia River at Vernita, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 23	John McCombs	6.12	68,400	Feb. 7	T. R. Newell	5.67	63,700
Dec. 4	T. R. Newell	2.99	44,100	21	do	5.09	59,800
5	do	3.04	44,800	Mar. 14	do	3.16	44,400
Jan. 22	do	8.54	88,200	Apr. 20	do	10.70	109,000
23	do	8.36	87,800	May 14	R. B. Kilgore	20.38	237,000

Daily discharge, in second-feet, of Columbia River at Vernita, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	77,500	53,800	43,100	92,000	71,400	49,700	69,700	152,000	234,000	405,000	200,000	124,000
2	76,600	53,100	43,100	102,000	69,700	49,700	73,100	157,000	234,000	391,000	194,000	122,000
3	75,700	51,700	43,800	105,000	68,000	49,700	74,800	169,000	234,000	380,000	190,000	119,000
4	75,700	51,000	44,400	111,000	65,400	49,700	76,600	179,000	229,000	366,000	187,000	117,000
5	74,000	51,000	44,400	117,000	64,600	49,700	78,400	188,000	227,000	354,000	185,000	115,000
6	73,100	50,300	44,400	119,000	63,800	49,700	79,300	196,000	227,000	339,000	185,000	113,000
7	73,100	49,700	45,100	119,000	63,800	49,000	80,200	208,000	229,000	328,000	184,000	110,000
8	74,000	49,000	44,400	120,000	65,400	48,400	80,200	213,000	236,000	315,000	181,000	107,000
9	75,700	48,400	43,800	119,000	64,600	47,000	81,100	219,000	245,000	302,000	176,000	105,000
10	78,400	47,700	43,800	118,000	64,600	46,400	82,900	222,000	254,000	294,000	172,000	103,000
11	81,100	47,000	43,100	117,000	63,800	46,400	85,600	227,000	268,000	288,000	168,000	101,000
12	81,100	46,400	42,500	115,000	64,600	45,700	88,300	231,000	282,000	282,000	165,000	99,700
13	82,000	46,400	42,500	112,000	63,800	45,100	93,000	236,000	298,000	280,000	162,000	98,700
14	82,000	46,400	42,500	111,000	63,800	45,700	96,800	243,000	321,000	278,000	158,000	97,800
15	82,000	45,700	43,800	109,000	63,800	45,700	101,000	252,000	341,000	278,000	154,000	95,800
16	80,200	44,400	44,400	105,000	63,800	46,400	103,000	259,000	364,000	276,000	150,000	94,900
17	78,400	43,800	44,400	103,000	63,000	47,000	106,000	267,000	377,000	274,000	145,000	94,000
18	77,000	43,100	45,700	101,000	62,200	47,000	107,000	272,000	389,000	268,000	142,000	94,000
19	75,700	43,100	55,200	97,800	61,400	47,000	109,000	274,000	400,000	265,000	138,000	93,000
20	73,100	42,500	54,500	94,900	59,800	47,000	110,000	272,000	407,000	263,000	134,000	91,100
21	70,600	41,300	51,700	91,100	59,000	48,400	112,000	272,000	414,000	261,000	133,000	91,100
22	68,800	41,900	50,300	89,200	57,400	49,000	116,000	272,000	421,000	259,000	131,000	90,200
23	67,200	41,300	48,400	87,400	55,200	49,700	122,000	268,000	426,000	259,000	130,000	89,200
24	66,300	41,300	52,400	85,600	52,400	49,700	126,000	267,000	428,000	255,000	128,000	88,300
25	63,800	41,300	54,500	83,800	51,000	51,700	131,000	263,000	430,000	252,000	127,000	88,300
26	63,000	41,900	55,900	82,000	51,700	53,800	133,000	255,000	430,000	245,000	126,000	88,300
27	61,400	41,900	57,400	81,100	51,700	55,200	137,000	250,000	430,000	239,000	125,000	88,300
28	59,000	41,900	63,000	79,300	50,300	58,200	138,000	245,000	428,000	231,000	125,000	88,300
29	57,400	42,500	68,800	78,400	.....	61,400	142,000	238,000	423,000	222,000	126,000	87,400
30	55,900	42,500	85,600	77,500	.....	63,000	145,000	234,000	416,000	214,000	126,000	86,500
31	55,200	.....	89,200	74,000	.....	66,300	.....	234,000	.....	206,000	125,000	.....

Monthly discharge of Columbia River at Vernita, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 95,500 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	82,000	55,200	72,100	0.755	0.87	4,430,000
November	53,800	41,300	45,700	.479	.53	2,720,000
December	89,200	42,500	50,800	.532	.61	3,120,000
January	120,000	74,000	99,900	1.05	1.21	6,140,000
February	71,400	50,300	61,400	.643	.67	3,410,000
March	66,300	45,100	50,300	.527	.61	3,090,000
April	145,000	69,700	103,000	1.08	1.20	6,130,000
May	274,000	152,000	233,000	2.44	2.81	14,300,000
June	430,000	227,000	335,000	3.51	3.92	19,900,000
July	405,000	206,000	286,000	2.99	3.45	17,600,000
August	200,000	125,000	154,000	1.61	1.86	9,470,000
September	124,000	86,500	99,400	1.04	1.16	5,910,000
The year	430,000	41,300	133,000	1.39	18.90	96,200,000

KOOTENAI 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, Lincoln County.

DRAINAGE AREA.—11,000 square miles.

RECORDS AVAILABLE.—October 13, 1910, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from highway bridge; prior to erection of bridge from ferry cable.

CHANNEL AND CONTROL.—Bed of stream composed of small rocks; permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.27 feet at 5.30 p. m. June 13 (discharge, 77,000 second-feet); minimum stage, 1.69 feet December 14 (discharge, 1,960 second-feet).

1910–1918: Maximum stage, 19.17 feet June 21, 1916 (discharge, 130,000 second-feet); minimum stage, 1.4 feet February 7, 1914 (discharge, 1,480 second-feet). (Previously published as 1,690 second-feet.)

ICE.—Stage-discharge relation may have been slightly affected by ice for short periods during winter but the open channel rating table has been applied.

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Stage-discharge relation unchanged since 1910 for open-water flow; slightly affected by ice. Rating curve well-defined between 3,400 and 25,000 second-feet and fairly well defined above 25,000 second-feet. Gage read to hundredths twice daily during May and June and once daily at other times. Daily discharge ascertained by applying mean daily gage height to rating table for open channel. Records good except for short periods during winter when there may have been slight ice effect on stage-discharge relation.

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

Daily discharge, in second-feet, of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	6,250	3,880	3,760	11,100	2,900	a 3,890	9,170	17,000	24,600	21,700	12,200	a 8,680
2...	6,190	3,920	a 3,760	13,700	2,290	a 3,830	8,470	20,800	a23,800	21,400	12,100	a 8,740
3...	6,120	3,880	3,760	11,200	a 2,780	a 3,770	7,400	24,400	23,000	21,700	12,100	a 8,810
4...	5,280	a 3,920	3,800	10,000	3,270	3,710	6,940	29,800	21,200	21,400	12,400	8,880
5...	5,520	a 3,950	3,530	9,210	3,710	3,480	6,440	a33,300	19,800	20,400	12,500	7,790
6...	5,760	a 3,980	3,310	a 8,850	4,000	3,480	6,560	36,800	21,400	18,500	12,100	7,260
7...	6,120	a 4,020	3,100	7,490	4,400	3,350	a 6,720	32,600	23,400	a19,000	11,400	7,130
8...	6,310	3,120	2,470	6,910	4,500	3,350	6,880	28,000	28,400	19,500	10,800	6,880
9...	6,190	a 3,640	a 2,540	5,910	4,360	3,350	7,260	23,700	a39,900	19,800	10,400	6,690
10...	5,700	4,170	2,620	4,910	a 4,380	a 3,310	8,680	21,300	51,400	19,800	10,300	6,750
11...	5,580	a 4,120	4,040	4,270	4,450	3,270	7,200	24,200	66,800	20,500	a10,400	6,750
12...	5,460	a 4,070	a 3,430	4,020	4,450	3,350	11,800	a21,600	a71,200	21,900	10,400	6,690
13...	5,280	a 4,020	2,820	a 3,860	4,450	3,100	12,300	19,100	75,600	20,100	10,100	6,500
14...	4,560	3,970	1,960	3,690	4,000	3,440	a12,400	22,600	74,400	19,200	10,900	6,560
15...	4,970	3,970	2,590	3,600	3,660	3,400	12,400	27,200	75,600	18,000	10,500	6,560
16...	4,910	3,920	a 3,300	3,830	3,350	3,270	11,600	30,800	a70,500	17,300	10,400	6,340
17...	4,880	3,730	4,000	3,970	a 3,460	3,540	10,700	30,000	65,400	17,000	10,300	6,310
18...	5,050	a 3,600	4,770	4,430	3,570	3,800	10,100	29,000	57,800	16,700	a10,400	6,340
19...	4,830	3,460	7,400	4,370	3,900	4,240	9,390	a26,000	55,300	16,800	10,400	6,220
20...	4,560	a 3,460	8,540	a 4,220	2,290	4,750	8,570	23,000	52,500	16,600	10,500	6,190
21...	a 4,610	3,460	5,520	4,070	2,250	4,610	10,700	20,600	a48,300	a16,400	10,300	6,060
22...	4,660	3,460	5,050	4,120	a2,280	4,560	12,900	19,400	44,100	16,100	9,990	6,190
23...	4,450	3,510	a 4,830	3,830	2,320	6,190	14,800	18,100	a44,000	15,000	9,690	6,310
24...	4,400	3,780	4,610	4,020	a 3,060	a 6,250	15,300	17,200	44,000	13,900	a 9,540	6,440
25...	4,400	a 3,900	4,100	4,020	3,800	6,310	15,700	16,400	41,300	13,400	a 9,390	6,620
26...	4,240	4,020	3,760	4,020	3,800	7,400	15,100	a15,600	39,300	13,500	9,240	7,010
27...	4,350	4,070	3,100	a 3,760	4,000	4,770	13,800	14,700	35,000	13,300	9,170	6,690
28...	a 4,280	a 3,980	2,740	3,510	a 3,950	4,830	13,400	14,200	30,400	13,500	9,170	6,190
29...	4,200	3,880	3,100	3,420	.....	4,660	13,400	14,000	25,900	13,200	9,100	6,090
30...	4,040	4,020	a 5,770	3,120	.....	4,610	14,700	a16,400	a28,800	12,700	8,540	5,820
31...	4,000	.....	a 8,430	2,300	.....	a6,890	.....	18,700	.....	12,400	a 8,610	.....

a Gage not read; discharge interpolated.

Monthly discharge of Kootenai River at Libby, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6,310	4,000	5,070	312,000
November	4,170	3,120	3,830	228,000
December	8,540	1,960	4,080	251,000
January	13,700	2,300	5,480	337,000
February	4,500	2,250	3,560	198,000
March	7,460	3,100	4,280	263,000
April	15,700	6,440	10,700	637,000
May	36,800	14,000	22,800	1,400,000
June	75,600	19,800	44,100	2,620,000
July	21,900	12,400	17,400	1,070,000
August	12,500	8,540	10,400	640,000
September	8,880	5,820	6,850	408,000
The year	75,600	1,960	11,600	8,360,000

CLARK FORK BASIN.

CLARK FORK AT ST. REGIS, MONT.

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

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 26, 1910, to September 30, 1918.

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

DISCHARGE MEASUREMENTS.—Made from ferry cable at gage prior to 1918; afterward from highway bridge above mouth of St. Regis River. Flow of St. Regis River added to obtain flow passing the gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; practically permanent. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.7 feet, June 14 (discharge, 48,400 second-feet); minimum stage recorded, 4.6 feet December 14 and February 1 (discharge, 3,160 second-feet).

1910–1918: Maximum stage recorded, 19.1 feet May–30–31, 1913 (discharge, 62,800 second-feet); minimum stage recorded, 2.9 feet January 4, 1912 (discharge, 1,710 second-feet).

ICE.—Stage-discharge relation slightly affected by ice; open channel rating applied throughout winter.

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

REGULATION.—Practically none.

ACCURACY—Stage-discharge relation practically permanent, except for possibly slight effect of ice for short periods during winter. Rating curve well defined between 2,000 and 65,000 second-feet. Gage read once daily to nearest tenth. Daily discharge ascertained by applying gage height to rating table. Records good.

The following discharge measurement was made by W. A. Lamb:
September 24, 1918: Gage height, 4.94 feet; discharge, 3,660 second-feet.

Daily discharge, in second-feet, of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,230	3,850	4,040	22,600	3,160	4,620	12,600	21,000	21,000	13,200	5,680	4,620
2	4,040	4,230	4,040	21,400	3,670	4,620	12,000	44,500	29,300	12,300	5,460	4,820
3	4,040	4,420	4,230	21,400	4,420	4,620	11,700	26,300	25,000	11,400	5,460	4,620
4	3,850	4,420	4,420	a19,200	5,240	4,820	11,100	30,700	17,700	10,800	5,030	4,230
5	3,850	5,030	4,420	17,000	5,900	4,820	10,800	36,000	23,000	10,200	5,240	4,230
6	3,850	4,420	3,670	15,600	6,560	4,820	10,500	36,500	23,800	9,700	5,460	4,230
7	3,670	4,420	3,670	11,400	6,780	4,620	10,500	33,000	27,600	9,200	5,460	4,040
8	3,670	4,230	3,670	13,200	7,000	4,820	11,400	34,000	31,600	8,200	5,680	4,040
9	3,670	4,230	3,490	12,600	6,780	4,620	12,900	31,600	36,000	7,480	5,460	4,040
10	3,670	4,040	3,490	11,100	6,340	4,820	12,900	27,600	40,600	7,960	5,240	3,670
11	3,670	4,040	3,320	9,700	6,120	4,820	14,500	25,900	45,000	7,720	5,460	3,850
12	3,670	3,850	3,320	8,450	6,340	5,030	15,900	23,800	46,700	7,480	5,460	3,670
13	3,490	4,040	3,490	8,700	6,120	5,030	15,900	23,800	47,800	7,480	5,240	3,670
14	3,490	4,420	3,160	9,200	6,120	5,240	21,000	24,200	48,400	7,240	5,460	3,670
15	3,490	4,230	3,490	8,700	5,900	5,240	21,000	26,700	47,800	7,240	5,460	3,850
16	3,490	3,850	3,850	8,700	5,240	5,030	16,600	27,600	46,200	7,480	5,240	3,850
17	3,490	3,670	4,420	8,200	5,030	5,030	15,900	27,600	40,600	7,720	5,240	4,230
18	3,490	3,670	6,120	8,200	5,030	4,420	14,800	26,700	35,500	7,720	5,680	4,230
19	3,490	3,490	11,700	8,450	4,820	6,120	14,200	25,400	33,100	7,240	6,340	4,040
20	3,490	3,490	12,000	7,960	4,230	6,560	13,800	23,800	31,600	7,000	6,560	3,850
21	3,490	3,490	10,800	7,480	4,620	6,780	14,200	23,000	29,300	6,780	7,000	3,850
22	3,490	3,490	9,970	7,000	5,240	7,000	14,800	21,800	27,200	6,560	7,000	3,670
23	3,490	3,490	12,000	7,000	4,420	7,960	17,000	21,800	25,400	6,340	7,240	3,670
24	3,490	3,670	11,400	7,000	5,030	8,700	18,000	21,400	23,800	6,120	6,780	3,850
25	3,490	3,490	10,800	7,000	5,240	10,200	34,000	21,800	23,000	5,900	6,780	4,230
26	a3,610	3,490	9,450	7,240	4,820	10,800	34,000	21,400	21,000	5,900	6,120	4,420
27	a3,730	3,490	9,700	6,780	5,030	12,000	29,300	21,000	29,300	6,120	5,900	4,230
28	3,850	3,490	14,200	6,340	5,030	12,300	21,000	17,000	17,000	6,340	5,460	4,230
29	3,850	3,670	21,000	6,560	.....	12,000	21,000	16,200	15,600	6,340	5,460	4,230
30	3,490	4,040	22,000	6,340	.....	12,000	34,000	15,900	14,500	6,120	5,460	4,040
31	3,490	.....	23,800	4,040	.....	12,000	.....	16,600	.....	5,900	4,820	.....

a Gage not read; discharge interpolated.

Monthly discharge of Clark Fork at St. Regis, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,230	3,490	3,650	224,000
November	5,030	3,490	3,930	234,000
December	23,800	3,160	8,079	496,000
January	22,600	4,040	10,500	646,000
February	7,000	3,160	5,370	298,000
March	12,300	4,420	6,820	419,000
April	34,000	10,500	17,200	1,020,000
May	44,500	15,900	25,800	1,590,000
June	48,400	14,500	30,800	1,830,000
July	13,200	5,900	7,840	482,000
August	7,240	4,820	5,750	354,000
September	4,820	3,670	4,060	242,000
The year	48,400	3,160	10,800	7,840,000

CLARK FORK NEAR PLAINS, MONT.

LOCATION.—In lot 7, sec. 7, T. 19 N., R. 26 W., at Cooper's ferry 3 miles above Plains and 7 miles below mouth of Flathead River, Sanders County.

DRAINAGE AREA.—19,900 square miles.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1918.

GAGE.—Barrett & Lawrence water-stage recorder, installed November 28, 1911, at point 50 feet below chain gage, used previously and referred to same datum; inspected by A. L. Steiner.

DISCHARGE MEASUREMENTS.—Made from cable installed April 26, 1917.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; permanent. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 16.45 feet at 11 a. m. June 16 (discharge, 100,000 second-feet); minimum stage, 3.95 feet at 8 a. m. December 14 (discharge, 5,780 second-feet).

1910–1918: Maximum stage recorded, 17.9 feet June 5, 1913, and July 2, 1916 (discharge, 115,000 second-feet); minimum stage recorded, 3.6 feet March 9–10, 1913 (discharge, 5,290 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice; open channel rating curve used during winter.

DIVERSIONS.—Numerous diversions are made for irrigation from the headwaters of Clark Fork and tributaries of Flathead River.

REGULATION.—Flathead Lake furnishes natural regulation for part of flow.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 5,500 and 60,000 second-feet and fairly well defined above 60,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of gage-height graph. Records good.

The following discharge measurement was made by W. A. Lamb:

September 23, 1918: Gage height, 4.76 feet; discharge, 8,640 second-feet.

Daily discharge, in second-feet, of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	9,210	8,000	6,890	28,900	10,900	10,900	19,100	39,800	47,200	57,100	18,600	13,200
2.....	9,210	8,000	6,890	29,600	10,500	10,900	19,600	43,800	47,200	54,300	18,100	13,200
3.....	8,800	8,400	7,250	28,900	11,800	10,900	19,100	48,100	47,200	50,800	18,100	12,800
4.....	8,800	8,400	7,250	28,200	12,800	10,900	18,600	54,300	47,200	49,000	17,600	12,300
5.....	8,800	8,400	7,250	27,500	14,200	10,900	18,100	61,600	48,100	46,400	17,100	12,300
6.....	8,800	8,000	6,890	26,200	14,600	10,900	18,100	67,200	51,600	44,700	17,100	11,800
7.....	8,800	8,000	6,890	25,500	15,600	10,900	18,100	69,100	57,100	42,200	17,100	11,800
8.....	8,800	8,000	6,890	24,800	16,100	10,500	18,100	68,200	62,600	40,600	16,600	11,400
9.....	8,800	7,620	6,890	24,800	15,600	10,500	18,600	67,200	68,200	39,000	16,600	11,400
10.....	8,800	7,620	6,890	24,800	14,600	10,500	20,200	64,400	74,800	36,600	16,100	10,900
11.....	8,800	7,620	6,540	24,800	14,200	10,100	21,800	61,600	80,600	35,800	16,100	10,900
12.....	8,800	8,000	6,540	24,200	13,700	10,500	23,600	58,900	87,400	34,200	15,600	10,500
13.....	8,400	8,000	6,540	23,000	13,700	10,500	24,200	58,000	92,400	33,400	15,600	10,500
14.....	8,000	7,620	5,850	20,700	13,700	10,900	26,200	58,000	96,400	31,800	15,600	10,500
15.....	7,620	7,250	6,890	20,700	13,200	10,500	28,200	60,700	98,400	31,100	15,600	9,630
16.....	7,620	7,250	7,250	20,200	11,800	10,500	28,200	63,500	99,500	30,400	15,100	9,630
17.....	7,620	6,890	7,250	19,600	11,800	10,500	28,200	64,400	95,400	28,900	15,100	9,630
18.....	7,620	6,890	8,800	19,100	11,400	10,500	28,200	63,500	89,400	28,900	15,100	9,210
19.....	7,620	6,890	14,200	19,100	12,800	11,400	27,500	62,600	88,400	27,500	15,100	9,210
20.....	7,620	6,890	16,100	18,600	12,800	11,800	26,800	60,700	87,400	26,200	15,100	9,210
21.....	7,620	6,890	15,600	18,100	12,800	12,300	27,500	58,900	85,400	24,800	15,600	8,800
22.....	7,620	6,540	14,600	17,600	12,800	12,800	28,900	57,100	82,500	24,200	16,100	8,800
23.....	7,620	6,890	16,100	17,100	12,300	13,200	31,100	54,300	79,600	23,600	15,600	8,800
24.....	7,620	6,890	16,600	17,100	11,800	14,200	32,600	52,500	77,700	23,600	15,100	8,800
25.....	7,620	6,890	16,100	17,100	12,800	15,600	34,200	51,600	75,800	22,400	15,100	8,800
26.....	7,620	6,890	14,200	17,100	11,800	16,600	35,800	50,800	72,900	21,800	14,600	9,210
27.....	7,620	6,890	14,200	17,100	11,800	17,600	35,000	49,000	69,100	21,200	14,200	9,210
28.....	8,000	6,540	18,100	16,600	11,400	18,100	35,000	48,100	66,300	20,700	13,700	9,210
29.....	8,000	6,540	21,800	16,100	.....	18,100	35,800	46,400	63,500	20,700	13,700	8,800
30.....	8,000	6,890	26,200	15,600	.....	18,100	36,600	44,700	60,700	20,200	13,200	8,800
31.....	8,000	.....	29,600	12,800	.....	18,100	.....	44,700	.....	19,600	13,200	.....

Monthly discharge of Clark Fork near Plains, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9,210	7,620	8,190	504,000
November	8,400	6,540	7,390	440,000
December	29,600	5,850	11,600	713,000
January	29,600	12,800	21,300	1,310,000
February	16,100	10,500	13,000	722,000
March	18,100	10,100	12,600	775,000
April	36,600	18,100	26,100	1,550,000
May	69,100	39,800	56,600	3,480,000
June	99,500	47,200	73,300	4,360,000
July	57,100	19,600	32,600	2,000,000
August	18,600	13,200	15,700	965,000
September	13,200	8,800	10,300	613,000
The year	99,500	5,850	24,100	17,400,000

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, Bonner County.

DRAINAGE AREA.—22,900 square miles (measured on British Columbia Department of Lands map, scale 1:1,125,000; and United States Geological Survey maps, scale 1 :500,000).

RECORDS AVAILABLE.—March 18, 1914, to September 30, 1918.

GAGE.—Vertical staff in two sections on pile at municipal wharf; read by A. B. Howard.

EXTREMES OF STAGE.—Maximum stage recorded during year, 21.20 feet June 21; minimum stage recorded, 5.03 feet November 30.

1914–1918: Maximum stage recorded 26 feet July 6, 1916; minimum stage recorded 4.95 feet March 16, 1917.

ICE.—Ice at gage renders observations difficult.

DIVERSIONS.—Considerable water diverted from tributaries of Clark 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, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5.83	5.22								19.50		
2	5.81	5.21				7.00	8.60					6.90
3	5.80	5.20		11.20				13.30	15.50		9.02	
4	5.79		5.10		8.00				15.50			
5	5.78	5.19			7.90		8.90			18.80	9.00	
6	5.77	5.18										
7		5.17	5.15	11.75				15.35				6.80
8	5.70	5.17			8.10		8.99		15.80			
9	5.67	5.16				6.80				15.08	8.80	6.80
10	5.65	5.15		11.50								
11	5.60		5.16		8.20			16.80	16.95			
12	5.58	5.14								13.07	8.03	
13	5.55	5.14					9.75					
14		5.13	5.18	10.85	8.00	6.70		17.05	18.80			6.40
15	5.50	5.12										
16	5.45	5.12				6.50	10.50			13.60	8.00	
17	5.43	5.11		10.40				17.50	20.20			6.10
18	5.41		5.40									
19	5.40					6.70	10.85					
20	5.39	5.09								12.00	7.80	6.00
21			6.25	9.85				17.70	21.20			
22	5.37						11.10					
23	5.35	5.07			7.30					11.05		
24	5.32			9.50				17.30			7.70	5.80
25	5.31						11.70	17.10				
26	5.30					7.40			20.75		7.70	
27	5.28	5.05	7.00					16.70		9.90		
28				9.15								5.80
29	5.25					8.00			19.65	10.00		
30	5.24	5.03					12.50					
31	5.23			9.00				15.95			7.80	

CLARK FORK AT METALINE FALLS, WASH.

LOCATION.—In SE. ¼ sec. 21, T. 39 N., R. 43 E., three-eighths of a mile above Metaline Falls, opposite town of Metaline Falls, Pend Oreille County, 11 miles above international boundary.

DRAINAGE AREA.—25,100 square miles. (Areas in United States measured on United States Geological Survey maps, scale 1:500,000; area of Flathead River in British Columbia measured on Department of Lands map, scale 1:1,125,000; area of Priest River in British Columbia measured on British Columbia map, Nelson sheet.)

RECORDS AVAILABLE.—November 4, 1908, to September 4, 1910 (gage heights only; data insufficient for determination of discharge); October 1, 1912, to September 30, 1918.

GAGE.—Vertical and inclined staff reading from 0 to 55 feet, on right bank; installed December 10, 1916; read by M. C. Helmer, W. A. Snure, and C. N. West. Previous gages as follows: November 4, 1908, to September 4, 1910, on right bank about three-quarters of a mile above falls; October 1 to December 27, 1912, on right bank just below Sullivan Creek, 500 feet above falls; January 16, 1913, to January 24, 1914, at same site but at different datum; January 25 to February 2, 1914, temporary gage at different datum; February 12, 1914, to December 9, 1916, vertical and inclined staff on right bank 500 feet above the falls and at different datum. All readings from October 1, 1912, to February 2, 1914, reduced to datum of gage installed February 12, 1914. Although some gages were above Sullivan Creek their records give flow below Sullivan Creek by the addition of measured flow of creek.

DISCHARGE MEASUREMENTS.—Made from cable near gage. Flow of Sullivan Creek added to flow measured at cable.

CHANNEL AND CONTROL.—Sensitive control formed by Metaline Falls, where water surface drops 20 feet in a distance of 1,200 feet; slightly shifting. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 31.55 feet June 24 (discharge, 99,100 second-feet); minimum stage recorded, 2.98 feet November 26 (discharge, 9,040 second-feet).

1912–1918: Maximum stage recorded, 41.2 feet June 16, 1913 (discharge, 139,000 second-feet); minimum stage recorded, 0.10 foot December 27, 1916 (discharge, 5,960 second-feet).

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation for stages below 29 feet (86,700 second-feet) changed January 6. Rating curves well defined. Gage read to half-tenths once daily. No diurnal fluctuation. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Station maintained in cooperation with Hydrometric Survey of British Columbia. Gage-height record furnished by Hugh L. Cooper Co.

Discharge measurements of Clark Fork at Metaline Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 2	R. B. Kilgore	18.80	43,400	July 1	L. D. Carson	29.25	89,300
4	do	19.89	46,300	2	do	28.75	85,600

Daily discharge, in second-feet, of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	11,700	9,800	9,210	24,700	23,200	17,000	21,400	41,900	63,600	88,100	28,800	16,800
2....	11,700	9,800	9,070	28,600	21,900	17,000	22,800	43,100	62,700	85,800	28,100	16,600
3....	11,500	9,950	9,070	32,200	21,000	16,800	23,600	44,100	61,800	82,900	26,200	16,200
4....	11,700	9,950	9,070	35,100	20,400	16,400	23,900	46,400	61,400	79,200	25,700	15,800
5....	11,700	9,950	9,070	36,800	20,200	15,800	24,100	47,800	60,900	76,800	25,500	15,500
6....	11,700	9,800	9,210	38,500	20,000	15,800	24,100	50,800	60,400	74,500	25,000	15,100
7....	11,500	9,650	9,210	36,600	20,200	15,500	24,600	54,400	60,900	71,300	24,600	14,800
8....	11,500	9,650	9,210	37,100	19,800	15,500	24,800	58,200	60,900	68,600	23,900	14,600
9....	11,500	9,650	9,210	36,800	20,200	15,500	25,200	62,700	62,700	65,800	23,200	14,200
10....	11,400	9,650	9,210	37,400	20,200	15,300	25,500	65,400	64,000	63,200	22,500	14,000
11....	11,200	9,650	9,210	36,800	20,400	15,100	25,700	67,200	66,300	60,000	22,300	13,700
12....	11,200	9,650	9,210	36,600	20,400	15,100	26,400	68,600	69,500	58,200	22,100	13,500
13....	11,200	9,650	9,350	35,500	20,600	14,900	27,400	69,900	73,600	55,700	21,600	13,300
14....	11,200	9,650	9,350	34,600	20,200	15,100	28,400	69,900	78,200	53,600	21,200	13,000
15....	10,900	9,650	9,350	33,300	20,600	15,100	29,300	71,800	81,100	51,600	21,000	12,800
16....	10,900	9,650	9,500	32,800	20,200	15,100	30,000	71,800	84,800	50,000	20,200	12,700
17....	10,600	9,350	9,650	32,300	20,000	14,900	31,300	72,700	88,600	47,500	19,800	12,500
18....	10,600	9,350	9,950	31,800	19,800	15,100	32,000	73,600	92,400	45,700	19,400	12,200
19....	10,400	9,210	10,100	30,800	19,400	15,300	32,800	74,500	94,300	40,600	19,000	12,000
20....	10,200	9,070	10,400	30,000	18,200	15,500	33,300	75,000	96,200	42,200	19,000	12,000
21....	10,200	9,070	10,900	29,300	16,200	15,100	33,300	75,500	98,200	40,600	18,800	11,800
22....	10,200	9,070	11,400	28,400	16,000	15,600	34,100	75,500	98,200	39,100	18,600	11,700
23....	10,100	9,070	12,400	27,900	16,800	15,600	34,600	74,500	98,600	38,000	18,400	11,500
24....	9,950	9,070	13,400	27,400	16,600	16,000	36,000	73,600	99,100	36,800	18,200	11,300
25....	9,800	9,070	14,500	26,900	16,200	16,800	36,000	72,700	98,200	35,700	18,000	11,200
26....	9,650	9,070	15,800	26,200	15,500	17,600	37,700	71,800	97,200	34,400	17,800	11,000
27....	9,650	9,070	16,600	26,000	16,200	18,200	38,600	70,900	96,200	33,600	17,400	11,000
28....	9,650	9,070	17,000	25,200	17,000	18,600	39,400	69,000	94,300	32,800	17,400	11,000
29....	9,650	9,070	17,900	24,600	.....	19,400	40,300	68,100	92,800	31,500	17,000	11,000
30....	9,650	9,070	19,500	24,600	.....	20,400	41,200	66,300	90,500	30,500	17,000	11,000
31....	9,800	.....	21,500	24,600	.....	21,000	.....	64,500	.....	29,800	16,800	.....

Monthly discharge of Clark Fork at Metaline Falls, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 25,100 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	11,700	9,650	10,700	0.426	0.49	658,000
November	9,950	9,070	9,450	.376	.42	562,000
December	21,500	9,070	11,600	.462	.53	713,000
January	38,500	24,600	31,300	1.25	1.44	1,920,000
February	23,200	15,500	19,200	.765	.80	1,070,000
March	21,000	14,900	16,300	.649	.75	1,000,000
April	41,200	21,400	30,300	1.21	1.35	1,800,000
May	75,500	41,900	64,900	2.59	2.99	3,990,000
June	99,100	60,400	80,300	3.20	3.57	4,780,000
July	88,100	29,800	53,000	2.11	2.43	3,260,000
August	28,800	16,800	21,100	.841	.97	1,300,000
September	16,800	11,000	13,100	.522	.58	780,000
The year	99,100	9,070	30,200	1.20	16.32	21,800,000

FLATHEAD LAKE AT POLSON, MONT.

LOCATION.—At steamboat dock on southern extremity of lake at Polson, Flathead County.

RECORDS AVAILABLE.—August 23, 1908, to September 30, 1918.

GAGE.—Vertical staff attached to a pile at end of pier; datum 2,803.00 feet above sea level. (Prior to 1917 this datum was given as 2,800 feet above sea level.)

EXTREMES OF STAGE.—Maximum stage recorded during year, 90.3 feet June 17–20; minimum stage recorded, 79.0 feet December 16.

1908–1918: Maximum stage recorded, 92.7 feet July 1, 2, and 4, 1916; minimum, 78.5 feet February 16–22, 1913.

COOPERATION.—Gage heights furnished by United States Reclamation Service.

Daily gage height, in feet, of Flathead Lake at Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	80.0	79.35	79.15	80.0	81.0	80.05	80.1	83.6	85.4	87.9	82.2	80.7
2	79.95	79.35	79.1	80.2	80.95	80.0	80.2	83.8	85.5	87.6	82.1	80.7
3	79.95	79.35	79.1	80.5	80.9	80.0	80.3	84.0	85.6	87.2	82.0	80.6
4	79.9	79.3	79.1	80.8	80.85	80.0	80.4	84.2	85.6	86.9	81.9	80.6
5	79.9	79.3	79.1	81.1	80.8	80.0	80.5	84.55	85.6	86.6	81.8	80.6
6	79.85	79.3	79.1	81.3	80.75	79.95	80.6	85.25	85.6	86.3	81.8	80.5
7	79.85	79.3	79.1	81.5	80.7	79.95	80.7	85.9	85.75	86.1	81.7	80.5
8	79.8	79.3	79.1	81.7	80.7	79.95	80.8	86.15	86.0	85.8	81.7	80.5
9	79.8	79.3	79.05	81.9	80.7	79.95	80.9	86.35	86.3	85.6	81.6	80.4
10	79.75	79.3	79.05	81.9	80.65	79.9	81.0	86.55	86.9	85.2	81.6	80.4
11	79.75	79.25	79.05	81.9	80.65	79.9	81.1	86.5	87.5	85.2	81.5	80.4
12	79.7	79.25	79.05	81.85	80.6	79.9	81.2	86.35	88.1	84.9	81.5	80.3
13	79.7	79.25	79.05	81.85	80.6	79.9	81.3	86.3	88.7	84.8	81.4	80.3
14	79.65	79.25	79.05	81.85	80.55	79.9	81.4	86.3	89.3	84.6	81.4	80.3
15	79.65	79.25	79.05	81.8	80.55	79.9	81.5	86.4	89.8	84.4	81.3	80.2
16	79.6	79.25	79.0	81.8	80.5	79.9	81.6	86.5	90.2	84.2	81.3	80.2
17	79.6	79.25	79.05	81.8	80.5	79.9	81.8	86.6	90.3	84.0	81.2	80.2
18	79.55	79.2	79.1	81.8	80.45	79.9	82.0	86.7	90.3	83.85	81.2	80.1
19	79.55	79.2	79.15	81.8	80.4	79.9	82.2	86.7	90.3	83.7	81.2	80.1
20	79.5	79.2	79.2	81.7	80.35	79.9	82.4	86.75	90.3	83.55	81.1	80.1
21	79.5	79.2	79.3	81.6	80.3	79.9	82.5	86.7	90.2	83.4	81.1	80.0
22	79.5	79.2	79.4	81.5	80.25	79.9	82.6	86.6	90.1	83.3	81.1	80.0
23	79.5	79.2	79.45	81.4	80.2	79.95	82.7	86.5	90.0	83.2	81.0	80.0
24	79.45	79.2	79.5	81.3	80.15	79.95	82.8	86.4	89.8	83.1	81.0	80.0
25	79.45	79.15	79.55	81.4	80.15	80.0	82.9	86.2	89.5	83.0	81.0	79.9
26	79.4	79.15	79.6	81.3	80.1	80.0	83.0	86.0	89.3	82.85	80.9	79.9
27	79.4	79.15	79.65	81.25	80.1	80.05	83.1	85.8	89.0	82.7	80.9	79.9
28	79.4	79.15	79.7	81.2	80.05	80.05	83.2	85.6	88.8	82.6	80.8	79.9
29	79.4	79.15	79.75	81.15	.....	80.1	83.3	85.4	88.5	82.5	80.8	79.9
30	79.35	79.15	79.8	81.1	.....	80.1	83.4	85.2	88.2	82.4	80.8	79.8
31	79.35	.....	79.9	81.05	.....	80.15	.....	85.3	.....	82.3	80.7	.....

FLATHEAD RIVER NEAR POLSON, MONT.

LOCATION.—In sec. 19, T. 22 N., R. 21 W., at Mischell's ferry at Norrisvale, 5 miles below Newell tunnel, 15 miles northwest of Ronan, and 12 miles below Polson, Flathead County.

DRAINAGE AREA.—7,010 square miles.

RECORDS AVAILABLE.—July 23, 1907, to September 30, 1918.

GAGE.—Vertical staff in four sections on left bank installed April 9, 1916; read by M. Slyapich. Prior to April 9, 1916, chain gage on right bank at same datum.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 80 feet below gage. Ferry cable removed in 1918 and measurements made at highway bridge at Polson 12 miles upstream.

CHANNEL AND CONTROL.—Control at riffle 1,000 feet below gage; permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet June 19–21 (discharge, 58,400 second-feet); minimum stage, 1.4 feet December 19–20 (discharge, 2,310 second-feet).

1907–1918: Maximum stage recorded, 16.4 feet June 12, 1913 (discharge, 75,400 second-feet); minimum stage recorded, 1.00 foot March 12, 1917 (discharge, 2,000 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice, and open channel rating applied.

DIVERSIONS.—Several small diversions from tributaries above Flathead Lake.

REGULATION.—Flathead Lake affords natural regulation.

ACCURACY.—Stage-discharge relation practically permanent. Daily discharge determined from rating curve which is well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

No discharge measurements made during year.

Daily discharge, in second-feet, of Flathead River near Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,600	2,690	2,490	3,350	5,840	3,010	5,630	17,500	27,000	41,600	12,000	5,840
2	3,470	2,690	2,490	4,020	5,430	3,010	6,060	18,500	27,500	39,700	11,600	5,630
3	3,470	2,690	2,490	5,230	5,040	3,010	5,630	20,000	27,500	37,800	11,300	5,590
4	3,470	2,690	2,490	7,820	5,040	3,010	5,630	21,500	27,500	37,800	10,900	5,550
5	3,470	2,690	2,490	9,000	4,850	2,900	5,840	24,200	27,500	32,200	10,900	5,510
6	3,470	2,690	2,490	9,930	4,850	2,900	6,290	27,500	27,500	31,000	9,620	5,470
7	3,470	2,690	2,490	10,200	4,850	2,900	6,520	29,800	28,100	30,400	8,700	5,430
8	3,470	2,690	2,490	10,600	4,500	2,900	6,520	32,800	29,300	29,800	9,310	5,430
9	3,350	2,690	2,490	11,300	4,330	2,900	6,760	32,800	32,200	28,100	9,310	5,230
10	3,350	2,690	2,490	10,200	4,330	3,880	7,010	32,800	34,600	27,500	9,310	5,230
11	3,230	2,690	2,590	10,200	4,170	4,020	7,270	32,800	38,400	26,400	9,000	5,140
12	3,120	2,690	2,690	10,200	4,170	4,020	7,820	32,200	42,300	24,700	9,000	5,040
13	3,010	2,690	2,590	10,200	4,170	4,020	8,700	32,800	46,200	24,200	9,000	4,940
14	3,230	2,590	2,590	10,200	4,020	4,020	9,620	32,800	50,200	23,100	9,000	4,850
15	3,010	2,590	2,490	10,200	3,880	4,020	9,930	33,400	54,300	22,000	8,700	4,710
16	3,350	2,590	2,490	10,200	3,880	4,020	10,600	33,400	57,000	21,000	8,700	4,580
17	2,900	2,590	2,490	10,200	3,880	4,020	11,300	33,400	57,000	20,500	8,400	4,440
18	2,900	2,590	2,400	9,930	3,880	3,880	11,600	34,000	57,700	19,500	7,820	4,310
19	2,900	2,590	2,310	9,620	3,880	3,880	11,600	34,600	58,400	19,000	7,540	4,170
20	2,790	2,590	2,310	9,620	3,740	3,880	12,000	34,000	58,400	18,000	7,540	4,100
21	2,790	2,590	2,400	9,310	3,740	3,880	13,200	34,000	58,400	17,100	7,540	4,020
22	2,790	2,590	2,590	9,000	3,600	3,880	12,800	33,400	57,000	16,600	7,270	4,000
23	2,790	2,490	2,790	9,000	3,600	3,880	13,200	32,800	56,300	16,200	7,010	3,980
24	2,790	2,490	2,900	8,700	3,350	4,020	13,600	32,200	54,300	16,200	7,010	3,970
25	2,790	2,490	2,790	8,700	3,230	4,170	14,800	31,000	52,200	14,800	6,760	3,960
26	2,790	2,490	2,790	8,700	3,230	4,170	15,300	29,800	50,200	14,400	6,520	3,940
27	2,790	2,490	2,790	8,400	3,230	4,330	15,300	28,700	50,200	13,600	6,520	3,920
28	2,690	2,490	2,790	8,110	3,010	4,500	16,200	27,500	47,500	13,200	6,520	3,910
29	2,690	2,490	2,790	6,520	.....	4,670	16,600	27,000	46,200	12,800	6,290	3,900
30	2,690	2,490	2,790	5,840	.....	4,670	16,600	26,400	44,900	12,400	6,290	3,880
31	2,690	.....	2,790	5,840	.....	4,500	.....	26,400	.....	12,400	6,060	.....

NOTE.—Gage not read; discharge interpolated: Sept. 3-6, 11-13, 15-18, 20, 22-29.

Monthly discharge of Flathead River near Polson, Mont., for the year ending Sept. 30, 1918.

[Drainage area, 7,010 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	3,600	2,690	3,070	0.438	0.50	189,000
November	2,690	2,490	2,610	.372	.42	155,000
December	2,900	2,310	2,580	.368	.42	159,000
January	11,300	3,350	8,720	1.24	1.43	536,000
February	5,840	3,010	4,130	.589	.61	229,000
March	4,670	2,900	3,770	.538	.62	232,000
April	16,600	5,630	10,300	1.47	1.64	613,000
May	34,600	17,500	29,700	4.24	4.89	1,830,000
June	58,400	27,000	44,200	6.31	7.04	2,630,000
July	41,600	12,400	23,000	3.28	3.78	1,410,000
August	12,000	6,060	8,430	1.20	1.38	518,000
September	5,840	3,880	4,690	.669	.75	279,000
The year	58,400	2,310	12,100	1.73	23.48	8,780,000

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 highway bridge at Belton and 2 miles above Lake McDonald outlet, Flathead County.

DRAINAGE AREA.—900 square miles.

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1918.

GAGE.—Inclined gage on left bank back of Hotel Belton; read by Mrs. S. C. Brock.

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

CHANNEL AND CONTROL.—Bed composed of rock ledge and gravel; slightly shifting. No well-defined control. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.85 feet June 11 (discharge, 22,300 second-feet); minimum stage recorded, 1.70 feet November 1–5 (discharge, 295 second-feet).

1910–1918: Maximum stage recorded, 20.0 feet at 9 a. m. June 21, 1916 (discharge determined by extension of rating curve, 49,000 second-feet); minimum stage recorded, 1.3 feet March 29–30, 1912 (discharge, 182 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; discharge not computed because of insufficient data.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation slightly shifting. Rating tables fairly well defined between 325 and 20,000 second-feet. Gage read to half-tenths daily. Daily discharge determined by applying daily gage height to rating table. Records good.

No discharge measurements made during year.

Daily discharge, in second-feet, of Middle Fork of Flathead River at Belton, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	510	295	325	680	485	1,580	5,000	7,910	4,120	1,310	820
2	485	295	325	710	485	1,770	7,250	6,400	3,820	1,390	820
3	485	295	325	770	510	1,580	9,780	5,780	3,260	1,390	820
4	462	295	310	770	535	1,440	15,000	5,980	2,870	1,390	820
5	462	295	310	800	510	1,320	15,600	6,610	2,620	1,390	790
6	440	310	310	830	462	1,400	13,100	8,600	2,510	1,310	790
7	440	310	310	770	462	1,360	11,000	11,800	2,510	1,310	820
8	440	310	310	680	462	1,580	8,600	13,600	2,510	1,230	790
9	420	310	310	680	440	2,080	7,250	18,000	2,560	1,230	730
10	420	310	310	650	420	2,900	7,030	19,600	2,740	1,270	700
11	400	310	310	650	420	3,770	6,820	22,300	2,740	1,310	700
12	400	310	310	650	420	4,450	6,610	18,600	2,340	1,310	670
13	380	310	310	620	420	5,380	6,610	17,600	2,190	1,350	670
14	380	310	310	485	420	5,100	6,820	16,500	2,190	1,310	640
15	380	310	310	485	420	4,270	8,140	15,900	2,140	1,270	640
16	360	310	310	440	420	3,690	9,060	13,600	2,140	1,270	610
17	360	310	.....	400	462	3,170	8,140	12,600	2,090	1,230	610
18	342	310	.....	360	562	2,770	7,250	11,500	2,000	1,230	610
19	342	310	.....	325	650	2,900	7,250	10,300	2,000	1,160	640
20	325	310	.....	325	740	3,030	6,820	9,660	1,910	1,160	640
21	325	310	.....	380	740	2,900	5,980	9,060	1,910	1,040	640
22	325	310	.....	400	800	3,310	5,190	8,370	1,910	1,010	640
23	325	310	.....	510	800	3,610	4,623	7,360	1,730	1,010	640
24	325	325	.....	535	830	3,930	4,270	6,820	1,600	1,040	640
25	325	325	.....	485	1,100	4,100	3,930	5,980	1,550	1,040	580
26	310	325	.....	440	1,240	4,810	3,610	5,380	1,390	1,040	580
27	310	325	.....	485	1,480	5,190	3,460	4,720	1,390	975	552
28	310	325	.....	485	1,620	5,000	4,450	4,200	1,350	940	552
29	310	325	.....	.....	1,480	4,900	5,580	3,820	1,350	940	552
30	310	325	.....	.....	1,440	5,000	6,400	3,540	1,310	880	552
31	310	.....	.....	.....	1,400	.....	9,540	.....	1,310	880	.....

NOTE.—Stage-discharge relation affected by ice Dec. 17 to Jan. 31; discharge not estimated.

Monthly discharge of Middle Fork of Flathead River at Belton, Mont., for the year ending Sept. 30, 1918.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	510	310	378	0.420	0.48	23,200
November	325	295	311	.346	.39	18,500
December 1–16	325	310	313	.348	.21	9,930
February	830	325	564	.627	.65	31,300
March	1,620	420	730	.811	.94	44,900
April	5,380	1,320	3,280	3.64	4.06	195,000
May	15,600	3,460	7,420	8.24	9.50	456,000
June	22,300	3,540	10,400	11.6	12.9	619,000
July	4,120	1,310	2,200	2.44	2.81	135,000
August	1,390	880	1,180	1.31	1.51	72,600
September	820	552	675	.750	.84	40,200

BIG CREEK NEAR POLSON, MONT.

LOCATION.—Near township line between sec. 4, T. 22 N., R. 19 W., and sec. 33, T. 23 N., R. 19 W., just below power house of Mission Range Power Co., three-quarters of a mile above mouth, and 7 miles east of Polson, Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 1, 1917, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank, used since June 14, 1917; inspected by Earl Webster. Prior to that date temporary gage on left bank 200 feet downstream.

CHANNEL AND CONTROL.—Artificial control at gage; repaired August 18, 1917, but not completed until October 29, 1917; shifting. Banks high and are not overflowed.

DISCHARGE MEASUREMENTS.—Made from foot log just below gage or by wading near by.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 1.9 feet June 11–14 (discharge, 38 second-feet); minimum stage, 1.26 feet January 30 (discharge, 1.8 second-feet).

1917–1918: Maximum stage recorded 2.4 feet at 6 p. m. June 9, 1917 (discharge from extension of curve, 104 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation affected by ice for short period.

DIVERSIONS.—None.

REGULATION.—Operation of power plant materially affects flow, maximum being during low water.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined between 5 and 40 second-feet; applied indirectly October 1–22 and March 15–31. Operation of water-stage recorder satisfactory except as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table daily gage height determined by inspection of recorder graph. Records good.

Discharge measurements of Big Creek near Polson, Mont., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 20	R. O. Crawford [a]	1.42	5.2	July 29	W. A. Lamb	1.37	5.8
June 13	do	1.90	38.1	Aug. 2	R. O. Crawford [a]	1.36	5.4
July 13	do	1.50	12.6				

[a] Engineer, U. S. Reclamation Service.

Daily discharge, in second-feet, of Big Creek near Polson, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.1	4.5	7.6	27.0	.....	6.2	10.5	25.0	11.0	10.0	5.8	4.5
2	9.6	4.5	5.4	26.0	.....	6.2	8.6	26.0	9.1	9.6	5.8	5.8
3	10.0	4.5	6.7	20.6	.....	5.0	8.1	26.0	5.8	11.0	5.8	5.4
4	9.6	3.7	6.2	13.8	.....	5.0	8.1	30.0	8.1	18.0	5.8	5.0
5	9.6	4.5	6.2	11.0	.....	5.0	8.6	.....	11.5	12.0	6.2	5.4
6	10.0	4.5	5.8	9.1	.....	5.0	9.1	.....	15.6	12.0	5.8	5.4
7	7.1	4.5	5.0	10.0	6.2	5.0	8.6	.....	18.6	9.1	5.8	5.4
8	10.0	4.1	5.0	7.6	5.8	4.5	10.5	.....	24.5	9.1	6.2	4.5
9	11.0	3.7	4.5	5.4	5.8	5.0	18.0	.....	21.9	9.6	5.8	5.4
10	10.0	3.2	6.7	5.4	5.0	5.0	21.2	.....	31.0	9.1	6.2	5.4
11	11.5	3.2	6.2	5.4	6.2	4.5	16.8	.....	38.0	9.6	6.2	5.8
12	11.5	5.0	5.8	5.4	5.8	4.5	9.1	.....	38.0	9.6	7.1	6.2
13	11.5	4.5	5.8	5.4	5.4	4.5	10.5	.....	38.0	9.1	7.1	5.4
14	8.1	4.1	5.8	5.4	5.4	4.5	23.2	.....	38.0	7.1	7.1	5.8
15	9.1	4.1	6.7	5.4	5.0	5.0	18.0	.....	31.0	8.1	8.1	5.4
16	11.5	4.1	4.5	5.4	5.8	5.0	15.0	.....	24.5	8.1	8.1	5.4
17	7.6	2.5	5.8	4.5	5.4	4.1	13.2	.....	24.5	7.1	7.1	6.2
18	8.6	2.8	12.6	4.5	5.0	5.4	12.0	.....	24.5	6.7	6.2	5.9
19	4.5	4.5	17.4	4.5	5.0	4.5	11.0	.....	24.5	6.2	5.8	5.6
20	3.2	4.5	9.1	4.5	5.0	3.7	12.0	11.0	24.5	6.7	6.7	5.4
21	5.4	4.1	6.2	3.7	5.1	3.7	16.8	11.0	18.0	5.4	5.8	5.2
22	8.1	4.5	5.8	3.7	5.2	5.4	18.6	10.5	18.0	6.2	5.8	5.0
23	7.9	4.1	5.0	3.7	5.3	7.6	18.0	8.1	12.0	6.2	5.8	7.1
24	7.7	5.0	5.2	3.7	5.4	8.1	18.6	7.1	12.0	6.2	5.4	7.1
25	7.5	3.7	5.5	3.7	5.8	10.5	20.6	6.2	9.6	6.7	5.4	7.1
26	7.4	5.8	5.8	4.1	6.2	12.0	17.4	6.2	10.0	6.2	5.4	6.7
27	7.3	6.2	7.6	2.2	6.2	10.5	15.6	6.2	11.0	6.7	5.4	5.4
28	7.2	5.8	10.5	2.0	6.2	9.6	16.2	5.8	11.0	6.2	5.0	6.2
29	7.1	5.8	15.0	2.0	.....	9.1	18.0	6.7	10.0	5.8	5.4	5.4
30	7.6	6.7	21.0	1.8	.....	11.5	21.2	10.0	10.0	5.8	5.0	5.4
31	5.4	.....	28.0	.....	.....	11.0	.....	13.2	.....	5.8	5.4	.....

NOTE.—Recorder not in operation; discharge interpolated Oct. 23–28, Dec. 24–25, 30, Jan. 10–13, Feb. 20–23, March 4–5, Aug. 3, and Sept. 18–21. Staff gage read twice daily June 10 to July 8 and Aug. 11–17.

Monthly discharge of Big Creek near Polson, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	11.5	3.2	8.44	519
November	6.7	2.5	4.42	263
December	28	4.5	8.21	505
January 1–30	27	1.8	7.23	430
February 7–28	6.2	5.0	5.55	242
March	12.0	3.7	6.34	390
April	23.2	8.1	14.4	857
May (16 days)	30	5.8	13.1	416
June	38	5.8	19.5	1,160
July	18.0	5.4	8.23	506
August	8.1	5.0	6.08	374
September	7.1	4.5	5.66	337

JOCKO RIVER NEAR JOCKO, MONT.

LOCATION.—In sec. 10, T. 16 N., R. 19 W., 500 feet above headworks of United States Reclamation Service Jocko K canal, 800 feet above mouth of Big Knife Creek, and 2 miles northeast of Jocko, Missoula County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 11 to September 30, 1918. At old station 2 miles downstream August 20, 1908, to September 30, 1916. Flow at two points not directly comparable as Big Knife Creek enters, and canal diverts between them.

GAGE.—Vertical staff on right bank; read occasionally by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from suspension bridge 50 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel, slightly shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 7.5 feet June 11, (discharge, 2,720 second-feet); minimum discharge during period, 101 second-feet September 29 and 30.

ICE.—Station not in operation during the ice period.

DIVERSIONS.—None above station. Jocko K canal diverts 500 feet below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation fairly permanent; not affected by ice. Rating curve fairly well defined. Gage heights read occasionally to hundredths or tenths. Daily discharge ascertained by applying gage height to rating table for days of gage readings and interpolating discharge for intervals between readings. Records fair.

COOPERATION.—Complete data furnished by United States Reclamation Service. Monthly computations slightly changed to conform to standard rules of computation of United States Geological Survey.

Discharge measurements of Jocko River near Jocko, Mont., during the year ending Sept. 30, 1918.

[Made by R. O. Crawford.[a]]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 11	4.61	326
June 21	5.46	857
July 10	4.30	310

[a] Engineer, U. S. Reclamation Service.

Daily discharge, in second-feet, of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	907	995	374	185	128	16	425	984	1,590	239	170	108
2	.....	929	1,130	374	192	126	17	436	911	1,360	270	166	107
3	.....	952	1,260	358	181	124	18	447	838	1,130	270	162	106
4	.....	975	1,400	328	181	122	19	458	765	1,040	256	159	104
5	.....	998	1,590	328	174	122	20	469	692	948	245	165	103
6	.....	1,020	1,780	310	209	120	21	481	618	856	245	171	104
7	.....	1,040	1,960	292	185	118	22	493	595	812	234	178	105
8	.....	1,060	2,150	276	172	117	23	505	572	768	224	185	106
9	.....	1,070	2,340	276	172	115	24	559	549	724	224	173	107
10	.....	1,080	2,530	261	172	114	25	613	526	680	219	162	106
11	370	1,090	2,720	270	174	112	26	667	503	629	219	151	104
12	381	1,100	2,490	261	176	111	27	721	479	578	256	140	102
13	392	1,120	2,260	261	178	110	28	775	455	527	234	136	102
14	403	1,130	2,040	245	175	109	29	830	590	476	209	133	101
15	414	1,060	1,810	245	173	109	30	885	725	425	199	132	101
							31	.....	860	.....	192	130	.....

NOTE.—Gage read on following days: Apr. 11, 23, 30; May 7, 14, 21, 28; June 4, 11, 18, 21, 25; July 1–31; August 1–10, 13, 16, 19, 23, 27, 29, 31; Sept. 3, 6, 9, 13, 17, 20, 24, 27. Discharge interpolated for intervening days.

Monthly discharge of Jocko River near Jocko, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 11-30	885	370	536	21,300
May	1,130	455	845	52,000
June	2,720	425	1,370	81,500
July	374	192	264	16,200
August	209	130	168	10,300
September	128	101	111	6,600
The period				188,000

REVAIS CREEK NEAR DIXON, MONT.

LOCATION.—In T. 18 N., R. 22 W., below highway bridge near residence of A. Bishop, 4 miles southwest of Dixon, Sanders County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 30, 1911, to September 30, 1916, and October 1, 1917, to 1918.

GAGE.—Staff gage attached to tree on right bank about 100 feet below highway bridge; read by A. Bishop.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders. Control shifts. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.40 feet June 10–11 (discharge, 204 second-feet); minimum discharge, 3.0 second-feet January 23 to March 19 and September 13, 1918.

1911–1918: Maximum stage recorded, 3.7 feet June 19, 1916 (discharge, 512 second-feet); minimum stage recorded, same as in 1918.

ICE.—Stage-discharge relation affected by ice January 30 to February 2 and February 18–22. Discharge estimated at 3.0 second-feet for these periods.

DIVERSIONS.—None of importance.

REGULATION.—None. The melting snow causes small diurnal fluctuation during spring.

ACCURACY.—Stage-discharge relation shifted. Two rating curves used are fairly well defined; one used October 1 to December 31, and the other January 1 to September 30. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean gage height to rating table. Records fair.

COOPERATION.—Records furnished by United States Reclamation Service.

Discharge measurements of Revais Creek near Dixon, Mont., during the year ending Sept. 30, 1918.

[Made by R. O. Crawford.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 7	3.05	157
Aug. 12	1.60	9.19
Sept. 20	1.50	5.35

Daily discharge, in second-feet, of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9	8	8	138	3	3	73	132	106	38	10	5
2	9	8	8	138	3	3	78	158	112	38	10	5
3	9	8	8	125	3	3	68	170	112	38	10	5
4	9	8	8	112	3	3	57	184	125	38	10	5
5	9	8	8	100	3	3	47	191	125	29	10	5
6	9	8	8	89	3	3	29	191	144	29	16	5
7	9	8	8	78	3	3	22	177	170	29	16	5
8	9	8	8	68	3	3	22	177	191	29	16	5
9	8	8	8	68	3	3	29	158	191	29	10	5
10	8	8	8	84	3	3	42	118	204	22	10	5
11	8	8	8	106	3	3	62	94	204	22	10	5
12	8	8	8	84	3	3	84	89	191	22	10	5
13	8	8	13	62	3	3	89	100	191	22	10	3
14	8	8	13	52	3	3	89	112	177	22	10	5
15	8	8	10	34	3	3	78	125	164	22	10	5
16	8	8	9	26	3	3	78	138	164	22	10	5
17	8	8	10	19	3	3	68	138	151	16	10	5
18	8	8	16	10	3	3	68	125	144	16	10	5
19	8	8	22	8	3	3	57	112	138	16	10	5
20	8	8	23	5	3	4	57	112	138	16	10	5
21	8	8	23	5	3	4	62	100	125	16	10	5
22	8	8	23	4	3	4	73	100	112	16	10	5
23	8	8	20	3	3	4	84	89	100	16	10	5
24	8	8	16	3	3	5	94	89	100	16	10	5
25	8	8	12	3	3	13	100	89	89	16	10	5
26	8	8	10	3	3	19	100	89	78	16	10	5
27	8	8	10	3	3	26	89	89	68	16	10	5
28	8	8	16	3	3	29	89	78	57	16	5	5
29	8	8	33	3	.....	29	94	78	47	16	5	5
30	8	8	64	3	.....	29	106	84	38	16	5	5
31	8	.....	142	3	.....	42	.....	94	.....	16	5	.....

Monthly discharge of Revais Creek near Dixon, Mont., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9	8	8.26	508
November	8	8	8.00	476
December	142	8	18.7	1,150
January	138	3	46.5	2,860
February	3	3	3.00	167
March	42	3	8.55	526
April	106	22	69.6	4,140
May	191	78	122	7,500
June	204	38	132	7,860
July	38	16	22.3	1,370
August	16	5	9.94	611
September	5	3	4.93	293
The year	204	3	37.9	27,500

SULLIVAN LAKE NEAR METALINE FALLS, WASH.

LOCATION.—Approximately in sec. 31, T. 39 N., R. 44 E., (unsurveyed) near forest-ranger station at north end of Sullivan Lake, 4¼ miles east of Metaline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1918.

GAGE.—Float gage on dam at outlet of lake, installed May 9, 1913, at same datum and site as staff gage used previously; read by A. J. McDougall.

EXTREMES OF STAGE.—Maximum stage recorded during year, 22.40 feet June 24–29; minimum stage recorded, 6.00 feet April 9.

1912–1918: Maximum stage recorded, 26.6 feet June 17–20, 1916; minimum stage recorded, April 9, 1918.

REGULATION.—Most of surplus flow of Sullivan Creek is diverted into lake. Sufficient water is stored in lake to afford a continuous flow of about 60 second-feet in flume of Inland 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 Inland Portland Cement Co.

Daily gage height, in feet, of Sullivan Lake, near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	18.90	15.90	13.50	11.60	9.70	8.10	6.20	8.30	17.80	22.30	20.50	18.50
2	18.85	15.85	13.50	11.55	9.65	8.00	6.15	8.60	18.00	22.30	19.90	18.50
3	18.80	15.80	13.50	11.40	9.65	7.90	6.20	8.75	18.20	22.20	19.80	.....
4	18.60	15.70	13.40	11.55	9.60	7.90	6.20	8.90	18.60	22.15	19.80	.....
5	18.50	15.65	13.35	11.65	9.60	7.80	6.20	9.65	18.70	22.10	19.75	.....
6	18.40	15.60	13.35	11.60	9.50	7.75	6.20	11.05	18.90	22.05	19.80	17.30
7	18.30	15.50	.....	11.60	9.45	7.70	6.20	11.30	19.05	22.00	19.85	17.30
8	18.20	15.40	13.20	11.60	9.40	7.65	6.20	12.01	19.20	22.10	19.95	17.25
9	18.00	15.20	13.15	11.50	9.30	7.60	6.00	12.35	20.00	22.05	19.90	17.20
10	17.85	15.00	.....	11.50	9.30	7.50	6.05	12.50	20.40	22.10	19.90	17.15
11	17.75	14.90	12.90	11.50	9.20	7.40	6.10	12.70	20.90	22.00	19.85	17.10
12	17.65	14.80	12.85	11.40	9.15	7.35	6.20	12.90	21.40	21.90	19.85	17.05
13	17.60	14.80	12.80	11.40	9.00	7.30	6.20	13.40	21.60	21.90	19.75	17.00
14	17.55	14.70	12.70	11.30	9.00	7.25	6.30	13.70	21.80	21.85	19.70	16.95
15	17.50	14.70	12.60	11.20	9.00	7.20	6.30	14.00	22.00	21.80	19.70	16.90
16	17.40	14.60	12.60	11.10	8.90	7.20	6.30	14.40	22.00	21.75	19.65	16.85
17	17.30	14.60	12.60	11.00	8.80	7.15	6.30	14.70	22.00	21.65	19.60	16.75
18	17.20	14.50	12.55	10.95	8.70	7.10	6.35	15.10	22.10	21.50	19.60	16.70
19	17.10	14.40	12.55	10.90	8.70	7.10	6.30	15.50	22.10	21.40	19.40	16.65
20	17.00	14.35	12.45	10.70	8.65	7.00	6.30	15.65	22.00	21.40	19.30	16.60
21	16.95	14.35	12.40	10.60	8.55	7.00	6.40	15.70	22.00	.....	19.25	16.55
22	16.90	14.30	12.30	10.50	8.50	7.00	6.35	15.95	22.00	21.10	19.30	16.50
23	16.85	14.20	12.20	10.40	8.40	6.80	6.40	16.30	22.20	21.05	19.25	16.50
24	16.75	14.10	12.10	10.30	.....	6.50	6.80	16.40	22.40	21.00	19.10	16.50
25	16.60	14.05	.....	10.25	.....	6.30	7.35	16.55	22.40	20.95	19.05	16.50
26	16.50	14.00	12.00	10.20	.....	6.30	7.50	16.60	22.40	20.95	19.00	16.50
27	16.40	13.90	12.00	10.20	.....	6.30	7.60	16.75	22.40	20.90	19.00	16.50
28	16.30	13.80	11.90	10.10	.....	6.20	7.80	17.00	22.30	20.85	18.90	16.50
29	16.10	13.70	11.80	10.00	.....	6.20	7.90	17.20	22.40	20.70	18.80	16.50
30	16.00	13.60	11.60	9.90	.....	6.20	8.10	17.40	.....	20.60	18.70	16.50
31	15.95	.....	11.55	9.80	.....	6.20	.....	17.60	.....	20.55	18.60	.....

NOTE.—Gage not read on days for which no gage height is given.

SULLIVAN CREEK NEAR METALINE FALLS, WASH.

LOCATION.—In sec. 30, T. 39 N., R. 44 E., one-eighth mile below Outlet Creek, half a mile below Sullivan Lake, and 4 miles east of Metaline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to September 30, 1918.

GAGE.—Vertical staff in four sections on left bank, installed September 21, 1917; read by A. J. McDougall. Prior to September 21, 1917, vertical staff on right bank directly opposite present gage and at same datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 40 feet below gage.

CHANNEL AND CONTROL.—Bed composed of cobblestones and coarse gravel; shifting. Gradient steep. No well-defined control. Banks high and not subject to overflow. Stage of zero flow, according to measurements made October 20, 1918, gage height +0.2 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.7 feet June 9 (discharge, 646 second-feet); minimum recorded stage, 1.30 feet September 25–30 (discharge, 74 second-feet).

1912–1918: 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).

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

DIVERSIONS.—Water is diverted from Sullivan Creek about a mile above station for storage in Sullivan Lake, but entire run-off of drainage basin passes gage.

REGULATION.—Storage in Sullivan Lake is used by Inland Portland Cement Co. to increase low-water flow.

ACCURACY.—Stage-discharge relation changed three times during year. Three fairly well defined rating curves used as follows: October 1 to April 8, May 2 to June 8, June 9 to July 26. Indirect method for shifting control used remainder of year. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records poor during period October to April; fair during remainder of year.

COOPERATION.—Station maintained in cooperation with United States Forest Service and Inland Portland Cement Co.

Discharge measurements of Sullivan Creek near Metaline Falls, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	R. B. Kilgore	2.32	394
June 30	L. D. Carson	1.67	185
30	....do	1.67	191

Daily discharge, in second-feet, of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	97	106	126	123	99	99	123	173	316	166	99	90
2	97	108	123	123	95	99	118	232	273	169	103	88
3	97	108	123	120	95	103	126	384	252	169	106	86
4	95	116	118	133	108	108	128	524	273	166	103	85
5	95	108	118	128	113	83	128	453	294	169	103	84
6	92	108	120	128	108	86	128	407	316	166	103	83
7	97	108	119	123	103	88	128	384	407	166	103	83
8	101	103	118	120	101	68	133	316	600	166	103	81
9	101	101	113	118	103	97	166	294	646	166	126	81
10	101	99	106	113	100	99	186	316	622	166	115	81
11	106	99	99	108	106	101	204	361	598	166	115	81
12	110	99	101	106	106	97	213	430	598	166	103	79
13	115	123	99	106	101	97	200	476	598	173	97	79
14	115	110	99	108	97	92	197	384	574	180	97	79
15	110	103	103	103	95	92	193	453	574	176	95	79
16	112	101	123	106	95	95	190	453	479	173	92	79
17	110	99	128	103	95	95	166	407	410	157	92	77
18	110	97	126	103	95	99	169	361	387	142	92	77
19	110	97	126	103	95	97	180	346	342	136	92	77
20	108	97	123	95	95	106	183	316	342	136	92	77
21	110	101	120	88	95	108	180	252	320	130	103	77
22	106	99	123	99	90	108	180	240	299	123	128	77
23	108	99	118	110	95	113	183	240	299	123	110	75
24	108	99	115	110	95	115	163	232	299	123	97	75
25	108	97	112	115	96	120	160	232	258	123	97	74
26	110	97	108	108	97	136	154	212	219	166	92	74
27	113	97	99	108	98	126	151	212	219	166	92	74
28	106	101	110	110	99	120	180	212	183	145	92	74
29	103	106	110	108	.....	128	173	273	166	110	92	74
30	103	126	120	106	.....	128	173	273	193	103	92	74
31	106	.....	126	97	.....	120	.....	316	.....	99	90	.....

NOTE.—Gage not read Dec. 7, 10, 25, Feb. 24–28, July 21, Sept. 3–5; discharge interpolated

Monthly discharge of Sullivan Creek near Metaline Falls, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	115	92	105	6,460
November	126	97	104	6,190
December	128	99	115	7,070
January	133	88	111	6,830
February	113	90	99.1	5,500
March	136	83	105	6,460
April	211	118	165	9,820
May	524	173	327	20,100
June	646	166	375	22,300
July	180	99	151	9,280
August	128	90	101	6,210
September	90	74	79.1	4,710
The year	646	74	153	111,000

KETTLE RIVER BASIN.

CURLEW CREEK NEAR CURLEW, WASH.

LOCATION.—In sec. 21, T. 38 N., R. 33 E., 400 feet below mouth of Lambert Creek, half a mile below outlet of Curlew Lake, 9 miles above Curlew, and 12 miles northeast of Republic, Ferry County.

DRAINAGE AREA.—About 93 square miles (measured on topographic and Forest Service maps); uncertain because divide between Curlew Creek and San Poil River can not be accurately determined.

RECORDS AVAILABLE.—May 4, 1917, to September 30, 1918.

GAGE.—Vertical staff on right bank attached to upstream wing wall of railroad culvert; read by Henry Kuehne.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Permanent and sensitive control formed by wooden culvert under railroad having a free fall of 1 foot. Banks subject to overflow below gage, but not above. Stage of zero flow, determined October 8, 1918 as −0.12 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.98 foot April 20 and May 23 (discharge, 11.2 second-feet); minimum stage recorded, 0.10 foot September 11 (discharge, 0.7 second-foot).

1917–1918: Maximum stage recorded, 3.08 feet May 30, June 2 and 6, 1917 (discharge, 65 second-feet); minimum stage same as 1918.

ICE.—Stage-discharge relation not affected by ice during year.

DIVERSIONS.—None.

REGULATION.—Natural storage in Curlew Lake.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Curlew Creek near Curlew, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 15	T. R. Newell	0.57	4.6
Apr. 21	R. B. Kilgore	.96	11.1
21	....do	.96	11.5

Daily discharge, in second-feet, of Curlew Creek near Curlew, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.3	1.6	1.8	5.7	4.9	4.1	8.3	9.1	10.9	3.4	1.7	1.1
2	1.2	1.8	1.8	5.7	5.0	4.3	7.8	9.5	8.8	3.2	2.0	1.0
3	1.3	2.0	1.9	5.8	5.1	4.4	7.5	9.8	8.6	3.0	2.2	1.0
4	1.3	2.0	1.9	5.7	5.3	4.6	8.1	10.0	8.4	2.9	2.0	1.0
5	1.3	2.0	2.0	5.4	5.7	4.7	8.6	9.1	8.3	2.8	1.9	.9
6	1.4	1.8	2.0	5.4	5.5	4.9	8.8	8.4	8.1	2.7	1.7	1.0
7	1.4	1.6	2.2	5.2	5.4	5.1	9.1	9.0	8.1	2.7	1.7	.9
8	1.5	1.6	2.2	5.4	5.1	4.9	9.8	9.5	8.4	2.6	1.6	.8
9	1.4	1.6	2.4	5.1	5.1	4.6	9.6	10.0	8.1	2.8	2.3	.8
10	1.3	1.6	2.5	5.1	5.0	4.4	9.5	8.4	7.3	3.0	2.0	.3
11	1.3	1.6	2.8	5.4	5.1	4.5	9.8	8.8	6.8	2.8	2.0	.7
12	1.3	1.7	3.2	5.7	4.9	4.6	10.2	9.1	6.2	2.7	1.9	.8
13	1.3	1.8	3.5	5.7	4.9	4.9	10.5	9.0	5.9	2.5	1.9	.9
14	1.3	1.7	3.5	5.8	5.1	4.6	10.7	9.1	6.1	2.4	1.7	1.0
15	1.3	1.6	3.7	5.9	4.9	4.4	10.3	9.5	5.7	2.3	1.6	1.0
16	1.3	1.6	3.7	5.9	4.6	4.7	10.2	10.2	5.2	2.2	1.4	1.0
17	1.3	1.6	3.9	5.7	4.9	5.1	9.6	10.3	4.9	2.4	1.3	1.0
18	1.2	1.7	4.4	5.7	5.1	5.7	9.8	10.5	4.6	2.3	1.4	.9
19	1.3	1.6	4.6	5.4	5.4	6.1	10.5	10.9	4.4	2.2	1.9	.9
20	1.3	1.7	3.5	5.4	5.4	6.5	11.2	10.9	3.9	2.1	1.9	.8
21	1.3	1.8	3.7	5.1	5.1	6.8	11.1	10.7	3.5	2.0	1.8	.8
22	1.3	1.7	3.9	5.0	4.9	7.5	10.9	10.9	3.4	2.0	1.7	.8
23	1.2	1.7	3.9	4.9	4.4	6.5	10.0	11.2	3.4	1.9	1.6	.8
24	1.1	1.6	4.1	4.6	4.4	7.1	9.5	10.9	5.4	1.7	1.5	.9
25	1.2	1.5	4.4	4.4	4.3	7.6	9.3	10.3	5.1	1.6	1.5	1.0
26	1.3	1.5	4.5	3.9	4.1	8.1	9.1	10.0	5.0	2.5	1.6	.9
27	1.3	1.6	4.6	4.4	4.1	8.4	9.0	9.8	4.9	2.5	1.4	.8
28	1.4	1.6	4.9	4.5	3.9	7.8	8.6	9.8	4.1	2.4	1.3	.8
29	1.3	1.7	5.1	4.6	.....	8.1	8.8	9.6	3.8	2.2	1.3	.9
30	1.4	1.8	5.4	4.6	.....	8.8	9.0	9.8	3.5	2.0	1.2	.8
31	1.5	.....	5.5	4.9	.....	8.4	.....	11.1	.....	1.9	1.2	.....

Monthly discharge of Curlew Creek near Curlew, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1.5	1.1	1.31	80.6
November	2.0	1.5	1.69	101
December	5.5	1.8	3.47	213
January	5.9	3.9	5.23	322
February	5.7	3.9	4.91	273
March	8.8	4.1	5.88	362
April	11.2	7.5	9.51	566
May	11.2	8.4	9.85	606
June	10.9	3.4	6.03	359
July	3.4	1.6	2.44	150
August	2.3	1.2	1.68	103
September	1.1	0.7	0.89	53
The year	11.2	0.7	4.40	3,190

HALL CREEK BASIN.

HALL CREEK AT INCHELIUM, WASH.

LOCATION.—In NE. ¼ sec. 6, T. 32 N., R. 37 E., half a mile above highway bridge, three-fourths mile above mouth of creek, and three-fourths mile northwest of Inchelium, Ferry County.

DRAINAGE AREA.—163 square miles; former location at Wires bridge, 3 miles above mouth, 160 square miles (measured on topographic, Colville Indian Reservation, and Forest Service maps).

RECORDS AVAILABLE.—December 18, 1912, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank used since March 27, 1918; inspected by Walter Johnson. Stevens eight-day recorder in use with same installation, August 27, 1916, to March 27, 1918. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 15 feet downstream or by wading.

CHANNEL AND CONTROL.—Bed of stream composed of gravel and boulders; permanent except at extremely high stages. Banks high. Stage of zero flow, according to measurements made June 22 and September 17, 1917, and October 10, 1918, gage height 0.4 foot ± 0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.57 feet at noon April 10 (discharge, 168 second-feet); minimum stage recorded, 1.24 feet September 28 (discharge, 8 second-feet); minimum discharge probably occurred during period in which stage-discharge relation was affected by ice.

1912–1918: Maximum stage recorded, 3.10 feet at 6.20 a. m. April 16, 1914 (discharge, 965 second-feet); minimum stage in 1918.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, weather records, and discharge measurements.

DIVERSIONS.—Water is diverted for use in Gwen mine power plant but is returned above gage.

REGULATION.—Effect of operation of power plant, negligible.

ACCURACY.—Stage-discharge relation permanent; affected by ice for short periods. Rating curve well defined below 500 second-feet. Operation of water-stage recorder satisfactory subsequent to March 27, but somewhat uncertain for short periods before that time. Daily discharge ascertained by applying to rating tables mean daily gage height determined from inspection of recorder graph. Records good.

Discharge measurements of Hall Creek at Inchelium, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 13	T. R. Newell	1.52	20.8	Apr. 6	T. R. Newell	2.17	82
Mar. 27	do	2.12	75	19	R. B. Kilgore	2.27	101
28	do	2.08	67	May 8	do	2.30	106

Daily discharge, in second-feet, of Hall Creek at Inchelium, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	23	21			18	102	104	51	18	13	10
2	16	23	20			19	91	106	52	18	13	10
3	16	25	20			21	79	106	52	17	17	12
4	16	31	20		12	21	84	106	50	17	16	10
5	16	26	16			20	81	106	49	17	13	10
6	17	23				17	84	102	47	17	13	10
7	17	21				17	87	98	45	18	13	10
8	16	20		23	20	20	96	104	44	16	12	10
9	16	20			20	19	125	102	42	16	15	10
10	17	19	14		19	18	160	95	40	17	17	10
11	17	19			20	18	160	89	38	18	16	10
12	17	20			20	18	160	87	37	18	14	10
13	16	20			20	20	150	82	35	19	13	10
14	16	20			18	20	141	79	34	16	13	10
15	16	20	19		16	20	129	81	32	16	12	10
16	16	20	21	22	22	20	119	87	31	16	12	10
17	16	19	26	21	20	23	112	87	30	15	12	10
18	16	19	30	21	19	31	106	82	28	13	13	10
19	16	18	34	15		40	102	81	26	12	16	9
20	16	18	33			41	104	79	25	11	16	9
21	17	19	28			43	119	76	24	12	15	9
22	17	19	25	14		49	121	74	24	12	15	9
23	17	19				59	121	71	26	12	14	9
24	18	19			11	60	123	69	36	14	12	9
25	18	20		20		66	121	67	28	13	11	9
26	18	19		20		77	114	66	24	14	11	9
27	19	19	21	21		71	110	64	21	21	11	8
28	20	19		22		61	106	60	21	18	11	8
29	20	20		16	.....	69	104	57	19	16	11	9
30	20	20		10	.....	84	104	54	18	15	11	9
31	21	.....		5	.....	102	.....	51	.....	14	11	.....

NOTE.—Stage-discharge relation affected by ice, Dec. 6–14, 23–31, Jan. 1–15, 20–24, 31, Feb. 1–7, 19–28, March 1; mean discharge estimated by periods as shown by braced figures. Recorder not operating Dec. 15, 20–22, Sept. 28–30; discharge estimated.

Monthly discharge of Hall Creek at Inchelium, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	21	16	17.1	1,050
November	31	19	20.6	1,230
December	.....	.....	20.3	1,250
January	.....	.....	19.6	1,210
February	.....	.....	14.6	811
March	102	17	38.1	2,340
April	160	79	114	6,780
May	106	51	83.0	5,100
June	52	18	34.3	2,040
July	21	11	15.7	965
August	17	11	13.3	818
September	12	8	9.6	571
The year	160	.....	33.4	24,200

STRANGER CREEK BASIN.

STRANGER CREEK AT METEOR, WASH.

LOCATION.—In sec. 21, T. 32 N., R. 36 E., at highway bridge at Meteor, about 8 miles southwest of Inchelium, Ferry County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 29, 1916, to September 30, 1918.

GAGE.—Vertical staff on right bank 15 feet downstream from bridge; read by E. J. Sparling.

DISCHARGE MEASUREMENTS.—From highway bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, apparently permanent. Left bank subject to overflow at extremely high stages. Concrete control 6 feet downstream from gage; permanent. Stage of zero flow, according to levels made October 11, 1918, gage height −0.06 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.78 foot April 28 to May 2 (discharge, 25 second-feet); minimum stage recorded, 0.06 foot September 20–23 (discharge, 0.6 second-foot).

1916–1918: Maximum stage recorded, 2.00 feet from May 15, afternoon reading, to May 19, 1917 (discharge, 164 second-feet); minimum stage in 1918.

ICE.—Stage-discharge relation affected by ice for short periods; flow estimated from recorded gage heights, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Stranger Creek at Meteor, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 14	T. R. Newell	0.38	5.3	Apr. 19	R. B. Kilgore	0.75	22.5
Mar. 28	do	.51	10.0	May 7	do	.73	20.5
Apr. 6	do	.60	14.2	7	do	.73	21.0

Daily discharge, in second-feet, of Stranger Creek at Meteor, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.8	2.3	3.5	6.2		5.6	12.4	25	12.9	5.6	2.8	1.0
2	2.8	2.4	3.5	5.9		5.6	12.4	25	12.4	5.6	3.0	1.0
3	2.8	2.6	3.5	5.9	4.5	6.2	13.3	24	12.4	5.0	2.8	1.0
4	2.6	2.8	3.5	5.9		5.9	13.8	24	12.4	5.0	2.8	.9
5	2.6	2.8	3.0	5.9		5.6	14.2	23	12.0	5.0	2.6	.9
6	2.6	2.8	3.5	6.2	5.0	5.6	14.2	22	12.0	4.7	2.4	.9
7	2.6	2.8	3.5	6.2	5.3	5.6	14.2	21	11.6	4.4	2.3	.9
8	2.6	2.8		6.2	5.6	5.6	15.1	22	11.6	4.4	2.1	.9
9	2.6	2.8	3.5	5.6	6.2	5.6	16.1	22	11.2	4.4	2.1	.9
10	2.6	2.8	3.5	5.0	6.2	5.6	16.1	22	10.7	4.4	2.1	.8
11	2.6	2.8	3.5		6.2	5.6	17.2	21	9.9	4.4	2.1	.8
12	2.6	3.0	3.5		5.9	5.6	18.3	21	9.5	5.0	2.1	.8
13	2.6	3.0	3.5	5.0	5.6	6.2	18.9	21	9.1	4.7	1.8	.8
14	2.6	3.0	3.7		5.6	6.2	21	19.5	9.1	4.4	1.8	.8
15	2.6	3.0	3.9		5.6	6.2	21	19.5	9.1	3.9	1.8	.7
16	2.4	3.0	4.7	6.2	5.6	5.9	21	19.5	8.4	3.9	1.8	.7
17	2.4	3.0	5.0	6.2	5.9	6.6	22	18.9	8.4	3.5	1.7	.7
18	2.4	3.0	5.3	6.2	5.9	6.9	21	18.9	7.6	3.5	1.8	.7
19	2.4	3.0	5.9	6.2	5.9	6.9	23	18.3	7.6	3.1	1.8	.7
20	2.4	3.0	6.2			7.3	23	18.3	7.6	3.0	1.7	.6
21	2.4	3.0	6.2	6.0	5.0	7.6	23	17.2	7.3	3.0	1.7	.6
22	2.3	3.0	6.2		5.0	9.1	23	17.2	7.3	3.0	1.7	.6
23	2.3	3.0	6.2	6.2	5.0	9.1	24	16.1	7.6	3.0	1.6	.6
24	2.3	3.0		6.2	5.0	9.5	24	16.1	7.6	3.1	1.6	.7
25	2.3	3.0		6.2	5.0	10.7	24	15.6	7.6	3.0	1.3	.8
26	2.3	3.0	6.0	6.2	5.0	10.7	24	14.7	7.3	3.9	1.3	.7
27	2.3	3.0		6.2	5.0	10.7	24	14.7	6.9	3.3	1.2	.7
28	2.3	3.0		6.2	5.6	10.3	25	14.2	6.6	3.0	1.1	.7
29	2.3	3.1		5.6	.....	11.6	25	14.2	6.6	2.8	1.1	.7
30	2.3	3.3	5.9	5.6	.....	11.6	25	13.8	6.2	2.8	1.1	.7
31	2.3	.....	5.9	5.0	.....	12.4	.....	13.3	.....	2.8	1.0	.....

NOTE.—Braced figures show estimated mean discharge for periods indicated, during which stage-discharge relation was affected by ice.

Monthly discharge of Stranger Creek at Meteor, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2.8	2.3	2.48	152
November	3.3	2.3	2.90	173
December	6.2	3.0	4.71	290
January	6.2	.....	5.81	357
February	6.2	.....	5.31	295
March	12.4	5.6	7.53	463
April	25	12.4	19.6	1,170
May	25	13.3	19.1	1,170
June	12.9	6.2	9.22	549
July	5.6	2.8	3.92	241
August	3.0	1.0	1.87	115
September	1.0	.6	.78	46.4
The year	25	.6	6.94	5,020

SPOKANE RIVER BASIN.

COEUR D'ALENE LAKE AT COEUR D'ALENE, IDAHO.

LOCATION.—In 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, Kootenai County.

DRAINAGE AREA.—3,690 square miles (measured on U. S. Geol. Survey map; scale, 1:500,000).

RECORDS AVAILABLE.—February 11, 1905, to September 30, 1918. April 25, 1903, to February 10, 1905, St. Joe Boom Co.'s gage at mouth of St. Joe River.

GAGE.—Vertical staff on pile at wharf; read by Henry Kloppenburg. Gage datum is 2,100 feet above mean sea level.

EXTREMES OF STAGE.—Maximum stage recorded during year 35.92 feet January 3; minimum stage recorded, 20.52 feet November 28 and 29.

1903–1918: Maximum stage recorded in 1918; 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 used by the Washington Water Power Co. to increase summer flow of Spokane River; regulation is effected by Taintor gates and bear-trap dam at Post Falls.

ACCURACY.—Gage read to hundredths once daily.

COOPERATION.—Gage-height record furnished by the Washington Water Power Co.

Daily gage height, in feet, of Coeur d'Alene Lake at Coeur d'Alene, Idaho, for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	23.14	21.42	20.64	34.65	25.92	24.07	28.60	29.24	26.51	26.31	26.00	25.22
2	23.06	21.36	20.64	35.45	25.72	23.98	28.76	29.32	26.45	26.32	25.98	25.14
3	23.02	21.32	20.66	35.92	25.60	23.92	28.84	29.36	26.36	26.29	25.05	25.12
4	23.00	21.26	20.74	35.85	25.44	23.85	28.76	29.48	26.35	26.28	25.92	25.10
5	22.96	21.24	20.74	35.58	25.34	23.82	28.64	29.66	26.33	26.26	25.90	25.08
6	22.90	21.22	20.78	35.25	25.44	23.74	28.52	29.90	26.34	26.26	25.88	25.06
7	22.84	21.16	20.82	34.89	25.72	23.67	28.40	29.96	26.40	26.25	25.86	25.02
8	22.78	21.12	20.84	34.58	26.12	23.61	28.36	29.92	26.44	26.25	25.84	24.98
9	.....	21.06	20.78	34.24	26.32	23.55	28.32	29.80	26.47	26.26	25.82	24.92
10	22.68	21.00	20.82	33.90	26.36	23.49	28.52	29.64	26.49	26.26	25.80	24.88
11	22.62	20.96	20.86	33.34	26.40	23.45	28.90	29.36	26.52	26.28	25.76	24.86
12	22.56	20.92	20.82	32.86	26.44	23.46	29.30	29.14	26.52	26.27	25.74	24.84
13	22.52	20.88	20.84	32.36	26.42	23.56	29.60	28.86	26.50	26.26	25.72	24.78
14	22.46	20.84	20.94	31.86	26.30	23.59	29.90	28.68	26.48	26.24	25.68	24.74
15	22.38	20.82	21.20	31.36	26.24	23.59	30.10	28.64	26.45	26.22	25.66	24.68
16	22.34	20.80	21.52	30.86	26.04	23.62	30.14	28.66	26.30	26.22	25.64	24.66
17	22.24	20.76	21.82	30.38	25.94	23.68	30.06	28.66	26.20	26.22	25.62	24.64
18	22.20	20.74	22.40	30.00	25.76	23.90	29.88	28.62	26.15	26.20	25.58	24.62
19	22.14	20.72	24.10	29.58	25.60	24.34	29.66	28.54	26.28	26.20	25.58	24.58
20	22.10	20.66	26.32	29.15	25.40	24.73	29.42	28.44	26.23	26.16	25.56	24.54
21	22.00	20.64	27.29	28.80	25.14	24.99	29.18	28.32	26.29	26.12	25.56	24.50
22	21.96	20.62	27.57	28.44	24.94	25.23	29.14	28.16	26.32	26.10	25.56	24.46
23	21.90	20.60	27.73	28.08	24.84	25.54	29.18	28.00	26.33	26.06	25.56	24.42
24	21.86	20.58	28.00	27.76	24.74	25.99	29.32	27.78	26.26	26.04	25.54	24.38
25	21.78	20.56	28.08	27.52	24.64	26.44	29.36	27.58	26.19	26.02	25.52	24.34
26	21.74	20.54	28.03	27.34	24.46	26.99	29.46	27.40	26.23	26.02	25.52	24.30
27	21.72	20.54	28.09	27.14	24.32	27.56	29.52	27.24	26.26	26.06	25.48	24.26
28	21.64	20.52	28.64	26.95	24.20	28.05	29.44	27.04	26.27	26.04	25.44	24.22
29	21.60	20.52	29.74	26.74	.....	28.24	29.34	26.88	26.27	26.04	25.40	24.20
30	21.54	20.56	31.33	26.46	.....	28.36	29.26	26.74	26.29	26.02	25.36	24.16
31	21.48	.....	33.19	26.24	.....	28.46	.....	26.62	.....	26.02	25.32	.....

SPOKANE RIVER AT SPOKANE, WASH.

LOCATION.—In sec. 9, T. 25 N., R. 43 E., above Washington Water Power Co.'s steam plant in Spokane, 2.8 miles above Spokane Falls, and 4 miles above Latah Creek, Spokane County.

DRAINAGE AREA.—3,910 square miles (measured on U. S. Geol. Survey base map, scale, 1:500,000).

RECORDS AVAILABLE.—March 22, 1891, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank 500 feet above Washington Water Power Co.'s steam plant; installed July 31, 1915; inspected daily by power plant attendant. For description of earlier gages see Water-Supply Paper 412. Approximate elevation of gage datum, 1,800 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet upstream from gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; somewhat shifting. Control is stretch of channel contracted by bridge structures and embankments between station and crest of Spokane Falls; shifts at extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 83.5 feet at 8 a. m. January 4 (discharge, 39,600 second-feet); minimum stage, from water-stage recorder, 68.90 feet at 7 p. m. December 9 (discharge 1,520 second-feet).

1891–1918: Maximum stage recorded, 83.8 feet at midnight May 17, 1917 (discharge, 41,900 second-feet); minimum stage recorded, 1.3 feet (Martha Street gage) September 28–30, 1905 (discharge, 1,240 second-feet).

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

DIVERSIONS.—Water is diverted above the station for irrigation by Spokane Valley Land & Water Co.

REGULATION.—Flow is partly regulated by storage in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation changed on April 16. Rating curves before and after change well defined. Water-stage recorder in continuous operation except December 29 to March 7, during which period it was removed on account of danger from high water. Staff gage read once daily throughout the year; to half-tenths until May 3, and to hundredths thereafter. Daily discharge ascertained by applying to rating table mean daily gage-height determined by inspecting recorder graph or, for days of considerable fluctuation by averaging discharge for shorter interval. Daily staff gage readings used December 29 to March 7. Records excellent.

COOPERATION.—Gage-height record furnished by Washington Water Power Co.

Discharge measurements of Spokane River at Spokane, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	John McCombs	69.62	2,320	Apr. 27	R. B. Kilgore	77.11	17,100
Feb. 17	T. R. Newell	73.92	9,810	29	do	76.98	16,800
19	do	73.62	9,120				

Daily discharge, in second-feet, of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,360	2,180	1,570	33,500	10,400	6,510	14,700	16,600	10,700	2,980	1,830	1,830
2	2,300	2,300	1,620	37,300	9,530	6,320	15,200	16,800	10,000	2,920	1,830	1,830
3	2,300	2,240	1,680	39,300	8,480	6,320	15,200	16,800	9,180	2,860	1,830	1,830
4	2,300	2,120	1,680	39,600	9,110	6,320	15,200	17,100	8,150	2,660	1,830	1,780
5	2,300	2,300	1,680	39,300	8,900	5,950	15,200	17,400	8,760	2,600	1,780	1,720
6	2,300	2,300	1,680	38,500	9,110	5,950	14,700	17,900	8,550	2,530	1,780	1,720
7	2,240	2,300	1,680	36,900	9,320	5,950	14,700	18,200	8,760	2,410	1,780	1,720
8	2,240	2,240	1,620	35,800	9,970	5,590	14,400	18,200	10,200	2,410	1,780	1,780
9	2,300	2,240	1,570	34,200	10,400	5,590	14,400	17,900	10,200	2,290	1,830	1,720
10	2,300	2,300	1,570	33,100	10,600	5,590	14,700	17,400	10,500	2,290	1,780	1,720
11	2,300	2,120	1,620	31,300	10,800	5,410	15,500	16,800	10,500	2,230	1,830	1,720
12	2,300	2,180	1,620	29,800	10,800	5,410	16,300	16,300	10,500	2,170	1,830	1,720
13	2,180	2,120	1,680	27,700	10,600	5,590	17,400	15,800	10,500	2,170	1,830	1,720
14	2,240	2,000	1,620	25,900	10,400	5,590	17,900	15,200	10,500	2,170	1,830	1,720
15	2,240	2,000	1,680	24,300	10,400	5,590	18,500	15,200	10,200	2,110	1,830	1,780
16	2,300	1,900	1,620	22,600	9,970	5,590	18,800	15,200	9,600	2,050	1,830	1,780
17	2,360	1,840	1,680	21,400	9,970	5,590	17,900	15,200	8,770	2,050	1,830	1,720
18	2,300	1,840	1,780	20,200	9,530	5,770	17,900	15,200	6,160	2,050	1,830	1,720
19	2,300	1,950	2,120	19,000	9,320	6,320	17,400	15,000	4,790	2,050	1,880	1,720
20	2,300	1,950	3,200	17,900	8,900	7,080	17,100	14,700	6,570	2,050	1,780	1,780
21	2,360	1,840	9,860	16,800	8,690	7,480	16,600	14,500	4,530	2,050	1,720	1,780
22	2,300	1,780	11,100	15,800	8,280	7,880	16,300	14,200	4,850	2,050	1,780	1,780
23	2,300	1,680	11,800	15,200	7,880	8,280	16,300	13,700	5,550	2,000	1,780	1,720
24	2,240	1,680	12,200	14,200	7,880	9,110	16,800	13,200	6,980	2,000	1,780	1,780
25	2,360	1,680	13,200	13,700	7,480	9,970	16,800	13,000	5,160	1,940	1,830	1,720
26	2,300	1,730	13,700	13,200	7,480	10,800	16,800	12,500	3,400	1,880	1,780	1,720
27	2,180	1,680	14,200	12,700	7,080	12,200	17,100	12,000	3,260	1,880	1,720	1,720
28	2,120	1,620	14,400	12,500	6,700	13,400	16,800	11,800	3,330	1,880	1,720	1,780
29	2,180	1,620	17,400	11,800	.....	14,000	16,800	11,600	3,400	1,880	1,620	1,780
30	2,360	1,620	21,400	11,300	.....	14,200	16,800	11,100	3,050	1,830	1,670	1,780
31	2,300	.....	27,300	10,800	.....	14,400	.....	10,900	.....	1,830	1,720	.....

Monthly discharge of Spokane River at Spokane Wash., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,120	2,000	2,070	127,000
November	2,610	2,060	2,300	137,000
December	2,420	2,180	2,330	143,000
January	2,420	2,180	2,330	143,000
February	3,140	2,240	2,780	154,000
March	3,350	2,540	2,890	178,000
April	26,500	3,350	14,200	845,000
May	41,500	24,500	32,900	2,020,000
June	37,700	16,000	25,800	1,540,000
July	15,500	3,000	6,470	398,000
August	3,000	2,480	2,730	168,000
September	2,600	2,360	2,430	145,000
The year	41,500	2,000	8,290	6,000,000

Monthly discharge of Spokane River at Spokane, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	2,360	2,120	2,280	140,000
November	2,300	1,620	1,980	118,000
December	27,300	1,570	6,500	400,000
January	39,600	10,800	24,400	1,500,000
February	10,800	6,700	9,210	512,000
March	14,400	5,410	7,730	475,000
April	18,800	14,400	16,300	970,000
May	18,200	10,900	15,100	928,000
June	10,700	3,050	7,550	449,000
July	2,980	1,830	2,200	135,000
August	1,830	1,620	1,790	110,000
September	1,830	1,720	1,750	104,000
The year	39,600	1,570	8,070	5,840,000

SPOKANE RIVER BELOW LITTLE FALLS, NEAR LONG LAKE, WASH.

LOCATION.—In NW. ¼ sec. 19, T. 27 N., R. 39 E., in Lincoln County, just above Chamokane ferry, 1½ miles below Little Falls power plant of Washington Water Power Co., 4 miles below Chamokane Creek, and 5 miles below Long Lake.

DRAINAGE AREA.—5,690 square miles (measured on U. S. Geol. Survey maps; scale, 1:500,000).

RECORDS AVAILABLE.—November 5, 1912, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank; gage datum 1,200 feet above mean sea level.

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

CHANNEL AND CONTROL.—Bed composed of large boulders; shifting at high stages. No well-defined control. Banks high; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 89.8 feet at 6 p. m. January 3 (discharge 39,400 second-feet); minimum mean daily discharge, 1,720 second-feet September 15; minimum discharge lower when water was below intake (elevation, 75.05 feet) for short periods on July 29, August 4 and 31, and many days in September.

1912–1918: Maximum stage recorded, 90.32 feet at 8.30 p. m. May 18, 1917 (discharge, 41,300 second-feet); minimum stage same as above, and for parts of days during low-water seasons.

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

DIVERSIONS.—Water is diverted by Spokane Valley Land & Water Co. for irrigation above 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 regulation of storage in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation changed January 6 during high water. Rating curves well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by means of discharge integrator except for periods when recorder was out of order, and for period December 29 to January 23, for which mean daily gage height determined by inspecting recorder graph was applied to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Washington Water Power Co.

Discharge measurements of Spokane River below Little Falls, near Long Lake, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Oct. 10	John McCombs	77.17	4,270
Apr. 4	T. R. Newell	83.27	16,900

Daily discharge, in second-feet, of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,980	3,030	2,480	28,200	11,700	7,460	15,600	18,800	12,300	4,300	2,390	1,950
2	2,960	2,990	2,380	33,300	11,000	7,240	16,000	18,600	12,000	3,970	2,430	2,000
3	2,940	2,930	2,440	37,900	10,400	7,520	16,400	18,700	11,100	3,780	2,380	2,030
4	3,020	2,840	2,550	38,700	10,300	7,660	16,500	18,900	10,000	2,840	2,080	2,210
5	2,980	2,960	2,660	38,700	10,400	7,520	16,500	19,100	9,850	3,710		2,330
6	3,080	3,050	2,610	38,700	11,400	7,210	16,500	19,500	10,300	3,310		2,250
7	2,810	2,990	2,580	38,300	12,200	7,020	16,500	20,000	10,600	2,710		2,250
8	3,070	3,070	2,620	37,600	12,400	6,860	16,400	20,500	10,600	3,420		2,080
9	3,080	2,750	2,420	36,500	12,300	6,710	16,200	20,300	11,100	3,240	2,310	2,170
10	3,140	2,850	2,540	35,100	12,300	6,560	16,300	20,000	11,300	3,060		2,310
11	3,100	2,770	2,480	33,600	12,100	6,570	16,600	19,500	11,500	2,970		2,280
12	2,890	2,950	2,520	31,800		6,680	17,400	18,800	11,600	2,840		2,180
13	3,070	2,980	2,480	30,400		7,020	18,100	18,100	11,600	2,780	2,350	2,140
14	2,720	3,100	2,400	28,600		7,080	19,000	17,600	11,500	2,470	2,300	2,120
15	3,000	3,060	2,390	27,200	12,000	7,120	19,800	17,300	11,400	2,630	2,280	1,720
16	3,060	2,910	2,340	25,500		7,240	20,300	17,300	11,000	2,810	2,270	2,110
17	2,950	2,960	2,490	24,200		7,240	20,300	17,000	10,500	2,770	2,190	2,250
18	3,090	2,410	2,400	22,800		7,280	20,200	17,000	9,380	2,700	1,920	2,050
19	2,780	2,650	2,260	20,500	10,400	7,820	19,600	16,900	7,160	2,660	2,170	2,100
20	3,090	2,720	2,560	19,500	9,980	8,500	19,200	16,800	6,890	2,600	2,340	2,140
21	2,650	2,660	4,210	19,200	9,550	8,890	18,700	16,600	6,720	2,320	2,390	2,140
22		2,590	8,320	18,300	9,250	9,160	18,300	16,300	5,830		2,330	1,880
23		2,620	10,100	17,400	9,100	9,520	17,900	15,800	5,670		2,360	2,200
24		2,530	11,100	16,300	8,830	9,980	18,100	15,500	6,420		2,230	2,080
25		2,340	11,700	15,500	8,560	10,800	18,300	15,100	6,640		1,930	2,050
26	2,800	2,410	12,900	15,200	8,340	11,600	18,600	14,600	5,710	2,510	2,260	2,160
27		2,520	13,400	15,000	7,830	12,700	19,000	14,100	4,770		2,390	2,100
28		2,500	13,800	14,500	7,650	13,900	19,100	13,700	4,820		2,450	1,990
29		2,340	16,400	13,900	.....	14,700	19,100	13,200	4,610	2,430	2,400	1,920
30	2,810	2,400	19,700	13,100	.....	15,200	18,800	12,800	3,650	2,490	2,320	2,270
31	2,920	.....	23,500	12,200	.....	15,400	.....	12,400	.....	2,560	2,280	.....

NOTE.—Braced figures show mean discharge for periods indicated; discharge for first period estimated from discharge at Spokane, and for remaining periods estimated from gage-height record on tailrace of power plant 1½ miles upstream.

Monthly discharge of Spokane River below Little Falls, near Long Lake, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3,140	2,650	2,920	180,000
November	3,100	2,340	2,760	164,000
December	23,500	2,260	6,280	386,000
January	38,700	12,200	25,700	1,580,000
February	12,400	7,650	10,700	594,000
March	15,400	6,560	8,910	548,000
April	20,300	15,600	18,000	1,070,000
May	20,500	12,400	17,100	1,050,000
June	12,300	3,650	8,880	528,000
July	4,300	2,320	2,870	176,000
August	2,450	1,920	2,290	141,000
September	2,330	1,720	2,120	126,000
The year	38,700	1,720	9,050	6,540,000

NESPELEM RIVER BASIN.

NESPELEM RIVER AT NESPELEM, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 31 N., R. 30 E., half a mile above Nespelem, Okanogan County, 5 miles above Little Nespelem River, and 6 miles above mouth.

DRAINAGE AREA.—122 square miles (measured on map of Colville Indian Reservation, edition of 1911).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1918.

GAGE.—Vertical staff on left bank at gaging bridge, installed October 19, 1916; read by Charles Kronk; inclined staff which was read during 1916, used October 5 to December 14, 1917. Prior to July 30, 1913, gage was about 1,000 feet upstream at different datum; July 30, 1913, to November 4, 1915, vertical staff at same site as present gage but at datum 0.38 foot lower; November 5, 1915, to October 18, 1916, inclined staff at same site as present gage but at datum 0.47 foot lower.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; overgrown with aquatic plants during summer. Concrete control built in November, 1915; new concrete control built at same site in October, 1916; permanent. Right bank flat; subject to overflow at gage height 4.0 feet; left bank high; not subject to overflow. Stage of zero flow for new control, according to measurements made October 3, 1917, and October 15, 1918, gage height 0.4 foot ± 0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.28 feet, March 3 (discharge, 51 second-feet); minimum stage recorded, 0.78 foot September 3–30 (discharge, 8.0 second-feet).

1911–1918: Maximum stage recorded, 4.75 feet at 9 a. m. April 16, 1914 (discharge, 442 second-feet); minimum stage recorded January 16–27 and March 1 and 2, 1917 (discharge, 6.7 second-feet).

ICE.—Stage-discharge relation seldom affected by ice.

DIVERSIONS.—Above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of Nespelem River at Nespelem, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Inclined gage.	Vertical gage.				Inclined gage.	Vertical gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Oct. 3	John McCombs	1.28	0.81	8.6	Apr. 11	T. R. Newell	1.71	1.24	44.8
4	do	1.28	.81	9.4	24	R. B. Kilgore	.....	1.24	48.7
Apr. 1	T. R. Newell	1.59	1.13	32.3	24	do	.....	1.24	47.5
2	do	.....	1.14	33.7	25	do	.....	1.24	45.4
10	do	1.68	1.22	42.9					

Daily discharge, in second-feet, of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.5	9.0	10.1	11.2	11.7	15.2	33	40	20	10.6	8.2	8.2
2	9.0	9.0	10.6	11.7	11.2	16	34	39	19.6	9.6	9.6	8.2
3	9.0	9.0	10.6	11.7	11.2	51	33	37	18.8	9.6	9.0	8.0
4	9.0	9.0	10.6	12.2	11.7	42	34	36	18.1	9.6	8.2	8.0
5	8.5	10.1	10.1	12.2	12.2	37	34	35	18.1	9.6	8.2	8.0
6	8.5	9.6	10.1	12.7	29	19.6	35	34	17.4	9.6	8.2	8.0
7	8.5	9.6	10.1	13.8	17.4	17.4	35	34	17.4	9.6	8.2	8.0
8	8.5	9.6	10.1	13.8	13.3	15.2	37	34	17.4	9.6	8.2	8.0
9	8.5	9.6	9.6	13.3	13.8	13.8	39	35	16.7	9.6	8.2	8.0
10	8.5	9.6	9.6	12.7	13.3	13.8	44	34	16	9.0	8.2	8.0
11	8.5	9.6	10.1	12.2	13.3	14.5	46	33	14.5	8.5	8.2	8.0
12	8.5	10.1	10.1	12.2	13.3	14.5	49	31	13.8	8.5	8.2	8.0
13	8.5	10.1	10.1	12.2	13.8	16	50	30	13.8	8.5	8.2	8.0
14	8.5	10.1	10.1	12.2	13.3	16	50	29	13.3	8.5	8.2	8.0
15	8.5	9.6	10.6	12.2	13.3	17	48	30	13.3	9.6	8.2	8.0
16	8.5	9.6	10.6	12.2	13.3	17	46	31	13.3	8.5	8.5	8.0
17	9.0	9.6	11.2	12.2	13.3	18	44	33	13.3	8.5	8.5	8.0
18	9.0	9.6	11.7	12.7	13.3	18	41	31	12.7	8.2	8.5	8.0
19	9.0	9.6	12.2	13.3	13	19	40	30	12.7	8.2	8.5	8.0
20	9.0	10.1	11.7	13.3	13	19.6	41	29	12.2	8.2	8.2	8.0
21	9.0	10.1	11.7	12.7	12.7	20.3	42	29	11.7	8.2	8.2	8.0
22	9.0	10.1	11.7	12.7	12.7	21	45	28	11.2	8.2	8.2	8.0
23	9.0	9.6	11.7	12.2	13.3	21	46	27	11.2	8.2	8.2	8.0
24	9.0	9.6	11.2	12.2	13.3	21	46	27	11.7	9.0	8.2	8.0
25	9.0	10.1	11.2	12.2	13.3	22	46	26	11.7	9.0	8.2	8.0
26	9.0	10.1	11.2	11.7	12.7	23	46	26	11.2	11.2	8.2	8.0
27	9.0	10.1	10.6	11.7	13.8	23	48	25	11.2	10.1	8.2	8.0
28	9.0	10.1	10.6	11.7	14.5	24	48	24	11.2	10.1	8.2	8.0
29	9.0	10.1	10.6	11.7	.....	26	46	23	11.2	9.6	8.2	8.0
30	9.0	10.1	11.2	11.7	.....	26	44	23	11.2	9.0	8.2	8.0
31	9.0	.....	11.2	11.7	.....	29	.....	21	.....	8.5	8.2	.....

NOTE.—Gage not read, discharge interpolated; Oct. 1, 2, 4, 8, 9, Jan. 15, 29, 30, Feb. 4, 19, 20, Mar. 14–19, and Sept. 22.

Monthly discharge of Nespelem River at Nespelem, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9.0	8.5	8.79	540
November	10.1	9.0	9.74	580
December	12.2	9.6	10.7	658
January	13.8	11.2	12.3	756
February	29	11.2	13.7	761
March	51	13.8	21.5	1,320
April	50	33	42.3	2,520
May	40	21	30.5	1,880
June	20	11.2	14.2	845
July	11.2	8.2	9.12	561
August	9.6	8.2	8.31	511
September	8.2	8.0	8.01	477
The year	51	8.0	15.8	11,400

OKANOGAN RIVER BASIN.

OKANOGAN RIVER AT OKANOGAN, WASH.

LOCATION.—In sec. 16, T. 33 N., R. 26 E., at Okanogan, Okanogan County, a quarter of a mile above Salmon Creek.

DRAINAGE AREA.—7,740 square miles (measured on topographic maps and maps of Okanogan National Forest, Colville Indian Reservation, and Canadian railway belt).

RECORDS AVAILABLE.—May 10, 1911, to September 30, 1918.

GAGE.—Inclined and vertical staff on left bank 300 feet above steamboat dock at Okanogan, installed March 3, 1917; read by C. R. Altman. Prior to October 21, 1915, and from April 28 to August 27, 1916, vertical staff attached to steamboat dock; October 21, 1915, to April 27, 1916, and August 28, 1916, to March 2, 1917, inclined gage at same site as present gage. All gages at same datum.

DISCHARGE MEASUREMENTS.—Made from boat at gage or from highway bridge at Omak, 4 miles upstream.

CHANNEL AND CONTROL.—Bed composed of boulders and cobblestones; likely to shift at extremely high water. No well-defined control. Banks fairly high. One channel at all stages. Stage of zero flow estimated on October 4, 1918, gage height −2.4 feet ±0.5 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.2 feet June 15 (discharge, 16,200 second-feet); minimum stage recorded, 1.50 feet December 28 (discharge, 520 second-feet).

1911–1918: Maximum stage recorded, 12.21 feet June 20, 1916 (discharge, 22,200 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation not affected during year.

DIVERSIONS.—Numerous small ditches divert water for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read once daily to hundredths, except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying daily gage height to rating table. Records good except for period estimated.

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

Discharge measurements of Okanogan River at Okanogan, Wash., during the year ending Sept. 30, 1918.

[Made by L. D. Carson.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Feb. 10	2.80	1,460	June 17	9.85	13,200
Apr. 6	2.48	1,080	20	8.88	11,100
9	2.61	1,210			

Daily discharge, in second-feet, of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,030	a 960	1,180	a2,730	1,180	1,100	1,180	6,450	11,300	5,930	2,360	a 1,260
2	1,030	a 960	a1,140	4,360	1,180	1,100	1,180	7,530	10,000	5,440	2,250	a 1,220
3	1,030	960	1,100	5,600	1,100	a1,060	1,180	8,700	8,900	5,120	2,250	1,180
4	1,030	a 1,000	1,100	4,070	1,030	1,030	1,180	10,000		a 4,890	a2,200	1,180
5	1,030	1,030	1,030	3,550	1,180	1,030	1,180	a10,800		4,660	2,140	1,100
6	1,100	1,030	1,030		1,430	960	1,100	11,700	11,500	4,510	2,030	1,100
7	a1,100	1,180	960		1,520	960	a1,140	10,900		a 4,290	1,920	1,030
8	1,100	a 1,140	890		1,430	890	1,180	10,000		4,070	1,920	a 1,030
9	1,030	1,100	a 940		1,340	890	1,180	9,300		4,070	1,820	1,030
10		1,100	a1,000		1,340	a 920	1,180	8,500	13,600	3,930	1,820	1,030
11		a1,100	a1,050		1,430	960	1,260	8,100	15,200	4,070	a1,820	960
12		a1,100	1,100		1,380	890	1,520	a 8,700	16,000	3,800	1,820	960
13		a1,100	1,030		1,340	960	1,720	9,300	16,000	4,070	1,820	890
14		a1,100	1,030		1,340	890	a1,880	10,600	16,000	a 3,810	1,920	890
15		1,100	a1,000	2,180	1,260	960	2,030	12,000	16,200	3,550	1,820	a 890
16		1,100	960		1,100	960	2,030	12,900	16,000	3,430	1,820	890
17		1,100	960		1,060	a1,030	2,030	12,400	12,900	3,550	1,720	830
18		a1,060	960		1,030	1,100	1,920	12,000	12,400	3,550	a1,770	830
19		1,030	1,030		960	1,080	1,920	a11,200	12,000	3,190	1,820	830
20	1,000	1,030	a1,030		960	960	1,820	10,400	11,100	3,190	1,820	830
21		1,030	1,030		960	960	a2,200	9,600	10,200	a 3,070	1,820	830
22		1,030	1,180		1,000	890	2,590	8,500	10,000	2,950	1,820	a 830
23		1,520	a1,040		1,080	960	3,670	8,100	9,300	2,830	1,720	830
24		1,920	890	2,140	1,030	a 960	4,070	7,530	9,300	2,710	1,720	770
25		a1,680	a 920	1,920	1,030	960	4,510	7,170	8,900	2,590	1,520	770
26		1,430	960	1,520	1,100	890	4,360	a 6,810	8,500	2,590	1,520	770
27		1,340	960	a1,480	1,100	890	4,360	6,450	7,910	2,590	1,480	770
28		1,340	520	1,430	1,100	a 950	a4,510	6,270	7,350	a 2,650	1,430	770
29		1,260	890	1,430	.....	a1,010	4,660	6,270	6,810	2,710	1,430	a 770
30		1,180	a1,000	a1,300	.....	a1,070	5,280	7,350	a 6,370	2,590	1,340	770
31		.....	1,100	1,180	.....	a1,130	.....	8,700	.....	2,470	a1,300	.....

a Interpolated.

NOTE.—Braced figures show mean discharge for periods indicated; estimated by comparison with record of Similkameen River near Oroville.

Monthly discharge of Okanogan River at Okanogan, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,100	.....	1,020	62,700
November	1,920	960	1,170	69,600
December	1,180	520	1,080	61,500
January	5,600	1,180	2,320	143,000
February	1,520	960	1,180	65,500
March	1,130	890	979	60,200
April	5,280	1,100	2,330	139,000
May	12,900	6,270	9,170	564,000
June	16,200	6,370	11,400	678,000
July	5,930	2,470	3,640	224,000
August	2,360	1,300	1,800	111,000
September	1,260	770	928	55,200
The year	16,200	520	3,080	2,230,000

SIMILKAMEEN RIVER NEAR OROVILLE, WASH.

LOCATION.—In SE. ¼ sec. 13, T. 40 N., R. 26 E., at Okanogan Valley Power Co.'s plant, 4 miles above Oroville, Okanogan County, 5 miles above mouth; below all tributaries.

DRAINAGE AREA.—3,450 square miles (measured on topographic maps and Canadian railway belt maps).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1918.

GAGE.—Vertical staff in seven sections on left bank—three sections 15 feet above tailrace and four sections fastened to power house; read by A. W. Mitchell.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Oroville, 4 miles downstream.

CHANNEL AND CONTROL.—Narrow canyon at gage and control; fairly permanent. Banks high, not subject to overflow. Lower falls (25 feet high) 150 feet upstream from gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.2 feet at 11 p. m. June 14 (discharge, 17,200 second-feet); minimum stage recorded 1.10 feet September 22–24 (discharge, 348 second-feet).

1911–1918: Maximum stage recorded, 18.3 feet at 7 a. m. June 19, 1916 (discharge, 20,600 second-feet). Minimum discharge uncertain, but estimated at 230 second-feet January 31, 1917, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, weather records, and discharge measurements.

DIVERSIONS.—Some water is diverted for irrigation from tributaries above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually during the summer; affected by ice for short periods. Rating curve well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used June 23 to September 30. Records excellent from October to June, except for periods when stage-discharge relation was affected by ice; good from July to September.

COOPERATION.—Gage-height record furnished by Okanogan Valley Power Co.

Discharge measurements of Similkameen River near Oroville, Wash., during the year ending Sept. 30, 1918.

[Made by L. D. Carson.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 7	a 2.53	912
Apr. 7	2.19	825
8	2.27	904
June 22	10.53	8,670

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	435	453	758	3,870		709	809	7,220	9,300	4,540	1,320	662
2	453	453	758	5,050		709	862	8,260	8,390	4,340	1,260	617
3	417	453	662	4,240		709	862	9,440	7,740	4,140	1,320	662
4	417	472	662	3,330		709	809	11,000	7,480	3,690	1,260	617
5	531	573	662	2,910	830	662	809	11,800	7,740	3,420	1,140	573
6	531	662	662	2,590		617	862	10,700	8,650	3,240	1,080	531
7	491	617	617	2,350		662	862	10,100	9,580	2,990	1,020	511
8	472	662	573	2,270		662	915	9,040	11,900	2,910	970	491
9	453	617	573	2,130	915	662	970	8,390	13,100	2,750	915	491
10	453	573		1,710	862	617	1,020	7,870	14,300	2,910	915	491
11	435	573		1,320	915	617	1,260	7,870	16,400	3,600	915	453
12	453	573			915	662	1,580	8,520	16,400	2,990	970	417
13	417	573	510		862	617	1,710	9,580	15,000	2,670	1,080	435
14	417	573		1,430	862	662	1,780	11,000	16,700	2,430	970	417
15	417	573			809	662	1,780	12,200	15,000	2,350	970	400
16	382	573			758	662	1,640	13,200	11,900	2,510	970	400
17	382	573	573	1,450	709	662	1,580	11,900	10,700	2,350	1,020	382
18	400	531	662	1,450	662	662	1,580	11,300	10,600	2,270	1,020	382
19	417	531	709	1,380	573	662	1,580	10,000	9,720	2,130	1,020	382
20	417	531	809			662	1,640	9,040	8,780	2,200	1,020	365
21	417	531	915	1,110		662	2,270	8,260	9,170	1,990	1,020	365
22	435	1,380	915			662	3,510	7,610	8,780	1,850	1,020	348
23	453	1,380	809			662	3,9 0	6,980	8,650	1,710	970	348
24	453	1,140			600	617	4,140	6,590	8,260	1,640	915	348
25	453	970		1,200		617	4,540	6,040	7,350	1,580	915	400
26	453	915	640	1,140		662	4,340	5,600	6,740	1,580	862	417
27	453	862		1,080		662	4,140	5,380	6,260	1,710	809	382
28	453	809		1,020		662	4,440	5,380	5,710	1,780	758	365
29	435	809	709		.....	662	4,940	6,040	5,380	1,640	709	365
30	435	758	1,640	800	.....	662	6,040	7,870	4,740	1,450	709	348
31	453	.....	4,340		.....	709	.....	10,000	.....	1,380	709	.....

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice.

Monthly discharge of Similkameen River near Oroville, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	531	382	441	27,100
November	1,380	453	690	41,100
December	4,340	.....	799	49,100
January	5,050	.....	1,790	110,000
February	.....	.....	746	41,400
March	709	617	661	40,600
April	6,040	809	2,240	133,000
May	13,200	5,380	8,840	544,000
June	16,700	4,740	10,000	595,000
July	4,540	1,380	2,540	156,000
August	1,320	709	986	60,600
September	662	348	446	26,500
The year	16,700	348	2,540	1,820,000

SALMON CREEK NEAR CONCONULLY, WASH.

LOCATION.—In sec. 18, T. 35 N., R. 25 E., half a mile below Conconully reservoir, Okanogan project of United States Reclamation Service, 2 miles south of Conconully and 14 miles above Okanogan, Okanogan County.

DRAINAGE AREA.—121 square miles; 164 square miles (revised measurement) at Jones ranch (measured on topographic maps).

RECORDS AVAILABLE.—July 6, 1910, to September 30, 1918. From April 12, 1903, to March 31, 1912, records were obtained at Jones ranch in sec. 31, T. 34 N., R. 26 E., about 3 miles above Okanogan.

GAGE.—Vertical staff half a mile below reservoir indicates head on weir; read by Allen Honey.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage.

CHANNEL AND CONTROL.—20-foot recatangular sharp-crested weir with two end contractions; prior to October 1, 1912, a 20-foot Cippoletti weir.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.58 feet from 8.45 p. m. June 12 to 11 p. m. June 13 (discharge, 143 second-feet); minimum stage recorded, 0.06 foot on numerous days during October to December (discharge, 1.3 second-feet).

1903–1918: 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.

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

DIVERSIONS.—None.

REGULATION.—Flow 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 1912–1918 have been corrected for storage.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once daily and oftener when head was changed. Daily discharge ascertained by applying daily gage height to rating table or, for days when head was changed, by taking weighted mean of results obtained by applying to rating table gage heights for various periods of constant head. Records excellent.

COOPERATION.—Gage-height record and storage determinations furnished by United States Reclamation Service.

Two independent discharge measurements were made on June 16 by L. D. Carson. During both measurements the gage height was 1.53 feet and discharge, 138 second-feet.

Daily discharge, in second-feet, of Salmon Creek near Conconully, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	1.3	1.5	1.5	1.7	1.7	1.9	2.8	14	12	7.9	22
2	1.5	1.3	1.5	1.5	1.7	1.7	1.9	4.2	14	16	6.3	22
3	1.5	1.3	1.5	1.5	1.7	1.7	1.9	18	14	14	5.4	22
4	1.5	1.3	1.5	1.5	1.7	1.7	1.9	19	14	15	7.0	23
5	1.5	1.3	1.5	1.5	1.7	1.7	1.9	25	17	15	11	18
6	1.5	1.3	1.3	1.5	1.7	1.7	1.9	30	23	15	6.1	19
7	1.5	1.3	1.3	1.5	1.7	1.7	1.9	41	26	20	10.0	20
8	1.5	1.3	1.3	1.5	1.7	1.7	1.9	51	32	25	10.5	21
9	1.5	1.3	1.3	1.5	1.7	1.7	1.9	63	53	25	10.5	18
10	1.5	1.3	1.3	1.5	1.7	1.7	1.9	72	80	28	10.5	13
11	1.5	1.3	1.3	1.5	1.7	1.7	1.9	78	126	28	15	15
12	1.3	1.3	1.3	1.5	1.7	1.7	1.9	78	140	27	17	15
13	1.3	1.3	1.3	1.5	1.7	1.7	1.9	108	143	25	26	15
14	15	2.8	1.3	1.5	1.7	1.7	1.9	113	140	25	30	16
15	53	4.0	1.3	1.5	1.7	1.9	2.8	115	139	24	33	16
16	56	4.0	1.7	1.5	1.7	1.9	5.1	114	135	23	28	16
17	15	4.0	1.7	1.7	1.7	1.9	4.0	110	124	22	28	6.3
18	1.5	4.0	1.7	1.7	1.7	1.9	4.0	95	110	13	26	8.6
19	1.3	4.0	1.7	1.7	1.7	1.9	4.0	2.5	82	13	28	12
20	1.3	4.0	1.5	1.7	1.7	1.9	4.0	11	25	27	22	17
21	1.3	4.0	1.5	1.7	1.7	1.9	4.0	18	28	74	32	10.3
22	1.3	4.0	1.5	1.7	1.7	2.1	4.0	18	27	115	32	8.0
23	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	20	132	30	16
24	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	20	54	26	15
25	1.3	4.0	1.5	1.7	1.7	2.1	4.0	20	16	47	26	15
26	1.3	2.1	1.5	1.7	1.7	2.1	4.0	20	15	26	24	15
27	1.3	1.5	1.7	1.7	1.7	2.1	4.0	18	12	23	23	15
28	1.3	1.5	1.7	1.7	1.7	2.1	4.0	10.3	15	22	22	15
29	1.3	1.5	1.7	1.7	.....	1.9	4.0	14	16	19	22	16
30	1.3	1.5	1.7	1.7	.....	1.9	4.0	14	13	19	22	16
31	1.3	.....	1.7	1.7	.....	1.9	.....	14	.....	17	22	.....

Monthly discharge of Salmon Creek near Conconully, Wash., for the year ending Sept. 30, 1918.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Mean discharge without storage, in second-feet.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	
October	56	1.3	5.69	350	+ 226	576	9.37
November	4.0	1.3	2.39	142	+ 476	618	10.4
December	1.7	1.3	1.49	91.6	+ 617	709	11.5
January	1.7	1.5	1.60	98.4	+ 544	642	10.4
February	1.7	1.7	1.70	94.4	+ 376	470	8.46
March	2.1	1.7	1.85	114	+ 515	629	10.2
April	5.1	1.9	3.02	180	+ 906	1,090	18.3
May	115	2.5	42.8	2,630	− 504	2,130	34.6
June	143	12	54.4	3,240	−2,040	1,200	20.2
July	132	12	31.0	1,910	−1,640	270	4.39
August	33	5.4	20.0	1,230	−1,070	160	2.60
September	23	6.3	15.9	946	− 580	366	6.15
The year	143	1.3	15.2	11,000	−2,170	8,860	12.2

METHOW RIVER BASIN.

METHOW RIVER AT PATEROS, WASH.

LOCATION.—In sec. 2, T. 29 N., R. 23 E., three-fourths mile above highway bridge at Pateros, Okanogan County, and 1 mile above mouth.

DRAINAGE AREA.—1,850 square miles (measured on topographic and Forest service maps).

RECORDS AVAILABLE.—June 17, 1903, to September 30, 1918. (Records, June 17, 1903, to September 30, 1914, are revised and presented in this paper.)

GAGE.—Inclined and vertical staff gage on left bank three-fourths mile above highway bridge; read by F. W. Robinson, Sarah E. Pasley, Walter Young, and Ella R. Yowell.

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. No well-defined control. One channel at all stages. Right bank high and not subject to overflow; left bank not subject to overflow below gage height 12 feet. Stage of zero flow, according to measurements made October 1, 1918, gage height 1.3 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.98 feet at 8.30 a. m. June 14 (discharge, 9,510 second-feet); minimum stage probably occurred during period in which stage-discharge relation was affected by ice.

1903–1918: Maximum stage recorded, 11.6 feet, May 11, 1910 (discharge, 14,900 second-feet). Minimum flow estimated at 230 second-feet January 3 and 4, 1912, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Many small ditches divert water for irrigation above station.

REGULATION.—None.

ACCURACY.—(1918) stage-discharge relation changed at high water June 13; affected by ice as indicated in footnote to table of daily discharge. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records excellent, others fair.

Discharge measurements of Methow River at Pateros, Wash., during the years ending Sept. 30, 1914, 1915, and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1913–14.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
June 28	C. O. Brown	7.18	[a] 3,880	Feb. 5	L. D. Carson	4.30	550
28	do	7.15	[a] 3,790	11	do	4.16	482
Aug. 18	do	4.31	[a] 519	Apr. 4	do	4.50	695
1914–15.				4	do	4.50	705
Jan. 30	J. T. Hartson	[b] 4.68	513	Apr. 12	do	5.24	1,280
Feb. 2	do	[b] 4.46	493	12	do	5.28	1,320
June 2	do	6.98	[a] 3,500	June 18	do	8.15	5,660
3	do	6.85	[a] 3,420	19	do	7.85	4,900
Aug. 11	C. O. Brown	4.48	651				

[a] Corrected since previous publication on account of arrangement of meter and weight or weights.
[b] Stage-discharge relation affected by ice.

NOTE.—Measurements made during 1913–14 listed here are only those which have been revised; others will be found in Water-Supply Paper 392.

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1903.					1903.				
1	.....	6,410	1,690	890	16	.....	2,940	1,150	820
2	.....	6,000	1,570	820	17	13,200	2,790	1,060	750
3	.....	5,600	1,460	750	18	11,800	2,790	1,100	820
4	.....	5,020	1,350	750	19	12,100	2,490	930	820
5	.....	4,830	1,350	718	20	11,200	2,070	855	820
6	.....	4,280	1,350	750	21	11,400	2,070	890	820
7	.....	4,100	1,350	750	22	10,700	2,070	930	970
8	.....	3,920	1,350	750	23	10,100	2,070	890	1,060
9	.....	3,750	1,320	685	24	8,980	1,940	890	1,060
10	.....	3,580	1,300	685	25	8,980	1,940	970	1,060
11	.....	3,410	1,280	750	26	8,760	1,940	970	1,060
12	.....	3,410	1,250	820	27	8,540	1,810	970	1,060
13	.....	3,250	1,220	820	28	8,320	1,810	890	970
14	.....	3,250	1,200	820	29	7,460	1,810	890	970
15	.....	2,790	1,180	820	30	7,040	1,810	820	970
					31	.....	1,690	820	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.												
1	890	1,060	890	685	520	520	475	7,460	8,100	7,280	1,270	625
2	890	1,060	930	655	545	520	475	7,040	7,880	7,510	1,270	625
3	820	1,060	970	625	598	498	498	6,410	7,880	6,590	1,170	570
4	890	1,060	890	625	625	498	498	6,200	7,880	6,590	1,170	570
5	890	1,060	785	625	625	498	520	6,000	8,100	6,360	1,170	570
6	890	1,150	820	625	625	498	545	5,400	8,540	6,360	1,070	570
7	820	1,150	890	655	625	498	570	5,020	8,760	6,590	1,070	570
8	890	1,150	890	655	598	498	598	4,020	7,880	5,920	980	570
9	890	1,150	890	655	570	498	625	4,640	7,040	5,260	980	520
10	820	1,060	890	625	570	498	718	4,640	7,040	4,830	980	520
11	890	1,100	890	625	598	498	890	4,640	6,410	4,620	820	520
12	970	1,020	890	625	655	498	1,350	4,640	6,410	4,410	820	520
13	970	970	890	625	625	475	2,350	4,640	6,410	3,800	820	520
14	970	1,020	855	625	685	475	3,580	5,210	6,410	3,220	820	475
15	970	970	855	655	685	475	5,800	5,210	5,800	2,860	750	475
16	1,060	930	820	655	655	475	6,830	5,400	5,800	2,520	750	475
17	1,060	890	820	655	625	475	6,410	5,600	5,800	2,360	750	475
18	1,060	890	820	655	625	475	6,000	6,000	9,420	2,200	750	475
19	1,150	890	785	625	598	475	6,200	6,410	9,410	2,050	685	475
20	1,150	890	785	520	598	475	6,200	7,670	8,690	2,050	685	475
21	1,150	930	785	520	598	475	6,410	9,200	7,280	2,050	685	475
22	1,150	890	785	520	570	475	6,200	9,640	6,590	1,900	685	475
23	1,150	855	785	598	570	475	6,200	11,800	4,200	1,900	685	475
24	1,150	820	750	570	570	475	5,800	10,700	5,260	1,900	625	475
25	1,150	820	718	570	545	475	5,600	8,540	4,830	1,760	570	475
26	1,060	820	718	570	545	475	5,400	7,880	5,700	1,630	570	475
27	1,060	785	718	570	545	475	6,200	7,460	6,590	1,630	570	475
28	1,060	785	718	570	545	475	8,100	7,880	7,280	1,630	570	475
29	1,060	785	685	570	520	475	9,640	8,760	7,280	1,500	685	435
30	1,060	820	685	520	.....	475	8,760	8,540	7,280	1,380	685	435
31	1,060	.....	685	520	.....	475	.....	8,100	.....	1,380	685	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	435	455	475	455		435	1,380	3,410	8,690	5,260	1,380	545
2	435	455	475	455		435	1,270	3,410	10,400	5,260	1,320	520
3	435	455	475	455		455	1,270	3,410	10,900	5,260	1,320	520
4	435	455	475	455		455	1,270	3,040	11,900	5,040	1,270	498
5	435	455	475	455	350	498	1,270	3,040	10,900	4,830	1,270	498
6	435	455	475	455		520	1,270	3,040	10,900	4,200	1,170	475
7	435	455	475	455		520	1,380	3,040	10,900	4,000	1,120	475
8	435	455	475	435		520	1,380	3,600	10,900	3,800	1,070	475
9	435	455	475	415		570	1,440	5,920	11,600	3,600	980	498
10	625	455	475	395		980	1,440	5,700	11,400	3,600	938	498
11	625	455	475	395		1,380	1,440	5,040	10,900	3,220	895	475
12	570	455	475	395		1,380	1,560	4,830	10,400	2,860	858	475
13	520	455	475	395		1,380	1,630	4,410	10,200	2,690	858	475
14	520	455	498	395	320	1,320	1,630	4,410	7,740	2,520	820	475
15	520	455	498	395		1,270	1,630	4,200	7,050	2,520	785	475
16	498	475	475	395		1,270	1,760	4,000	6,820	2,200	785	475
17	498	475	475	395		1,380	1,900	4,000	6,360	2,200	785	475
18	498	498	455	435		1,630	1,900	4,000	5,920	2,050	750	475
19	498	475	435	475		1,760	1,900	4,000	6,140	1,900	718	475
20	498	475	415	475		1,900	2,050	4,000	6,140	1,900	685	475
21	475	498	415	435	340	1,900	2,200	4,000	6,140	1,900	625	475
22	475	520	415	435		1,760	2,690	3,800	6,140	1,900	625	475
23	475	520	415	435		1,630	3,600	3,800	6,140	1,900	598	475
24	455	520	395	435		1,630	4,410	3,600	7,050	1,900	598	475
25	455	520	360	435		1,630	5,920	3,600	6,590	1,630	598	498
26	455	520	345	435	415	1,560	6,140	3,410	6,360	1,630	598	520
27	455	498	415	415	435	1,560	5,700	4,000	6,140	1,760	570	570
28	455	498	435	415	435	1,500	5,260	4,410	5,920	1,630	570	570
29	455	475	455	395	.....	1,380	4,200	5,480	5,480	1,630	570	570
30	455	475	455	330	.....	1,380	4,000	6,140	5,260	1,560	570	570
31	455	.....	455	320	.....	1,380	.....	7,740	.....	1,500	545	.....
1905–6.												
1	570	718	475	360	360	360	655	4,830	6,820	2,860	758	486
2	598	718	475	360	360	360	655	5,040	6,820	3,040	725	486
3	598	718	498	360	360	378	655	5,700	6,820	3,220	695	463
4	980	685	498	435	360	378	718	5,260	9,650	3,410	695	463
5	598	655	498	435	360	378	820	4,410	7,280	3,600	695	442
6	598	655	520	435	360	378	1,170	4,000	6,590	3,600	695	442
7	598	655	498	435	330	378	1,760	4,000	5,700	4,000	638	442
8	685	625	475	378	330	378	1,900	4,000	5,040	3,220	638	442
9	785	625	475	378	330	395	1,630	4,200	4,000	2,860	638	442
10	895	625	475	378	330	395	1,500	4,410	4,620	2,520	638	463
11	895	625	475	378	360	395	1,380	5,700	4,620	2,520	610	463
12	858	625	455	395	395	360	1,270	5,700	6,820	2,210	610	463
13	820	625	455	455	395	360	1,170	5,700	6,140	2,210	610	463
14	785	598	455	598	378	360	1,170	4,200	5,260	1,920	610	463
15	750	570	455	435	378	378	1,270	4,620	4,410	1,790	610	463
16	750	625	455	435	378	378	1,500	4,000	4,830	1,660	610	463
17	750	625	435	435	378	378	1,500	3,800	4,200	1,540	584	463
18	750	625	435	435	395	378	1,630	3,410	3,600	1,430	558	463
19	750	625	435	435	395	378	1,760	3,220	3,600	1,380	534	463
20	718	598	435	435	415	378	1,760	3,220	3,410	1,270	534	463
21	685	570	435	435	395	378	2,360	3,220	3,410	1,220	509	442
22	625	570	435	435	378	378	3,600	3,220	3,220	1,170	534	442
23	625	598	435	475	378	378	4,000	3,220	3,220	1,080	534	442
24	625	598	435	498	378	395	3,600	3,600	3,220	1,030	534	442
25	625	598	435	455	378	415	3,040	3,600	3,600	988	534	442
26	625	598	435	455	378	415	2,690	12,200	4,410	945	534	442
27	685	570	435	455	360	435	2,690	12,200	4,830	905	509	442
28	785	520	435	435	378	455	2,860	8,930	4,830	865	509	442
29	785	498	435	395	.....	455	2,860	8,450	4,000	865	486	420
30	750	475	395	360	.....	498	4,000	7,740	3,220	828	486	420
31	750	.....	395	360	.....	625	.....	7,050	.....	790	486	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	420	638	584	420		534	584	2,360	12,900	5,040	1,430	610
2	420	610	584	380		534	610	2,520	10,600	4,410	1,380	584
3	420	610	584			558	638	2,360	9,900	4,410	1,380	584
4	420	638	584			558	638	2,360	9,410	4,830	1,330	442
5	420	638	584			558	665	3,410	9,410	4,200	1,220	442
6	420	638	584	330	380	558	725	4,000	9,170	3,600	1,120	442
7	400	610	584			558	725	4,830	7,970	2,520	1,080	442
8	400	638	584			558		5,920	7,970	2,690	1,030	558
9	400	610	584			558		6,590	7,050	3,220	1,030	558
10	400	638	584			558		6,590	6,360	3,220	1,030	584
11	400	758	584			558	1,130	6,360	6,140	3,220	945	584
12	400	758	584			558		5,920	6,140	3,040	905	610
13	400	758	584			558		5,260	5,480	2,860	865	610
14	400	790	420			558		5,260	5,260	2,690	828	584
15	420	1,320	534	300	420	558		6,140	4,620	2,690	790	610
16	442	1,170	534			558	1,540	10,200	4,410	2,860	758	638
17	442	945	534			558	1,790	10,400	4,200	2,520	758	638
18	442	865	509			558	1,920	9,900	4,620	2,520	725	638
19	442	790	486			558	1,920	9,900	5,480	2,520	725	665
20	442	758	486			558	1,920	10,200	5,700	2,360	695	665
21	420	725	509			558	1,920	9,410	6,140	2,210	665	665
22	420	695	509			558	2,060	8,210	5,700	2,210	665	665
23	420	665	509			558	2,360	7,970	5,040	2,210	638	665
24	420	665	509			558	2,360	8,210	5,040	2,060	638	665
25	420	665	509		500	558	2,520	7,970	5,040	1,920	638	665
26	400	638	420	380		558	2,520	7,970	6,140	1,660	695	665
27	725	638	442			558	2,520	8,210	7,280	1,660	695	665
28	695	610	442		534	558	2,360	9,410	6,820	1,660	665	638
29	695	584	463		.....	558	2,210	10,400	6,140	1,540	665	638
30	665	584	486		.....	584	2,360	10,900	5,480	1,480	695	638
31	665	.....	486		.....	584	.....	12,600	.....	1,480	665	.....
1907–8.												
1	638	509	486	442	380	380	534	2,210	6,140	5,480	1,120	610
2	638	509	486	463	315	362	534	2,360	6,140	5,700	1,030	610
3	610	486	486	463	380	362	534	3,220	6,590	5,260	988	584
4	610	486	486	442	463	362	558	3,220	6,820	4,830	945	584
5	610	486	463	420	509	362	558	3,220	7,050	4,000	945	558
6	584	486	463	420	486	362	558	3,220	7,970	4,000	905	558
7	584	463	463	400	463	362	558	4,410	8,930	3,800	865	534
8	584	463	463	400	463	362	558	4,830	10,400	3,600	865	534
9	558	463	442	420	486	362	584	4,830	11,600	3,600	828	509
10	558	463	442	420	486	362	610	4,830	11,600	3,410	790	509
11	558	463	442	400	463	380	665	4,830	11,600	3,220	758	486
12	534	463	442	400	442	380	665	4,830	11,400	3,220	758	463
13	534	463	442	400	420	400	828	4,620	9,650	3,220	725	463
14	534	463	442	420	442	420	1,030	4,410	9,650	4,000	725	463
15	534	463	420	400	420	442	1,540	4,410	9,410	4,000	695	463
16	509	442	400	400	420	463	1,120	4,200	8,930	4,000	695	463
17	509	442	380	380	420	463	1,170	4,000	7,970	3,800	665	442
18	509	442	400	420	400	463	1,220	4,000	7,050	3,600	665	442
19	509	442	400	420	380	442	1,270	4,200	6,140	3,220	665	442
20	509	442	442	420	380	442	1,320	4,410	5,480	3,040	665	442
21	486	463	463	380	380	442	1,430	4,620	4,830	2,860	665	442
22	486	463	463	345	362	442	1,540	4,830	4,410	2,690	665	420
23	486	463	463	362	362	463	1,660	4,830	4,410	2,520	725	420
24	486	463	486	362	380	486	1,790	4,830	4,830	2,860	695	420
25	486	463	486	362	380	534	1,920	5,040	5,700	2,210	695	420
26	486	463	463	345	380	534	1,920	5,260	5,260	1,920	665	420
27	486	463	442	330	380	534	1,790	5,260	5,040	1,660	665	420
28	463	486	442	330	362	534	1,920	5,700	4,410	1,540	665	420
29	463	486	420	400	362	509	1,920	6,140	4,000	1,430	638	409
30	463	486	420	345	.....	509	1,920	6,360	4,000	1,270	638	400
31	463	.....	442	330	.....	534	.....	6,590	.....	1,220	638	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908–9.												
1	400	400	420	400		486	558	1,220	7,740	4,000	1,480	509
2	400	400	380	400		463	558	1,270	11,400	4,000	1,430	509
3	400	400	380	380		463	558	1,540	12,200	4,000	1,320	486
4	400	400	380	380		463	558	2,210	10,400	4,000	1,220	486
5	400	420	380			420	558	2,520	9,410	4,410	1,120	463
6	400	420	380			345	558	2,360	8,450	4,830	1,080	463
7	400	420	400		330	345	558	2,060	7,280	5,700	1,030	463
8	400	420	420			345	558	1,920	6,820	6,140	988	463
9	400	442	442			345	584	1,920	7,050	5,480	945	442
10	380	442	442			345	610	2,210	7,970	5,260	905	442
11	380	420	442	280		345	665	2,060	9,170	4,830	865	442
12	380	420	442			345	725	2,060	9,900	4,000	790	420
13	380	420	442			345	790	2,210	9,170	3,600	758	420
14	380	400	420			345	865	2,520	8,210	3,220	758	420
15	380	420	400			362	945	2,690	8,690	3,040	725	400
16	380	420	420			362	945	2,860	8,930	2,860	695	400
17	380	420	400			362	905	2,860	8,450	2,860	665	400
18	380	442	380			380	905	2,860	7,970	2,690	638	380
19	380	442	345		330	390	905	2,860	7,970	2,520	610	400
20	400	509	362			380	945	2,860	7,510	2,210	584	400
21	400	509	380			380	945	2,860	7,050	2,210	584	400
22	400	584	400			380	988	2,860	6,820	1,920	584	400
23	400	509	420			380	1,030	2,860	5,920	1,920	558	400
24	380	509	400			380	1,120	3,410	5,260	1,920	558	400
25	380	486	400	330	330	400	1,220	4,200	4,830	1,920	558	400
26	400	463	400		302	420	1,320	6,140	4,620	1,790	558	400
27	400	463	400		300	442	1,380	7,280	4,620	1,660	558	420
28	400	463	420		300	486	1,380	7,740	4,200	1,660	558	442
29	400	463	420		.....	558	1,270	6,590	3,800	1,660	558	442
30	400	442	400		.....	558	1,220	5,920	3,800	1,540	534	463
31	400	.....	420		.....	558	.....	5,920	.....	1,540	534	.....
1909–10.												
1	463	420	945			584	2,210	7,050	7,740	4,200	1,320	558
2	463	442	828			665	2,210	6,590	7,050	4,200	1,320	558
3	463	486	610			638	2,210	6,360	6,820	4,200	1,220	584
4	463	509	558			558	2,210	6,360	6,360	4,000	1,170	558
5	442	486	584			486	2,060	6,590	6,590	4,000	1,120	558
6	442	463	610	350	340	486	2,210	7,510	6,820	4,000	1,120	534
7	442	463	610			463	2,210	9,410	6,820	4,000	1,220	534
8	442	463	638			463	2,210	11,400	6,360	4,200	1,170	558
9	442	463	610			442	2,210	11,900	6,590	4,200	1,170	558
10	420	463	610			442	2,360	13,900	7,050	4,200	1,220	534
11	420	463	610			442	2,520	14,900	7,740	4,410	1,120	509
12	420	463	584			420	2,520	12,200	8,690	4,200	1,080	509
13	420	442	558			463	2,690	10,600	9,410	4,000	988	509
14	420	420	534			509	2,860	9,410	9,170	3,800	945	509
15	420	420	509			558	2,690	8,450	8,450	3,220	905	486
16	420	420	534	370	360	638	2,690	7,740	7,970	3,220	865	486
17	420	420	509			790	2,860	7,970	7,050	3,220	790	509
18	420	420	509			988	3,220	8,930	6,590	2,860	758	534
19	420	442	509			1,170	4,000	8,930	6,140	2,690	725	509
20	420	463	442			1,920	5,260	8,450	5,700	2,520	695	509
21	420	463	400			2,690	5,700	8,210	5,480	2,210	695	509
22	420	463	380			3,040	5,700	10,900	5,260	2,360	665	509
23	420	509				3,220	5,700	11,400	4,830	2,210	638	509
24	420	558				3,220	7,050	12,200	4,410	2,060	638	509
25	420	584			390	3,220	9,410	12,600	4,000	1,920	610	509
26	420	558	370	360		2,860	12,200	10,900	4,410	1,920	584	509
27	400	509				2,860	11,900	9,410	4,620	1,660	584	486
28	400	534				2,690	9,900	7,970	4,410	1,660	584	486
29	420	558			.....	2,520	8,930	7,050	4,410	1,540	584	486
30	420	790			.....	2,360	7,740	6,820	4,000	1,430	558	486
31	420	.....			.....	2,360	.....	6,820	.....	1,380	534	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	486	865	584	420			1,380	2,690	8,930	3,940	1,020	448
2	509	828	584	380			1,430	3,040	10,900	3,770	1,020	448
3	558	828	610	400		450	1,430	3,220	9,900	3,600	1,020	448
4	610	790	584	420			1,380	3,410	8,450	3,280	1,020	501
5	610	758	558	442			1,320	3,600	7,050	3,120	1,020	660
					360							
6	584	758	558	610		558	1,320	3,600	6,590	3,280	980	770
7	610	790	584	584		509	1,220	3,410	6,590	3,120	1,120	732
8	695	828	584	534		486	1,120	3,410	6,590	2,970	1,020	732
9	758	790	558	509		463	1,120	3,220	6,590	2,680	1,020	732
10	905	758	558	509		442	1,170	2,860	6,590	2,400	935	770
11	905	758	534	420		420	1,120	2,690	8,450	2,270	850	732
12	865	725	534	362		400	1,080	2,690	11,900	2,270	770	732
13	828	695	534	362		380	1,030	2,690	13,200	2,140	732	732
14	828	695	534	315		380	1,030	2,860	11,200	2,140	732	770
15	790	695	509			380	1,030	2,860	10,100	2,270	695	770
					450							
16	865	665	509			380	1,030	3,800	9,420	2,270	660	810
17	905	638	509			400	1,030	4,620	8,100	2,140	625	770
18	988	638	486			420	1,080	4,620	7,040	2,140	592	732
19	988	638	509	340		442	1,080	4,410	6,000	2,010	560	732
20	946	665	509			463	1,080	4,200	5,400	1,890	560	695
21	905	725	486			486	1,120	4,200	5,020	1,770	560	660
22	865	725	486			558	1,220	4,620	5,400	1,650	560	625
23	828	758	486			638	1,320	4,620	6,000	1,540	560	625
24	790	665	486			828	1,660	4,200	5,600	1,430	560	592
25	865	610	463		380	945	2,210	3,800	5,020	1,380	530	592
26	1,120	509	420	340		945	2,520	3,600	5,020	1,380	501	592
27	1,080	558	442			945	2,520	3,410	5,020	1,320	501	592
28	1,030	610	463			905	2,360	3,410	4,830	1,220	474	560
29	988	584	486		.....	905	2,360	3,410	4,470	1,120	474	530
30	988	584	486		.....	988	2,520	4,200	4,110	1,070	448	530
31	945	.....	463		.....	1,170	.....	6,140	.....	1,020	448	.....
1911–12.												
1	530	401	381			294	401	1,540	5,020	2,540	770	560
2	530	401	401			294	448	1,430	4,830	2,540	770	560
3	501	381	381			294	501	1,430	4,650	2,540	732	560
4	501	381	381			294	530	1,430	4,650	2,400	732	560
5	501	401	361			294	530	1,430	5,020	2,270	695	560
				250								
6	501	401	381			310	501	1,540	5,400	2,270	695	560
7	474	401	361		310	310	501	1,770	5,800	2,140	660	592
8	474	401	361			310	530	2,400	6,620	2,140	625	625
9	448	401	361			310	560	3,280	6,620	2,010	625	625
10	448	401	344			294	660	3,770	6,200	1,890	625	625
11	448	294	326			294	935	3,600	6,000	1,770	592	592
12	448	326	326			310	1,120	3,600	6,200	1,650	560	560
13	424	401	344		310	310	1,120	4,290	6,200	1,650	560	560
14	424	424	361		310	310	1,120	5,400	5,800	1,650	530	560
15	424	448	361		310	310	1,120	6,620	6,620	1,540	560	530
				330								
16	424	424	361		310	310	1,120	7,460	6,000	1,540	810	530
17	424	448	361		326	310	1,120	6,410	3,940	1,430	935	530
18	424	424	344		326	310	1,170	5,800	4,110	1,320	935	530
19	424	424	361		310	310	1,220	5,800	4,650	1,320	892	501
20	424	448	344		310	310	1,170	7,250	5,020	1,220	810	501
21	401	424	294		310	310	1,170	10,100	5,600	1,220	732	474
22	401	401	326		310	310	1,170	8,320	5,020	1,120	695	474
23	401	401	344		310	310	1,170	6,830	4,290	1,120	695	474
24	401	381	294		310	310	1,170	6,620	4,290	1,120	660	474
25	401	401	280		310	310	1,170	6,200	4,290	1,120	625	448
				370								
26	401	401			310	326	1,220	6,200	4,110	1,120	625	448
27	401	381			294	344	1,220	6,000	3,940	1,020	592	448
28	401	326	290		294	361	1,270	5,800	3,280	935	560	448
29	401	344			294	381	1,320	5,400	2,680	892	530	448
30	401	401			.....	401	1,540	5,400	2,400	892	530	424
31	401	.....			.....	401	.....	5,020	.....	770	560	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912–13.												
1	424	424	401				361	1,650	9,640	4,650	1,170	448
2	424	424	401	350			361	1,540	10,700	4,290	1,120	448
3	424	424	381				361	1,430	11,000	3,770	1,120	448
4	424	424	401			390	361	1,430	10,700	3,280	1,120	448
5	424	424	381				401	1,380	9,420	3,120	1,070	695
				280	300							
6	401	401	381				401	1,430	8,760	3,280	1,070	810
7	401	424	361			344	401	1,540	8,320	3,280	1,020	732
8	401	448	381	290		344	401	1,890	8,320	3,280	980	660
9	401	448	381			344	401	3,600	8,980	2,970	935	625
10	401	448	361			326	401	4,830	9,640	2,820	892	592
11	401	448	344			326	448	4,830	8,980	2,820	850	560
12	401	448	381			326	474	4,470	8,540	2,680	770	560
13	401	424	381			326	560	4,290	8,540	2,540	770	530
14	401	424	381			326	660	4,110	8,100	2,400	770	530
15	401	424	361			326	892	3,940	7,670	2,140	770	501
				260	320							
16	401	424	381			344	1,170	3,600	7,250	2,010	732	501
17	401	424	381			344	1,220	3,440	6,620	1,890	695	474
18	401	424	401			361	1,270	3,280	5,800	1,890	695	448
19	448	424	381			361	1,430	3,280	6,000	1,890	695	448
20	448	424	310			344	2,010	3,280	6,620	2,010	660	448
21	448	424	310			326	2,140	3,280	6,000	2,140	625	448
22	448	401				344	2,140	3,770	5,600	2,270	592	448
23	448	401				361	2,010	4,830	5,400	2,270	560	448
24	448	401				344	1,890	5,800	5,020	2,140	560	424
25	448	401			360	326	1,890	6,620	5,020	2,010	530	424
				340								
26	474	401	340			344	1,890	7,040	5,020	1,890	530	424
27	448	401				344	1,890	7,880	5,210	1,650	501	424
28	448	401				344	1,770	8,100	5,210	1,540	501	401
29	448	401			.....	344	1,650	8,320	5,020	1,430	474	401
30	424	401			.....	344	1,650	8,100	5,020	1,320	474	401
31	424	.....			.....	361	.....	8,980	.....	1,220	448	.....
1913–14.												
1	401	448	448	361	381	326	625	2,970	7,040	4,650	850	401
2	401	448	424	361	381	326	660	4,290	8,320	4,830	810	381
3	401	424	401	361	310	326	660	6,000	9,860	5,210	770	381
4	401	424	381	361		326	695	5,600	8,320	4,650	732	381
5	401	448	381	361		326	810	5,020	7,040	3,940	695	361
6	381	448	381	361		326	980	4,650	6,200	3,600	695	361
7	424	448	381	381		326	1,380	4,650	5,400	3,280	695	381
8	401	448	361	381		326	1,650	4,290	4,830	2,970	660	424
9	401	424	344	361	320	326	2,010	4,290	4,290	2,820	625	448
10	401	424	294	344		326	2,140	4,290	4,110	2,680	625	448
11	401	424	344	381		326	2,400	4,470	3,940	2,680	592	448
12	401	424	381	361		326	2,820	4,650	4,290	2,680	560	448
13	424	401	381	361		326	2,970	5,020	5,020	2,820	560	448
14	424	401	361	361	560	344	3,120	6,620	5,800	2,680	530	448
15	424	401	361	361	530	344	3,280	8,540	6,830	2,540	501	448
16	424	401	361	381	501	361	3,120	8,980	7,670	2,270	501	448
17	424	424	361	381	501	381	2,970	8,760	8,320	2,140	501	474
18	448	424	361	361	474	381	2,970	8,320	7,880	2,140	501	501
19	424	424	361	361	448	401	2,970	7,880	7,040	2,010	501	501
20	448	401	294	361	448	401	3,440	7,460	6,410	1,890	501	560
21	448	381	326	344	474	448	3,280	7,670	5,400	1,770	501	560
22	448	401	381	361	401	474	3,120	7,880	4,650	1,540	474	530
23	448	381	361	310	344	530	2,970	8,320	3,940	1,430	474	530
24	448	381	361	252	326	560	2,970	8,980	3,940	1,430	448	501
25	448	401	361	361	326	560	2,820	8,540	4,110	1,320	448	530
26	448	401	361	326	326	560	2,820	7,250	3,940	1,220	448	560
27	448	424	361	326	326	560	2,970	6,200	3,940	1,220	448	660
28	448	424	361		326	592	2,820	5,600	3,940	1,120	448	770
29	448	424	344	320	.....	592	2,680	5,020	3,940	1,020	424	732
30	448	448	344		.....	625	2,820	5,020	4,290	1,020	424	695
31	448	.....	361	401	.....	625	.....	5,800	.....	850	401	.....

Daily discharge, in second-feet, of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.												
1	413	413	430	735			586	4,640	4,830	2,300	768	386
2	396	413	430	920			671	5,020	4,640	2,300	768	348
3	396	413	430	920	330	380	642	6,200	3,750	2,170	768	366
4	413	430	430	960			671	6,620	3,580	2,040	768	348
5	413	430	413	920	559		671	6,410	3,580	1,920	768	329
6	413	430	413	880	559	396	735	5,600	4,280	1,800	698	312
7	413	430	396	842	535	413	805	5,020	4,640	1,800	635	312
8	396	430	396	735	511	413	880	4,460	5,600	1,680	605	312
9	396	430	396	671	490	413	920	3,920	7,250	1,680	578	295
10	396	430	396	671	468	413	1,000	3,750	8,760	1,800	550	312
11	396	413	430	671	490	413	1,140	3,580	9,200	1,920	550	295
12	396	430	430	671	490	430	1,290	3,580	9,420	1,800	550	295
13	396	430	430	642	490	430	1,440	4,460	9,420	1,800	578	295
14	396	430	430			430	1,440	5,600	9,070	1,680	550	295
15	381	430	430			413	1,340	6,410	6,710	1,570	578	295
16	381	430	430		400	413	1,290	6,000	5,690	1,570	578	295
17	396	413	430			413	1,240	5,600	5,290	1,570	578	295
18	396	413	535			430	1,140	5,400	5,290	1,570	578	295
19	396	413	511			430	1,190	4,830	5,100	1,460	578	295
20	396	413	468	480		430	1,190	4,100	5,100	1,460	578	312
21	396	413	413			430	2,000	3,580	4,720	1,460	550	295
22	396	413	449			449	2,510	3,250	4,720	1,350	524	295
23	413	413	396		280	468	2,650	2,650	4,910	1,020	524	295
24	413	430	338			468	2,790	2,650	4,910	970	498	312
25	396	430				490	2,940	2,790	4,170	928	498	312
26	396	413	340			490	2,650	2,650	3,650	928	498	312
27	396	413				511	2,650	2,510	3,320	1,020	474	312
28	396	430				511	2,790	2,510	3,010	970	450	295
29	396	413		320	.....	511	3,090	2,650	2,710	845	428	295
30	396	413	511		.....	511	3,920	3,750	2,430	768	406	280
31	396	.....	735		.....	535	.....	5,020	.....	768	406	.....

NOTE.—Records June 17, 1903, to Sept. 30, 1914, revised since previous publication. Discharge ascertained from rating curves as follows: June 17, 1903, to June 18, 1904, fairly well defined; June 19, 1904, to May 26, 1906, fairly well defined; May 27, 1906, to June 13, 1911, well defined; June 14, 1911, to Sept. 30, 1914, well defined. Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by ice.

Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1903.				
June 17–30	13,200	7,040	9,900	275,000
July	6,410	1,690	3,150	194,000
August	1,690	820	1,140	70,100
September	1,060	685	854	50,800
The period	.....	.....	.....	590,000
1903–4.				
October	1,150	820	1,000	61,500
November	1,150	785	961	57,200
December	970	685	816	50,200
January	685	520	606	37,300
February	685	520	595	34,200
March	520	475	485	29,800
April	9,640	475	3,980	237,000
May	11,800	4,640	6,830	420,000
June	9,420	4,200	7,060	420,000
July	7,510	1,380	3,610	222,000
August	1,270	570	832	51,200
September	625	435	509	30,300
The year	11,800	435	2,270	1,650,000

Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1905–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1904–5.				
October	625	435	479	29,500
November	520	455	476	28,300
December	498	345	451	27,700
January	475	320	421	25,900
February	435	.....	347	19,900
March	1,900	435	1,210	74,400
April	6,140	1,270	2,500	149,000
May	7,740	3,040	4,210	259,000
June	11,900	6,260	8,250	491,000
July	5,266	1,500	2,830	174,000
August	1,380	545	847	52,100
September	570	475	498	29,600
The year	11,900	.....	1,880	1,360,000
1905–6.				
October	980	570	719	44,200
November	718	475	614	36,500
December	520	395	454	27,900
January	598	360	424	26,100
February	415	330	370	20,500
March	625	360	398	24,500
April	4,000	655	1,920	114,000
May	12,200	3,220	5,250	323,000
June	9,650	3,220	4,940	294,000
July	4,000	790	1,970	121,000
August	758	486	592	36,400
September	486	420	453	27,000
The year	12,200	330	1,510	1,100,000
1906–7.				
October	725	400	461	28,300
November	1,320	564	722	43,000
December	584	420	528	32,500
January	.....	.....	343	21,100
February	.....	.....	430	23,900
March	584	534	558	34,300
April	2,860	584	1,560	92,800
May	12,600	2,360	7,190	442,000
June	12,900	4,200	6,720	400,000
July	5,040	1,480	2,760	170,000
August	1,430	638	882	54,200
September	665	442	602	35,800
The year	12,900	.....	1,900	1,380,000
1907–8.				
October	638	463	531	32,600
November	509	442	468	27,800
December	486	380	448	27,500
January	463	330	395	24,300
February	509	315	411	23,900
March	534	362	434	26,700
April	1,920	534	1,140	67,800
May	6,590	2,210	4,520	278,000
June	11,600	4,000	7,250	431,000
July	5,700	1,220	3,250	200,000
August	1,120	638	763	46,900
September	610	400	473	28,100
The year	11,600	315	1,670	1,210,000
1908–9.				
October	400	280	392	24,100
November	534	400	444	26,400
December	442	345	404	24,800
January	.....	.....	317	19,500
February	.....	.....	327	18,200
March	558	345	405	24,900
April	1,380	558	871	51,800
May	7,740	1,220	3,250	200,000
June	12,200	3,800	7,520	447,000
July	6,140	1,540	3,210	197,000
August	1,480	534	798	49,100
September	509	380	432	25,700
The year	12,200	.....	1,530	1,110,000

Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1909–10.				
October	463	400	428	26,300
November	790	420	485	28,900
December	945	.....	516	31,700
January	.....	.....	369	22,100
February	.....	.....	361	20,000
March	3,220	420	1,429	87,800
April	12,200	2,060	4,599	273,600
May	14,900	6,360	9,320	573,000
June	9,410	4,000	6,360	378,000
July	4,410	1,380	3,099	196,000
August	1,320	534	889	54,700
September	584	486	520	30,900
The year	14,900	.....	2,379	1,720,000
1910–11.				
October	1,120	486	827	50,800
November	865	509	704	41,900
December	610	420	519	31,900
January	610	.....	389	23,900
February	.....	.....	398	22,100
March	1,170	.....	583	35,800
April	2,520	1,030	1,440	85,700
May	6,140	2,690	3,660	225,000
June	13,200	4,110	7,320	436,000
July	3,940	1,020	2,210	136,000
August	1,120	448	728	44,800
September	810	448	654	38,900
The year	13,200	.....	1,620	1,170,000
1911–12.				
October	530	401	439	27,000
November	448	294	396	23,600
December	401	.....	338	20,800
January	.....	.....	318	19,600
February	.....	.....	309	17,800
March	401	294	318	19,600
April	1,540	401	960	57,100
May	10,100	1,430	4,780	294,000
June	6,620	2,400	4,980	296,000
July	2,540	770	1,590	97,800
August	935	530	675	41,500
September	625	424	526	31,300
The year	10,100	.....	1,300	946,000
1912–13.				
October	474	401	424	26,100
November	448	401	420	25,000
December	401	.....	363	22,300
January	.....	.....	305	18,800
February	.....	.....	324	18,000
March	.....	326	350	21,500
April	2,140	361	1,100	65,500
May	8,980	1,380	4,260	262,000
June	11,000	5,020	7,400	440,000
July	4,650	1,220	2,480	152,000
August	1,170	448	764	47,000
September	810	401	505	30,000
The year	11,000	.....	1,560	1,130,000
1913–14.				
October	448	381	425	26,100
November	448	381	419	24,900
December	448	294	364	22,400
January	381	252	353	21,700
February	560	310	378	21,000
March	625	326	419	25,800
April	3,440	625	2,360	140,000
May	8,980	2,970	6,230	383,000
June	9,860	3,940	5,690	339,000
July	5,210	850	2,470	152,000
August	850	401	559	34,400
September	770	361	492	29,300
The year	9,860	252	1,680	1,220,000

Monthly discharge of Methow River at Pateros, Wash., for the years ending Sept. 30, 1903–1914 and 1918—Continued.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917–18.				
October	413	381	399	24,500
November	430	413	422	25,100
December	735	.....	426	26,200
January	960	.....	578	35,500
February	559	.....	383	21,300
March	535	.....	437	26,900
April	3,920	586	1,610	95,800
May	6,620	2,510	4,360	268,000
June	9,420	2,430	5,320	317,000
July	2,300	768	1,510	92,800
August	768	406	576	35,400
September	386	280	310	18,400
The year	9,420	.....	1,360	987,000

NOTE.—Open-water records prior to June, 1906, good; beginning that month, excellent. Records during periods prior to 1911 in which stage-discharge relation was affected by ice, poor; beginning 1911, fair.

CHELAN RIVER BASIN.

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.—950 square miles (measured on topographic and Forest Service maps).

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, 1918.

GAGE.—Vertical staff on pile at landing installed December 5, 1910; datum, 1,076.15 feet above sea level; read by W. E. Naylor. Gage used from 1897 to 1899 was at Lakeside, about a mile west of Chelan; datum 1,070.18 feet above sea level. In 1905 gage was on a bent of upper bridge at Chelan; elevation not determined.

EXTREMES OF STAGE.—Maximum stage recorded during year, 5.00 feet July 1; minimum stage recorded, 1.37 feet April 8.

1898–1899 and 1911–1918: Maximum stage recorded, 7.2 feet June 18, 1916; minimum stage recorded, 6.60 feet January 27–28 and December 2–5, 1898.

REGULATION.—Height of water in the lake controlled by operation of gates in dam at outlet.

ACCURACY.—Gage read to hundredths about once a week.

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

Daily gage height, in feet, of Lake Chelan at Chelan, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1										5.00		
2												
3					2.30							3.52
4			3.01			2.02						
5		2.90						3.72			3.50	
6				4.98								
7	3.44											
8							1.37			4.25		
9												3.50
10			2.98			1.95			4.93			
11		3.00			2.16						3.35	
12								3.74				
13				4.00								
14												
15	3.30						1.75			4.02		3.51
16			3.25									
17									5.30			
18					1.89	1.71						
19		2.87									3.25	
20								4.03				
21	3.10			3.18						3.90		
22							1.92					3.50
23												
24			3.67									
25		3.11			2.02	1.54					3.42	
26								3.53				
27				2.73								
28					1.98					3.50		
29	2.83											3.49
30							2.75					
31	2.85		4.53			1.60						

CHELAN RIVER AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at lower highway bridge at Chelan, Chelan County, 800 feet below flashboard dam at outlet of Chelan Lake and 4 miles northwest of Chelan Falls.

DRAINAGE AREA.—950 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—November 1, 1903, to September 30, 1918. (Records prior to October 1, 1913, have been revised and published in this report).

GAGE.—Vertical staff on fourth bent of left approach to lower highway bridge; read by W. E. Naylor.

DISCHARGE MEASUREMENTS.—Made from upper highway bridge 1,000 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high water. No well-defined control. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.30 feet June 14 and 15 (discharge, 8,140 second-feet); minimum stage recorded, 3.99 feet March 9 (discharge, 330 second-feet).

1903–1918: Maximum stage recorded, 11.48 feet June 20, 1916 (discharge, 9,780 second-feet). Practically no flow for at least part of day on January 30, 1917; river frozen solid at dam so no water could flow over it.

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

DIVERSIONS.—Several irrigation ditches divert from tributaries a very small proportion of the run-off.

REGULATION.—Flashboard dam 800 feet above gage controls lake level at low water in interest of navigation. Monthly summaries of flow have been corrected for natural and artificial storage in Lake Chelan.

ACCURACY.—Stage-discharge relation changed at high water on June 14, 1918. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

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

Discharge measurements of Chelan River at Chelan, Wash., during the years ending Sept. 30, 1910, 1912–1915, and 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1909–10.		*Feet.*	*Sec.-ft.*	1914–15.		*Feet.*	*Sec.-ft.*
May 14	McGlashan and Ebert	10.65	[a] 8,320	June 3	J. T. Hartson	7.33	[b] 3,050
1911–12.				1917–18.			
June 6	R. C. Pierce	9.08	[b] 5,660	Apr. 2	L. D. Carson	5.98	1,270
1912–13.				2	do	5.98	1,230
June 3	F. B. Storey	10.48	[b] 8,040	June 14	do	10.30	8,140
3	do	10.50	[b] 8,200	15	do	10.30	8,130
1913–14.				July 5	do	8.95	5,620
July 1	Brown and Muldrow	8.77	[b] 5,150				
2	C. O. Brown	8.84	[b] 5,200	Sept. 30	Lee and Calkins	5.60	991

[a] Discharge previously published corrected as error was made in original computations.
[b] Discharge previously published corrected on account of arrangement of meter and weight or weights.

NOTE.—Measurements made prior to 1918 and listed here are only those which have been revised; others will be found in previous water-supply papers.

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1903–4.											
1		1,440	1,060	900	900	1,060	5,580	7,600	7,430	4,460	900
2		1,680	1,060	900	900	1,060	5,580	7,770	7,600	4,300	765
3	1,940	1,560	1,060	900	830	1,060	5,580	7,770	7,770	4,300	765
4		1,560	975	900	830	1,060	5,420	7,770	7,940	4,300	765
5		1,560	880	830	830	1,060	5,420	7,940	7,940	4,140	765
6	1,940	1,560	900	555	830	1,060	5,260	8,110	8,110	3,980	1,680
7	1,940	1,800	900	765	830	1,060	4,940	8,280	7,940	3,980	1,680
8	1,940	1,440	900	765	900	1,060	4,940	8,280	8,110	3,980	1,680
9	1,940	1,440	975	1,060	900	1,060	4,940	8,110	7,940	3,820	1,680
10	1,940	1,330	975	1,060	900	1,060	4,940	7,940	8,280	3,820	1,810
11	1,940	1,230	900	1,060	900	1,060	4,780	7,770	7,940	3,670	1,680
12	1,810	1,060	900	1,060	900	1,330	4,620	7,600	8,110	3,670	1,680
13	1,810	1,140	900	975	900	1,560	4,620	7,430	7,940	3,520	1,680
14	1,680	1,140	975	975	900	2,070	4,620	7,260	7,600	3,370	1,680
15	1,680	1,230	900	900	900	2,350	4,620	7,260	7,260	3,220	1,680
16	1,680	1,230	900	900	1,140	2,770	4,780	7,430	6,920	3,220	1,680
17	1,680	1,230	900	960	1,060	3,220	4,940	7,430	6,580	3,070	1,680
18	1,680	1,140	1,060	960	1,440	3,370	4,940	7,770	6,240	3,070	1,440
19	1,560	1,140	975	960	1,440	3,670	5,230	7,940	5,900	3,070	1,440
20	1,560	1 140	900	960	1,440	3,820	5,420	7,940	5,740	2,920	1,440
21	1,560	1,140	900	900	1,440	4,140	5,580	7,940	5,420	2,770	1,440
22	1,560	1,140	900	975	1,440	4,300	6,070	7,940	5,260	2,770	1,330
23	1,560	1,140	900	830	1,330	4,300	6,580	7,600	5,260	2,620	1,330
24	1,440	1,230	900	830	1,140	4,300	6,920	7,260	5,260	2,490	1,230
25	1,440	1,230	975	960	1,140	4,300	7,090	7,260	4,940	2,490	1,230
26	1,440	1,230	975	900	1,140	4,460	7,260	7,090	4,300	2,350	1,230
27	1,440	1,230	900	975	1,140	4,620	7,260	6,920	4,140	1,680	900
28	1,440	1,140	900	900	1,060	4,780	7,260	6,920	4,620	1,230	900
29	1,440	1,140	900	900	1,060	5,260	7,260	7,090	4,620	765	900
30	1,440	1,060	900	.....	1,060	5,580	7,430	7,260	4,460	830	900
31	.....	1,060	900	.....	1,060	.....	7,600	.....	4,460	900	.....

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1904–5.												
1	900	765	830	765	705	765	2,210	3,670	5,420	6,410	3,980	1,140
2	900	765	830	765	705	765	2,070	3,670	5,900	6,240	3,820	1,060
3	900	765	830	765	705	765	1,940	3,670	6,240	6,240	3,670	1,060
4	900	765	830	765	705	830	1,940	3,670	6,580	6,240	3,520	1,060
5	900	765	830	765	705	830	1,940	3,370	6,920	6,070	3,370	1,060
6	900	765	830	765	830	900	1,940	3,370	7,260	6,070	3,370	1,060
7	900	765	830	765	765	900	1,940	3,520	7,260	5,900	3,220	1,060
8	900	765	830	765	765	1,410	1,940	3,670	7,430	5,900	3,370	1,140
9	830	765	765	765	765	1,440	1,940	3,670	7,600	5,740	3,220	1,230
10	830	765	765	765	765	1,810	1,940	3,820	7,940	5,580	3,070	1,330
11	765	765	765	765	765	1,940	1,940	3,980	7,940	5,580	3,070	1,330
12	765	830	765	765	765	1,940	1,940	3,980	8,280	5,580	2,920	1,440
13	765	830	765	765	765	1,940	1,940	2,980	8,280	5,420	2,920	1,440
14	1,060	765	765	765	765	2,210	1,940	3,980	8,280	5,260	2,770	1,440
15	1,060	830	830	765	765	2,210	1,940	3,980	7,940	5,100	2,770	1,440
16	1,060	830	830	765	765	2,210	1,940	3,980	7,770	4,940	1,940	1,440
17	1,060	830	765	765	765	2,210	1,940	3,980	7,600	4,780	1,940	1,440
18	1,060	765	765	765	765	2,350	2,070	3,980	7,260	4,620	975	1,330
19	1,060	765	765	705	765	2,350	2,070	3,980	7,260	4,300	1,060	1,230
20	1,060	830	765	705	765	2,490	2,070	3,980	7,260	4,300	1,060	1,230
21	975	830	765	705	765	2,490	2,210	3,980	7,090	4,300	1,060	1,330
22	975	830	765	705	765	2,490	2,210	3,980	6,920	4,300	1,060	1,330
23	975	830	765	705	765	2,490	2,490	3,980	6,920	4,300	1,060	1,330
24	900	830	765	705	765	2,490	2,630	3,980	6,920	4,300	1,060	1,440
25	900	900	765	765	765	2,490	2,920	3,820	6,920	4,300	1,060	1,440
26	900	900	765	705	765	2,490	3,370	3,670	6,920	4,300	1,060	1,440
27	900	900	765	705	765	2,490	3,520	3,820	6,920	4,300	1,060	1,440
28	830	830	765	705	765	2,490	3,670	3,980	6,750	4,300	1,060	1,440
29	765	830	765	705	.....	2,350	3,670	3,980	6,580	4,300	1,060	1,440
30	765	830	765	705	.....	2,210	3,670	4,300	6,580	4,300	1,230	1,440
31	765	.....	765	705	.....	2,210	.....	4,940	.....	4,140	1,140	.....
1905–6.												
1	1,440	1,560	900	765	975	900	1,060	3,670	4,620	3,370	2,770	1,440
2	1,440	1,440	900	765	975	900	1,140	3,820	4,620	3,520	2,770	1,440
3	1,680	1,440	900	765	900	900	1,140	3,980	4,780	3,670	2,770	1,330
4	1,940	1,440	900	765	900	900	1,140	4,300	4,620	3,980	2,490	1,330
5	1,940	1,440	900	765	900	900	1,230	4,460	4,620	4,300	2,490	1,230
6	2,070	1,330	830	765	900	900	1,230	4,620	4,620	4,300	1,810	1,230
7	2,350	1,330	830	765	900	900	1,680	4,460	4,620	4,620	1,810	1,140
8	2,210	1,330	830	765	900	1,940	1,680	4,460	4,620	4,780	1,810	1,140
9	2,210	1,330	830	765	900	1,940	1,810	4,460	4,620	4,780	1,810	1,140
10	1,940	1,230	830	765	900	1,810	1,810	4,620	4,460	4,620	1,810	1,060
11	1,940	1,230	765	765	900	1,680	1,810	4,780	4,460	4,620	1,810	1,140
12	2,070	1,230	765	765	900	1,680	1,810	4,940	4,620	4,620	1,810	1,230
13	2,210	1,140	830	830	900	1,560	1,810	5,100	4,620	4,620	1,680	1,440
14	1,940	1,140	830	830	900	1,440	1,810	5,100	4,460	4,620	1,680	1,440
15	1,940	1,060	830	765	900	1,440	1,940	5,100	4,460	4,620	1,680	1,330
16	1,810	1,140	830	830	900	1,440	1,940	4,940	4,300	4,620	1,680	1,230
17	1,810	1,060	830	765	900	1,440	1,940	4,940	4,300	4,460	1,680	1,230
18	1,680	1,060	830	765	900	1,330	1,940	4,940	4,300	4,460	1,680	1,230
19	1,680	1,140	765	765	900	1,230	2,070	4,780	4,140	4,300	1,560	1,230
20	1,560	1,140	765	765	900	1,140	2,210	4,620	3,980	4,140	1,560	1,230
21	1,330	1,060	765	765	900	1,140	2,210	4,460	3,670	3,980	1,440	1,140
22	1,440	1,060	765	765	900	1,060	2,490	4,300	3,370	3,820	1,440	1,140
23	1,440	975	765	1,140	900	1,060	2,770	4,300	3,220	3,670	1,440	1,140
24	1,440	900	765	1,060	975	1,060	2,770	4,300	3,070	3,520	1,330	1,060
25	1,440	975	765	1,060	900	1,060	3,070	4,300	3,220	3,370	1,230	1,140
26	1,440	1,060	900	1,060	975	1,060	3,070	4,620	3,370	3,370	1,230	1,060
27	1,680	975	830	1,060	975	1,060	3,070	4,620	3,520	3,370	1,230	1,060
28	1,560	900	765	1,060	900	1,060	3,070	4,780	3,520	3,220	1,230	1,060
29	1,560	900	765	1,060	.....	975	3,220	4,780	3,520	3,220	1,330	1,060
30	1,680	900	765	975	.....	975	3,370	4,780	3,370	3,070	1,440	1,060
31	1,560	.....	765	975	.....	1,060	.....	4,780	.....	2,920	1,440	.....

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1906–7.												
1	1,060	900	2,770	900	650	1,140	975	2,770	7,940	6,410	3,820	1,140
2	975	830	2,630	900	650	1,140	975	2,770	8,280	6,240	3,820	1,230
3	975	765	2,490	830	650	1,140	900	2,770	8,280	6,240	3,820	1,230
4	900	765	2,490	830	650	1,140	975	2,770	8,460	5,900	3,820	1,230
5	900	765	2,490	830	650	1,140	975	3,070	8,460	5,900	3,820	1,230
6	900	765	2,490	830	705	1,060	975	3,070	8,280	5,740	3,670	1,230
7	900	765	2,490	900	765	1,060	975	3,370	8,280	5,580	3,520	1,140
8	830	765	2,490	830	765	1,060	1,060	3,670	8,110	5,580	3,370	1,140
9	900	830	2,350	830	765	1,060	1,060	3,980	7,940	5,580	3,070	1,140
10	900	830	2,350	765	765	1,060	1,060	4,300	7,770	5,420	2,920	1,230
11	900	900	2,210	765	830	1,060	1,060	4,460	7,600	5,420	2,770	1,230
12	900	900	2,210	765	830	1,060	1,140	4,620	7,260	5,260	2,630	1,230
13	900	1,060	2,070	765	830	1,060	1,230	5,260	6,920	5,260	2,490	1,230
14	900	1,320	1,940	765	830	1,060	1,230	5,580	6,580	5,100	2,350	1,230
15	900	1,810	1,940	765	830	1,060	1,330	5,740	6,410	4,940	2,210	1,230
16	900	2,490	1,810	765	830	1,060	1,440	5,740	6,240	4,940	2,070	1,230
17	900	3,220	1,680	765	830	1,060	1,560	5,900	5,900	4,780	1,940	1,230
18	900	3,520	1,680	765	830	1,060	1,680	6,240	5,900	4,780	1,810	1,230
19	900	3,370	1,680	765	830	1,060	1,810	6,240	5,740	4,620	1,560	1,230
20	830	3,220	1,680	705	900	1,060	1,940	6,410	5,580	4,620	1,440	1,230
21	765	3,070	1,560	705	900	1,060	1,940	6,410	5,580	4,620	1,230	1,230
22	765	3,070	1,560	650	900	1,060	2,350	6,580	5,580	4,620	1,230	1,140
23	765	3,070	1,560	650	975	1,060	2,210	6,580	5,580	4,460	1,230	1,140
24	765	3,070	1,440	650	1,060	1,060	2,210	6,750	5,580	4,300	1,230	1,140
25	1,060	3,070	1,330	650	1,060	1,060	2,350	6,750	5,900	4,300	1,230	1,140
26	1,060	3,070	1,230	650	1,060	1,060	2,490	6,920	5,900	4,140	1,230	1,140
27	1,140	2,920	1,140	600	1,060	975	2,490	6,920	6,240	3,980	1,230	1,140
28	1,060	2,770	1,140	600	1,140	975	2,490	7,260	6,240	3,980	1,140	1,140
29	900	2,770	1,060	650	.....	975	2,490	7,260	6,410	3,980	1,230	1,140
30	900	2,770	1,060	650	.....	975	2,490	7,600	6,240	3,980	1,230	1,140
31	900	.....	975	650	.....	975	.....	7,770	.....	3,980	1,230	.....
1907–8.												
1	1,140	765	418	480	418	480	1,940	2,770	4,940	6,240	4,780	1,440
2	1,060	765	390	480	418	480	1,810	2,770	4,940	6,240	4,460	1,440
3	1,060	765	390	480	418	448	1,810	2,770	5,260	6,240	4,300	1,440
4	1,060	765	390	480	418	448	1,680	2,770	5,260	6,410	3,980	1,440
5	1,060	765	390	480	418	448	1,560	2,920	5,420	6,580	3,670	1,440
6	1,060	765	364	515	418	448	1,440	3,070	5,580	6,580	3,670	1,330
7	1,060	705	364	515	448	448	1,440	3,070	5,740	6,580	3,370	1,330
8	1,060	650	364	515	448	448	1,440	3,220	6,070	6,580	3,220	1,330
9	1,060	650	364	515	448	448	1,440	3,370	6,410	6,580	2,920	1,230
10	1,060	650	390	515	480	448	1,440	3,370	6,920	6,750	2,770	1,230
11	1,060	650	390	480	480	480	1,440	3,520	7,260	6,750	2,490	1,230
12	1,060	650	364	515	480	480	1,440	3,670	7,600	6,750	2,210	1,230
13	1,060	600	364	515	480	515	1,440	3,670	7,940	6,750	1,940	1,230
14	1,060	555	364	515	448	555	1,440	3,670	8,280	6,580	1,810	1,230
15	975	555	364	515	448	3,370	1,440	3,670	8,640	6,580	1,680	1,230
16	975	555	364	515	480	3,220	1,440	3,820	8,640	6,920	1,560	1,230
17	975	555	364	515	480	3,070	1,560	3,820	8,820	6,920	1,680	1,230
18	975	515	390	515	480	3,070	1,680	3,980	8,280	6,920	1,680	1,140
19	900	515	390	555	480	2,770	1,810	3,980	7,940	6,750	1,680	1,140
20	900	480	390	555	480	2,770	1,940	4,140	7,770	6,580	1,810	1,060
21	900	480	390	515	480	2,630	2,210	4,460	7,430	6,580	1,810	1,060
22	900	480	390	515	480	2,490	2,210	4,300	7,260	6,580	1,810	1,060
23	900	480	390	515	480	2,490	2,350	4,300	6,920	6,410	1,810	1,060
24	900	480	418	515	448	2,350	2,490	4,460	6,750	6,240	1,680	1,060
25	900	448	418	480	448	2,210	2,490	4,620	6,580	6,070	1,680	975
26	900	448	418	480	480	2,210	2,490	4,780	6,410	5,900	1,680	900
27	900	418	418	448	448	2,070	2,490	4,940	6,240	5,740	1,680	900
28	830	418	418	480	448	1,940	3,070	4,940	6,240	5,580	1,680	900
29	830	418	448	480	448	1,940	2,630	4,940	6,070	5,260	1,680	900
30	830	418	480	480	.....	1,810	2,630	4,940	6,070	5,100	1,560	900
31	830	.....	480	480	.....	1,940	.....	4,940	.....	4,940	1,440	.....

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1915 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1908-9.												
1	830	418	900	650	600	555	600	2,070	5,260	6,070	3,370	1,060
2	830	418	830	650	600	515	650	2,210	5,580	5,900	3,370	1,060
3	830	418	765	650	555	515	650	2,210	5,900	5,900	3,220	1,060
4	765	418	765	600	555	480	650	2,070	6,240	5,900	3,070	1,060
5	765	418	765	600	555	480	705	2,070	6,580	5,740	3,070	1,060
6	765	418	830	555	555	515	705	1,940	6,580	5,580	2,920	1,060
7	765	418	900	555	555	2,630	765	1,940	6,580	5,900	2,770	1,140
8	765	448	900	555	555	2,490	705	1,940	6,750	5,900	2,770	1,230
9	765	448	830	555	555	2,490	650	1,940	6,920	5,740	2,630	1,230
10	765	480	830	555	555	2,350	650	2,070	6,920	5,740	2,490	1,230
11	765	480	830	555	555	2,350	650	2,210	7,260	5,740	418	1,230
12	765	480	765	555	555	2,210	2,490	2,210	7,260	5,580	418	1,230
13	765	480	765	555	515	2,070	2,210	2,210	7,260	5,580	418	1,230
14	705	448	765	515	555	1,940	2,210	2,210	7,260	5,580	418	1,230
15	705	448	765	515	555	1,810	1,940	2,210	7,430	5,580	480	1,230
16	705	480	705	555	555	1,680	1,810	2,210	7,600	5,420	515	1,230
17	705	515	705	515	600	1,440	1,810	2,350	7,600	5,260	555	1,230
18	650	555	650	555	600	1,330	1,680	2,490	7,600	5,100	555	1,140
19	650	650	650	555	555	1,230	1,680	2,490	7,600	4,940	600	1,230
20	650	765	650	555	555	1,060	1,810	2,630	7,600	4,620	650	1,230
21	650	900	650	515	555	1,060	1,940	2,920	7,600	4,300	650	1,230
22	650	900	650	515	555	975	1,940	3,070	7,430	4,300	705	1,330
23	650	975	600	480	600	515	2,210	3,370	7,260	4,140	765	1,230
24	650	1,060	600	480	555	555	2,070	3,670	7,090	3,980	765	1,230
25	650	1,060	555	480	555	555	1,940	3,670	6,920	3,980	830	1,230
26	600	975	555	480	555	555	1,940	3,820	6,580	3,820	830	1,060
27	555	975	555	480	515	555	1,940	3,980	6,580	3,670	900	1,060
28	418	975	600	480	555	600	1,940	3,980	6,580	3,670	900	1,060
29	418	900	600	480	.....	600	1,940	4,140	6,410	3,670	900	960
30	418	900	650	515	.....	650	2,070	4,460	6,240	3,520	975	900
31	418	.....	650	555	.....	650	.....	4,940	.....	3,520	1,060	.....
1909-10.												
1	830	650	2,490	900	600	830	3,370	4,780	7,940	5,260	3,670	555
2	765	650	2,210	975	650	900	3,370	5,260	7,940	5,420	3,670	600
3	765	765	2,210	900	650	900	3,220	5,580	7,940	5,260	3,520	765
4	765	705	2,490	830	650	1,060	3,070	5,900	7,770	5,260	3,370	765
5	765	705	2,210	765	650	1,140	3,070	6,240	7,600	5,260	3,370	705
6	830	650	2,210	830	650	1,140	2,920	6,240	7,600	5,260	3,370	765
7	900	650	2,210	830	650	1,230	2,770	6,410	7,600	5,260	3,220	765
8	900	705	2,210	765	650	1,230	2,770	6,580	7,430	5,260	3,070	765
9	900	765	2,210	765	650	1,230	2,770	6,920	7,430	5,260	3,070	765
10	900	765	2,210	765	650	1,230	2,770	7,430	7,260	5,260	2,490	765
11	830	650	2,210	705	650	1,140	2,770	7,770	7,260	5,260	1,940	705
12	900	650	2,210	650	650	1,230	2,770	7,940	7,260	5,420	1,940	765
13	830	650	2,350	650	650	1,230	2,630	8,280	7,260	5,580	1,940	765
14	830	600	1,940	650	650	1,140	2,630	8,460	7,090	5,580	1,810	765
15	765	650	1,940	650	650	1,940	2,490	8,280	6,920	5,740	1,680	765
16	765	650	1,940	650	650	2,210	2,490	8,110	6,920	5,740	1,560	765
17	765	650	1,680	650	600	2,920	2,490	7,940	6,920	5,580	1,440	765
18	765	705	1,560	705	600	3,070	2,630	7,940	6,750	5,580	1,330	765
19	765	765	1,440	765	555	3,370	2,630	7,940	6,580	5,420	555	765
20	650	705	1,440	765	555	3,670	2,770	7,770	6,580	5,260	555	830
21	650	765	1,330	830	515	3,670	2,770	7,770	6,410	5,260	515	765
22	650	830	1,280	830	555	3,820	2,770	7,940	6,240	4,940	480	765
23	650	900	1,280	900	555	3,980	2,770	7,940	6,240	4,940	480	765
24	705	1,060	1,330	830	600	3,820	2,920	7,940	5,900	4,620	555	765
25	765	1,330	1,280	765	555	3,820	3,220	8,110	5,580	4,620	555	765
26	650	1,440	1,280	765	555	3,820	3,520	8,110	5,420	4,300	600	830
27	650	1,680	1,140	765	650	3,820	3,980	8,280	5,420	4,300	650	765
28	650	1,680	1,060	765	705	3,670	3,980	8,280	5,260	4,140	650	830
29	600	1,940	1,060	650	.....	3,670	4,300	8,280	5,260	3,980	650	900
30	600	2,210	975	650	.....	3,670	4,300	8,110	5,420	3,980	600	830
31	650	.....	900	650	.....	3,520	.....	7,940	.....	3,980	555	.....

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1910–11.												
1	900	2,210	1,810	418	364	418	2,630	2,490	5,100	5,580	2,490	900
2	900	2,210	1,680	390	364	418	2,630	2,490	5,260	5,580	2,490	900
3	3,670	2,070	1,680	364	364	418	2,490	2,630	5,580	5,580	2,490	900
4	3,670	1,940	1,440	364	390	390	2,490	2,770	5,589	5,580	2,630	900
5	3,670	1,940	1,440	364	418	418	2,490	2,770	5,420	5,260	2,490	900
6	3,670	1,940	1,440	390	390	418	2,350	2,770	5,580	5,260	2,490	900
7	3,670	1,940	1,440	418	364	418	2,350	2,920	5,580	5,260	2,490	975
8	3,670	1,940	1,330	390	390	418	2,490	3,070	5,580	5,260	2,490	1,060
9	3,670	1,940	1,230	364	364	418	2,350	3,070	5,580	4,940	2,490	1,060
10	3,620	1,810	1,230	364	390	418	2,210	3,070	5,900	4,780	2,490	1,060
11	3,370	1,940	1,230	364	418	390	2,210	3,220	5,900	4,620	2,490	1,060
12	3,370	1,940	1,230	364	418	418	2,210	3,370	6,240	4,620	2,490	1,140
13	3,370	1,940	1,230	364	418	418	2,210	3,370	6,240	4,300	2,350	1,230
14	3,070	1,940	1,140	364	418	418	2,070	3,370	6,410	4,300	2,210	1,230
15	3,070	1,940	480	364	390	390	2,070	3,370	6,580	3,980	2,210	1,230
16	2,770	1,810	418	364	364	364	1,940	3,220	6,750	3,980	2,210	1,230
17	2,770	1,940	364	340	364	390	2,070	3,070	7,260	3,820	2,070	1,140
18	2,770	1,940	364	317	364	390	2,210	3,220	7,260	3,820	1,940	1,060
19	2,770	1,940	364	340	390	418	2,210	3,370	7,090	3,670	1,940	1,060
20	2,770	2,070	390	364	418	418	2,210	3,370	7,090	3,670	1,940	1,060
21	2,770	1,940	418	340	418	418	2,210	3,370	6,920	3,670	1,940	1,060
22	2,630	1,940	448	364	418	555	2,210	3,370	7,090	3,370	1,940	900
23	2,490	1,810	480	340	390	650	2,070	3,520	6,920	3,370	1,940	900
24	2,490	1,680	515	317	418	650	1,940	3,670	7,090	3,070	1,940	975
25	2,490	1,680	480	340	390	1,230	2,070	3,670	6,920	3,070	1,940	975
26	2,490	1,680	480	364	364	1,230	2,210	3,520	6,750	2,770	1,940	900
27	2,490	1,680	480	364	364	1,330	2,210	3,980	6,580	2,770	1,810	830
28	2,350	1,680	480	364	364	1,680	2,210	4,300	6,410	2,770	900	830
29	2,490	1,810	448	364	.....	1,940	2,350	4,300	6,240	2,630	830	765
30	2,350	1,940	418	364	.....	2,210	2,490	4,620	6,240	2,490	900	765
31	2,210	.....	418	340	.....	2,490	.....	4,940	.....	2,490	900	.....
1911–12.												
1	830	390	390	418	448	480	480	2,490	6,070	7,260	975	1,230
2	900	364	418	418	480	480	480	2,490	5,900	7,260	975	1,230
3	830	340	418	390	448	480	515	2,490	5,900	7,090	975	1,140
4	705	364	448	390	480	480	555	2,630	5,900	6,920	1,060	1,060
5	765	390	480	418	480	480	600	2,630	5,900	6,920	1,060	1,060
6	705	364	480	418	480	480	650	2,770	5,900	6,920	1,060	1,060
7	650	390	515	448	480	448	765	2,770	5,900	6,750	1,060	1,060
8	600	418	480	448	448	448	900	2,770	5,900	6,580	1,060	1,060
9	1,060	448	515	448	480	480	900	2,770	5,900	6,580	1,140	1,060
10	975	448	515	418	480	448	1,060	2,920	6,070	6,410	1,140	975
11	975	418	480	418	480	448	1,060	3,370	6,070	5,900	1,230	975
12	830	390	480	390	480	448	2,210	3,670	6,070	5,900	1,230	900
13	705	390	480	390	448	448	2,490	3,980	6,070	5,580	1,230	900
14	600	418	448	390	480	448	2,490	4,620	6,070	4,780	1,330	900
15	555	448	480	418	480	448	2,490	4,940	6,240	4,620	1,440	900
16	515	418	480	390	480	448	2,630	5,420	6,240	4,300	1,560	990
17	555	448	515	418	515	448	2,630	5,580	6,240	4,300	1,680	830
18	515	418	515	418	515	448	2,490	5,900	6,240	4,140	1,680	765
19	555	418	480	448	515	448	2,490	6,410	6,240	3,980	1,680	705
20	515	390	448	448	515	448	2,630	6,580	6,240	3,820	1,560	600
21	480	364	418	418	515	418	2,770	6,580	6,240	3,820	1,560	650
22	480	390	448	448	515	418	2,770	6,580	6,240	3,670	1,680	650
23	515	418	448	448	515	418	2,770	6,580	6,240	1,940	1,680	650
24	480	418	480	480	515	418	2,770	6,580	6,410	1,560	1,680	650
25	448	418	448	480	480	448	2,770	6,580	6,410	1,140	1,680	650
26	418	390	480	515	515	448	2,770	6,580	6,580	1,060	1,680	600
27	390	418	480	515	480	448	2,770	6,580	6,580	1,060	1,680	600
28	390	418	448	480	480	448	2,770	6,580	6,750	975	1,560	555
29	418	390	418	448	480	480	2,770	6,410	7,260	900	1,440	555
30	390	364	418	480	.....	480	2,630	6,410	7,260	975	1,440	555
31	418	.....	448	480	.....	480	.....	6,240	.....	900	1,330	.....

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1913 and 1918—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1912-13.												
1	555	448	418	464	448	515	980	2,180	6,910	6,820	4,060	1,240
2	555	418	418	480	448	498	980	2,180	7,340	6,820	3,430	1,100
3	555	418	480	448	448	480	942	2,050	8,190	6,650	3,210	1,060
4	555	418	448	480	448	480	904	2,050	8,530	6,310	2,990	1,450
5	555	448	480	449	448	480	904	2,050	8,710	6,140	2,990	1,800
6	518	448	448	418	418	480	904	2,050	8,710	6,060	2,990	1,800
7	480	448	448	448	480	480	904	2,050	8,530	5,980	2,990	1,800
8	515	448	433	448	480	480	833	2,180	8,530	5,980	2,990	1,800
9	515	448	418	448	480	480	833	2,310	8,530	5,820	2,850	1,680
10	480	448	418	418	480	480	833	2,710	9,070	5,820	2,850	1,680
11	480	448	418	448	480	480	868	2,850	9,070	5,820	2,850	1,680
12	480	480	418	448	480	390	904	2,990	8,890	5,660	2,850	1,560
13	480	480	418	448	480	1,940	982	3,130	8,890	5,420	2,710	1,450
14	480	480	418	448	480	1,940	1,060	3,280	8,890	5,180	2,710	1,340
15	480	448	418	418	480	2,070	1,240	3,280	8,620	5,180	2,440	1,240
16	480	448	418	448	480	2,000	1,240	3,430	8,360	4,860	2,440	1,200
17	448	464	418	448	480	1,940	1,240	3,430	8,190	4,700	2,310	1,200
18	448	480	433	448	480	1,940	1,450	3,430	7,680	4,540	2,180	1,240
19	448	480	448	464	480	1,680	1,560	3,430	7,680	4,540	1,340	1,240
20	433	480	448	480	515	1,680	1,680	3,430	7,850	4,620	1,240	1,200
21	418	448	418	480	515	1,560	1,800	3,580	7,680	4,700	1,240	1,220
22	448	480	418	480	515	1,440	1,920	3,580	7,600	4,860	1,240	1,240
23	448	448	418	480	515	1,380	1,920	3,900	7,510	5,020	1,240	1,100
24	418	448	448	480	515	1,330	1,920	4,220	7,510	5,180	1,130	1,020
25	448	448	433	480	480	1,230	1,920	4,540	7,340	5,180	1,020	1,060
26	448	480	418	480	480	1,230	2,050	4,860	7,170	5,180	1,100	1,020
27	448	480	418	480	480	1,140	1,800	5,180	7,170	4,990	1,100	980
28	448	449	418	448	448	1,140	2,180	5,820	6,310	4,810	1,060	980
29	448	418	433	480	.....	1,230	2,180	5,980	6,560	4,620	1,150	980
30	418	418	448	480	.....	1,140	2,180	6,230	6,820	4,430	1,240	833
31	448	.....	448	480	.....	1,060	.....	6,480	.....	4,250	1,240	.....
1917-18.												
1	870	465	530	4,040	1,700	605	1,280	3,100	4,150	6,520	2,880	1,060
2	810	495	530	5,570	1,700	605	1,280	3,250	4,150	6,340	3,180	1,060
3	940	465	530	5,570	1,700	605	1,280	3,550	4,150	6,340	2,880	1,060
4	940	480	530	5,570	1,700	605	1,280	4,000	4,150	6,070	2,520	1,150
5	940	495	565	5,410	1,700	605	1,280	4,150	4,220	5,800	2,160	1,150
6	940	495	530	5,170	1,280	605	1,280	4,300	4,300	5,690	2,160	1,150
7	940	530	565	4,930	1,580	605	1,280	4,450	4,450	5,570	2,030	1,060
8	940	495	565	4,770	1,380	470	1,280	4,610	4,770	5,460	2,160	1,060
9	940	495	580	4,450	1,280	330	1,280	4,450	5,420	5,120	2,030	1,060
10	940	465	595	4,300	1,280	330	1,280	4,450	6,080	5,120	2,030	1,060
11	870	495	605	4,000	1,280	330	1,380	4,450	6,590	5,120	1,900	1,060
12	870	465	530	3,700	1,280	330	1,480	4,380	6,930	5,120	1,780	1,060
13	870	495	530	3,620	1,280	330	1,580	4,300	7,270	4,950	1,660	1,060
14	840	495	530	3,550	1,280	330	1,580	4,450	8,140	4,860	1,780	1,060
15	810	465	530	3,250	1,180	350	1,580	4,610	8,140	4,780	1,780	1,060
16	940	465	650	3,100	1,280	1,100	1,580	4,930	8,080	4,780	1,660	1,060
17	755	465	755	3,100	1,230	1,190	1,580	4,930	8,020	4,780	1,660	1,060
18	700	465	870	2,950	1,180	1,280	1,580	4,930	7,960	4,780	1,660	1,150
19	700	465	940	2,800	605	1,380	1,700	4,850	7,780	4,780	1,660	1,150
20	605	465	940	2,650	565	1,280	1,700	4,770	7,780	4,780	1,150	1,150
21	605	465	870	2,500	565	1,280	1,760	4,690	7,600	4,620	845	1,150
22	605	495	940	2,360	585	1,180	1,820	4,610	7,780	4,450	910	1,150
23	605	530	980	2,360	605	1,180	1,940	4,460	7,870	4,290	980	1,150
24	605	530	1,020	2,360	605	1,230	2,150	4,310	7,960	3,970	910	1,060
25	605	530	980	2,080	605	1,280	2,360	4,150	7,960	3,490	980	980
26	565	530	940	2,080	605	1,280	2,500	4,000	7,600	3,180	1,060	980
27	605	565	870	2,080	605	1,280	2,500	3,850	7,420	3,180	1,060	980
28	570	530	940	2,080	650	1,280	2,580	3,700	7,240	3,030	1,060	980
29	530	530	1,100	1,940	.....	1,280	2,650	3,700	7,000	2,880	980	980
30	495	530	1,800	1,820	.....	1,280	2,800	3,920	6,760	2,880	980	980
31	495	.....	2,500	1,700	.....	1,280	.....	4,150	.....	2,880	1,060	.....

NOTE.—Records Nov. 1, 1903, to March 31, 1913, revised since publication in previous water-supply papers. Discharge Nov. 1-5, 1913, estimated same as for Nov. 6-11. Discharge interpolated for Sundays beginning August 18, 1912, and a very few other days, when gage was not read. Sudden increase or decrease in daily discharge due to operation of flashboard dam at outlet of lake. Revised records excellent.

Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918.

[Drainage area, 950 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1903–4.									
October						74,100	1,210	1.27	1.46
November		1,440	1,710	102,000	− 21,500	80,500	1,350	1.42	1.58
December	1,680	1,060	1,280	78,700	− 17,700	61,000	992	1.04	1.20
January	1,060	830	935	57,500	− 12,200	45,300	737	.776	.89
February	1,060	555	904	52,000	− 9,900	42,100	732	.771	.83
March	1,440	830	1,050	64,600	− 20,600	44,000	716	.754	.87
April	5,580	1,060	2,730	162,000	+176,000	338,000	5,680	5.98	6.67
May	7,600	4,620	5,730	352,000	+ 88,000	440,000	7,160	7.54	8.69
June	8,280	6,920	7,620	453,000	− 48,000	405,000	6,810	7.17	8.00
July	8,280	4,140	6,520	401,000	− 36,000	365,000	5,940	6.25	7.21
August	4,460	765	3,060	188,000	− 69,000	119,000	1,940	2.04	2.35
September	1,810	765	1,330	79,100	− 29,100	50,000	840	.884	.99
The year					0	2,060,000	2,840	2.99	40.74
1904–5.									
October	1,060	765	910	56,000	− 21,800	34,200	556	.585	.67
November	900	765	807	48,000	− 10,800	37,200	625	.658	.73
December	830	765	786	48,300	− 11,600	36,700	597	.628	.72
January	765	705	742	45,600	− 4,500	41,100	668	.703	.81
February	830	705	757	42,000	− 14,000	28,000	504	.531	.55
March	2,490	765	1,900	117,000	+ 13,000	130,000	2,110	2.22	2.56
April	3,670	1,940	2,330	139,000	+ 28,000	167,000	2,810	2.96	3.30
May	4,940	3,370	3,870	238,000	+ 22,000	260,000	4,230	4.45	5.13
June	8,280	5,420	7,160	426,000	+ 37,000	463,000	7,780	8.19	9.14
July	6,410	4,140	5,080	312,000	− 11,000	301,000	4,900	5.16	5.95
August	3,980	975	2,190	135,000	− 6,000	129,000	2,100	2.21	2.55
September	1,440	1,060	1,300	77,400	− 20,300	57,100	960	1.01	1.13
The year	8,280	705	2,330	1,680,000	0	1,680,000	2,330	2.45	33.24
1905–6.									
October	2,350	1,330	1,760	108,000	− 25,500	82,500	1,340	1.41	1.63
November	1,560	900	1,160	69,000	− 21,900	47,100	792	.834	.93
December	900	765	816	50,200	− 18,300	31,900	519	.546	.63
January	1,140	765	854	52,500	− 17,500	35,000	569	.599	.69
February	975	900	913	50,700	− 15,100	35,600	641	.675	.70
March	1,940	900	1,220	75,000	− 31,300	43,700	711	.748	.86
April	3,370	1,060	2,080	124,000	+ 80,000	204,000	3,430	3.61	4.03
May	5,100	3,670	4,580	282,000	+ 76,000	358,000	5,820	6.13	7.07
June	4,780	3,070	4,120	245,000	+ 42,000	287,000	4,820	5.07	5.66
July	4,780	2,920	4,020	247,000	− 35,000	212,000	3,450	3.63	4.18
August	2,770	1,230	1,740	107,000	− 14,000	93,000	1,510	1.59	1.83
September	1,440	1,060	1,200	71,400	− 19,400	52,000	874	.920	1.03
The year	5,100	765	2,050	1,480,000	0	1,480,000	2,050	2.16	29.24
1906–7.									
October	1,140	765	911	56,000	− 2,000	54,000	878	.924	1.07
November	3,520	765	1,980	118,000	+ 12,000	130,000	2,180	2.29	2.56
December	2,770	975	1,870	115,000	− 69,200	45,800	745	.784	.90
January	900	600	746	45,900	− 18,300	27,600	449	.473	.54
February	1,140	650	841	46,700	− 2,500	44,200	796	.838	.87
March	1,140	975	1,060	65,200	− 11,800	53,400	868	.914	1.05
April	2,490	900	1,600	95,200	+ 48,800	144,000	2,420	2.55	2.84
May	7,770	2,770	5,840	328,000	+143,000	471,000	7,660	8.06	9.29
June	8,460	5,580	6,840	407,000	− 17,000	390,000	6,550	6.89	7.69
July	6,410	3,980	4,990	307,000	− 45,000	262,000	4,260	4.48	5.16
August	3,820	1,140	2,270	140,000	− 25,000	115,000	1,870	1.97	2.27
September	1,230	1,140	1,190	70,800	− 13,000	57,800	971	1.02	1.14
The year	8,460	600	2,480	1,790,000	0	1,790,000	2,480	2.61	35.38
1907–8.									
October	1,140	830	975	60,000	− 24,700	35,300	574	.604	.70
November	765	418	579	34,500	− 400	34,100	573	.603	.67
December	480	364	395	24,300	+ 11,600	35,900	584	.615	.71
January	555	448	502	30,900	+ 3,100	34,000	553	.582	.67
February	480	418	456	26,200	+ 1,900	28,100	489	.515	.56
March	3,370	448	1,580	97,200	− 44,500	52,700	857	.902	1.04
April	3,070	1,440	1,890	112,000	+ 10,000	122,000	2,050	2.16	2.41
May	4,940	2,770	3,860	237,000	+ 53,000	290,000	4,720	4.97	5.73
June	8,820	4,940	6,790	404,000	+ 26,000	430,000	7,230	7.61	8.49

Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1907–8.									
July	6,920	4,940	6,340	390,000	+ 16,000	406,000	6,600	6.95	8.01
August	4,780	1,440	2,390	147,000	− 27,000	120,000	1,950	2.05	2.36
September	1,440	900	1,180	70,200	− 25,000	45,200	760	.800	.89
The year	8,820	364	2,250	1,630,000	0	1,630,000	2,250	2.36	32.24
1908–9.									
October	830	418	677	41,600	− 16,500	25,100	408	.429	.49
November	1,060	418	641	38,100	+ 3,000	41,100	691	.727	.81
December	900	555	717	44,100	− 20,200	23,900	389	.409	.47
January	650	480	542	33,300	− 11,100	22,200	361	.380	.44
February	600	515	560	31,100	− 11,600	19,500	351	.369	.38
March	2,630	480	1,210	74,400	− 42,700	31,700	516	.545	.63
April	2,490	600	1,500	89,300	− 2,900	86,400	1,450	1.53	1.71
May	4,940	1,940	2,760	170,000	+ 63,000	233,000	3,790	3.99	4.60
June	7,600	5,260	6,880	409,000	+ 53,000	462,000	7,760	8.17	9.12
July	6,070	3,520	4,980	306,000	− 4,000	302,000	4,910	5.17	5.96
August	3,370	418	1,420	87,300	+ 16,700	104,000	1,690	1.78	2.05
September	1,330	900	1,150	68,400	− 26,700	41,700	701	.738	.82
The year	7,600	418	1,920	1,390,000	0	1,390,000	1,920	2.02	27.45
1909–10.									
October	900	600	755	46,400	− 15,700	30,700	499	.525	.61
November	2,210	600	915	54,400	+ 41,000	95,400	1,600	1.68	1.87
December	2,490	900	1,740	107,000	− 36,600	70,400	1,140	1.20	1.38
January	975	650	760	46,700	− 9,700	37,000	602	.634	.73
February	705	515	620	34,400	− 6,000	28,400	511	.538	.56
March	3,980	830	2,390	147,000	− 25,000	122,000	1,980	2.08	2.40
April	4,300	2,490	3,030	180,000	+107,000	287,000	4,820	5.07	5.66
May	8,460	4,780	7,430	457,000	+ 56,000	513,000	8,340	8.78	10.12
June	7,940	5,260	6,770	403,000	− 81,000	322,000	5,410	5.69	6.35
July	5,740	3,980	5,060	311,000	− 39,000	272,000	4,420	4.65	5.36
August	3,670	480	1,740	107,000	+ 10,000	117,000	1,900	2.00	2.31
September	900	555	762	45,300	− 1,000	44,300	744	.783	.87
The year	8,460	480	2,680	1,940,000	0	1,940,000	2,680	2.82	38.22
1910–11.									
October	3,670	900	2,850	175,000	− 31,000	144,000	2,340	2.46	2.84
November	2,210	1,680	1,910	114,000	− 10,000	104,000	1,750	1.84	2.05
December	1,810	364	871	53,600	− 7,500	46,100	750	.789	.91
January	418	317	362	22,300	+ 15,000	37,300	607	.639	.74
February	418	364	389	21,600	+ 3,500	25,100	452	.476	.50
March	2,490	364	727	44,700	+ 7,500	52,200	849	.894	1.03
April	2,630	1,940	2,260	134,000	− 6,000	128,000	2,150	2.26	2.52
May	4,940	2,490	3,360	207,000	+ 97,000	304,000	4,940	5.20	6.00
June	7,300	5,100	6,300	375,000	− 21,000	354,000	5,950	6.26	6.98
July	5,580	2,490	4,080	251,000	− 33,000	218,000	3,550	3.74	4.31
August	2,630	830	2,060	127,000	− 14,000	113,000	1,840	1.94	2.24
September	1,230	765	996	59,300	0	59,300	997	1.05	1.17
The year	7,260	317	2,190	1,580,000	+ 500	1,580,000	2,190	2.31	31.29
1911–12.									
October	1,060	390	618	38,000	− 15,000	23,000	374	.394	.45
November	448	340	402	23,900	+ 6,900	30,800	518	.545	.61
December	515	390	464	28,500	− 3,700	24,800	403	.424	.49
January	515	390	437	26,900	− 500	26,400	429	.452	.52
February	515	448	486	28,000	+ 300	28,300	492	.518	.56
March	480	418	454	27,900	0	27,900	454	.478	.55
April	2,770	480	1,940	115,000	0	115,000	1,930	2.03	2.26
May	6,580	2,490	4,800	295,000	+ 56,000	351,000	5,710	6.01	6.93
June	7,260	5,900	6,230	371,000	+ 9,000	380,000	6,390	6.73	7.51
July	7,260	900	4,320	266,000	− 60,000	206,000	3,350	3.53	4.07
August	1,680	975	1,370	84,200	+ 2,500	86,700	1,410	1.48	1.71
September	1,230	555	848	50,500	− 12,300	38,200	642	.676	.75
The year	7,260	340	1,870	1,350,000	− 16,800	1,340,000	1,840	1.94	26.41

Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1912–13.									
October	555	418	477	29,300	− 6,000	23,300	379	.399	.46
November	480	418	453	27,000	0	27,000	454	.478	.53
December	480	418	432	26,600	+ 1,500	28,100	457	.481	.55
January	480	418	460	28,300	− 1,500	26,800	436	.459	.53
February	515	418	477	26,500	− 3,000	23,500	423	.445	.48
March	2,070	390	1,120	68,900	− 40,500	28,400	462	.486	.56
April	2,180	833	1,370	81,500	+ 29,500	111,000	1,870	1.97	2.20
May	6,480	2,050	3,510	216,000	+ 98,000	314,000	5,110	5.38	6.20
June	9,070	6,820	7,960	474,000	0	474,000	7,970	8.39	9.36
July	6,820	4,250	5,360	330,000	− 44,000	286,000	4,650	4.89	5.64
August	4,060	1,020	2,170	133,000	− 11,000	122,000	1,980	2.08	2.40
September	1,890	833	1,310	78,000	− 7,500	70,500	1,180	1.24	1.38
The year	9,070	390	2,100	1,520,000	+ 15,500	1,530,000	2,120	2.23	30.27
1913–14.									
October	868	598	715	44,000	− 3,000	41,000	667	.702	.81
November	800	598	678	40,300	+ 1,000	41,300	694	.731	.82
December	678	424	530	32,600	− 11,700	20,900	340	.358	.41
January	800	454	677	41,600	+ 8,700	50,300	818	.861	.99
February	706	463	544	30,200	− 3,300	26,900	484	.509	.53
March	2,990	484	1,340	82,400	− 27,700	54,700	890	.937	1.08
April	3,280	1,920	2,670	159,000	+ 33,000	192,000	3,230	3.40	3.79
May	6,820	3,280	5,140	316,000	+ 49,000	365,000	5,940	6.25	7.21
June	6,650	4,860	5,730	341,000	− 20,000	321,000	5,390	5.67	6.33
July	5,509	2,850	4,620	278,000	− 40,000	238,000	3,870	4.07	4.69
August	2,850	484	1,280	78,700	+ 7,500	86,200	1,400	1.47	1.70
September	800	550	706	42,000	+ 6,500	48,500	815	.858	.96
The year	6,820	424	2,050	1,490,000	0	1,490,000	2,050	2.16	29.32
1914–15.									
October	920	678	783	48,100	+ 6,000	54,100	880	.926	1.07
November	1,470	1,040	1,250	74,400	+ 5,000	79,400	1,330	1.40	1.56
December	1,210	602	903	55,500	− 11,000	44,500	724	.762	.88
January	648	418	535	32,900	− 8,000	24,900	405	.426	.49
February	482	403	423	23,500	− 8,000	15,500	279	.294	.31
March	1,310	433	579	35,600	+ 23,500	59,100	961	1.01	1.16
April	3,900	1,360	3,410	203,000	− 11,000	192,000	3,230	3.40	3.79
May	3,740	2,990	3,330	205,000	− 5,000	200,000	3,250	3.42	3.94
June	3,130	2,380	2,630	156,000	+ 8,000	164,000	2,710	2.85	3.18
July	2,460	1,210	1,900	117,000	− 2,000	115,000	1,870	1.97	2.27
August	1,820	1,260	1,520	93,500	− 8,800	84,700	1,380	1.45	1.67
September	1,580	418	601	35,800	− 3,200	32,600	548	.577	.64
The year	3,900	403	1,490	1,080,000	− 17,500	1,060,000	1,470	1.55	20.96
1915–16.									
October	466	349	388	23,900	+ 6,000	29,900	486	.512	.59
November	673	482	560	33,300	+ 4,500	37,800	635	.663	.75
December	727	465	607	37,300	− 1,400	35,900	584	.615	.71
January	624	303	500	30,700	− 15,500	15,200	247	.260	.30
February	538	465	513	29,500	+ 6,500	36,000	626	.659	.71
March	2,990	500	1,960	121,000	−20,000	101,000	1,640	1.73	1.99
April	3,200	2,070	2,610	155,000	+31,000	186,000	3,130	3.29	3.67
May	5,500	3,280	4,900	301,000	+45,000	346,000	5,630	5.93	6.84
June	9,780	5,180	7,580	451,000	+67,000	518,000	8,710	9.17	10.23
July	8,880	5,340	7,480	460,000	−71,000	389,000	6,330	6.66	7.68
August	5,340	1,580	3,530	217,000	−29,000	188,000	3,060	3.22	3.71
September	1,940	871	1,390	82,700	−17,000	65,700	1,100	1.16	1.29
The year	9,780	303	2,680	1,940,000	+ 6,100	1,950,000	2,680	2.82	38.47

Monthly discharge of Chelan River at Chelan, Wash., for the years ending Sept. 30, 1904–1918—Continued.

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
1916–17.									
October	870	370	541	33,300	− 8,000	25,300	411	.438	.50
November	392	330	347	20,600	+ 1,500	22,100	371	.391	.44
December	370	330	345	21,200	− 1,500	19,700	320	.337	.39
January	370	.....	297	18,300	− 1,500	16,800	273	.287	.33
February	415	370	398	22,100	− 4,500	17,600	317	.334	.35
March	1,940	392	996	61,200	−42,300	18,900	307	.323	.37
April	905	370	559	33,300	+26,800	60,100	1,010	1.06	1.18
May	6,590	565	3,340	205,000	+97,000	302,000	4,910	5.17	5.96
June	7,440	6,250	6,810	405,000	− 1,000	404,000	6,790	7.15	7.98
July	7,100	4,380	6,260	385,000	−40,000	345,000	5,610	5.91	6.81
August	4,150	1,020	2,040	125,000	− 1,000	124,000	2,020	2.13	2.46
September	1,480	940	1,180	70,200	−12,500	57,700	970	1.02	1.14
The year	7,440	.....	1,940	1,400,000	+13,000	1,410,000	1,950	2.05	27.91
1917–18.									
October	940	495	756	48,500	−17,000	29,500	480	.505	.58
November	565	465	495	29,500	+ 6,500	36,000	605	.637	.71
December	2,500	530	817	50,200	+46,500	96,700	1,570	1.65	1.90
January	5,570	1,700	3,410	210,000	−66,000	144,000	2,340	2.46	2.84
February	1,700	565	1,120	62,200	−13,100	49,100	884	.931	.97
March	1,380	330	874	53,700	−11,900	41,800	680	.716	.83
April	2,800	1,280	1,720	102,000	+36,000	138,000	2,320	2.44	2.72
May	4,930	3,100	4,270	263,000	+56,000	319,000	5,190	5.46	6.30
June	8,140	4,150	6,590	392,000	+ 8,000	400,000	6,720	7.07	7.89
July	6,520	2,880	4,700	289,000	−42,000	247,000	4,020	4.23	4.88
August	3,180	845	1,660	102,000	+ 2,000	104,000	1,690	1.78	2.05
September	1,150	980	1,070	63,700	0	63,700	1,070	1.13	1.26
The year	8,140	330	2,300	1,660,000	+ 5,000	1,670,000	2,300	2.42	32.93

NOTE.—Discharge without storage estimated October, 1903, to December, 1904, and July, 1905, to November, 1910, when a gage-height record for Lake Chelan is not available, by comparison of discharge without storage for remainder of period with records at gaging stations on Wenatchee and Methow rivers

ENTIAT RIVER BASIN.

ENTIAT RIVER AT ENTIAT, WASH.

LOCATION.—In sec. 18, T. 25 N., R. 21 E., one-eighth mile below power house of Wenatchee Valley Gas & Electric Co. three-fourths mile above Entiat, Chelan County, and 1 mile above mouth.

DRAINAGE AREA.—419 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1918.

GAGE.—Inclined staff on left bank one-eighth mile below power house; read by L. G. Asher.

DISCHARGE MEASUREMENTS.—Made from private bridge 200 feet below power house or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting. No well-defined control. One channel at all stages. Left bank high; not subject to overflow; right bank slopes gradually.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.98 feet June 14 (discharge, 3,120 second-feet); minimum stage recorded, 0.83 foot November 20 and December 1 and 2 (discharge, 95 second-feet). Discharge may have been as low or lower during period in which stage-discharge relation was affected by ice.

1910–1918: Maximum stage recorded, 5.00 feet June 17, 1916 (discharge, 5,150 second-feet); minimum stage recorded, 0.68 foot November 13, 1916 (discharge, 62 second-feet).

ICE.—Stage-discharge relation affected by ice; flow estimated from recorded gage heights, discharge measurements, and weather records.

DIVERSIONS.—Several diversions above station for irrigation. Entiat Irrigation Co.'s high-line canal (capacity about 15 second-feet) carries water past station.

REGULATION.—Flow affected by changes in load at power plant.

ACCURACY.—Stage-discharge relation for low stages changed January 1 and June 13; remained permanent for high stages; affected by ice for short periods. Rating curves used prior to change on June 13 fairly well defined; rating curve used after change well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records prior to June 13 good except for ice periods, for which they are fair; after June 13 excellent.

COOPERATION.—Gage-height record furnished by Wenatchee Valley Gas & Electric Co.

Discharge measurements of Entiat River at Entiat, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 4	L. D. Carson	a 1.42	258	July 6	L. D. Carson	2.01	633
12	do	1.36	220	Sept. 29	Lee and Calkins	.93	112
Apr. 1	do	1.46	291	29	Calkins and Lee	.92	109
13	do	1.73	428				

a Stage-discharge relation slightly affected by ice.

Daily discharge, in second-feet, of Entiat River at Entiat, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	136	111	95	1,290	210	186	286	1,290	1,680	893	268	141
2	155	117	95	1,180		158	290	1,540	1,540	893	288	146
3	155	123	117	990	212	164	281	1,680	1,290	808	289	146
4	155	123	123	904	267	151	276	2,130	1,290	808	289	138
5	155	136	111	904	258	144	276	2,130	1,290	653	268	119
6	148	123	106	904	263	126	286	1,680	1,540	583	268	119
7	136	123		744	233	129	286	1,540	1,830	583	245	119
8	139	120		600	224	129	290	1,410	2,290	583	237	116
9	139	117		533	216	132	314	1,290	2,450	808	229	116
10	130	117		533	216	132	324	1,180	2,950	653	222	124
11	133	120	120	533	224	132	334	1,180	3,120	618	215	124
12	126	120		409	241	132	354	1,240	2,780	583	207	132
13	130	123		409	233	129	409	1,350	3,120	518	207	132
14	130	123		409	220	129	469	1,540	3,120	518	204	129
15	126	117		409	193	132	409	1,610	2,130	518	204	129
16	123	106		409	178	132	381	1,760	1,830	518	207	129
17	120	103	209	381		129	381	1,680	1,680	583	207	124
18	120	103	620	334		132	354	1,540	1,680	518	193	116
19	123	100	420			132	409	1,480	1,540	488	180	116
20	123	95	299			132	469	1,290	1,410	458	164	116
21	120	98		290	140	135	600	1,180	1,410	458	161	116
22	117	148				135	744	1,080	1,540	390	161	116
23	117	148		272		132	904	990	1,540	355	164	114
24	111	145		276		135	904	990	1,480	355	164	114
25	109	148		281		141	990	990	1,410	355	164	114
26	109	136	340	281	186	151	904	990	1,290	355	164	109
27	114	136		276	193	158	904	990	1,130	332	156	114
28	114	130		267	178	164	904	990	1,030	310	152	111
29	100	117			.....	168	990	1,080	984	289	144	111
30	109	100		240	.....	178	990	1,200	938	289	141	114
31	114	.....			.....	224	.....	1,680	.....	289	141	.....

NOTE.—Braced figures show mean discharge for periods when stage-discharge relation was affected by ice.

Monthly discharge of Entiat River at Entiat, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	155	100	127	7,810
November	148	95	121	7,200
December			230	14,100
January	1,200		497	30,600
February	267		193	10,700
March	224	126	145	8,920
April	990	276	524	31,200
May	2,130	990	1,380	84,800
June	3,120	938	1,780	106,000
July	893	289	527	32,400
August	289	141	203	12,500
September	146	109	122	7,260
The year	3,120		488	353,000

WENATCHEE RIVER BASIN.

WENATCHEE RIVER NEAR LEAVENWORTH, WASH.

LOCATION.—In SW. ¼ sec. 12, T. 26 N., R. 17 E., 1,500 feet below highway bridge, half a mile below Beaver Creek, and 14 miles north of Leavenworth, Chelan County.

DRAINAGE AREA.—591 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 27, 1910, to September 30, 1918.

(Revised records, November 27, 1910, to November 16, 1913, are presented in this paper).

GAGE.—Vertical and inclined staff on left bank 1,500 feet below highway bridge, since September 6, 1913; read by R. E. Nickles and P. H. Hertzog. November 28, 1910, to September 5, 1913, vertical staff 15 feet downstream at same datum.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; likely to shift during extremely high water. No well-defined control. One channel at all stages. Banks high and not subject to overflow. Stage of zero flow, according to measurements made February 8 and October 3, 1915, gage height 1.5 feet ± 0.2 foot; according to measurements made September 27, 1918, gage height 1.2 feet ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.10 feet December 30 (discharge, 18,700 second-feet); minimum stage recorded, 2.70 feet October 21, 23–25, 30, 31 (discharge, 405 second-feet).

1910–1918: Maximum stage in 1918; minimum stage recorded, 2.53 feet October 11 and 12, 1915 (discharge, 316 second-feet).

ICE.—Stage-discharge relation generally affected by ice during winter, but not affected during current year.

DIVERSIONS.—Wenatchee Park Land & Irrigation Co. divert water from Chiwawa River for short periods during irrigation season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during 1918. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Quincy Valley Irrigation District.

Discharge measurements of Wenatchee River near Leavenworth, Wash., during the years ending Sept. 30, 1912–1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1911–12.		*Feet.*	*Sec.-ft.*	1917–18.		*Feet.*	*Sec.-ft.*
May 21	R. C. Pierce	8.50	[a] 11,300	Feb. 2	L. D. Carson	3.70	1,300
				Jan. 10	do	7.98	10,200
1913–14.				Sept. 28	Calkins and Lee	2.86	494
July 11	C. O. Brown	5.22	[a] 3,400				
1914–15.							
June 10	J. T. Hartson	4.38	[a] 2,130				

[a] Records previously published corrected on account of arrangement of meter and weight or weights.

NOTE.—Discharge measurements made prior to 1918 listed in this table are only those which have been revised. Other measurements made prior to 1918 will be found in the earlier water-supply papers.

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.
1910–11.											
1	.....	2,080	915	708	468	2,360	4,490	8,760	3,230	1,430	804
2	.....	1,940	860	756	501	2,360	4,690	9,300	3,230	1,430	852
3	.....	1,810	915	756	501	2,360	4,690	8,760	3,390	1,430	900
4	.....	1,810	915	756	501	2,220	5,330	6,710	3,390	1,380	1,000
5	.....	1,680	915	661	468	2,080	5,110	5,330	3,390	1,320	804
6	.....	1,620	970	661	501	2,080	4,900	5,110	3,740	1,380	804
7	.....	1,550	1,140	618	501	2,010	3,560	4,900	3,740	1,210	804
8	.....	1,490	1,140	618	501	1,940	4,110	4,900	3,070	1,100	714
9	.....	1,370	1,110	618	501	2,080	3,920	5,110	2,910	1,050	672
10	.....	1,310	1,080	618	501	2,080	3,740	5,110	2,610	1,000	714
11	.....	1,310	1,020	618	501	2,080	3,390	6,950	2,460	1,000	672
12	.....	1,250	915	618	501	2,080	3,390	8,760	2,610	900	714
13	.....	1,190	808	618	501	1,940	3,230	10,100	2,760	900	714
14	.....	1,140	756	618	538	1,810	3,150	10,400	2,910	900	804
15	.....	1,020	708	576	576	1,810	3,070	9,570	3,070	852	1,100
16	.....	970	808	576	576	1,810	3,740	8,760	3,560	804	1,210
17	.....	970	860	576	661	1,810	4,300	7,710	3,740	804	1,050
18	.....	970	860	576	708	1,810	4,200	6,230	3,740	804	900
19	.....	970	860	538	808	1,810	4,110	5,770	3,070	900	804
20	.....	970	860	501	970	1,810	3,920	4,900	2,610	804	759
21	.....	970	860	501	1,140	2,080	3,740	4,490	2,460	759	716
22	.....	970	860	501	1,310	2,220	4,490	4,690	2,050	714	672
23	.....	970	860	501	1,550	2,650	4,110	4,900	1,920	759	672
24	.....	1,080	915	501	1,810	3,100	4,110	4,300	2,050	714	630
25	.....	1,080	756	501	1,810	4,530	4,110	3,740	2,050	714	590
26	.....	1,050	756	501	1,810	4,530	3,920	4,300	1,980	714	550
27	2,800	1,020	756	501	1,680	4,370	3,920	4,900	1,920	714	550
28	2,500	1,020	756	468	1,550	4,210	4,110	4,690	1,670	714	513
29	2,360	970	808	.....	1,620	4,050	4,490	3,740	1,670	714	513
30	2,220	1,020	708	.....	1,810	4,210	5,330	3,560	1,670	759	476
31	.....	970	708	.....	2,080	.....	7,200	.....	1,550	804	.....

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1911–12.												
1	476	346	1,380		900	630	1,430	3,230	5,330	4,110	1,550	950
2	476	335	1,260		852	630	1,670	3,230	5,770	3,740	1,430	900
3	459	335	1,160	500	804	630	1,920	3,230	5,770	3,390	1,380	804
4	442	335	1,100		714	630	2,050	3,390	6,000	3,390	1,260	738
5	408	346	1,050		714	630	1,920	3,390	6,230	3,390	1,210	672
6	408	408	1,000	550	714	590	1,920	3,740	6,710	3,230	1,100	630
7	408	476	950	550	759	590	1,790	4,300	7,710	3,070	1,050	714
8	408	714	900	632	759	550	1,920	6,000	8,490	2,910	1,130	714
9	408	630	1,100	714	804	550	2,050	7,200	8,760	2,910	1,210	630
10	408	550	1,050	590	804	550	2,460	7,710	7,710	2,760	1,180	630
11	377	476	1,000	550	804	550	2,760	7,450	7,970	3,070	1,160	630
12	377	476	1,000	590	804	550	2,760	7,200	7,970	3,070	1,100	610
13	377	476	900	590	804	550	2,610	7,710	7,710	3,070	1,000	590
14	408	476	900	804	759	550	2,320	8,760	6,710	3,070	1,000	610
15	476	550	900	1,000	759	550	2,320	9,840	5,330	2,760	1,100	630
16	476	550	900	950	804	550	2,320	9,570	4,490	2,760	1,210	590
17	442	550	804	900	900	550	2,320	8,230	4,900	2,760	1,260	550
18	408	1,260	804	1,050	804	590	2,460	7,200	5,770	2,610	1,050	550
19	408	3,920	804	804	900	550	2,460	6,950	6,710	2,460	1,000	550
20	408	4,300	804	804	900	550	2,320	9,300	8,230	2,460	950	550
21	408	3,740	714	804	852	550	2,320	11,500	8,490	2,460	1,000	550
22	377	2,760	759	804	804	513	2,320	10,400	6,710	2,320	950	550
23	377	2,180	852	759	804	550	2,460	7,710	6,230	2,180	1,000	513
24	377	1,920	759	804	759	550	2,460	7,200	7,200	1,920	1,000	513
25	346	1,670	714	804	714	590	2,460	6,710	7,710	1,920	1,000	476
26	346	2,460	714	804	714	630	2,460	7,200	7,710	1,670	950	456
27	346	2,050	714	759	714	852	2,610	7,200	7,710	1,490	852	449
28	346	1,790	672	759	672	1,100	2,610	6,710	6,000	1,490	759	442
29	346	1,670	672	804	672	1,210	3,070	6,470	4,690	1,440	736	442
30	346	1,490	630	1,000	.....	1,210	3,230	5,770	4,110	1,380	714	442
31	340	.....	630	1,000	.....	1,260	.....	5,110	.....	1,380	759	.....
1912–13.												
1	442	476	804	610		804	772	2,640	11,500	7,970	2,760	950
2	456	476	804	630		804	772	2,920	12,900	6,710	2,910	900
3	462	476	1,000	852		804	772	2,640	14,000	6,000	3,070	900
4	462	494	1,000	804		759	772	2,640	14,300	5,780	2,760	1,920
5	462	513	950	804	590	759	810	2,380	12,600	5,550	2,610	2,760
6	462	550	900	630		759	810	2,640	11,500	6,230	2,460	2,180
7	428	590	804	672		804	810	3,210	10,700	7,200	2,460	1,670
8	435	630	804	630		804	810	4,340	11,000	6,710	2,460	1,490
9	442	630	759	672	590	804	850	6,720	11,200	6,230	2,180	1,380
10	428	630	714	630	590	852	890	7,380	10,400	6,230	2,050	1,320
11	428	630	714	630	590	900	1,060	6,940	10,100	6,230	1,920	1,210
12	428	630	714	630	590	900	1,300	6,300	10,100	5,770	1,920	1,210
13	408	630	672	630	590	876	1,780	5,800	10,400	5,110	1,670	1,100
14	408	714	672	630	590	852	2,010	5,700	10,100	4,420	1,490	1,000
15	402	714	630	590	630	852	2,380	5,300	8,760	3,740	1,430	1,000
16	496	630	630	590	852	852	2,510	4,900	7,740	3,740	1,320	950
17	590	630	672	590	1,260	850	2,640	4,700	6,710	3,740	1,260	950
18	590	672	672	550	1,320	890	2,780	4,700	6,710	4,110	1,210	1,000
19	590	861	672	550	1,260	890	3,360	4,520	8,230	4,690	1,160	950
20	550	1,050	630		1,210	890	3,830	4,900	9,570	5,550	1,100	900
21	513	1,000	550	550	1,160	850	4,160	5,700	9,030	6,230	1,050	900
22	513	1,000	590		1,100	810	3,990	6,500	8,490	6,230	1,100	950
23	513	1,000	590	550	1,050	810	3,670	7,380	8,230	6,000	1,160	950
24	513	1,000	590	590	1,000	772	3,210	8,520	8,230	5,770	1,320	900
25	513	1,000	590		950	772	3,060	8,760	7,450	5,230	1,210	852
26	513	950	590		900	735	3,060	9,030	7,200	4,690	1,100	804
27	513	900	590	590	852	735	3,060	9,840	7,200	4,300	1,100	714
28	513	900	590		852	735	2,920	9,840	7,450	3,740	1,100	714
29	513	804	590		.....	772	2,640	9,300	7,200	3,390	1,100	714
30	513	804	550		.....	772	2,640	9,300	7,970	2,910	1,210	714
31	476	.....	590		.....	810	.....	10,100	.....	2,760	1,050	.....

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the period Nov. 27, 1910, to Nov. 30, 1913—Continued.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1913.			1913.			1913.		
1	672	1,100	11	1,430	1,000	21	1,550	1,640
2	672	1,000	12	1,920	950	22	1,550	1,550
3	651	950	13	1,920	925	23	1,550	1,460
4	630	900	14	1,920	900	24	1,550	1,520
5	630	950	15	1,670	852	25	1,670	1,520
6	590	1,100	16	1,670	1,050	26	1,550	1,520
7	630	1,050	17	1,430	2,140	27	1,440	1,520
8	630	1,000	18	1,380	2,010	28	1,320	1,460
9	672	1,000	19	1,490	2,010	29	1,320	1,400
10	672	1,000	20	1,490	1,760	30	1,160	1,400
						31	1,100	.....

NOTE.—Records prior to Nov. 17, 1913, revised since publication in previous water-supply papers. Stage-discharge relation changed during high water May 1–5, 1911; shifting-control method used May 1–5. Rating curve used prior to change fairly well defined; curve used after the change well defined. Stage-discharge relation affected by ice Jan. 1–5, 1912, and Jan. 20–22, 25–31, Feb. 1–8, 10, 11, 13, 1913; discharge estimated by comparison with record of flow at Dryden and by interpolation. Stage-discharge relation affected by logs on control Mar. 17 to May 24, 1913; daily discharge ascertained from fairly well defined rating curve. Discharge interpolated for days when gage was not read. Revised records good prior to shift in May, 1911, and for months during which stage-discharge relation was affected by ice or logs on control; excellent for remainder of period.

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	580	412	660	15,400	1,420	930	1,790	5,330	4,900	4,300	1,540	835
2	700	418	620	13,800	1,300	880	1,660	6,000	4,490	3,920	1,660	790
3	745	457	620	10,400	1,300	880	1,660	6,710	4,110	3,740	1,660	790
4	745	700	620	8,490	1,360	880	1,660	7,710	3,920	3,390	1,420	745
5	700	745	580	7,710	1,420	835	1,660	7,710	4,490	3,390	1,300	700
6	700	790	580	6,230	1,480	835	1,660	6,470	5,770	3,230	1,300	700
7	660	790	540	5,330	1,480	835	1,790	5,550	7,200	3,230	1,300	660
8	620	700	505	4,690	1,360	790	1,920	5,110	8,230	3,230	1,190	660
9	580	620	540	4,110	1,300	790	2,050	4,490	8,490	3,390	1,080	660
10	580	620	580	3,390	1,660	790	2,320	4,110	9,840	3,740	1,080	660
11	540	580	660	3,230	1,540	790	2,610	4,110	9,840	3,740	1,080	660
12	540	620	620	3,070	1,540	790	2,760	4,490	9,300	3,390	1,080	700
13	505	620	700	2,610	1,480	790	2,760	4,900	10,100	2,760	1,030	700
14	505	580	2,180	2,610	1,360	745	2,610	5,770	11,000	2,610	1,080	660
15	505	540	2,320	2,320	1,300	745	2,460	6,000	8,490	3,390	980	700
16	470	540	2,460	2,180	1,360	745	2,320	5,770	6,710	3,390	1,030	660
17	464	505	2,610	2,180	1,190	790	2,180	5,330	6,710	3,230	980	660
18	444	505	6,000	2,180	1,190	790	1,920	4,900	6,710	3,070	930	660
19	431	470	8,760	1,920	1,140	790	2,460	4,490	6,000	2,910	930	660
20	418	470	6,230	1,790	980	835	2,460	3,920	6,710	2,610	980	620
21	405	1,140	5,330	1,660	930	980	3,390	3,390	6,710	2,180	980	620
22	418	1,140	3,740	1,660	930	1,080	4,110	3,390	7,200	1,920	835	660
23	405	1,030	3,230	1,660	1,030	1,080	4,490	3,390	7,200	1,920	880	580
24	405	930	2,610	1,920	1,030	1,140	4,490	3,390	6,950	1,790	980	540
25	405	835	2,320	1,920	980	1,300	4,490	3,070	6,230	1,790	930	505
26	457	835	2,050	1,790	980	1,300	4,490	2,760	5,770	1,660	930	505
27	438	700	3,070	1,660	980	1,300	4,110	2,910	5,550	1,660	880	505
28	424	700	5,770	1,660	930	1,300	4,490	3,230	4,900	1,540	835	505
29	418	660	12,600	1,660	.....	1,300	4,490	3,740	4,110	1,540	790	540
30	405	700	18,700	1,540	.....	1,420	5,110	5,110	4,110	1,660	790	580
31	405	.....	14,900	1,300	.....	1,790	.....	5,770	.....	1,540	790	.....

Monthly discharge of Wenatchee River near Leavenworth, Wash., for the period Dec. 1, 1910, to Sept. 30, 1914.

[Drainage area, 591 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1910–11.						
December	2,080	970	1,240	2.10	2.42	76,200
January	1,140	708	876	1.48	1.71	53,900
February	756	468	591	1.00	1.04	32,800
March	2,080	468	950	1.61	1.86	58,400
April	4,530	1,810	2,540	4.30	4.80	151,000
May	7,200	3,070	4,210	7.12	8.21	259,000
June	10,400	3,560	6,220	10.5	11.71	370,000
July	3,740	1,550	2,720	4.60	5.30	167,000
August	1,430	714	951	1.61	1.86	58,500
September	1,210	476	756	1.28	1.43	45,000
The period						1,270,000
1911–12.						
October	476	340	400	.677	.78	24,600
November	4,300	335	1,310	2.22	2.48	78,000
December	1,380	630	890	1.51	1.74	54,700
January	1,050		732	1.24	1.43	45,000
February	900	672	785	1.33	1.43	45,200
March	1,260	513	662	1.12	1.29	40,700
April	3,230	1,430	2,330	3.94	4.40	139,000
May	11,500	3,230	6,760	11.4	13.14	416,000
June	8,760	4,110	6,690	11.3	12.61	398,000
July	4,110	1,380	2,600	4.40	5.07	160,000
August	1,550	714	1,070	1.81	2.09	65,800
September	950	442	602	1.02	1.14	35,800
The year	11,500	335	2,070	3.50	47.60	1,500,000
1912–13.						
October	590	402	483	.817	.94	29,700
November	1,050	476	733	1.24	1.38	43,600
December	1,000	550	698	1.18	1.36	42,900
January	852		621	1.05	1.21	38,200
February	1,320		809	1.37	1.43	44,900
March	900	735	815	1.38	1.59	50,100
April	4,160	772	2,140	3.62	4.04	127,000
May	10,100	2,380	5,990	10.1	11.64	368,000
June	14,300	6,710	9,570	16.2	18.07	569,000
July	7,970	2,760	5,260	8.90	10.26	323,000
August	3,070	1,050	1,700	2.88	3.32	105,000
September	2,760	714	1,130	1.91	2.13	67,200
The year	14,300	402	2,500	4.23	57.37	1,810,000
1913–14.						
October	1,920	590	1,240	2.10	2.42	76,200
November	2,140	852	1,290	2.18	2.43	76,800
December	1,290	599	830	1.40	1.61	51,000
January	2,140	591	1,160	1.96	2.26	71,300
February	930	575	666	1.13	1.18	37,000
March	2,540	817	1,510	2.55	2.94	92,800
April	5,700	1,350	3,410	5.77	6.44	203,000
May	8,560	3,510	5,920	10.0	11.53	364,000
June	7,760	2,970	4,560	7.72	8.61	271,000
July	4,700	1,370	2,760	4.67	5.38	170,000
August	1,400	700	981	1.66	1.91	60,300
September	1,080	482	710	1.20	1.34	42,200
The year	8,560	482	2,090	3.54	48.05	1,520,000

Monthly discharge of Wenatchee River near Leavenworth, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 591 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	745	405	517	0.875	1.00	31,800
November	1,140	412	678	1.15	1.28	40,300
December	18,700	505	3,640	6.16	7.10	224,000
January	15,400	1,300	3,940	6.67	7.69	242,000
February	1,660	930	1,250	2.12	2.21	69,400
March	1,790	745	976	1.65	1.90	60,000
April	5,110	1,660	2,880	4.87	5.43	171,000
May	7,710	2,760	4,810	8.14	9.38	296,000
June	11,000	3,920	6,720	11.4	12.72	400,000
July	4,300	1,540	2,770	4.69	5.41	170,000
August	1,660	790	1,070	1.81	2.09	65,800
September	835	505	647	1.09	1.22	38,500
The year	18,700	405	2,500	4.23	57.43	1,810,000

YAKIMA RIVER BASIN.

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, Kittitas County, and 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 12, 1906, to September 30, 1918.

GAGE.—Vertical staff attached to pier of gate house bridge; read by A. L. Flint. Position of gage changed frequently during 1914 and 1915 to accommodate work on construction of new dam. Since August 19, 1914, gages have been set to sea-level datum; prior to that date at height of gate sill in temporary crib dam—elevation, 2,457 feet.

EXTREMES OF STAGE.—Maximum stage recorded during the year, 2,490.66 feet on July 10 (contents, 97,410 acre-feet); minimum stage recorded, 2,431.24 feet on September 30 (contents, 7,820 acre-feet).

1906–1918: Maximum and minimum stages recorded in 1918.

STORAGE.—Capacity of new reservoir, 152,000 acre-feet; elevation of gate sill, 2,425 feet, and of spillway crest, 2,515 feet. Record of storage or release each month used to determine discharge without storage for gaging station below dam.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Keechelus Lake near Martin, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	53,710	57,780	20,110	68,000	32,100	44,160	54,010	70,660	95,810	96,430	90,900	16,570
2...	53,860	57,970	18,670	67,800	32,460	44,430	54,540	72,050	95,380	96,650	87,780	16,010
3...	54,020	58,200	17,600	66,620	33,010	44,650	55,000	73,860	94,940	96,910	84,820	15,520
4...	54,160	58,700	16,700	65,970	33,440	44,880	55,480	76,130	94,640	97,010	81,810	15,050
5...	54,290	59,070	15,810	65,350	34,000	45,060	55,930	78,030	94,780	97,090	79,150	14,650
6...	54,420	59,390	15,090	64,290	34,650	45,280	56,360	79,430	95,340	97,150	76,890	14,640
7...	54,510	59,620	14,510	63,330	35,250	45,480	56,810	80,540	96,170	97,170	74,880	13,970
8...	54,620	59,840	14,660	62,090	35,790	45,680	57,330	81,540	96,870	97,250	72,820	13,240
9...	54,750	60,040	14,880	60,400	36,270	45,900	57,980	82,340	96,970	97,330	69,910	12,650
10...	54,870	60,210,	15,190	58,360	37,030	46,130	58,820	83,090	97,250	97,410	66,720	12,140
11...	54,960	60,370	15,770	56,330	37,880	46,300	59,760	83,860	97,050	97,370	63,580	11,740
12...	55,050	60,550	16,550	54,450	38,550	46,500	60,650	84,820	96,770	97,250	60,460	11,380
13...	55,170	59,190	18,570	52,440	39,150	46,700	61,520	85,910	96,650	97,090	57,330	11,100
14...	55,240	57,570	27,000	50,330	39,620	46,840	62,250	87,140	96,730	96,970	54,080	10,850
15...	55,320	55,640	31,080	48,440	40,070	47,010	62,980	88,270	96,810	96,850	51,040	10,500
16...	55,390	53,540	34,170	46,180	40,480	47,180	63,330	89,300	96,770	96,810	47,950	10,240
17...	55,460	51,050	37,920	43,950	40,910	47,410	62,910	90,360	96,750	96,710	44,820	9,980
18...	55,540	48,500	48,480	41,790	41,240	47,640	62,720	91,400	96,690	96,570	41,760	9,730
19...	55,610	45,620	53,850	39,530	41,540	47,870	62,710	92,390	96,670	96,450	38,960	9,490
20...	55,730	42,760	53,830	37,190	41,790	48,140	62,980	93,290	96,770	96,170	36,200	9,280
21...	55,870	40,300	52,600	34,920	42,070	48,400	63,680	94,030	96,930	96,090	33,650	9,100
22...	55,940	39,620	52,220	32,900	42,350	48,840	64,160	94,700	97,130	95,890	31,200	8,930
23...	56,030	37,240	51,920	31,190	42,710	49,270	64,160	95,340	97,170	95,690	28,920	8,760
24...	56,240	34,750	50,680	30,510	43,010	49,700	64,380	95,730	96,970	95,500	26,770	8,610
25...	56,450	32,060	48,950	30,470	43,290	50,160	64,770	95,930	96,650	95,300	24,790	8,410
26...	56,720	29,590	47,300	30,110	43,330	50,630	65,360	96,010	96,370	95,100	23,060	8,270
27...	57,010	27,330	48,110	29,790	43,680	51,080	65,970	96,050	96,170	94,860	21,470	8,130
28...	57,190	25,210	51,840	29,860	43,940	51,580	66,980	96,130	96,170	94,620	20,130	8,030
29...	57,360	23,390	59,580	30,550	.....	52,010	67,960	96,130	96,210	94,430	18,980	7,900
30...	57,510	21,760	64,450	31,080	.....	52,570	69,310	96,170	96,330	94,190	17,980	7,820
31...	57,640	.....	65,320	31,750	.....	53,330	.....	96,090	.....	93,510	17,220	.....

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, and 9½ miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 18 to November 14, 1903; January 28, 1904, to September 30, 1918.

GAGE.—Inclined staff gage in paved section on left side of outlet works, installed December 2, 1916; read by A. L. Flint. Previous gage vertical staff just above cable, 1¼ miles below dam, installed May 4, 1915. For description of former gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 1¼ miles below dam or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts at high stages. Logs and brush sometimes lodge on riffle control below gage and cause backwater, affecting stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.2 feet August 9 to 16 (discharge, 1,840 second-feet); minimum stage, no flow October 8 to November 6, and December 10–16, when reservoir gates were closed.

1904–1918: Maximum discharge, 7,370 second-feet at 10.45 a. m. March 26, 1915, when temporary crib dam was washed out (gage destroyed; discharge computed from hourly gage readings of lake surface and estimated natural inflow to lake); practically no flow when gates in Keechelus reservoir dam are closed.

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

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.—Stage-discharge relation not permament. Rating curves for period October 1 to December 31, fairly well defined except for extreme low water; curves for remainder of year well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Yakima River near Martin, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Nov. 16	7.89	1,180	Jan. 12	8.73	1,500
21	8.73	1,530	May 17	2.47	45
21	7.10	919	June 12	7.70	1,120
22	4.50	308	July 16	3.82	199
22	6.00	599	Aug. 6	7.46	1,120

Daily discharge, in second-feet, of Yakima River near Martin, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1	.....	860	1,800	9	5	5	24	710	220	1,600	434
2	1	.....	755	1,800	9	5	5	26	606	78	1,680	379
3	1	.....	653	1,800	9	5	5	28	553	120	1,680	338
4	1	.....	576	1,760	9	5	5	31	553	167	1,680	348
5	1	.....	520	1,760	9	5	5	32	553	167	1,440	187
6	1	.....	467	1,760	9	5	5	33	553	167	1,180	232
7	1	1	157	1,720	9	5	5	35	609	167	1,220	534
8	.....	1	3	1,720	9	5	5	36	800	167	1,430	446
9	.....	1	1	1,680	9	5	5	36	890	167	1,840	379
10	.....	1	.....	1,640	9	5	5	37	1,050	186	1,840	328
11	.....	1	.....	1,640	9	5	6	38	1,130	204	1,840	281
12	.....	502	.....	1,600	9	5	8	38	1,130	204	1,840	244
13	.....	860	.....	1,600	9	5	11	38	1,060	204	1,840	220
14	.....	963	.....	1,520	9	5	14	39	553	204	1,840	228
15	.....	1,130	.....	1,520	9	5	15	39	553	204	1,840	228
16	.....	1,320	.....	1,520	9	4	330	39	553	204	1,840	212
17	.....	1,400	276	1,520	9	4	451	43	553	204	1,800	212
18	.....	1,490	951	1,480	9	4	342	45	553	204	1,760	189
19	.....	1,560	1,400	1,480	8	4	292	46	427	204	1,680	175
20	.....	1,520	1,440	1,400	8	4	188	46	427	204	1,600	165
21	.....	918	1,440	1,320	7	4	308	46	427	204	1,520	160
22	.....	638	1,440	1,200	7	4	683	47	467	204	1,440	146
23	.....	1,400	1,440	1,020	6	4	770	109	531	204	1,370	143
24	.....	1,440	1,400	890	6	4	553	235	553	204	1,260	145
25	.....	1,400	1,400	769	6	4	314	292	531	204	1,150	143
26	.....	1,320	1,400	653	6	4	244	292	509	204	1,050	135
27	.....	1,240	1,480	500	5	4	98	324	383	204	945	127
28	.....	1,160	1,560	184	5	4	22	390	509	204	817	122
29	.....	1,020	1,680	10	.....	5	23	588	237	204	712	114
30	.....	955	1,720	9	.....	5	24	830	221	204	586	107
31	.....	.....	1,760	9	.....	5	.....	867	.....	947	508	.....

NOTE.—No flow Oct. 8 to Nov. 6, Dec. 10-16; water being stored in Keechelus Lake.

Monthly discharge of Yakima River near Martin, Wash., for year ending Sept. 30, 1918.

[Drainage area, 55 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	1	0	0.23	14.1	+ 4,050	4,060	66.0	1.20	1.38
November	1,560	0	741	44,100	−35,900	8,200	138	2.51	2.80
December	1,760	0	799	49,100	+43,600	92,700	1,510	27.5	31.70
January	1,800	9	1,270	78,100	−33,600	44,500	724	13.2	15.22
February	9	5	8.07	448	+12,200	12,600	227	4.13	4.30
March	5	4	4.58	282	+ 9,390	9,670	157	2.85	3.29
April	770	5	158	9,400	+16,000	25,400	427	7.76	8.66
May	867	24	153	9,410	+26,800	36,200	589	10.7	12.34
June	1,130	221	606	36,100	+ 240	36,300	610	11.1	12.38
July	947	78	214	13,200	− 2,820	10,400	169	3.07	3.54
August	1,840	508	1,450	89,200	−76,300	12,900	210	3.82	4.40
September	534	107	237	14,100	− 9,400	4,700	79.0	1.44	1.61
The year	1,840	0	474	343,000	−45,800	298,000	411	7.47	101.62

YAKIMA RIVER AT CLE ELUM, WASH.

LOCATION.—In sec. 27, T. 20 N., R. 15 E., at highway bridge at Cle Elum, Kittitas County, just above Roslyn Creek, 3 miles below mouth of 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, 1918.

GAGE.—Friez water-stage recorder referred to staff gage on right bank under highway bridge; installed July 12, 1911; inspected by T. J. Denny. For description of previous gages see Water-Supply Paper 442.

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

CHANNEL AND CONTROL.—Bed composed of gravel and cobblestones; somewhat shifting. 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; shifting during high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 11.0 feet at 12.30 a. m. December 30 (discharge, 19,900 second-feet); minimum stage, from recorder, 1.47 feet November 7 (discharge, 286 second-feet).

1906–1918: Maximum stage, measured from high-water marks, 12.5 feet November 14, 1906 (discharge about 25,600 second-feet); minimum stage recorded, 1.11 feet at 6 p. m. September 30, 1915 (discharge, 192 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—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.

ACCURACY.—Stage-discharge relation changing October 1 to December 30; permanent thereafter. Rating curves fairly well defined prior to December 30; curve for remainder of year well defined. Water-stage recorder inspected and staff gage read twice daily. Operation satisfactory. Daily discharge ascertained by applying to rating table daily gage height ascertained by inspection of recorder graph; shifting-control method used October 1 to December 18. Records good for period October to December; excellent for period January to September.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Yakima River at Cle Elum, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	1.99	542	Apr. 3	2.89	1,470
Nov. 15	2.90	1,140	May 16	4.61	3,760
Dec. 26	4.75	3,790	June 10	5.96	6,430
Jan. 10	5.53	5,540	July 15	3.07	1,700
Feb. 7	2.20	863	Aug. 5	3.60	2,330

Daily discharge, in second-feet, of Yakima River at Cle Elum, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	726	417	1,060	13,000	1,600	691	1,600	4,290	4,480	2,000	2,260	1,820
2	726	388	1,020	11,100	1,660	665	1,600	4,580	3,840	1,760	2,450	1,760
3	726	323	903	8,950	1,600	659	1,490	4,970	3,430	1,600	2,380	1,710
4	694	306	853	7,920	1,550	647	1,390	5,690	3,130	1,600	2,380	1,940
5	627	294	745	7,680	1,240	629	1,340	5,900	3,360	1,820	2,320	1,940
6	614	290	694	6,970	894	593	1,290	5,270	3,840	2,000	2,260	2,000
7	632	286	781	6,750	863	582	1,290	4,380	4,670	2,120	2,190	2,060
8	546	286	774	6,530	841	565	1,340	3,930	5,480	2,120	2,190	2,120
9	526	290	719	6,110	784	560	1,440	3,510	5,900	2,260	2,380	2,000
10	546	286	694	5,690	956	554	1,600	3,060	6,320	2,380	2,580	1,940
11	551	298	706	5,270	1,240	554	2,060	2,780	6,530	2,120	2,580	1,880
12	687	358	910	5,070	1,290	549	2,260	2,710	6,320	1,880	2,580	1,820
13	1,000	745	1,380	5,480	1,290	532	2,260	3,060	6,320	1,760	2,580	1,760
14	1,180	984	2,960	5,070	1,240	527	2,060	3,510	6,110	1,710	2,520	1,710
15	1,180	1,140	2,470	4,970	1,170	527	1,940	3,930	5,070	1,760	2,520	1,710
16	1,140	1,260	2,960	4,870	1,120	532	1,880	3,760	4,200	2,260	2,520	1,710
17	1,100	1,420	4,600	4,770	1,040	565	2,120	3,510	3,840	2,380	2,450	1,760
18	1,060	1,420	11,700	4,380	1,010	605	1,940	3,360	3,760	2,380	2,450	1,710
19	1,060	1,550	15,100	4,200	940	623	1,820	3,130	3,430	2,380	2,380	1,710
20	1,020	1,550	10,500	4,020	849	653	1,940	2,850	3,200	2,320	2,260	1,660
21	947	1,500	7,160	3,760	805	697	2,450	2,640	3,130	2,060	2,320	1,660
22	947	871	6,010	3,760	771	757	3,510	2,450	3,280	1,940	2,260	1,600
23	903	1,200	5,790	3,590	777	820	4,380	2,320	3,510	2,000	2,190	1,600
24	903	1,460	4,930	3,930	757	863	4,380	2,260	3,590	1,940	2,320	1,440
25	687	1,500	4,330	3,760	737	925	4,020	2,320	3,430	1,880	2,260	1,100
26	614	1,460	4,050	2,780	784	1,020	3,510	2,260	3,130	2,000	2,060	1,020
27	524	1,380	5,140	2,450	737	1,060	3,510	2,060	2,850	2,060	2,000	989
28	487	1,340	9,470	2,190	717	1,060	3,360	2,190	2,580	2,000	2,000	997
29	446	1,260	16,500	1,940	.....	1,070	3,510	2,640	2,320	1,940	2,190	1,290
30	431	1,220	17,700	1,710	.....	1,200	3,930	3,590	2,120	2,000	1,880	1,290
31	421	.....	12,700	1,550	.....	1,490	.....	4,580	.....	2,120	1,820	.....

Monthly discharge of Yakima River at Cle Elum, Wash., for year ending Sept. 30, 1918.

[Drainage area, 500 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	1,180	421	763	46,900	− 25,000	21,900	356	0.712	0.82
November	1,550	286	903	53,700	− 24,500	29,200	491	.982	1.10
December	17,700	649	5,010	308,000	+139,000	447,000	7,270	14.5	16.72
January	13,000	1,550	5,170	318,000	− 34,800	283,000	4,610	9.22	10.63
February	1,660	717	1,050	58,300	+ 27,700	86,000	1,550	3.10	3.23
March	1,490	527	735	45,200	+ 19,600	64,800	1,050	2.10	2.42
April	4,380	1,290	2,370	141,000	+ 38,600	180,000	3,020	6.04	6.74
May	5,900	2,060	3,470	213,000	+ 28,700	242,000	3,940	7.88	9.08
June	6,530	2,120	4,110	245,000	− 1,250	244,000	4,100	8.20	9.15
July	2,380	1,600	2,020	124,000	− 47,900	76,100	1,240	2.48	2.86
August	2,580	1,820	2,310	142,000	− 99,500	42,500	691	1.38	1.59
September	2,120	989	1,660	98,800	− 77,400	21,400	360	.720	.80
The year	17,700	286	2,480	1,790,000	− 55,800	1,740,000	2,400	4.80	65.14

YAKIMA RIVER AT UMTANUM, WASH.

LOCATION.—In sec. 30, T. 16 N., R. 19 E., at Umtanum, 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 November 15, 1915; irrigation seasons, 1916 to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank 100 feet east of Northern Pacific Railway section house at Umtanum, installed July 10, 1914; inspected by Tom Letos and G. F. Sterling. For descriptions of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; slightly shifting. No well-defined control. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.00 feet 9 a. m. to 6 p. m. May 5 (discharge, 7,740 second-feet); minimum stage recorded, 3.47 feet at noon November 5 (discharge, 493 second-feet).

1906–1918: Maximum stage recorded, 14.2 feet November 15 or 16, 1906 (estimated from high-water marks; discharge, about 41,000 second-feet); minimum stage recorded, 2.86 feet at 7 p. m. October 3, 1915 (discharge, 138 second-feet).

ICE.—Record discontinued during winter.

DIVERSIONS.—Water diverted above gage for irrigation of about 40,000 acres in Kittitas Valley.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs.

ACCURACY.—Stage-discharge relation for stages below 6.0 feet changed slightly during winter. Rating curves well defined. Water-stage recorder inspected, and staff gage read to hundredths twice daily. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data.

Discharge measurements of Yakima River at Umtanum, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 5	3.64	640	July 18	4.89	2,210
Apr. 1	5.55	3,600	Aug. 8	4.73	1,870
July 3	4.55	1,680			

Daily discharge, in second-feet, of Yakima River at Umtanum, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	705	601	3,600	5,590	5,310	2,180	1,900	1,620
2	686	601	3,360	5,880	4,760	1,970	1,990	1,600
3	667	563	3,030	6,330	4,230	1,660	2,150	1,550
4	696	518	2,820	7,100	3,720	1,490	2,150	1,560
5	648	501	2,720	7,580	3,600	1,530	2,130	1,620
6	610	536	2,610	7,100	4,230	1,700	2,040	1,660
7	592	563	2,610	6,030	5,030	1,820	1,970	1,680
8	620	563	2,720	5,450	6,030	1,900	1,940	1,820
9	610	563	2,820	5,310	6,640	2,010	1,970	1,840
10	563	563	3,250	4,490	6,940	2,240	2,180	1,790
11	536	563	3,720	4,100	7,420	2,200	2,300	1,730
12	545	563	4,100	3,720	7,260	2,010	2,320	1,650
13	610	563	4,230	3,840	7,100	1,790	2,330	1,560
14	933	.....	3,840	4,490	7,100	1,700	2,280	1,560
15	1,030	.....	3,480	5,170	6,330	1,600	2,280	1,490
16	1,070	.....	3,250	5,310	5,170	1,770	2,410	1,480
17	1,080	.....	3,140	4,900	4,490	2,040	2,410	1,500
18	1,070	.....	3,140	4,620	4,230	2,200	2,390	1,520
19	1,030	.....	2,920	4,360	4,100	2,200	2,300	1,480
20	1,050	.....	3,030	3,970	3,600	2,180	2,180	1,460
21	1,060	.....	3,720	3,480	3,480	2,060	2,110	1,450
22	1,030	.....	5,030	3,250	3,480	1,810	2,130	1,450
23	1,030	.....	6,330	3,030	3,720	1,740	2,090	1,490
24	1,020	.....	6,640	2,820	3,970	1,890	2,080	1,480
25	977	.....	6,330	2,720	3,840	1,850	2,060	1,330
26	890	.....	5,310	2,720	3,480	1,810	1,960	1,110
27	820	.....	4,900	2,510	3,250	1,840	1,770	1,060
28	762	.....	4,760	2,410	2,820	1,820	1,770	974
29	705	.....	4,760	2,610	2,610	1,810	1,870	1,030
30	658	.....	5,170	3,480	2,370	1,760	1,770	1,210
31	638	.....	.....	4,900	.....	1,790	1,660	.....

Monthly discharge of Yakima River at Umtanum, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,080	536	805	49,500
November 1–13	601	501	559	14,400
April	6,640	2,610	3,910	233,000
May	7,580	2,410	4,490	276,000
June	7,420	2,370	4,680	278,000
July	2,240	1,490	1,880	116,000
August	2,410	1,660	2,090	129,000
September	1,840	974	1,490	88,700

YAKIMA RIVER NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., below Sunnyside diversion dam, 2 miles below Union Gap, 1½ miles east of Parker, Yakima County, 3½ miles northwest of Wapato, and 11 miles below mouth of Naches River.

DRAINAGE AREA.—3,560 square miles (measured on topographic maps and Plate I of Water-Supply Paper 369).

RECORDS AVAILABLE.—April 25, 1908, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank about 600 feet below Sunnyside diversion dam, installed August 17, 1915; inspected by Henry Hanson. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable 80 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of solid rock, large boulders, and gravel; somewhat shifting. Control formed by diagonal riffle just below Oregon-Washington Railroad & Navigation Co.'s bridge and about 250 feet below gage; may shift slightly during extremely high floods; supports of railway bridge form part control at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 15.0 feet at 1 p. m. December 30 (discharge, 52,900 second-feet); minimum stage recorded, 1.12 feet at 6 a. m. September 14 (discharge, zero).

1908–1918: Maximum stage recorded above. Minimum discharge recorded, zero in 1918, October 26, 1911 (gage height −0.65 foot) and August 25, 28, 1915 (gage height, 1.12 feet).

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

DIVERSIONS.—Water diverted above gage for irrigation of about 250,000 acres.

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 changed December 18. Rating curves well defined. Water-stage recorder inspected and staff gage read twice daily; operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height ascertained by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Yakima River near Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	Moxley and Philpott	1.98	70	May 8	F. E. Moxley	5.99	5,590
Nov. 12	Philpott and Moxley	3.63	868	29	Moxley and Blair	3.73	1,510
Dec. 15	F. E. Moxley	6.80	6,400	June 28	Moxley and Skillin	4.29	2,290
28	....do	10.02	21,700	July 5	F. E. Moxley	1.84	112
29	....do	12.19	33,700	July 11	....do	3.11	823
Feb. 4	....do	5.62	4,800	26	....do	2.19	247
Apr. 6	....do	5.28	4,020				

Daily discharge, in second-feet, of Yakima River near Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	104	995	1,940	35,600	4,050	2,810	5,450	5,330	5,330	1,120	315	26
2	128	1,010	1,700	33,800	4,650	2,810	5,220	5,690	4,650	855	507	12
3	131	986	1,700	25,600	4,650	2,810	4,760	6,320	3,860	591	684	16
4	122	1,050	1,580	22,600	4,650	2,810	4,440	7,740	3,320	239	519	7
5	112	1,040	1,530	20,600	4,870	2,650	4,240	8,360	3,500	104	441	40
6	66	995	1,480	19,100	4,870	2,570	4,050	7,590	4,440	98	373	117
7	41	951	1,390	19,100	4,760	2,490	4,050	6,590	6,060	174	326	76
8	12	857	1,350	18,100	4,340	2,650	4,050	5,690	7,740	315	295	92
9	19	874	1,480	16,600	4,050	2,650	4,140	5,570	8,360	331	290	186
10	8	942	1,480	14,600	4,050	2,570	4,650	4,540	9,000	810	558	174
11	5	916	1,400	13,200	4,440	2,650	5,330	3,680	9,680	810	545	162
12	28	977	1,580	12,400	4,440	2,650	5,690	3,320	9,340	647	545	197
13	16	968	1,760	12,000	4,440	2,490	5,690	3,680	9,680	346	552	47
14	160	1,010	3,150	11,600	4,240	2,330	5,220	4,980	9,680	373	507	8
15	639	1,410	6,040	10,800	4,050	2,330	4,650	6,460	8,050	84	482	148
16	770	1,530	4,660	10,000	4,050	2,330	4,240	6,060	5,940	65	545	137
17	778	1,700	5,330	9,340	3,860	2,490	3,770	5,330	5,100	532	647	170
18	725	1,880	11,800	8,680	3,770	2,650	3,500	4,760	4,760	598	654	231
19	770	1,940	36,800	8,360	3,500	2,730	3,240	4,340	4,340	640	626	87
20	801	2,000	33,200	8,360	3,150	2,810	3,240	3,860	3,860	692	558	272
21	865	2,060	21,100	7,740	3,060	2,650	3,960	3,150	3,680	571	526	248
22	865	2,060	16,600	7,440	3,150	2,650	5,450	2,730	3,860	357	558	235
23	899	1,640	16,100	7,590	3,320	3,060	6,870	2,330	3,960	209	412	267
24	848	1,700	13,200	8,360	3,150	3,150	7,440	2,090	4,140	384	373	357
25	874	1,880	11,200	10,000	3,150	3,500	7,010	2,010	3,770	305	435	341
26	840	2,000	10,000	8,360	2,980	3,860	5,810	1,890	3,320	257	406	186
27	809	2,000	11,200	6,870	2,980	3,860	4,980	1,940	2,730	276	276	197
28	770	1,940	19,600	6,320	2,810	3,680	4,540	1,650	2,170	231	197	320
29	718	2,000	34,400	6,060	.....	3,500	4,540	1,650	1,790	239	214	470
30	653	1,940	50,100	5,450	.....	3,860	4,870	2,810	1,450	159	464	495
31	725	.....	41,000	4,650	.....	4,870	.....	4,650	.....	124	137	.....

Monthly discharge of Yakima River near Parker, Wash., New Reservation, Old Reservation, and Sunnyside canals, for the year ending Sept. 30, 1918.

Month.	Discharge in 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	899	5	461	94.9	35.9	562	1,150	28,300	70,700
November	2,060	857	1,440	.....	.....	6.67	1,450	85,700	86,300
December	50,100	1,350	11,800	.....	.....	.....	11,800	726,000	726,000
January	35,600	4,650	13,200	.....	.....	.....	13,200	812,000	812,000
February	4,870	2,810	3,910	.....	.....	.....	3,910	217,000	217,000
March	4,870	2,330	2,930	.....	.....	93.1	3,020	180,000	186,000
April	7,440	3,240	4,840	245	134	749	5,970	288,000	355,000
May	8,360	1,650	4,410	803	267	1,160	6,640	271,000	408,000
June	9,680	1,450	5,250	939	289	1,140	7,620	312,000	453,000
July	1,120	65	404	813	174	1,190	2,580	24,800	159,000
August	684	137	451	693	168	1,160	2,470	27,700	152,000
September	495	7	177	535	113	946	1,770	10,500	105,000
The year	50,100	5	4,120	.....	.....	.....	5,150	2,980,000	3,730,000

[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. 155–160.

YAKIMA RIVER NEAR PROSSER, WASH.

LOCATION.—In SE. ¼ sec. 36, T. 9 N., R. 24 E., 1¼ miles northeast of Prosser, Benton County, and 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; August 4, 1913, to October 31, 1915; irrigation seasons 1916 to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on right bank, 1¼ miles below Prosser Falls, installed August 4, 1913; inspected by T. Martinson. June 1, 1904, to December 30, 1905, chain gage on highway bridge 600 feet below Prosser Falls. 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 boat.

CHANNEL AND CONTROL.—Bed composed of rock and large boulders; changes only during floods. Control formed by broad riffle about 800 feet below gage; permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.60 feet at 1 p. m. June 12 (discharge, 10,000 second-feet); minimum stage recorded, 1.40 feet at 9 a. m. October 12 (discharge, 484 second-feet).

1904–1906 and 1914–1918: 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, about 40 second-feet).

ICE.—Record discontinued during winter.

DIVERSIONS.—Water diverted above gage for irrigation of about 250,000 acres.

REGULATION.—Flow partly regulated by diversions and by storage and release of water of Keechelus, Kachess, Cle Elum, and Bumping reservoirs.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Water-stage recorder inspected once daily; operation satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data and rating table.

Discharge measurements of Yakima River near Prosser, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 5	Philpott and Moxley...	2.77	1,460	June 18	F. E. Moxley.....	5.68	5,670
Mar. 29	F. E. Moxley.....	5.02	4,380	July 8	.....do.....	1.99	790

Daily discharge, in second-feet, of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	771	5,910	5,510	4,770	2,130	796	863
2	734	6,320	5,910	5,510	1,840	777	850
3	693	5,910	6,110	4,950	1,560	830	796
4	734	5,510	6,950	4,230	1,310	927	753
5	722	5,320	8,040	3,740	1,090	949	746
6	688	4,950	8,510	3,820	942	891	722
7	645	4,770	8,040	4,770	856	877	717
8	693	4,770	6,950	6,320	796	830	699
9	665	4,770	6,530	8,040	771	809	753
10	633	4,770	6,110	8,510	856	803	746
11	633	5,320	5,130	9,510	1,050	765	753
12	563	5,910	4,500	10,000	1,170	830	722
13	654	6,320	4,060	9,510	1,220	884	728
14	612	6,320	4,230	9,770	1,050	920	823
15	592	5,910	5,710	9,770	956	906	843
16	759	5,320	6,740	8,270	836	891	843
17	994	4,770	6,320	6,740	753	913	843
18	1,090	4,410	5,710	5,710	863	1,000	843
19	1,130	4,140	5,320	5,320	1,050	1,010	850
20	1,170	3,820	4,950	4,770	1,090	1,090	891
21	1,220	3,900	4,410	4,320	1,130	1,130	898
22	1,260	4,590	3,820	4,320	1,130	1,090	898
23	1,310	6,110	3,440	4,230	1,000	1,090	884
24	1,360	7,160	3,090	4,500	956	1,050	884
25	1,260	7,590	2,820	4,500	964	1,000	920
26	1,310	7,160	2,680	4,230	1,010	1,010	964
27	1,310	6,110	2,620	3,660	920	987	1,000
28	1,220	5,510	2,620	3,230	884	964	920
29	1,220	5,320	2,430	2,820	836	906	898
30	1,170	5,130	2,250	2,430	823	877	1,010
31	1,130	.....	3,090	.....	771	920	.....

Monthly discharge of Yakima River near Prosser, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,360	563	934	57,400
April	7,590	3,820	5,460	325,000
May	8,510	2,250	4,990	307,000
June	10,000	2,430	5,740	342,000
July	2,130	753	1,050	64,600
August	1,130	765	927	57,000
September	1,010	699	835	49,700

KACHESS LAKE NEAR EASTON, WASH.

LOCATION.—In sec. 24, T. 21 N., R. 13 E. (unsurveyed), at outlet of lake, 2½ miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—63 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 20, 1905, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder installed in gate tower November 25, 1915, for use when gates are closed, and staff gage in three sections (datum, mean sea level); read by I. Pennington and Fred Diener. For description of present staff gage and former gages see Water-Supply Paper 442.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2,259.96 feet at 7.30 a. m. June 23 (contents, 229,780 acre-feet); minimum stage recorded, 2,225.03 feet on November 12 (contents, 91,080 acre-feet).

1906–1918: Maximum stage recorded, June 23, 1918; minimum stage recorded, 2,197.73 feet September 26–27, 1915 (contents, 13,730 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 221,000 acre-feet (revised determination). Elevation of gate sill, 2,192.75 feet; and of spillway crest, 2,258.00 feet. Record of storage or release each month used for determining discharge without storage at gaging station below dam.

ACCURACY.—Water-stage recorder in gate tower, used when gates were closed; referred to staff gage once daily. When gates were open, staff gage read to hundredths twice daily.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Kachess Lake near Easton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1....	118,140	93,120	94,780	178,590	184,420	197,720	207,280	226,200	227,630	228,610	184,800	174,060
2....	117,380	92,770	94,990	181,940	185,180	197,930	207,940	226,250	227,580	228,610	184,760	172,980
3....	116,650	92,430	95,340	184,250	185,860	198,320	208,500	226,560	227,360	228,700	184,550	171,950
4....	115,930	92,360	95,900	186,360	186,400	198,400	208,890	226,740	227,090	228,700	184,290	170,140
5....	114,840	92,360	95,970	188,690	187,210	198,620	209,420	226,290	227,140	228,170	183,910	168,170
6....	114,300	92,290	96,180	190,820	188,060	198,750	209,770	225,440	227,540	227,050	183,070	165,680
7....	113,650	92,220	96,530	192,950	188,400	198,960	210,290	224,950	228,340	225,670	182,020	163,280
8....	113,140	91,940	96,600	193,600	188,910	199,140	210,820	224,600	228,660	224,240	180,970	160,900
9....	112,670	91,700	96,740	193,510	189,290	199,350	211,430	224,330	228,610	222,670	180,470	158,580
10....	112,090	91,490	96,880	193,170	190,100	199,740	212,130	224,240	228,880	221,040	180,470	156,300
11....	111,550	91,250	97,720	193,080	190,950	199,870	213,010	224,150	228,660	219,800	180,470	153,920
12....	111,040	91,080	98,280	193,000	191,720	200,040	213,980	224,420	228,340	218,910	180,180	151,640
13....	109,930	91,360	99,470	192,230	192,310	200,210	214,770	224,950	228,700	217,850	179,880	149,250
14....	108,710	91,490	101,720	191,380	192,740	200,380	215,520	225,350	229,060	217,060	179,760	146,950
15....	107,650	91,560	107,900	190,520	193,170	200,510	216,490	225,440	229,060	216,180	179,720	144,540
16....	106,330	91,740	110,150	189,500	193,600	200,640	217,060	225,310	228,880	214,150	179,460	142,040
17....	105,150	91,840	113,210	188,480	194,070	200,820	217,410	225,040	228,930	212,130	179,300	139,470
18....	103,910	91,980	121,220	187,420	194,320	201,080	217,760	224,860	228,930	210,200	179,170	137,060
19....	102,850	92,050	130,120	186,110	194,620	201,380	218,070	224,690	228,930	208,110	179,010	134,560
20....	101,610	92,180	132,940	184,760	194,920	201,590	218,560	224,690	228,930	206,110	178,760	132,040
21....	100,560	92,360	134,630	183,410	195,140	201,850	219,490	224,600	229,150	204,630	178,550	129,480
22....	99,260	92,630	136,910	182,060	195,400	202,460	220,770	224,290	229,510	203,110	178,340	126,910
23....	98,280	92,880	138,630	180,890	195,820	202,890	222,110	224,200	229,690	201,590	178,170	124,660
24....	97,160	93,080	139,890	179,970	196,250	203,330	223,350	224,200	229,560	199,950	177,880	123,700
25....	96,530	93,260	140,850	179,720	196,680	203,670	224,370	224,060	229,330	198,140	177,670	122,510
26....	96,210	93,400	142,190	180,550	197,070	204,110	225,220	224,020	229,150	196,420	177,340	121,330
27....	95,900	93,600	145,120	181,390	197,370	204,540	225,490	224,150	228,970	194,070	177,130	120,040
28....	95,380	93,810	150,580	181,940	197,590	204,930	225,580	224,600	228,790	192,010	176,800	117,820
29....	94,850	94,050	160,860	183,160	.....	205,540	225,840	225,130	228,660	189,930	175,880	114,770
30....	94,230	94,580	168,660	183,660	.....	205,980	226,200	226,160	228,610	187,930	175,340	112,700
31....	93,670	.....	173,060	183,910	.....	206,460	.....	227,500	.....	185,350	174,840	.....

KACHESS RIVER NEAR EASTON, WASH.

LOCATION.—In sec. 3, T. 20 N., R. 13 E., three-fourths mile below Kachess storage dam, a quarter of a mile above mouth, and 2 miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—64 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 20, 1903, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder at highway bridge, installed August 15, 1916; inspected by I. Pennington and Fred Diener; original staff gage on left bank a quarter of a mile below Kachess storage dam was replaced by water-stage recorder at same site and datum July 22, 1913.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below site of old gage or by wading.

CHANNEL AND CONTROL.—Bed at old station composed of light gravel and sand; shifting frequently. Control formed by broad riffle 125 feet below gage; shifting. High water in Yakima River causes backwater at gage at infrequent intervals.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.38 feet at 8 p. m. September 6 (discharge, 1,290 second-feet). Practically no flow November 13 to January 2 and January 27 to April 10.

1904–1918: Maximum stage recorded, 8.0 feet at 8.30 a. m. November 16, 1906 (discharge, 1,760[1] second-feet). Practically no flow when gates in dam are closed.

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—None.

REGULATION.—Flow controlled by storage and release of water in Kachess Lake reservoir. Monthly discharge, without storage, determined from records of stage of reservoir.

ACCURACY.—Stage-discharge relation affected by backwater from Yakima River January 2–27, April 16–25, May 27 to June 30, and July 31 to September 4 when water was being released from Keechelus reservoir and gates were closed at Kachess reservoir. Rating curve for normal conditions fairly well defined; backwater curve fairly well defined between 500 and 1,200 second-feet and poorly defined below. Water-stage recorder inspected once daily; operation satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records fair.

COOPERATION.—United States Reclamation Service furnished field data and rating tables.

Discharge measurements of Kachess River near Easton, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 8	4.31	286	June 11	a 5.83	922
Jan. 15	a 5.93	984	July 16	5.98	1,140
May 18	5.23	641	Aug. 7	a 5.17	577

a Affected by backwater from Yakima River.

[1] Revised from original data.

Daily discharge, in second-feet, of Kachess River near Easton, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	408	297	.....	.....	.....	760	435	184	204	455
2	428	222	.....	.....	.....	810	415	109	217	542
3	428	140	.....	377	.....	860	455	109	204	745
4	428	140	.....	377	.....	1,060	519	251	204	910
5	414	140	.....	396	.....	1,060	519	585	308	1,090
6	428	140	.....	377	.....	995	519	810	566	1,290
7	375	140	.....	566	.....	810	566	910	566	1,170
8	309	130	.....	855	.....	710	745	960	542	1,170
9	297	130	.....	855	.....	560	855	1,010	217	1,170
10	297	130	.....	855	.....	492	910	960	217	1,170
11	369	130	.....	800	19	408	910	660	217	1,170
12	537	100	.....	910	19	350	910	585	217	1,170
13	660	.....	.....	1,020	19	428	690	585	217	1,170
14	635	.....	5	965	19	537	519	585	217	1,170
15	635	.....	5	1,020	28	660	497	880	217	1,170
16	635	.....	.....	1,020	68	660	519	1,060	217	1,230
17	635	.....	.....	1,020	75	660	497	1,110	217	1,230
18	635	.....	.....	1,020	71	635	415	1,110	217	1,230
19	635	.....	.....	1,020	70	537	359	1,110	204	1,230
20	635	.....	.....	1,020	69	470	359	960	191	1,230
21	635	.....	.....	1,020	72	470	291	860	191	1,230
22	610	.....	.....	1,020	95	470	324	910	191	1,230
23	635	.....	.....	1,020	117	369	435	960	191	1,170
24	504	.....	.....	1,020	95	314	476	960	179	910
25	332	.....	.....	1,020	76	314	435	1,010	167	710
26	314	.....	.....	62	202	250	377	1,060	167	710
27	314	.....	.....	.....	470	167	260	1,110	167	710
28	314	.....	.....	.....	492	167	260	1,110	351	860
29	314	.....	.....	.....	537	179	260	1,170	398	1,060
30	314	.....	.....	.....	610	245	260	1,230	260	1,060
31	314	.....	.....	.....	.....	359	.....	935	324	.....

NOTE.—No flow on days for which no record is given.

Monthly discharge of Kachess River near Easton, Wash., for year ending Sept. 30, 1918.

]Drainage area, 64 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	660	297	465	28,600	−25,400	3,200	52.0	0.812	0.94
November	297	0	61.3	3,650	+ 910	4,560	76.6	1.20	1.34
December	5	0	.32	19.7	+78,500	78,500	1,280	20.0	23.06
January	1,020	0	633	38,900	+10,800	49,700	808	12.6	14.53
February	0	0	0	0	+13,700	13,700	247	3.86	4.02
March	0	0	0	0	+ 8,870	8,870	144	2.25	2.59
April	610	0	107	6,370	+19,700	26,100	439	6.86	7.65
May	1,060	167	541	33,300	+ 1,300	34,600	563	8.80	10.14
June	910	260	500	29,800	+ 1,110	30,900	519	8.11	9.05
July	1,230	109	834	51,300	−43,300	8,000	130	2.03	2.34
August	566	167	257	15,800	−10,500	5,300	86.2	1.35	1.56
September	1,290	455	1,050	62,500	−62,100	400	6.7	.105	.12
The year	1,290	0	372	270,000	−6,320	264,000	365	5.70	77.34

CLE ELUM LAKE NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., at outlet of lake, 4 miles northwest of Roslyn, Kittitas County, and 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, 1918.

GAGE.—Water-stage recorder installed November 8, 1916; inspected by J. G. Giddings. Vertical staff on left abutment of temporary crib dam, installed June 17, 1907; zero at elevation of gate sills, 2,122.75 feet. Considerable fall between lake and dam for stages below 5.0 feet; auxiliary gages at same datum about 200 feet above dam, installed October, 1907, and July 16, 1915, used to obtain true elevation of lake at low stages.

EXTREMES OF STAGE.—Maximum stage during year from water-stage recorder, 19.10 feet at 6 a. m. December 30 (contents, 43,180 acre-feet); minimum stage recorded, 3.40 feet October 26 (contents, 7,090 acre-feet).

1907–1918: Maximum stage recorded same as above; minimum stage estimated at 1.15 feet August 31, 1906 (contents, 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.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Cle Elum Lake near Roslyn, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1...	11,660	8,310	19,040	36,040	22,760	25,300	26,890	29,880	29,780	27,170	25,760	14,940
2...	11,740	8,560	19,260	33,760	21,620	25,260	26,840	30,000	29,020	27,360	25,830	13,920
3...	11,740	9,410	19,480	31,560	21,120	25,280	26,660	30,810	28,360	27,240	25,880	13,100
4...	11,780	9,510	20,020	30,880	20,510	25,300	26,540	31,340	28,150	27,080	25,740	12,400
5...	11,950	10,090	20,350	30,550	20,900	25,300	26,730	31,320	28,550	26,960	25,710	11,700
6...	12,270	10,510	20,790	29,920	21,980	25,260	26,780	30,620	29,400	26,870	25,530	11,230
7...	12,420	11,060	20,700	29,540	22,870	25,210	26,800	29,850	30,690	26,840	25,620	10,620
8...	12,490	11,530	19,700	28,810	23,650	25,210	26,820	29,280	31,320	26,820	25,510	10,210
9...	12,700	11,890	18,650	28,360	24,330	25,240	26,960	28,850	31,290	26,840	25,580	9,830
10...	12,760	12,210	17,850	27,870	25,330	25,240	27,380	28,430	31,780	26,980	25,710	9,560
11...	12,760	12,340	16,980	27,610	25,810	25,240	27,780	28,120	31,780	27,010	25,900	9,320
12...	12,810	12,590	16,190	27,500	26,060	25,240	28,080	28,310	31,370	26,820	25,900	9,010
13...	12,590	12,810	15,800	27,240	26,080	25,170	28,080	28,810	31,660	26,610	25,780	8,860
14...	11,700	12,910	18,780	27,010	26,060	25,120	27,890	29,500	31,760	26,450	25,690	8,670
15...	11,210	13,080	24,720	26,820	25,990	25,100	27,700	29,680	30,690	26,450	25,600	8,560
16...	10,260	13,190	27,870	26,680	25,880	25,140	27,380	29,500	29,680	26,570	25,600	8,400
17...	8,350	13,280	29,300	26,570	25,830	25,210	27,150	29,090	29,380	26,680	25,550	8,310
18...	9,410	13,440	34,180	26,340	25,760	25,210	26,870	28,880	29,330	26,840	25,490	8,310
19...	8,990	13,660	37,300	26,040	25,670	25,210	26,840	28,500	29,120	26,840	25,490	8,230
20...	8,560	13,830	33,000	25,600	25,580	25,240	27,120	28,240	28,900	26,710	25,420	8,020
21...	7,930	14,090	30,470	25,030	25,530	25,300	27,910	27,870	28,930	26,540	25,170	7,890
22...	7,720	14,680	29,350	24,330	25,530	25,440	29,090	27,560	29,120	26,310	24,690	7,780
23...	7,510	15,480	29,120	23,830	25,510	25,530	29,660	27,450	29,350	26,200	24,080	7,660
24...	7,370	16,060	28,620	24,170	25,490	25,690	29,920	27,400	29,300	26,170	23,140	7,550
25...	7,230	16,450	27,890	24,350	25,440	25,810	29,680	27,360	28,970	26,100	22,220	7,510
26...	7,090	16,880	27,640	24,350	25,440	25,990	29,260	27,290	28,620	26,040	21,320	7,490
27...	7,350	17,200	28,970	24,350	25,400	26,080	28,970	27,190	28,360	25,970	20,290	7,470
28...	7,610	17,630	33,000	24,100	25,370	26,130	28,930	27,400	28,080	25,920	18,720	7,340
29...	7,720	18,060	39,200	24,240	.....	26,150	29,210	28,080	27,730	25,880	17,180	7,260
30...	8,040	18,610	40,730	24,040	.....	26,380	29,610	29,210	27,590	25,810	15,440	7,190
31...	8,140	.....	35,590	23,560	.....	26,750	.....	30,190	.....	25,760	13,060	.....

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, 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, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank 800 feet below temporary crib dam, installed October 14, 1913; inspected by J. G. Giddings. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 350 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; shifting at high water. No well-defined control. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.42 feet, 11 p. m. December 29 to 1 a. m. December 30 (discharge, 14,800 second-feet); minimum stage recorded, 0.29 foot at 2 p. m. October 31 (discharge, 12 second-feet).

1904–1918: 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).

ICE.—Stage-discharge relation not seriously affected by ice.

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Cle Elum Lake reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined up to 4,500 second-feet. Water-stage recorder inspected twice daily. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph or for days of considerable variation in stage by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for extremely high water.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed discharge.

Discharge measurements of Cle Elum River near Roslyn, Wash., during the year ending Sept. 30, 1918.

[Made by F. E. Moxley.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Oct. 9	0.66	43	Apr. 2	3.30	926
Dec. 27	4.73	2,220	June 10	6.60	4,030
Jan. 11	4.01	1,470	July 15	2.91	771
Feb. 8	1.14	133	Aug. 5	2.22	439

Daily discharge, in second-feet, of Cle Elum River near Roslyn, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	268	17	76	8,140	940	322	1,030	2,680	2,680	1,250	518	874
2	271	20	83	6,230	1,000	309	1,000	2,780	2,170	1,220	522	770
3	268	26	79	4,350	970	319	940	3,080	1,840	1,170	518	720
4	224	44	64	3,520	910	322	880	3,520	1,680	1,120	495	632
5	131	79	55	3,300	518	322	822	3,520	1,880	1,060	457	554
6	119	74	79	2,880	126	319	793	2,980	2,390	1,040	417	509
7	184	51	375	2,680	147	291	793	2,580	3,190	988	405	449
8	142	69	569	2,260	173	297	822	2,300	3,520	988	401	424
9	160	85	559	1,960	173	297	880	2,040	3,630	1,010	401	398
10	193	98	573	1,800	319	291	1,060	1,800	3,990	1,070	444	380
11	164	114	545	1,520	482	294	1,290	1,680	3,990	1,060	504	355
12	224	128	559	1,400	622	294	1,480	1,720	3,630	982	536	338
13	487	139	569	1,290	632	282	1,440	2,000	3,870	886	509	325
14	541	161	607	1,180	607	265	1,360	2,350	3,990	810	457	313
15	522	173	746	1,090	588	256	1,250	2,530	3,190	781	431	297
16	478	173	1,640	1,000	554	282	1,090	2,390	2,530	845	428	291
17	432	112	2,390	910	513	285	970	2,210	2,350	910	428	288
18	390	83	7,230	880	478	288	910	2,040	2,300	946	405	277
19	355	87	9,420	932	456	291	880	1,880	2,170	952	390	262
20	335	69	5,670	880	428	306	1,000	1,720	2,040	892	420	262
21	310	76	3,410	990	408	325	1,400	1,520	2,080	822	588	254
22	274	94	2,680	880	398	365	2,040	1,320	2,210	753	583	245
23	254	92	2,350	764	390	420	2,440	1,250	2,350	699	684	237
24	248	76	1,960	793	383	448	2,580	1,250	2,300	667	822	234
25	245	61	1,560	880	379	491	2,440	1,180	2,120	637	822	229
26	147	62	1,360	880	365	588	2,210	1,150	1,920	607	822	218
27	59	81	2,210	880	348	627	2,040	1,120	1,800	573	874	208
28	33	73	5,390	851	338	647	2,040	1,180	1,640	550	926	206
29	14	70	11,700	880	.....	667	2,170	1,560	1,400	531	934	206
30	13	67	11,900	851	.....	764	2,440	2,260	1,320	513	940	208
31	12	.....	7,680	822	.....	940	.....	2,780	.....	513	922	.....

Monthly discharge of Cle Elum River near Roslyn, Wash., for year ending Sept. 30, 1918.

[Drainage area, 202 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	541	12	242	14,900	− 3,710	11,200	182	0.901	1.04
November	173	17	85.1	5,060	+10,500	15,600	262	1.30	1.45
December	11,900	55	2,710	167,000	+17,000	184,000	2,990	14.8	17.06
January	8,140	764	1,860	114,000	−12,000	102,000	1,660	8.22	9.48
February	1,000	126	487	27,000	+ 1,810	28,800	519	2.57	2.68
March	940	256	394	24,200	+ 1,380	25,600	416	2.06	2.38
April	2,580	793	1,420	84,500	+ 2,860	87,400	1,470	7.28	8.12
May	3,520	1,120	2,080	128,000	+ 580	129,000	2,100	10.4	11.99
June	3,990	1,320	2,540	151,000	− 2,600	148,000	2,490	12.3	13.72
July	1,250	513	866	53,200	− 1,830	51,400	836	4.14	4.77
August	940	390	581	35,700	−12,700	23,000	374	1.85	2.13
September	874	206	365	21,700	− 5,870	15,800	266	1.32	1.47
The year	11,900	12	1,140	826,000	− 4,660	821,000	1,130	5.59	76.29

NACHES RIVER BELOW TIETON RIVER, NEAR NACHES, WASH.

LOCATION.—In sec. 35, T. 15 N., R. 16 E., 600 feet below Tieton River, 500 feet above intake of Wapatox power canal, and 5 miles northwest of Naches, Yakima County.

DRAINAGE AREA.—942 square miles (measured on topographic maps and drainage map published in Water-Supply Paper 369).

RECORDS AVAILABLE.—August 4 to October 28, 1905; March 16, 1909, to October 31, 1912; May 10 to September 30, 1915; April 13, 1916, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank, referred to same datum as previous gage; installed December 7, 1916; inspected by N. E. Wray, David Rasmusson, A. C. Saunders, and Paul Mitchel. Previous gages as follows: August 4 to October 28, 1905, vertical staff nailed to stump on left bank at nearly same site as present gage but at different datum; March 16, 1909, to December 7, 1916, inclined and vertical staff gage on left bank in two sections 8 feet above cable; April 3, 1916, vertical staff installed to supplement inclined and vertical sections.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of stream composed of small boulders and gravel; shifts at extremely high water. Control at riffle, 200 feet downstream, shifting during high water. One channel except at extremely high stages when a small overflow channel at right bank carries water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.7 feet at 4 a. m. December 30 (discharge, 16,800 second-feet); minimum stage recorded, 1.62 feet at 5 p. m. November 20, and 1.67 feet September 23 (discharge, 202 second-feet).

1905, 1909–1918: Maximum stage recorded, 8.9 feet at 8 a. m. November 24, 1909 (discharge, 18,800 second-feet); minimum stage same as above.

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Above all important diversions except Selah Valley and Tieton canals.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake. See record for Bumping Lake and table of monthly discharge for Bumping River near Nile, Wash.

ACCURACY.—Stage-discharge relation changed December 29 and June 10; possibly affected during periods of low stage by backwater from wing dam extended across the river for the purpose of regulating head on Wapatox canal intake. No definite information on effect of backwater, but probably slight. Rating curves well defined below 8,000 second-feet; extended above. Water-stage recorder in operation October 1 to December 1, December 14 to February 12, April 2 to September 9, and September 20 to 30, and inspected three times daily during these periods. Staff gage read three times daily at other times. Gage-height record fairly reliable. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods of extreme low and high water, for which they are fair.

COOPERATION.—Maintained by United States Reclamation Service in cooperation with Pacific Power & Light Co. United States Reclamation Service made discharge measurements and computed discharge.

Discharge measurements of Naches River below Tieton River, near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 3	Philpott and Moxley	2.21	421	Apr. 8	F. E. Moxley	[a]3.78	1,610
Nov. 3	F. E. Moxley	2.00	340	June 7	do	5.83	4,330
Dec. 21	do	6.14	4,660	July 9	do	3.11	1,090
Feb. 12	do	3.85	1,750	31	do	2.46	529

[a] Stage-discharge relation affected by backwater from temporary dam below heading of Wapatox canal.

Daily discharge, in second-feet, of Naches River below Tieton River, near Naches, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	404	304	377	14,100	1,750	1,240	2,010	2,850	3,040	1,340	663	339
2	404	335	339	10,800	1,850	1,200	1,750	3,040	2,660	1,250	675	335
3	413	348	316	8,260	1,900	1,200	1,650	3,390	2,350	1,160	590	316
4	404	460	323	7,550	1,900	1,200	1,700	3,820	2,350	1,040	465	308
5	377	413	304	6,870	2,010	1,160	1,650	3,970	2,590	1,000	446	308
6	369	377	308	5,850	1,900	1,080	1,650	3,670	3,320	970	516	312
7	339	352	271	6,020	1,850	1,080	1,650	3,390	4,120	903	511	327
8	323	331	289	5,370	1,800	1,200	1,700	3,180	4,890	903	521	316
9	323	308	296	4,730	1,700	1,200	1,900	2,980	4,730	935	542	323
10	323	296	289	4,120	1,800	1,200	2,290	2,660	5,370	1,040	537	331
11	304	300	308	3,820	1,850	1,200	2,470	2,410	4,960	935	548	316
12	285	312	451	3,820	1,750	1,200	2,530	2,350	4,640	838	496	327
13	274	304	574	3,530	1,700	1,010	2,410	2,470	5,130	763	456	319
14	282	271	1,780	3,390	1,600	1,010	2,230	2,920	4,960	686	574	364
15	285	247	1,780	3,040	1,500	1,010	2,010	3,320	3,700	716	635	348
16	271	240	1,530	2,780	1,550	1,040	1,900	3,250	2,960	870	640	316
17	253	240	2,060	2,590	1,500	1,040	1,750	2,980	2,960	870	629	300
18	244	234	9,890	2,720	1,460	1,120	1,700	2,850	2,820	838	629	282
19	234	208	12,000	2,530	1,410	1,120	1,700	2,660	2,560	782	629	271
20	250	205	6,490	2,290	1,280	1,120	1,850	2,470	2,490	745	607	247
21	247	250	4,800	2,290	1,360	1,120	2,350	2,180	2,620	710	408	237
22	274	296	5,640	2,120	1,550	1,280	3,180	2,010	2,890	716	386	230
23	244	278	5,640	2,180	1,750	1,360	3,390	1,900	2,820	698	451	202
24	244	260	4,320	2,180	1,320	1,410	3,460	1,850	2,560	635	470	215
25	267	237	3,400	2,290	1,240	1,900	3,320	1,800	2,240	542	432	208
26	296	244	3,100	2,120	1,280	1,550	2,850	1,700	1,950	602	418	247
27	304	304	5,640	2,060	1,240	1,410	2,660	1,650	1,890	511	460	271
28	300	296	10,100	2,010	1,200	1,320	2,530	1,550	1,680	456	456	360
29	278	304	15,600	1,960	.....	1,410	2,590	1,600	1,530	432	451	369
30	271	343	15,400	1,800	.....	1,700	2,850	2,120	1,380	506	465	356
31	267	.....	12,000	1,460	.....	2,060	.....	2,980	.....	521	386	.....

Monthly discharge of Naches River below Tieton River, near Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	413	234	302	18,600
November	460	205	297	17,700
December	15,600	271	4,050	249,000
January	14,100	1,460	4,090	251,000
February	2,010	1,200	1,610	89,400
March	2,060	1,010	1,260	77,500
April	3,460	1,650	2,260	134,000
May	3,970	1,550	2,640	162,000
June	5,370	1,380	3,140	187,000
July	1,340	432	804	49,400
August	675	386	519	31,900
September	369	202	300	17,900
The year	15,600	202	1,780	1,290,000

BUMPING LAKE NEAR NILE, WASH.

LOCATION.—At storage dam at outlet of Bumping Lake, 12 miles above American River and 19 miles west of Nile, 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, 1918.

GAGE.—Vertical staff on face of gate tower; read by J. H. Nelson, Datum, mean sea level. Prior to November 3, 1910, vertical staff on north shore of lake, one-fourth mile above outlet, at different datum.

EXTREMES OF STAGE.—Maximum stage recorded during year, 3,429.75 feet at 4 p. m. December 29 (contents, 38,740 acre-feet); minimum stage recorded, 3,392.30 feet October 20–23, and October 28 to November 2 (contents, 2,090 acre-feet).

1911–1918: Maximum stage recorded December 29, 1917; minimum stage recorded, 3,391 feet February 12–15, 1916 (contents, 1,260 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 33,700 acre-feet. Elevation of gate sill, 3,389 feet, and of spillway crest, 3,426 feet. Storage or release each month used for determining discharge without storage for gaging station below dam.

ACCURACY.—Gage read to hundredths twice daily. Storage computed by United States Reclamation Service.

COOPERATION.—Records furnished by United States Reclamation Service.

Daily contents, in acre-feet, of Bumping Lake near Nile, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,750	2,090	5,840	37,850	31,970	21,200	13,670	31,140	37,550	36,900	31,520	12,440
2	2,620	2,090	5,950	36,760	31,340	20,750	14,070	32,390	37,470	36,830	31,080	11,970
3	2,530	2,380	6,090	36,020	30,700	20,130	14,440	33,730	37,410	36,760	30,580	11,550
4	2,460	2,940	6,230	35,750	30,120	19,550	14,710	35,350	37,280	36,760	30,200	11,030
5	2,410	3,360	6,320	35,490	29,830	18,900	15,040	36,900	37,330	36,680	29,860	10,540
6	2,360	3,590	6,400	35,320	29,770	18,690	15,410	37,170	37,600	36,630	29,340	10,160
7	2,330	3,650	6,510	35,530	29,650	18,360	15,720	37,170	37,880	36,560	28,750	9,690
8	2,280	3,730	6,650	35,260	29,500	17,650	16,080	37,170	38,050	36,490	28,180	9,180
9	2,280	3,790	6,750	35,000	29,250	16,980	16,540	37,140	38,010	36,420	27,580	8,650
10	2,250	3,840	6,810	34,730	29,100	16,370	16,980	37,030	38,260	36,450	27,010	8,120
11	2,220	3,900	6,890	34,620	28,890	15,740	17,670	36,900	38,050	36,360	26,450	7,680
12	2,150	3,970	7,020	34,560	28,640	15,110	18,240	36,960	37,990	36,290	25,920	7,200
13	2,140	4,110	7,330	34,430	28,400	14,760	18,750	37,030	37,990	36,120	25,360	6,590
14	2,120	4,190	7,900	34,230	28,160	14,390	19,160	37,140	37,880	35,910	24,620	6,030
15	2,120	4,310	8,680	34,070	27,840	13,980	19,580	37,170	37,600	35,710	23,620	5,510
16	2,120	4,370	9,610	33,970	27,550	13,530	20,030	37,100	37,440	35,650	22,680	4,940
17	2,120	4,440	11,220	33,970	27,320	13,140	20,450	37,100	37,440	35,450	21,980	4,490
18	2,120	4,490	14,560	34,100	27,010	12,700	20,880	37,030	37,440	35,250	20,980	4,100
19	2,120	4,530	21,140	34,030	26,680	12,270	21,280	36,960	37,370	35,050	19,940	3,770
20	2,090	4,660	23,720	34,030	26,270	11,890	21,690	36,900	37,370	34,850	19,130	3,420
21	2,090	4,810	24,940	33,970	25,630	11,630	22,350	36,900	37,440	34,560	18,790	3,190
22	2,090	4,870	26,300	33,860	24,700	11,580	23,170	36,900	37,440	34,320	18,480	3,110
23	2,090	5,060	27,820	33,770	23,850	11,300	24,080	36,790	37,440	34,060	18,260	2,910
24	2,120	5,130	28,520	33,770	23,420	11,110	24,900	36,760	37,300	33,840	17,770	2,740
25	2,120	5,210	29,030	33,600	22,980	11,010	25,940	36,760	37,300	33,600	17,280	2,590
26	2,120	5,280	29,460	33,450	22,530	11,340	26,800	36,760	37,240	33,510	16,660	2,420
27	2,120	5,350	31,270	33,380	22,090	11,760	27,550	36,760	37,170	33,340	15,940	2,360
28	2,090	5,490	34,820	33,220	21,630	12,140	28,450	36,790	37,100	33,150	15,200	2,300
29	2,090	5,630	38,640	33,040	.....	12,460	29,300	37,240	37,030	32,930	14,360	2,250
30	2,090	5,740	38,120	32,830	.....	12,870	30,170	37,510	36,960	32,480	13,440	2,220
31	2,090	.....	37,100	32,570	.....	13,220	.....	37,640	.....	32,100	12,870	.....

BUMPING RIVER NEAR NILE, WASH.

LOCATION.—A quarter of a 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, 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, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank one-fourth mile below spillway of storage dam, installed June 17, 1913; inspected by J. H. Nelson. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of large angular rocks and gravel; shifts at extremely high water. Riffle control 60 feet below gage; shifting during high water. Stage of zero flow, about gage height 0.6 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.33 feet at 5 p. m. December 29 (discharge, 5,180 second-feet); minimum stage recorded, 0.96 foot at 6 p. m. November 14 (discharge, 1.6 second-feet).

1906 and 1909–1918: Maximum stage same as above; practically no flow when gates in outlet conduit are closed.

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

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation changed at high water of December 29. Curves used before and after change well defined below 1,500 second-feet. Daily discharge ascertained by applying mean daily gage-height to rating table, or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good below 100 second-feet and excellent above.

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

No discharge measurements were made during the year.

Daily discharge, in second-feet, of Bumping River near Nile, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	121	47	2.2	1,840	518	356	11	24	628	394	389	295
2	107	27	1.9	1,920	512	352	11	25	530	365	335	291
3	96	3.2	1.9	1,560	512	352	11	28	560	348	291	295
4	89	2.2	1.9	1,400	506	352	12	33	622	322	276	287
5	86	2.0	1.8	1,240	395	348	11	322	698	303	331	284
6	80	2.0	1.8	1,200	335	348	12	692	970	287	380	306
7	78	2.0	1.8	1,200	331	380	12	679	1,200	276	389	327
8	76	2.0	1.8	1,080	327	461	13	628	1,280	273	380	314
9	73	1.9	1.7	873	327	461	16	566	1,240	269	380	314
10	72	1.8	1.7	724	327	455	17	495	1,360	269	375	310
11	70	1.8	1.9	634	322	434	17	429	1,320	269	375	327
12	68	1.7	2.4	597	322	380	17	429	1,280	266	365	322
13	67	1.7	7.0	524	322	291	17	501	1,400	263	478	335
14	66	1.6	12	495	318	284	17	622	1,240	260	584	331
15	60	1.6	6.4	434	314	276	16	634	970	260	572	310
16	55	1.6	10	394	314	276	16	584	825	260	566	280
17	52	1.7	18	375	314	273	16	560	818	256	572	253
18	52	1.7	49	403	310	269	14	512	764	253	572	223
19	52	1.8	44	384	306	269	15	466	738	256	560	196
20	51	1.8	140	365	412	269	16	413	731	256	378	166
21	51	1.7	322	348	518	269	18	370	798	253	284	144
22	49	1.7	335	339	578	269	21	356	832	256	314	127
23	49	1.8	335	331	461	269	21	352	825	256	375	107
24	49	1.8	339	331	356	273	24	343	731	237	365	94
25	49	1.8	348	331	356	139	24	335	666	204	361	81
26	49	1.8	356	327	356	9.4	24	327	591	204	380	73
27	48	1.8	356	327	356	8.2	24	310	548	204	370	66
28	47	2.0	1,280	327	356	8.2	24	213	495	204	408	62
29	45	2.0	4,520	327	.....	9.0	24	306	439	276	413	58
30	45	2.4	2,920	327	.....	10	24	603	413	314	356	55
31	45	.....	2,400	424	.....	11	.....	653	.....	343	287	.....

Monthly discharge of Bumping River near Nile, Wash., for year ending Sept. 30, 1918.

[Drainage area, 68 square miles.]

Month.	Observed discharge in second-feet.			Run-off in acre-feet.			Discharge without storage in second-feet.		Run-off in inches.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.	
October	121	45	64.4	3,960	− 790	3,170	51.6	0.759	0.88
November	47	1.6	4.23	252	+ 3,650	3,900	65.5	.963	1.07
December	4,520	1.7	446	27,400	+31,400	58,800	956	14.1	16.26
January	1,920	327	690	42,400	− 4,530	37,900	616	9.06	10.44
February	578	306	381	21,200	−10,900	10,300	185	2.72	2.83
March	461	8.2	263	16,200	− 8,410	7,790	127	1.87	2.16
April	24	11	17.2	1,020	+17,000	18,000	302	4.44	4.95
May	692	24	413	25,400	+ 7,470	32,900	535	7.87	9.07
June	1,400	413	850	50,600	− 680	49,900	839	12.3	13.72
July	394	204	273	16,800	− 4,860	11,900	194	2.85	3.29
August	584	276	402	24,700	−19,200	5,500	89.4	1.31	1.51
September	335	55	221	13,200	−10,600	2,600	43.7	.643	.72
The year	4,520	1.6	336	243,000	− 660	243,000	335	4.93	66.90

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 16 miles southwest of Naches, Yakima County.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17 to September 17, 1906 (fragmentary gage-height record); July 5, 1907, to September 30, 1918.

GAGE.—Friez water-stage recorder on right bank about 1,000 feet below intake of Tieton canal; inspected by employees of United States Reclamation Service. For description of previous gages see Water-Supply Paper 442.

DISCHARGE MEASUREMENTS.—Made from cable about 500 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifts slightly at high water; gradient steep. No well-defined control. One channel at all stages

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 4.97 feet at 6.30 p. m. June 13 (discharge, 1,720 second-feet); minimum stage recorded 1.68 feet at 10 a. m. August 28 (discharge, 8 second-feet).

1907–1918: Maximum stage recorded 7.15 feet at 4 a. m. November 24, 1909 (discharge about 5,400 second-feet); minimum stage same as above.

ICE.—Record discontinued during winter.

DIVERSIONS.—Tieton canal has diverted water above the gage since 1910. Diversions 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 for low water changed slightly during winter; permanent during period of records. Rating curve well defined. Water-stage recorder inspected twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—United States Reclamation Service furnished field data.

Discharge measurements of Tieton River at headworks of Tieton canal near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 6	Moxley and Philpott...	2.79	222	Jan. 26	F. E. Moxley.....	3.63	578
Apr. 5	F. E. Moxley.....	3.44	496	July 29	.....do.....	2.45	104
25	.....do.....	3.75	701	Aug. 12	Blair and Moxley.....	2.18	46
Jan. 4	.....do.....	3.48	496				

Daily discharge, in second-feet, of Tieton River at headworks of Tieton canal, near Naches Wash., for the year ending Sept. 30, 1918.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	504	598	592	455	211	40	16.....	628	675	825	375	24	28
2.....	477	675	527	439	194	35	17.....	645	642	893	352	26	33
3.....	439	825	471	399	134	26	18.....	661	604	842	366	20	28
4.....	439	978	493	380	72	22	19.....	678	550	769	343	38	35
5.....	450	850	630	380	65	36	20.....	695	471	793	300	26	53
6.....	455	675	825	334	67	38	21.....	711	380	910	267	18	62
7.....	455	610	1,060	280	67	13	22.....	728	357	986	251	43	79
8.....	455	568	1,360	326	64	36	23.....	744	352	893	165	60	89
9.....	493	510	1,260	334	74	34	24.....	761	334	825	116	44	131
10.....	550	477	1,620	357	81	30	25.....	675	309	703	142	14	131
11.....	556	419	1,460	339	74	31	26.....	598	300	598	221	34	194
12.....	562	434	1,410	288	50	14	27.....	544	271	656	126	25	240
13.....	579	550	1,620	259	43	14	28.....	510	267	527	104	13	317
14.....	595	745	1,460	201	29	48	29.....	533	371	477	91	29	313
15.....	612	745	995	240	22	26	30.....	539	550	444	104	36	304
							31.....	.....	675	.....	136	37	.....

NOTE.—No gage-height record Apr. 13–23; discharge interpolated.

Monthly discharge of Tieton River at headworks of Tieton canal, Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	761	439	576	34,300
May	978	267	541	33,300
June	1,620	444	897	53,400
July	455	91	273	16,800
August	211	13	55.9	3,440
September	317	13	82.7	4,920

Combined monthly discharge of Tieton River and canal at headworks of Tieton canal, near Naches, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 240 square miles.]

Month.	Discharge in second-feet.						Combined run-off.	
	River (mean).	Canal (mean).	Combined.				Inches.	Acre-feet.
			Maximum.	Minimum.	Mean.	Per square mile.		
April	576	553	844	439	631	2.63	2.93	37,500
May	541	298	1,280	572	839	3.50	4.04	51,600
June	897	304	1,920	752	1,200	5.00	5.58	71,400
July	273	306	762	398	579	2.41	2.78	35,600
August	55.9	298	518	284	354	1.48	1.71	21,800
September	82.7	235	370	272	318	1.32	1.47	18,900

TIETON CANAL NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below canal intake and 16 miles southwest of Naches, Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1910 to September 30, 1918.

GAGE.—Float gage installed in stilling well about 500 feet below canal intake; read by H. E. Andrus.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Earth section merging into concrete-lined section 1,000 feet below gage.

EXTREMES OF DISCHARGE.—Irrigation seasons 1910–1918: Maximum stage recorded 4.78 feet June 9, 1918 (discharge, 310 second-feet); no flow reported during non-irrigating season.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed daily discharge.

Canal diverts water from right bank of Tieton River in sec. 30, T. 14 N., R. 15 E. **Water** is used for irrigation.

Discharge measurements of Tieton canal near Naches, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 25	F. E. Moxley	2.98	157	July 22	F. E. Moxley	4.74	296
May 9	do	4.66	298	Aug. 12	Blair and Moxley	4.68	296
June 4	do	4.70	304	29	F. E. Moxley	4.59	298
26	do	4.75	309	29	do	4.60	289
July 22	do	4.74	310				

Daily discharge, in second-feet, of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1918.

Day.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			89	258	301	307	307	294
2			89	283	301	308	306	294
3			89	285	302	307	307	296
4				301	303	307	307	293
5				301	302	308	307	293
6				301	303	309	307	295
7				300	303	307	304	289
8				301	303	307	304	292
9				301	303	310	299	294
10				300	301	307	302	292
11				299	301	307	298	288
12	36			301	303	307	300	294
13	50			302	301	307	241	291
14	65			301	299	289	290	293
15	80			300	301	308	301	287
16	100			300	302	307	299	289
17	100			301	301	308	298	265
18	100			300	301	308	299	244
19	100			300	301	307	299	237
20	100			300	303	307	294	236
21	100			301	303	305	299	230
22	100		55	301	308	307	298	234
23	100		71	301	307	305	298	227
24	100		83	300	308	305	296	219
25	100	89	117	301	307	307	296	216
26	0	89	158	301	308	305	298	176
27	0	89	176	303	308	305	294	98
28	31	89	232	305	307	304	295	
29	31	89	241	301	308	307	294	
30	31	89	258	302	308	305	294	
31		89		302		307	295	

Monthly discharge of Tieton canal near Naches, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
November	100	0	44.1	2,620
March	89	0	20.1	1,240
April	258	0	55.3	3,290
May	305	258	298	18,300
June	308	299	304	18,100
July	310	289	306	18,800
August	307	241	298	18,300
September	296	0	235	14,000

NORTH FORK OF AHTANUM CREEK NEAR TAMPICO, WASH.

LOCATION.—In NW., ¼ sec. 2, T. 12 N., R. 15 E., at Prior ranch, 100 feet below Nasty Creek and 3½ miles northwest of Tampico, Yakima County.

DRAINAGE AREA.—69 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 26, 1907, to September 30, 1918.

GAGE.—Stevens eight-day water-stage recorder on left bank, about 300 feet southeast of ranch house, installed April 14, 1918; inspected by F. B. Hill. Previous gages as follows: August 26, 1907, to April 1, 1913, and August 20, 1915, to September 5, 1916, vertical staff at same site and datum as present gage; April 2, 1913, to August 19, 1915, and September 6, 1916, to September 30, 1917, Stevens continuous water-stage recorder at same site and datum.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Concrete control 50 feet below gage installed in November, 1915, slightly shifting. Stage of zero flow at time of construction of control, gage height 1.45 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.13 feet at 9 p. m. June 10 (discharge, 275 second-feet); minimum stage recorded, 1.76 feet during October (discharge, 17 second-feet); actual minimum probably occurred in the winter period of no record.

1907–1918: Maximum stage recorded, 4.60 feet at 9 a. m. June 18, 1916 (discharge, 728 second-feet); minimum stage recorded 1.60 feet at noon November 12, 1916 (discharge, 7 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Record discontinued during winter.

DIVERSIONS.—Station is above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter by wearing down of concrete control. Rating curves well defined. Staff gage read to hundredths four times during October. Record April to September from water-stage recorder not entirely satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from inspection of recorder graph. Discharge interpolated for days when recorder did not operate. Records good except during June, for which they are fair.

Discharge measurements of North Fork of Ahtanum Creek near Tampico, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	T. R. Newell	2.00	36.5	Aug. 10	T. G. Bedford	1.87	27.0
Apr. 14	do	2.46	101	Sept. 6	R. Skillin	1.76	20.3

Daily discharge, in second-feet, of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	.....	179	171	56	28	21
2	.....	.....	192	151	55	28	21
3	.....	.....	216	148	51	27	20
4	.....	.....	238	163	48	27	19
5	.....	.....	208	187	47	27	19
6	.....	.....	184	208	45	19	19
7	.....	.....	176	226	43	26	19
8	.....	.....	163	243	41	26	19
9	.....	.....	156	243	39	28	19
10	17	.....	144	263	39	26	18
11	.....	.....	144	243	38	26	18
12	.....	.....	153	223	37	25	18
13	.....	.....	166	203	36	24	19
14	.....	104	198	183	36	24	22
15	.....	94	198	163	35	25	20
16	.....	89	184	153	44	24	20
17	.....	84	179	146	34	25	19
18	17	84	166	141	31	25	19
19	.....	90	141	132	32	24	19
20	.....	106	139	124	33	24	19
21	.....	136	127	116	34	24	18
22	.....	166	127	108	36	24	18
23	.....	174	122	102	39	22	18
24	.....	176	117	92	35	22	18
25	.....	163	112	84	32	22	19
26	.....	146	110	78	31	21	18
27	17	141	108	72	31	21	18
28	.....	148	112	69	31	21	18
29	.....	158	141	63	29	21	18
30	.....	171	192	62	28	20	18
31	.....	.....	182	.....	27	20	.....

NOTE.—No gage-height record November to April 13. Recorder not operating, discharge interpolated, May 23, 24, 31, June 7, 11–14, 19–21, July 19, 20.

Monthly discharge of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending Sept. 30, 1918.

[Drainage area, 69 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
April 14–30	176	84	131	1.90	1.20	4,420
May	238	108	160	2.32	2.68	9,840
June	263	62	152	2.20	2.46	9,040
July	56	27	37.8	.548	.63	2,320
August	28	19	24.1	.349	.40	1,480
September	22	18	18.9	.274	.31	1,120
The period	.....	.....	.....	.....	7.68	28,200

SOUTH FORK OF AHTANUM CREEK AT CONRAD RANCH, NEAR TAMPICO, WASH.

LOCATION.—In W. ½ sec. 23, T. 12 N., R. 15 E., at Conrad ranch, 2½ miles above mouth of North Fork, and 2¾ miles southwest of Tampico, Yakima County.

DRAINAGE AREA.—26 square miles (measured on topographic maps and Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—March 15, 1915, to September 30, 1918.

GAGE.—Vertical staff on left bank about 75 feet from ranch house; read by Mrs. W. B. Conrad. Gage datum raised 1.00 foot on August 9, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; somewhat shifting. Concrete control 7 feet downstream from gage; slightly shifting. Stage of zero flow, according to levels run August 9, 1918, gage height +0.05 feet (new datum).

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet May 15 (discharge, 50 second-feet); minimum stage probably occurred during the winter when record was discontinued.

1915–1918: Maximum stage recorded, 3.10 feet June 19, 1916 (discharge, 216 second-feet); minimum stage recorded, 0.60 foot September 25-26, 1915 (discharge, 4.3 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; record discontinued during winter.

DIVERSIONS.—Small ditch diverting above gage supplies water to Conrad's hop fields.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly on October 25 by trees blown into creek by high wind; changed again during winter by wearing down of concrete control. Rating curves used for October well defined. Curve used April 13 to September 30, fairly well defined; gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of South Fork of Ahtanum River at Conrad ranch, near Tampico, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	T. R. Newell	1.68	11.4	Aug. 9	T. G. Bedford	[a] 1.54	9.9
Apr. 15	do	1.72	27.1	Sept. 6	R. Skillin	.50	7.5
May 4	do	1.94	49.0				

[a] Gage height, 0.54 foot, referred to new datum.

Daily discharge, in second-feet, of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.0	.....	41	43	14.3	9.0	7.1
2	7.6	.....	43	41	14.3	11.4	6.8
3	7.2	.....	46	39	14.3	9.0	6.8
4	7.2	.....	50	37	14.3	9.0	7.1
5	7.2	.....	46	39	12.7	8.5	6.8
6	7.2	.....	43	43	12.7	8.0	6.8
7	7.2	.....	41	45	12.0	8.5	7.5
8	7.2	.....	44	47	12.7	8.0	6.8
9	7.2	.....	41	47	12.0	9.6	7.1
10	7.2	.....	37	47	11.4	10.2	7.1
11	7.2	.....	37	45	11.4	9.6	7.5
12	7.2	.....	39	41	11.4	9.6	7.5
13	7.2	35	39	39	10.8	9.6	7.5
14	7.2	29	46	37	10.8	9.0	7.5
15	7.2	26	50	33	10.2	10.2	6.8
16	7.2	25	47	31	12.7	8.5	6.8
17	7.2	23	45	30	10.8	9.6	6.2
18	7.6	20	43	29	9.6	9.6	6.2
19	7.6	20	41	27	9.6	9.0	6.2
20	7.6	23	40	26	9.0	9.0	6.2
21	7.6	29	39	23	9.0	8.5	6.2
22	7.2	30	37	23	10.2	8.5	6.2
23	7.2	33	37	22	20	7.5	5.6
24	7.2	36	37	20	12.0	7.5	5.9
25	7.0	35	37	20	11.4	7.1	5.9
26	6.8	33	37	20	10.8	6.8	5.6
27	6.8	33	35	18.0	10.2	7.5	5.6
28	6.8	31	37	17.0	10.2	7.1	5.6
29	7.2	32	36	16.1	10.2	6.8	5.6
30	7.6	35	41	16.1	10.2	7.1	5.6
31	8.0	.....	45	.....	9.0	6.8	.....

Monthly discharge of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8.0	6.8	72.8	448
April 13–30	36	20	29.3	1,050
May	50	35	41.2	2,530
June	47	16.1	32.0	1,900
July	20	9.0	11.6	713
August	11.4	6.8	8.58	528
September	7.5	5.6	6.54	389

NEW RESERVATION CANAL AT PARKER, WASH.

LOCATION.—In sec. 20, T. 12 N., R. 19 E., about a mile below intake of canal, three-fourths mile northwest of Parker, Yakima County, and 5½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904 to September 30, 1918.

GAGE.—Vertical staff at highway bridge a quarter of a mile below intake, installed before opening of irrigation season in 1917; read by G. M. Baugher. Gages previously used as follows: Prior to April 1, 1911, gage about a mile below intake; April 1, 1911, to April 26, 1916, about three-fourths mile below intake; April 26 to October 14, 1916, at highway bridge about a mile below intake.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of gravel and small stones; permanent during irrigation season. Channel at times obstructed by aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.88 feet July 2 to 6 (discharge, 1,010 second-feet). No flow reported during nonirrigation season. 1904–1918: Maximum stage recorded July 2 to 6, 1918. No flow reported during nonirrigation seasons.

ACCURACY.—Stage-discharge relation permanent during each season. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Records excellent.

COOPERATION.—Gage-height record and discharge measurements furnished by United States Reclamation Service and United States Office of Indian Affairs.

Canal diverts water from right bank of Yakima River in sec. 20, T. 12 N., R. 19 E., about 2 miles above intake of Old Reservation canal. Water is used for irrigation.

Discharge measurements of New Reservation canal at Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	R. Skillin	2.77	193	May 20	R. Skillin	5.31	853
8	do	3.11	225	27	do	5.49	872
9	Austin Philpott	3.05	217	31	do	5.70	946
Apr. 8	R. Skillin	.42	39.5	June 12	do	5.52	926
13	do	1.20	130	24	do	5.73	956
15	do	1.31	140	July 11	Moxley and Skillin	5.71	982
19	do	2.04	212	22	R. Skillin	4.51	614
20	do	2.60	248	25	Moxley and Skillin	4.75	693
22	do	3.20	374	Aug. 5	R. Skillin	4.38	612
23	do	3.84	524	12	do	4.57	665
25	do	4.32	634	19	do	4.87	741
27	do	4.37	653	Sept. 4	do	4.50	639
May 6	do	5.22	840	17	do	4.05	556
10	do	5.30	863	23	do	3.38	400
13	Moxley and Skillin	5.37	854				

Daily discharge, in second-feet, of New Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	188	.....	755	934	987	633	730
2	193	.....	805	934	1,010	633	705
3	192	.....	856	960	1,010	633	681
4	205	.....	856	960	1,010	609	657
5	205	.....	681	987	1,010	633	657
6	202	.....	830	960	1,010	633	657
7	212	.....	856	987	987	609	705
8	223	.....	856	960	987	609	705
9	220	.....	856	960	987	633	705
10	226	19	856	960	960	657	681
11	220	28	856	934	934	681	681
12	217	28	882	908	830	681	681
13	220	72	882	934	856	681	681
14	220	99	121	960	830	705	657
15	.....	57	110	960	830	755	609
16	.....	77	657	934	830	755	585
17	.....	99	882	934	805	755	562
18	.....	237	805	960	705	755	539
19	.....	289	830	960	633	755	495
20	.....	347	856	987	633	755	474
21	.....	379	856	474	657	681	474
22	.....	495	882	960	657	657	474
23	.....	539	908	934	681	755	433
24	.....	609	908	908	681	755	414
25	.....	609	908	934	681	755	396
26	.....	633	908	960	681	755	363
27	.....	657	856	987	681	780	347
28	.....	657	830	960	681	730	289
29	.....	681	908	987	633	705	2
30	.....	730	908	987	657	681	2
31	.....	.....	934	.....	657	730	.....

Monthly discharge of New Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–14	226	188	210	5,830
April 10–30	730	19	350	14,600
May	934	110	803	49,400
June	987	474	939	55,900
July	1,010	633	813	50,000
August	755	609	693	42,600
September	730	2	535	31,800

OLD RESERVATION CANAL AT PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., 300 feet below intake, 500 feet above controlling waste of first lateral, 1 mile east of Parker, Yakima County, and 3½ miles northwest of Wapato.

RECORDS AVAILABLE.—Irrigation seasons 1904 to September 30, 1918.

GAGE.—Vertical staff on left side about 10 feet upstream from private farm bridge; read by H. B. Ealy. Prior to June 23, 1908, vertical staff on downstream end of right retaining wall of Northern Pacific Railway bridge, about half a mile below site of present gage and at different datum.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL.—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, 6.05 feet June 8 (discharge, 350 second-feet). No flow reported during nonirrigation season.

1904–1918: Maximum stage recorded on June 8, 1918. No flow reported during nonirrigating seasons.

ACCURACY.—Stage-discharge relation permanent during each season. Rating curves well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Field data furnished by United States Reclamation Service and United States Office of Indian Affairs.

Canal diverts water from right bank of Yakima River in sec. 28, T. 12 N., R. 19 E., about half a mile above intake of Sunnyside canal. Water is used for irrigation.

Discharge measurements of Old Reservation canal at Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	R. Skillin	2.30	79	June 19	R. Skillin	5.40	285
6	Moxley and Philpott	2.20	84	28	Skillin and Moxley	4.71	239
8	R. Skillin	2.32	80	July 10	do	4.41	202
Apr. 9	Skillin and Moxley	1.82	32.7	22	R. Skillin	4.11	161
18	R. Skillin	3.88	166	25	Skillin and Moxley	4.05	168
May 13	Skillin and Moxley	5.35	303	Aug. 5	R. Skillin	4.20	174
14	R. Skillin	5.85	326	12	do	4.22	179
14	do	5.85	340	29	do	3.48	130
20	do	5.18	268	Sept. 10	do	3.62	131
27	do	1.10	3.3	23	do	2.97	94
June 12	do	5.98	347				

Daily discharge, in second-feet, of Old Reservation canal at Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	.....	290	340	182	166	123
2	82	.....	290	340	206	182	123
3	83	.....	300	310	174	190	123
4	82	.....	310	290	174	182	123
5	81	.....	330	290	151	182	130
6	78	.....	330	310	151	174	137
7	74	.....	310	340	158	166	137
8	78	.....	290	350	166	158	137
9	78	.....	300	350	166	166	137
10	76	37	280	340	206	166	137
11	80	57	270	350	206	174	137
12	80	78	260	350	190	182	130
13	80	90	260	350	166	182	123
14	78	102	330	340	215	182	130
15	.....	123	340	330	151	182	137
16	.....	151	350	310	151	182	137
17	.....	151	310	300	182	190	123
18	.....	174	300	300	190	190	109
19	.....	251	270	290	190	190	116
20	.....	206	270	270	190	182	123
21	.....	224	270	270	182	166	109
22	.....	242	260	270	174	174	96
23	.....	251	251	270	166	166	96
24	.....	251	242	280	182	151	130
25	.....	280	233	96	166	151	83
26	.....	270	233	151	166	151	67
27	.....	270	233	242	166	144	67
28	.....	270	3	224	158	137	62
29	.....	270	3	206	151	123	62
30	.....	280	215	198	158	137	62
31	.....	.....	330	.....	151	130	.....

Monthly discharge of Old Reservation canal at Parker, Wash., for the the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–14	83	74	79.4	2,200
April 10–30	280	37	192	8,000
May	350	3	267	16,400
June	350	96	289	17,200
July	215	151	174	10,700
August	190	123	168	10,300
September	137	62	113	6,720

SUNNYSIDE CANAL NEAR PARKER, WASH.

LOCATION.—In sec. 28, T. 12 N., R. 19 E., 600 feet below intake, 1½ miles east of Parker, and 3½ miles northwest of Wapato, Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1904 to Septmeber 30, 1918.

GAGE.—Lietz water-stage recorder on right side; installed April 20, 1909, and referred to vertical staff gage installed April 6, 1908; inspected daily by employee of United States Reclamation Service. Prior to April 6, 1908, vertical staff on left side about 200 feet above site of present gage and at different datum. An inclined staff, installed April 6, 1907, at about same site as present gage, was in use during 1907, but gage heights were referred to datum of original gage.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 30 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; fairly permanent. Operation of flashboard at drop No. 1 makes control changeable.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year, 1,240 second-feet on July 7; no flow reported during nonirrigating season.

1904–1918: Maximum mean daily discharge, 1,270 second-feet on July 21, 1917. No flow reported during nonirrigating seasons.

ACCURACY.—Stage-discharge relation changed during June and July. Rating curves well defined. Water-stage recorder inspected daily; operation satisfactory. Daily discharge ascertained by applying mean daily gage height to rating table, shifting-control method used for periods of change. Discharge measurements made frequently. Records excellent.

COOPERATION.—United States Reclamation Service made current-meter measurements and computed discharge.

Canal diverts water from left bank of Yakima River in sec. 28, T. 12 N., R. 19 E., about half a mile below intake of Old Reservation canal. Water is used for irrigation.

Discharge measurements of Sunnyside canal near Parker, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	G. D. Hall	3.54	570	June 8	O. W. Lindgren	5.18	1,130
20	do	3.40	528	8	Lindgren and Hall	5.16	1,120
29	Hall and Edwards	2.99	382	18	O. W. Lindgren	5.21	1,130
Mar. 27	O. W. Lindgren	2.80	285	27	do	5.43	1,190
27	G. D. Hall	2.80	296	July 10	do	5.43	1,180
Apr. 14	Lindgren and Hall	2.71	358	19	do	5.56	1,200
11	do	3.70	632	30	do	5.34	1,130
20	O. W. Lindgren	4.72	992	Aug. 8	do	5.54	1,200
29	do	5.15	1,110	19	do	5.50	1,190
May 10	Lindgren and James	5.25	1,150	29	do	5.24	1,090
20	O. W. Lindgren	5.13	1,110	Sept. 9	do	4.95	985
23	G. D. Hall	5.18	1,110	19	Lindgren and James	4.70	906
23	O. W. Lindgren	5.18	1,090	30	B. G. James	4.28	762
26	do	5.20	1,130				
26	C. E. Edwards	5.20	1,140				

Daily discharge, in second-feet, of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	690			358	1,160	1,120	1,200	1,180	1,090
2	693			363	1,180	1,120	1,200	1,190	1,040
3	693			356	1,180	1,120	1,130	1,190	1,020
4	693			358	1,200	1,120	1,190	1,200	1,000
5	693			404	1,200	1,120	1,170	1,200	1,090
6	681			429	1,190	1,130	1,220	1,200	1,090
7	681			437	1,190	1,120	1,240	1,190	1,080
8	669	200		455	1,190	1,120	1,220	1,200	1,040
9	660			503	1,180	1,140	1,210	1,200	1,000
10	655			562	1,170	1,140	1,180	1,200	989
11	602			627	1,180	1,140	1,200	1,200	989
12	594			657	1,160	1,140	1,190	1,200	996
13	591			663	1,180	1,140	1,210	1,200	989
14	614			710	1,160	1,130	1,200	1,200	1,000
15	620			742	1,170	1,130	1,200	1,200	985
16	617			768	1,160	1,140	1,220	1,200	989
17	591			826	1,140	1,130	1,210	1,190	952
18	563			850	1,120	1,130	1,210	1,190	932
19	557			891	1,120	1,130	1,210	1,190	909
20	540			909	1,120	1,130	1,190	1,140	909
21	516		188	966	1,110	1,140	1,200	1,120	909
22	484		188	989	1,120	1,160	1,200	1,100	895
23	466		206	1,030	1,140	1,180	1,190	1,090	877
24	454		225	1,050	1,140	1,180	1,210	1,100	860
25	439		225	1,060	1,140	1,180	1,190	1,100	843
26	424		266	1,090	1,140	1,170	1,180	1,100	822
27	415		291	1,100	1,160	1,180	1,170	1,090	755
28	400		313	1,090	1,120	1,180	1,170	1,090	752
29	386		335	1,100	1,130	1,190	1,150	1,100	802
30	379		313	1,120	1,140	1,200	1,160	1,090	782
31	375		335	.....	1,140	.....	1,180	1,090	.....

Monthly discharge of Sunnyside canal near Parker, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	693	375	562	34,600
March 21–31	335	188	262	5,200
April	1,120	356	749	44,600
May	1,200	1,110	1,160	71,300
June	1,200	1,120	1,140	67,800
July	1,240	1,130	1,190	73,200
August	1,200	1,090	1,160	71,300
September	1,090	752	946	56,300

RESERVATION DRAIN AT ALFALFA, WASH.

LOCATION.—In sec. 29, T. 10 N., R. 21 E., at highway bridge a quarter of a mile southeast of Alfalfa, Yakima County, about 2 miles above mouth of drain.

RECORDS AVAILABLE.—December 5, 1912, to September 30, 1918; miscellaneous measurements 1911 and 1912.

GAGE.—Vertical staff on right bank under highway bridge; read by Miss Nellie Ide.

DISCHARGE MEASUREMENTS.—Made from footbridge 1,000 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, 8.2 feet on January 2, from high-water mark (discharge, estimated 1,500 second-feet); minimum stage recorded, 2.92 feet October 16 and 17 (discharge, 214 second-feet).

1913–1918: Maximum stage same as above; minimum stage recorded, 1.8 feet. July 3, August 12, 15–31, September 1–14, 19, 1915 (discharge, 145 second-feet).

ICE.—Ice does not form at this station.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed several times during the year. Five rating curves, all parallel to a standard curve developed in previous years, and shifting-control method were used. Curves well defined below 500 second-feet. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent except for the high water early in January; daily discharge December 31 to January 2 is rough estimate only.

COOPERATION.—Most of discharge measurements made by United States Office of Indian Affairs.

Reservation drain carries 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 channel by seepage.

Discharge measurements of Reservation drain at Alfalfa, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 6	R. Skillin	3.10	253	May 1	R. Skillin	3.15	221
13	do	3.03	237	18	do	3.51	286
20	do	3.06	243	25	do	3.48	278
27	do	3.10	251	June 1	do	3.40	266
Nov. 6	do	3.16	263	8	do	3.55	294
10	do	3.13	257	13	do	3.61	318
18	do	3.21	275	15	do	3.76	346
24	do	3.23	279	22	do	3.57	308
Dec. 7	do	3.24	280	29	do	3.50	291
14	do	3.25	279	July 20	do	3.35	258
15	T. R. Newell	3.26	288	27	do	3.42	274
22	R. Skillin	3.75	388	Aug. 3	do	3.50	292
Feb. 21	Skillin and Cunningham	3.35	284	10	do	3.40	272
Mar. 8	do	3.21	237	13	T. G. Bedford	3.56	302
19	T. R. Newell	3.16	225	17	R. Skillin	3.56	305
21	R. Skillin	3.18	236	24	do	3.81	366
Apr. 1	Skillin and Cunningham	3.29	247	30	do	3.62	321
18	T. R. Newell	3.21	240	Sept. 7	do	3.49	289
				21	do	3.67	330

Daily discharge, in second-feet, of Reservation drain at Alfalfa, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	255	255	299	1,200	277	255	255	224	266	299	277	322
2	255	255	299	1,500	277	255	255	224	277	277	266	322
3	255	255	299	742	277	244	255	224	277	266	299	299
4	266	255	299	598	277	244	255	224	299	266	277	299
5	255	266	277	551	277	244	266	234	299	266	299	299
6	255	266	277	504	277	244	266	244	277	266	277	299
7	255	266	277	480	277	234	255	244	277	266	277	299
8	255	266	277	457	299	234	255	244	299	266	277	299
9	244	266	277	434	299	234	255	277	299	277	266	299
10	234	255	277	434	299	234	244	277	322	299	266	299
11	234	255	277	389	299	234	255	266	322	322	266	299
12	244	255	277	389	299	234	255	277	322	322	277	322
13	234	266	277	367	299	234	255	266	322	322	299	299
14	234	266	277	367	299	234	277	255	322	322	299	322
15	234	255	277	344	299	234	277	255	344	299	299	322
16	214	266	299	344	322	234	255	266	344	277	277	322
17	214	266	299	367	322	234	255	277	344	277	299	322
18	234	277	299	344	299	234	234	277	344	266	322	322
19	244	277	299	344	299	234	234	277	344	277	322	322
20	244	277	457	344	299	234	234	299	322	255	344	322
21	244	277	412	322	277	234	234	299	299	255	367	322
22	255	277	389	322	266	234	214	299	299	255	367	322
23	255	277	367	322	266	234	224	277	322	255	367	322
24	255	277	367	322	266	234	234	277	322	266	367	344
25	255	277	344	322	277	244	244	277	322	266	367	367
26	255	277	344	322	266	244	255	277	322	277	367	344
27	255	277	322	322	266	255	234	277	322	277	367	344
28	244	277	344	299	266	255	234	255	299	277	344	344
29	244	277	367	299	.....	255	224	255	299	277	344	322
30	255	277	504	299	.....	255	224	244	322	266	322	322
31	255	.....	1,000	299	.....	255	.....	244	.....	277	322	.....

NOTE.—Water over top of gage Dec. 31 to Jan. 2; discharge estimated from elevation of high-water mark and roughly determined gage heights.

Monthly discharge of Reservation drain at Alfalfa, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	266	214	246	15,100
November	277	255	268	15,900
December	1,000	277	344	21,200
January	1,500	299	450	27,700
February	322	266	286	15,900
March	255	224	240	14,800
April	277	214	247	14,700
May	299	224	262	16,100
June	344	266	312	18,600
July	322	255	278	17,100
August	367	266	312	19,200
September	367	299	319	19,000
The year	1,500	214	297	215,000

TOPPENISH CREEK NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 26, T. 10 N., R. 16 E., at Olney ranch, 1½ miles below highway bridge, 3½ miles southeast of Fort Simcoe, and about 5 miles southwest of White Swan, Yakima County.

DRAINAGE AREA.—124 square miles (measured on Plate I, Water Supply Paper 369.

RECORDS AVAILABLE.—February 27, 1909, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank half a mile east of ranch house, installed August 19, 1915; inspected by M. W. Schuler and Ivan Hartzell. Previous gages as follows: February 27,1909, to July 22, 1913, chain gage on left bank a quarter of a mile above site of present gage; July 23, 1913, to August 18, 1915, vertical staff attached to cottonwood tree on right bank 150 feet above site of present gage.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders, slightly shifting. Concrete control 18 feet below gage; permanent. Banks subject to overflow at extremely high water. Stage of zero flow, according to measurements made August 14, 1918, gage height 1.78 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.05 feet at 11 p. m. December 18 (discharge, 1,000 second-feet); minimum stage recorded, 2.18 feet at 9.30 a. m. September 8 (discharge, 9 second-feet).

1909–1918: Maximum stage recorded, 5.46 feet at noon May 4, 1916 (discharge, 1,650 second-feet); minimum stage recorded, 0.95 foot January 17, 1915 (discharge, 3.5 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Nicol and Abe Lincoln ditches diverted from 3 to 6 second-feet above station throughout year. Diversion of spring run-off into reservoir on Simcoe Creek for use in irrigating Indian lands is proposed.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspection of recorder graph; for a few days in December when range in stage was considerable, mean gage heights for shorter intervals were used. Records excellent except during February, for which they are fair.

Discharge measurements of Toppenish Creek near Fort Simcoe, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 12	T. R. Newell	2.45	26.3	Aug. 14	T. G. Bedford	2.26	12.8
Mar. 20	do	3.05	138				

Daily discharge, in second-feet, of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	14.0	17.8	29	289			256		54	20	13.5	11.0
2	14.0	17.8	28	226			232		52	20	14.5	11.5
3	14.0	17.8	27	181	90	78	208	121	50	19.0	14.0	11.5
4	14.0	18.0	28	184			190		47	19.0	13.5	11.5
5	14.0	18.0	26	163		74	181		46	18.5	13.5	11.5
6	14.0	19.0	26	143		70	175		43	18.5	13.5	11.5
7	14.0	19.0	24	149		69	169		41	17.8	13.0	11.5
8	14.0	20	23	152	210	67	163	125	39	17.8	13.0	11.5
9	14.0	20	23	141		65	169		36	17.8	13.5	12.5
10	14.0	21	23	122		64	190		35	17.1	13.5	12.5
11	14.0	24	23	114		64	197	116	33	15.7	13.0	12.5
12	14.0	25	25	112		64	200	130	32	15.7	12.5	12.5
13	14.0	22	28	104	140	62	190	127	31	15.0	12.5	13.5
14	14.0	21	40	102		58	172	132	31	15.0	12.5	17.8
15	14.0	21	40	99		58	163	160	30	14.5	13.0	16.4
16	14.0	21	51	96	118	67	152	152	29	18.5	13.0	14.5
17	14.0	21	90	92		76	141	141	28	15.7	13.5	13.5
18	15.0	21	418	104	112	124	132	127	27	14.0	13.5	13.5
19	15.0	21	703	104	104	132	127	119	26	14.0	13.5	13.0
20	15.7	21	354	94		132	132	99	26	14.0	14.0	13.0
21	15.0	21	194	92		135	141	102	25	14.0	14.5	12.5
22	15.0	21	260	90		181		94	24	15.7	14.0	12.5
23	15.0	21	253	90		250		87	25	18.5	13.0	13.0
24	15.0	21	184	94	95	253		81	25	21	12.5	13.0
25	15.0	21	146	102		267	150	79	23	17.8	12.0	13.0
26	15.0	21	127	102		270		74	21	17.1	11.5	13.0
27	15.7	21	192	94		250		72	21	15.7	11.0	13.0
28	15.7	23	372	90		226	124	67	21	15.0	11.5	12.5
29	16.4	25	446	87	.....	213	118	64	21	14.5	11.5	12.5
30	17.1	30	372	83	.....	229		58	21	13.5	11.5	12.5
31	17.1	.....	307	80	.....	260	.....	55	.....	13.0	11.0	.....

NOTE.—Braced figures show mean discharge for periods indicated; estimated from recorded range of stage weather records, and comparison with Satus and Simcoe creeks. Discharge interpolated; Nov. 4-9, June 30 to July 4.

Monthly discharge of Toppenish Creek near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	17.1	14.0	14.7	904
November	30.	17.8	21	1,250
December	703	23	157	9,650
January	289	80	122	7,500
February	.....	.....	125	6,940
March	270	58	132	8,120
April	256	.....	164	9,760
May	160	55	109	6,700
June	54	21	32.1	1,910
July	21	13.0	16.6	1,020
August	14.5	11.0	12.9	793
September	17.8	11.0	12.8	762
The year	703	11.0	76.5	55,300

SIMCOE CREEK BELOW SPRING CREEK, NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 34, T. 11 N., R. 16 E., at site of proposed reservoir, 4 miles northeast of Fort Simcoe, Yakima County.

DRAINAGE AREA.—77 square miles (measured on Plate I, Water-Supply Paper 369).

RECORDS AVAILABLE.—November 20, 1915, to September 30, 1918. For station just above Spring Creek, February 28, 1909, to November 20, 1915.

GAGE.—Stevens continuous water-stage recorder, on left bank just below Spring Creek; inspected by M. W. Schuler and Ivan Hartzell.

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

CHANNEL AND CONTROL.—Bed composed of sand and gravel; somewhat shifting. Concrete control 16 feet below gage; permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.85 feet at 2 a. m. December 30 (discharge, 296 second-feet); minimum stage recorded, 0.16 foot September 28–30 (discharge, 0.2 second-foot).

1916–1918: Maximum stage recorded, 6.14 feet at 5 p. m. February 10, 1916 (discharge, 731 second-feet); mimimum stage in 1918.

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

DIVERSIONS.—Considerable water is diverted above the station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection; for a few days in December when the range in stage was considerable, mean gage heights for shorter intervals were used. Records good.

Discharge measurements of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 13	T. R. Newell	0.36	3.2	Aug. 14	T. G. Bedford	0.27	1.3
Mar. 20	do	.81	34.0				

Daily discharge, in second-feet, of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	0.3	0.3	2.8	232	29	33	70	26.	13.4	4.4	1.9	0.3
2	.3	.3	2.8	199	30	33	70	27	13.4	4.4	1.9	.3
3	.3	.3	2.5		33	31	66	29	12.8	4.0	1.9	.3
4	.3	.3	2.5	150	34	32	63	30	12.3	3.7	1.7	.3
5	.3	.3	2.5		40	33	62	29	9.6	3.7	1.7	.3
6	.2	.3	2.8		102	32	59	28	9.7	3.7	1.7	.3
7	.2	.4	3.1		97	31	47	28	9.9	3.7	1.5	.3
8	.2	.4	3.4	120	80	31	46	28	10.0	3.4	1.5	.3
9	.2	.4	3.4		77	30	46	24	10.2	3.4	1.5	.3
10	.2	.4	3.4		70	29	46	24	10.3	3.4	1.3	.3
11	.2	.4	3.4		63	31	49	24	10.5	3.4	1.3	.3
12	.2	.6	3.4		60	33	50	24	10.6	3.4	1.1	.3
13	.2	.5	3.4	74	56	31	52	26	9.6	2.5	1.1	.3
14	.2	.5	4.4		52	29	50	28	9.0	2.8	.9	.4
15	.2	.5	5.6		46	29	47	32	9.0	3.1	.8	.3
16	.2	.5	5.6		46	29	46	33	8.1	3.1	.8	.3
17	.2	.5	8.1	47	46	29	43	33	7.2	3.4	.8	.3
18	.2	.5	71		45	31	41	32	6.8	3.4	.8	.3
19	.2	.5	226		42	33	37	30	6.4	2.8	.8	.3
20	.2	.5	162	41	37	34	36	29	6.0	3.1	.9	.2
21	.3	.5	94	41	30	36	34	28	5.6	2.8	.9	.2
22	.3	.5	222	40	36	42	37	25	5.6	2.8	.8	.2
23	.3	.5	196	38	38	49	40	23	5.2	2.8	.8	.2
24	.2	.5	127	40	36	54	41	21	5.2	3.1	.8	.2
25	.3	.5	86	41	33	59	41	20	5.2	2.8	.6	.2
26	.3	.6	66	40	37	62	40	20	4.8	2.8	.5	.2
27	.2	.9	101	40	36	65	38	19	4.8	2.5	.4	.2
28	.3	1.1	220	40	34	63	34	18	4.8	2.5	.5	.2
29	.3	1.7	282	40	.....	62	33	14.5	4.8	2.2	.4	.2
30	.3	2.2	286	38	.....	63	31	13.4	4.8	2.2	.4	.2
31	.3	.....	251	25	.....	66	.....	13.4	.....	2.2	.3	.....

NOTE.—Braced figures show mean discharge for periods indicated, estimated by comparison with Toppenish Creek. Discharge interpolated May 2-3, June 6-11.

Monthly discharge of Simcoe Creek below Spring Creek, near Fort Simcoe, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	0.3	0.2	0.25	15.4
November	2.2	.3	.58	34.5
December	286	2.5	79.1	4,860
January	232	25	80.7	4,960
February	102	29	48.8	2,710
March	66	29	40.2	2,470
April	70	31	46.5	2,770
May	33	13.4	25.1	1,540
June	13.4	4.8	8.19	487
July	4.4	2.2	3.15	194
August	1.9	.3	1.04	64.0
September	.4	.2	.27	16.1
The year	286	.2	27.8	20,100

SATUS CREEK BELOW DRY CREEK, NEAR TOPPENISH, WASH.

LOCATION.—In sec. 24, T. 9 N., R. 19 E., at dam site 1 mile below mouth of Dry Creek and 9 miles southwest of Toppenish, Yakima County.

DRAINAGE AREA.—427 square miles (measured on topographic maps and map of Yakima Indian Reservation).

RECORDS AVAILABLE.—June 22, 1913, to September 30, 1918.

GAGE.—Stevens continuous water-stage recorder on left bank, inspected by W. H. Walker.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifting. No well-defined control. Stage of zero flow determined by levels, 0.44+0.05 foot on August 12, 1918.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.44 feet at 5 a. m., December 19 (discharge, 1,330 second-feet); minimum stage recorded, 1.23 feet at 7 p. m. July 31 (discharge, 11 second-feet).

1913–1918: Maximum stage recorded, 9.15 feet December 22, 1915 (from high-water marks in well; discharge, 3,870 second-feet); minimum stage recorded, 0.28 foot at 10 p. m. August 28 and 4 a. m. August 30, 1915 (discharge, 6.6 second-feet).

ICE.—Stage-discharge relation not affected by ice during current year.

DIVERSIONS.—Entire flow of Satus Creek above Lazy Creek is diverted for irrigation during July and August; records for low-water summer months show run-off of Lazy and Dry creeks and seepage return from upper Satus Creek.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 18 and again March 23 to April 8. Rating curves well defined. Operation of water-stage recorder unsatisfactory through several long periods as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspection of recorder graph; shifting-control method used March 23 to April 8. Records good except for January and February; January, fair; February, poor.

Discharge measurements of Satus Creek below Dry Creek, near Toppenish, Wash., during the year ending Sept. 30, 1918.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	T. R. Newell	1.55	29.5	Apr. 17	T. R. Newell	2.31	150
Mar. 21	do	3.03	365	Aug. 12	T. G. Bedford	1.31	14.2

Daily discharge, in second-feet, of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1918.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	21	32		118	141	268	133	71	20	12	
2	13	21	30			162	248	133	68	20	13	
3	13	22	29			190	232	137	65	20	12	
4	14	23	28	645		181	218	144	62	20	12	
5	14	24	28			162	208	133	58	19	13	1
6	14	22	28			146	195	124	56	19	13	
7	13	22	28	530		144	185	120	54	18	14	
8	14	23	28	444		141	183	118	54	18	14	
9	14	22	28	365	360	137	195	160	50	26	14	14
10	14	22	27	311		133	190	155	46	18	14	13
11	14	23	26	288		135	188	155	45	18	14	13
12	14	25	27			139	181	162	43	18	14	13
13	14	27	26	255		135	176	153	42	16		13
14	14	26	31			128	171	146	39	16		21
15	14	26	41			137	164	150	39	16		22
16	14	26	42			171	157	139	38	17		16
17	16	26	76			213	150	133	36	18		15
18	16	25	289	180		371	141	126	34	14		14
19	17	25	1,130			409	135	120	32	14		14
20	18	25	614			356	133	116	31	14		14
21	17	25	365		175	359	133	110	28	14		14
22	16	25				417	135	108	28	15	14	14
23	17	26	575	150		495	141	104	29	16		15
24	17	26				422	141	101	28	16		16
25	18	26				425	139	97	26	16		16
26	18	25				390	137	95	25	15		16
27	18	25			148	359	135	90	23	14		16
28	18	25	870	130	141	332	135	81	22	14		15
29	20	28			.....	305	133	78	22	13		15
30	20	30			.....	296	133	76	22	12		15
31	20	.....			.....	288	.....	73	.....	12		.....

NOTE.—Braced figures show mean discharge for period indicated; estimated as follows: Dec. 22 to Jan. 6, from partial gage-height record; Jan. 12–31, from hydrographic comparison with Toppenish Creek; Feb. 2–26, from hydrographic comparison with Simcoe Creek; Apr. 13, 15–16, Aug. 4–7, 9–11, and Aug. 13 to Sept. 8, estimated.

Monthly discharge of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending Sept. 30, 1918.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	13	15.7	965
November	30	21	24.6	1,460
December	1,130	26	338	20,800
January	.....	.....	315	19,400
February	.....	.....	263	14,600
March	495	128	252	15,500
April	268	133	169	10,100
May	162	73	122	7,500
June	71	22	40.5	2,410
July	26	12	16.6	1,020
August	.....	.....	13.7	842
September	22	.....	14.9	887
The year	1,130	.....	132	95,500

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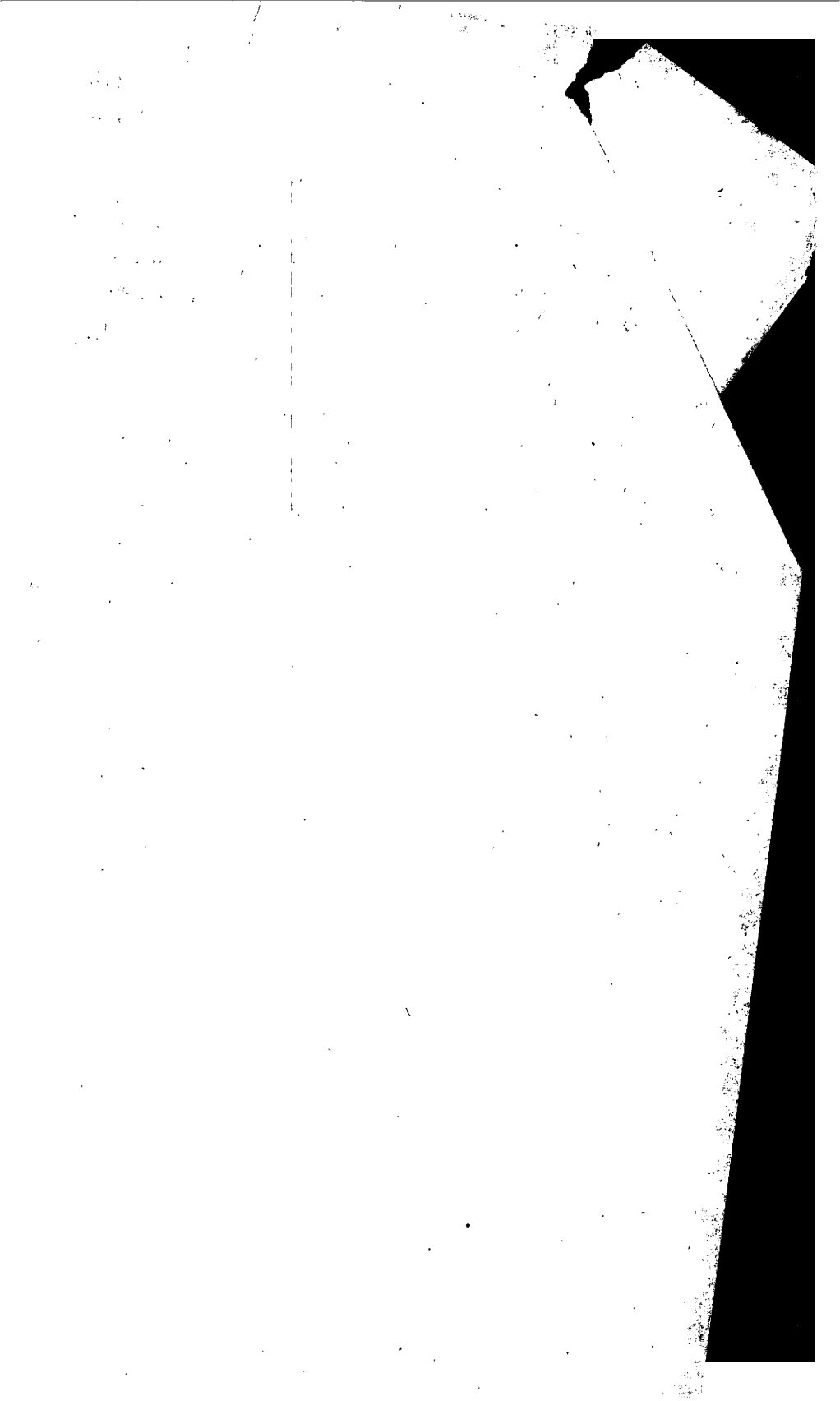

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