DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 413

SURFACE WATER SUPPLY OF THE UNITED STATES

1915

PART XII. NORTH PACIFIC DRAINAGE BASINS

B. SNAKE RIVER BASIN

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Prepared in cooperation with
THE STATES OF IDAHO, OREGON, NEVADA, AND WASHINGTON

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SURFACE WATER SUPPLY OF SNAKE RIVER BASIN, 1915.

AUTHORIZATION AND SCOPE OF WORK.

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

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

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 of water supply for irrigation. Since the fiscal year ending June 30, 1895, successive sundry civil bills passed by Congress have carried the following item and appropriations:

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

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

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

In the execution of the work many private and State organizations have cooperated, either by furnishing data or by assisting in collecting data. 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 13.

Measurements of stream flow have been made at about 3,800 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1915, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements 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 regular water-supply papers from time to time Information in regard to publications relating to water resources is presented in the appendix to this report.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, 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 depth 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 by the use of the factors given in the tables of convenient equivalents (pp. 9–10).

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

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

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

The following terms not in common use are here defined:

"Stage-discharge relation," an abbreviation for the expression "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.

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

CONVENIENT EQUIVALENTS.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1½ horsepower equals about 1 kilowatt.

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

EXPLANATION OF DATA.

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

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

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

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

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

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

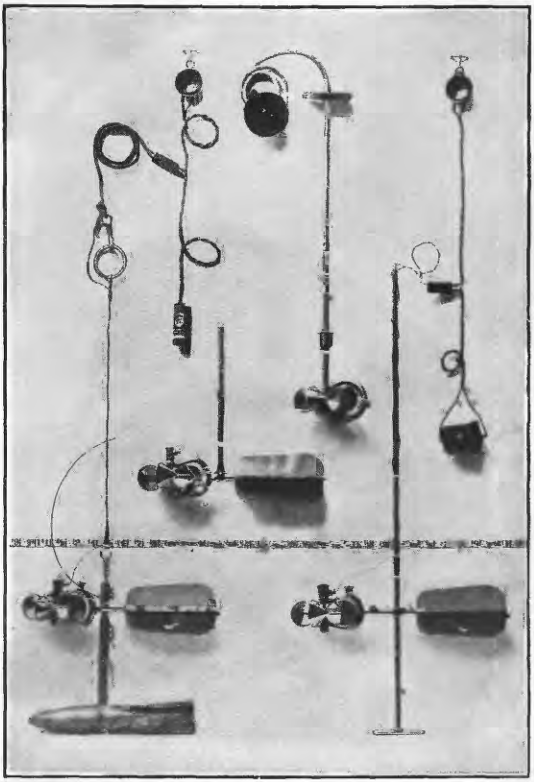
The table of daily discharge gives the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge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

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than that 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 8, are based.

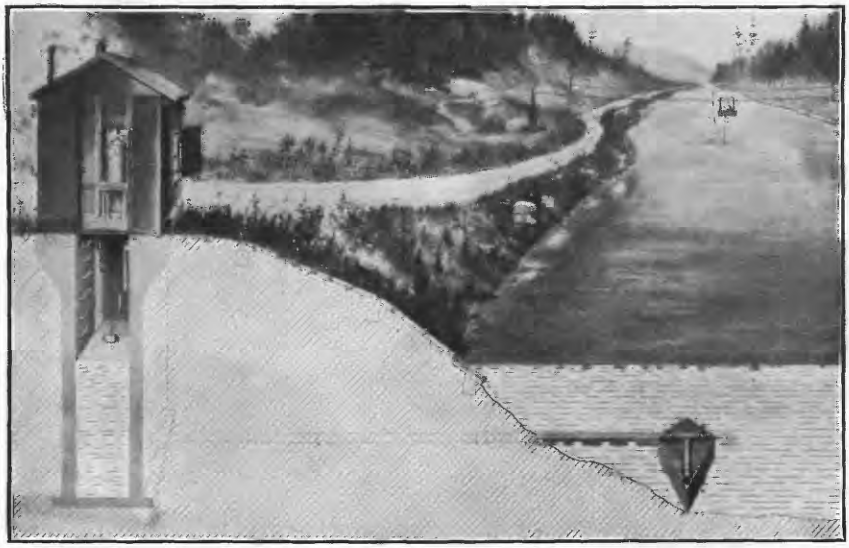
ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

The accuracy of steam-flow data depends primarily (1) on the permanance of the stage-discharge relation and (2) on the accuracy of observations of stage, measurements of flow, and interpretation of records.

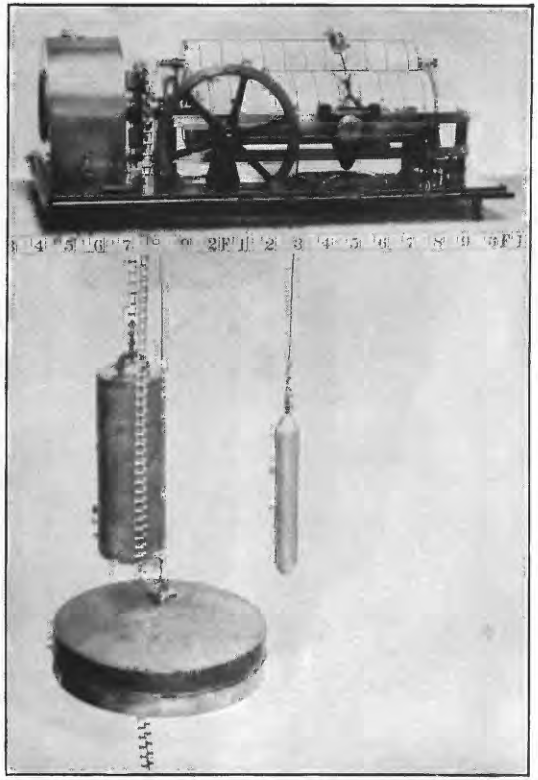
Foot-notes added to the daily-discharge tables give information regarding the probable accuracy of the rating tables used, and an



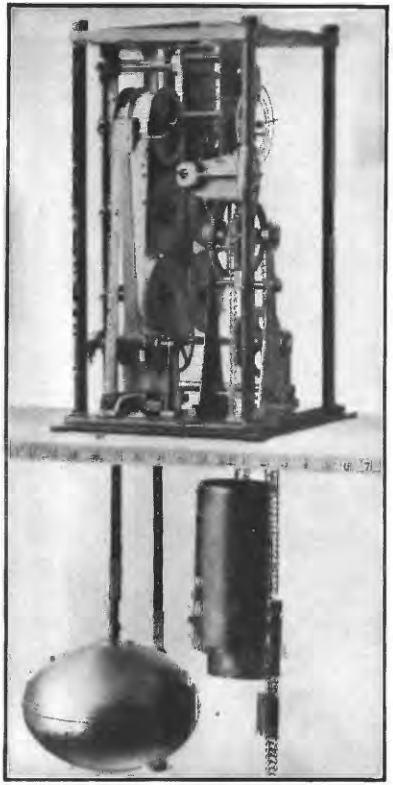
A. PRICE CURRENT METERS.



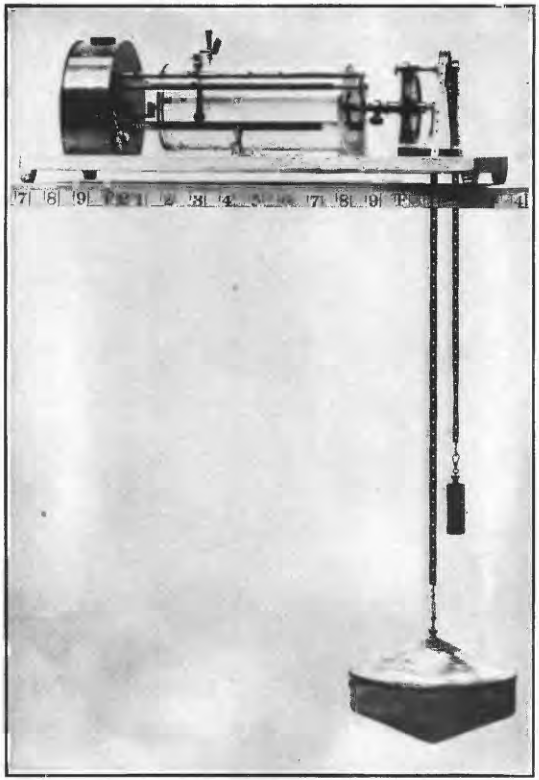
B. TYPICAL GAGING STATION.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth of run-off in inches may be subject to gross errors caused by the inclusion of large 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 (depth in inches)" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off (depth in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

The table of monthly discharge gives only a general idea of the flow at the station and should not be used for other than preliminary estimates; the tables of daily discharge allow more detailed studies of the variation in flow. It should be borne in mind, however, that the observations in each succeeding year may be expected to throw new light on data previously published.

COOPERATION.

During the year ending September 30, 1915, work in the Snake River basin was carried on in cooperation with the States of Idaho, Oregon, Nevada, and Washington, effected under contracts made between the Director of the Federal Survey and the State engineers or other officials and authorized by legislative acts appropriating money. The State of Idaho, however, furnished no funds for the cooperative work after November 30, 1914.

Special acknowledgements are due to Frank P. King, State engineer of Idaho, and Herbert Wing, acting State engineer, after the death of Mr. King; to John H. Lewis, State engineer of Oregon; to Henry Landes, State geologist of Washington; and to W. M. Kearney, State engineer of Nevada, for the efficient manner in which they represented their States in the investigations.

Acknowledgements are due also to the United States Reclamation Service, the United States Forest Service, and the United States Indian Office, which permitted the freest use of data gathered exclusively for them and paid for by them. The United States Weather Bureau and the officials of Yellowstone National Park furnished hydrometric and climatic data.

The following cities, private companies, and individuals have aided in the collection of records by paying the expense of work or otherwise assisting: City of Pocatello, Twin Falls Canal Co., I. B. Perrine, Idaho Power Co., Twin Falls-Oakley Land & Water Co., Twin Falls-Salmon River Land & Water Co., North Side Twin Falls Land & Water Co., Idaho Irrigation Co., L. S. Kimball, Willow River Land & Irrigation Co., Mesa Orchards Co., Crane Creek Irrigation, Land & Power Co., Maney Bros. Construction Co., Utah Construction Co., Portneuf-Marsh Valley Canal Co., S. A. Mullenix, J. J. Richardson, P. W. McCarthy, and Burbank Co.

DIVISION OF WORK.

The data for stations in Nevada, except those in the basin of Salmon Falls Creek, were collected and prepared for publication under the direction of E. A. Porter and C. C. Jacob, district engineers, who were assisted by Lynn Crandall, A. B. Burton, L. W. Jordan, J. J. Sanford, C. W. Bennett, and Miss Ruby Christenson.

For stations in Idaho, except the Clearwater basin, in Wyoming and in the Salmon Falls Creek basin in Nevada, the data were collected and prepared for publication under the direction of G. C. Baldwin, district engineer, assisted by A. B. Purton, H. J. Dean, A. W. Harrington, C. G. Paulsen, L. W. Roush, and Miss E. Hazel Haugse.

Data for stations in Oregon were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, who was assisted by James E. Stewart, C. L. Batchelder, C. G. Paulsen, P. V. Hodges, and C. E. Stricklin and H. K. Donnelly, assistants to the State engineer of Oregon.

For stations in Washington and in the Clearwater basin in Idaho records were collected and prepared for publication by G. L. Parker, district engineer, who was assisted by James E. Stewart, Lasley Lee, C. O. Brown, J. T. Hartson, A. H. Tuttle, C. G. Paulsen, and I. L. Collier.

The manuscript was assembled by H. J. Dean and G. C. Stevens.

GAGING-STATION RECORDS.

SNAKE RIVER.

SNAKE RIVER AT SOUTH BOUNDARY OF YELLOWSTONE NATIONAL PARK.

LOCATION.—About one-fourth mile below junction of Lewis and Snake rivers, half a mile north of the Snake River soldier station and the south boundary of Yellowstone National Park, and 25 miles north of Moran, Wyo.

DRAINAGE AREA.—490 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 19, 1913, to September 30, 1915.

GAGE.—Overhanging chain gage on right bank; read by Sergt. James M. Webb, in charge of Snake River soldier station.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge about 4 miles downstream.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; clean except for drift which occasionally lodges on control. Control probably permanent at ordinary stages. One channel at gage but an island divides channel at control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.9 feet at 6 p. m. June 6 (discharge, 3,230 second-feet); minimum stage recorded, 1.7 feet March 2–8, August 28–31, and September 7 (discharge, 271 second-feet).

1913–1915: Maximum stage recorded 6.3 feet June 2, 1914 (discharge, 5,690 second-feet); minimum stage recorded, 1.7 feet March 2–8, August 28–31, and September 7, 1915 (discharge, 271 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice, the formation of which is evidently prevented by hot springs above the gage.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Gage read to half tenths twice daily. Gage-height record fairly satisfactory. Rating curve well defined between 250 and 5,000 second-feet by measurements made in 1916 and 1917. Discharge ascertained by applying mean daily gage heights to rating table. Records published herewith supersede those previously published and are rated good.

COOPERATION.—Gage-height record furnished by superintendent of Yellowstone National Park.

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

September 13, 1915: Gage height, 1.80 feet; discharge, 304 second-feet.

Daily discharge, in second-feet, of Snake River at south boundary of Yellowstone National Park for the years ending Sept. 30, 1913–1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1913.					1913.				
1		2,750	1,480	821	16		1,110	887	587
2		2,600	1,280	758	17		956	821	587
3		2,450	1,280	758	18		956	821	561
4		2,450	1,280	758	19	3,070	956	758	561
5		2,180	1,280	758	20	3,230	922	758	561
6		2,050	1,200	698	21	3,070	887	698	561
7		1,980	1,110	641	22	2,750	1,480	698	587
8		1,930	1,030	587	23	2,750	1,110	698	561
9		1,700	1,110	698	24	2,750	1,810	670	561
10		1,700	1,110	641	25	2,750	2,000	670	535
11		1,480	1,030	614	26	2,450	2,450	670	535
12		1,380	956	614	27	2,750	2,180	728	535
13		1,280	956	587	28	2,750	1,810	698	510
14		1,200	956	587	29	2,750	2,050	641	510
15		1,110	887	587	30	2,750	1,700	641	510
					31		1,590	821	

Daily discharge, in second-feet of Snake River at south boundary of Yellowstone National Park for the years ending Sept. 30, 1913–1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1913–14.											
1	510	510	486	416	561	535	351	821	5,510	2,050	641
2	510	561	486	416	587	486	351	922	5,690	1,930	.....
3	510	535	486	416	535	486	351	1,280	5,510	1,810	.....
4	510	510	462	416	510	462	351	1,280	5,510	1,700	.....
5	510	486	462	416	510	462	351	1,150	5,510	1,700	.....
6	510	587	439	416	510	439	351	1,070	4,430	1,590	.....
7	510	587	439	416	510	439	372	1,110	3,400	1,480	.....
8	510	535	439	416	486	416	372	1,700	3,400	1,380	.....
9	510	510	439	416	486	394	394	2,180	3,400	1,280	.....
10	510	510	439	416	486	372	394	2,600	3,400	1,280	.....
11	510	535	416	416	486	372	394	2,180	3,400	1,280	.....
12	510	510	416	394	510	372	416	1,930	3,230	1,200	.....
13	535	510	394	394	510	372	416	2,180	3,400	1,110	.....
14	535	486	416	394	535	351	439	2,750	3,400	1,110	.....
15	535	462	416	416	535	351	439	2,750	3,740	1,030	.....
16	535	462	416	416	561	351	486	3,070	3,910	956	.....
17	561	462	416	394	561	351	462	3,400	4,080	922	.....
18	561	486	416	394	561	351	486	3,740	4,430	887	.....
19	535	486	416	394	561	351	486	3,740	3,570	854	.....
20	535	510	416	416	535	330	698	3,910	3,740	821	.....
21	535	510	416	439	535	330	728	4,430	4,080	821	.....
22	535	535	416	439	510	330	790	4,970	3,400	790	.....
23	535	510	416	486	486	330	854	4,970	2,910	758	.....
24	510	486	416	486	561	330	790	5,330	2,750	728	.....
25	510	510	416	486	535	330	821	4,790	2,600	670	.....
26	510	535	416	535	561	330	821	4,080	2,600	641	.....
27	510	535	416	561	561	330	790	4,250	2,600	614	.....
28	510	561	416	587	561	351	758	4,430	2,450	587	.....
29	510	535	394	587	.....	351	698	4,430	2,310	641	.....
30	510	510	416	535	.....	351	670	4,790	2,310	698	.....
31	510	.....	416	510	.....	351	.....	5,150	.....	670	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	.....	439	330	351	439	310	535	1,810	1,930	1,030	486	290
2	.....	439	310	351	439	271	641	1,930	2,180	958	462	330
3	.....	439	310	351	416	271	854	2,050	2,450	854	439	330
4	1,280	439	310	394	394	271	956	2,180	2,600	821	462	372
5	1,280	416	310	394	394	271	1,110	2,180	2,750	790	439	351
6	1,200	394	330	394	394	271	1,280	2,450	3,070	758	439	310
7	1,110	394	394	439	394	271	1,480	2,180	2,450	728	416	271
8	1,110	394	439	439	394	271	1,590	2,180	2,310	698	394	290
9	1,110	394	439	439	372	290	1,700	2,180	1,930	641	351	310
10	1,030	394	486	439	351	351	1,700	2,310	2,180	614	351	310
11	1,030	394	486	439	351	351	1,700	2,180	1,930	641	351	310
12	956	394	486	439	351	351	1,590	2,180	1,810	641	310	310
13	887	351	486	439	351	351	1,480	2,450	1,700	587	310	310
14	887	351	561	439	351	351	1,590	2,450	1,810	561	310	310
15	854	351	587	439	351	351	1,480	2,180	1,930	535	330	310
16	821	351	561	439	351	351	1,280	1,930	2,180	510	330	310
17	821	351	535	439	351	351	1,110	1,810	2,450	488	330	330
18	790	351	510	462	351	394	1,280	1,700	2,450	488	310	351
19	758	351	486	486	351	394	1,590	1,480	2,450	510	310	351
20	728	351	462	486	330	394	1,700	1,380	2,180	561	310	351
21	698	310	439	486	310	394	1,810	1,480	2,180	587	310	394
22	670	330	439	486	310	351	1,930	1,480	2,180	535	310	394
23	641	394	439	486	310	351	2,180	1,480	1,810	535	290	439
24	614	394	416	486	310	351	2,310	1,590	1,700	510	290	439
25	587	372	394	439	310	351	2,180	1,480	1,700	488	290	486
26	561	351	394	439	310	351	1,930	1,700	1,700	587	310	462
27	535	351	394	439	310	372	2,180	1,590	1,700	561	290	439
28	535	351	351	439	310	394	2,050	1,480	1,380	535	271	439
29	535	351	351	439	.....	439	1,930	1,590	1,280	535	271	486
30	486	351	351	439	.....	439	1,700	1,590	1,030	488	271	462
31	439	.....	351	439	.....	462	.....	1,700	.....	488	271	.....

NOTE.—No record obtained Aug. 2 to Oct. 4, 1914; discharge Oct. 1–3, 1914, estimated at 1,230 second-feet.

Monthly discharge of Snake River at south boundary of Yellowstone National Park for the years ending Sept. 30, 1913–1915.

[Drainage area, 490 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1913.							
June 19–30	3,230	2,450	2,820	5.76	2.57	67,100	A.
July	2,750	887	1,680	3.43	3.95	103,000	A.
August	1,480	641	923	1.88	2.17	56,800	A.
September	821	510	612	1.25	1.40	36,400	A.
The period						263,000	
1913–14.							
October	561	510	521	1.06	1.22	32,000	A.
November	587	462	516	1.05	1.17	30,700	A.
December	486	394	428	.873	1.01	26,300	A.
January	587	394	446	.910	1.05	27,400	A.
February	587	486	530	1.08	1.12	29,400	A.
March	535	330	379	.773	.89	23,300	A.
April	854	351	536	1.09	1.22	31,900	A.
May	5,330	821	3,080	6.29	7.25	189,000	B.
June	5,690	2,310	3,690	7.53	8.40	220,000	B.
July	2,050	587	1,100	2.24	2.58	67,600	B.
The period						678,000	
1914–15.							
October		439	859	1.75	2.02	52,800	B.
November	439	310	376	.767	.86	22,400	B.
December	587	310	424	.865	1.00	26,100	B.
January	486	351	436	.890	1.03	26,800	B.
February	439	310	356	.727	.76	19,800	B.
March	462	271	347	.708	.82	21,300	B.
April	2,310	535	1,560	3.18	3.55	92,800	B.
May	2,450	1,380	1,880	3.84	4.43	116,000	B.
June	3,070	1,030	2,050	4.18	4.66	122,000	B.
July	1,030	486	621	1.27	1.46	38,200	B.
August	486	271	342	.698	.80	21,000	B.
September	486	271	362	.739	.82	21,500	B.
The year	3,070	271	802	1.64	22.21	581,000	

JACKSON LAKE AT MORAN, WYO.

LOCATION.—In sec. 18, T. 45 N., R. 114 W., a short distance above gates at outlet of lake at Moran, Lincoln County.

RECORDS AVAILABLE.—June 1, 1909, to September 30, 1915. Records for years 1909 and 1910 fragmentary.

GAGE.—Inclined staff on right shore just below the engineers' cottage; zero of gage 6,700 feet above sea level.

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

Daily gage height, in feet, of Jackson Lake at Moran, Wyo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	39.30	38.80	38.60	39.45	40.80	45.45	51.80	49.65	41.76	33.90
2	.....	.....	39.28	38.80	38.60	39.50	40.85	45.67	52.30	49.10	41.43	33.84
3	.....	.....	39.25	38.80	38.60	39.55	40.90	45.80	52.50	48.60	41.13	33.86
4	.....	.....	39.20	38.75	38.60	39.60	41.05	46.00	52.75	48.00	40.69	33.88
5	.....	.....	39.20	38.75	38.60	39.65	41.10	46.05	52.85	47.40	40.05	33.85
6	.....	.....	39.20	38.75	38.60	39.70	41.65	46.18	52.90	46.90	39.40	33.82
7	.....	.....	39.20	38.75	38.60	39.75	41.70	46.40	52.90	46.30	38.80	33.77
8	.....	.....	39.15	38.70	38.60	39.80	41.75	46.40	53.10	45.75	38.15	33.71
9	.....	.....	39.10	38.70	38.60	39.85	41.80	46.50	53.35	45.25	37.62	33.66
10	.....	.....	39.10	38.70	38.65	39.85	41.85	46.75	53.70	45.00	37.04	33.62
11	37.90	.....	39.10	38.65	38.70	39.90	41.94	46.85	53.90	44.95	36.67	33.59
12	38.10	.....	39.05	38.65	38.75	39.95	42.00	47.05	54.00	44.85	36.30	33.54
13	38.20	.....	39.05	38.65	38.80	40.00	42.05	47.30	53.95	44.75	36.23	33.50
14	38.30	.....	39.00	38.65	38.80	40.05	42.15	47.60	53.95	44.65	36.15	33.44
15	38.40	39.55	39.00	38.60	38.85	40.05	42.28	47.90	53.95	44.60	35.91	33.40
16	38.50	39.50	39.00	38.00	38.90	40.10	42.43	48.00	53.90	44.55	35.65	33.38
17	38.60	39.50	39.00	38.60	38.95	40.15	42.58	48.20	53.90	44.50	35.45	33.35
18	.....	39.48	39.00	38.55	39.05	40.20	42.73	48.45	54.00	44.45	35.34	33.32
19	.....	39.48	39.00	38.50	39.00	40.25	42.94	48.70	54.00	44.10	35.10	33.30
20	.....	39.48	39.00	38.50	39.05	40.30	43.12	49.00	54.00	43.90	34.95	33.27
21	.....	39.45	38.95	38.50	39.10	40.35	43.48	49.15	54.00	43.65	34.80	33.25
22	.....	39.45	38.95	38.50	39.20	40.40	43.60	49.35	53.90	43.45	34.70	33.23
23	.....	39.43	38.95	38.45	39.25	40.45	43.80	49.65	53.85	43.20	34.60	33.20
24	.....	39.42	38.90	38.45	39.30	40.50	43.98	49.80	53.80	42.95	34.50	33.19
25	.....	39.40	38.90	38.45	39.30	40.55	44.15	50.00	53.40	42.70	34.45	33.22
26	.....	39.35	38.90	38.45	39.35	40.60	44.33	50.20	53.00	42.55	34.33	33.24
27	.....	39.30	38.85	38.50	39.40	40.60	44.65	50.45	52.50	42.58	34.22	33.34
28	.....	39.30	38.85	38.50	39.40	40.65	44.67	50.70	51.60	42.59	34.18	33.44
29	.....	39.30	38.85	38.55	.....	40.70	44.95	50.90	50.95	42.54	34.10	33.40
30	.....	39.30	38.85	38.60	.....	40.70	45.20	51.00	50.30	42.30	34.02	33.38
31	.....	.....	38.85	38.60	.....	40.70	.....	51.20	.....	42.09	33.95	.....

NOTE.—Add 6,700 feet to reduced these gage heights to sea-level datum.

SNAKE RIVER NEAR MORAN, WYO.

LOCATION.—In sec. 17, T. 45 N., R. 114 W., about 1½ miles below Moran post office, Lincoln county, and United States Reclamation Service dam at outlet of Jackson Lake. No important trlbutaries between dam and statiom.

DRAINAGE AREA.—820 square miles.

RECORDS AVAILABLE.—September 21, 1903, to Spetember 30, 1915.

GAGE.—Inclined staff on left bank; datum lowered 1.0 foot on July 26, 1915. Read by employees of United States Reclamation Service.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; control practically permanent.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.75 feet at 2 p. m., June 27 (discharge 9,610 second-feet); minimum stage recorded —0.50 foot on different days during October, January, February, and March (discharge 28 second-feet.

1903–1915: Maximum stage recorded 8.8 feet July 6, 1910 (discharge 12,100 second-feet); (no flow during a few days in 1907 and 1909, when gates in Jackson Lake dam were closed).

DIVERSIONS.—No diversions between dam and station and practically none above Jackson Lake.

REGULATION.—Flow controlled by operation of gates in Jackson Lake dam. Storage capacity of reservoir in 1915 about 400,000 acre-feet.

ACCURACY.—Stage-discharge relation constant during year. Rating curve well defined between 50 and 8,000 second-feet. Discharge ascertained by applying mean daily gage heights to rating table. Records good except those for low water in February, March, and April, which are somewhat uncertain.

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

The following discharge measurement was made by Robert Follansbee:
July 23, 1915: Gage height, 3.93 feet; discharge, 3,210 second-feet.

Daily discharge, in second-feet, of Snake River near Moran, Wyo., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	35	840	670	555	28	28	34	114	132	8,300	3,980	912
2	36	840	670	555	28	28	34	118	132	8,120	3,980	875
3	37	840	670	555	28	28	34	120	2,030	7,950	3,830	875
4	38	840	670	555	28	28	34	123	2,030	7,950	3,830	912
5	38	840	670	555	28	28	34	125	2,160	7,780	6,230	875
6	38	840	670	555	28	28	41	127	2,160	7,780	6,230	840
7	38	840	670	555	28	28	41	127	990	7,780	6,000	840
8	38	840	670	555	28	28	41	127	39	7,600	5,900	805
9	38	805	640	555	28	28	41	127	39	7,420	5,770	770
10	38	805	610	555	28	28	41	127	35	3,090	4,920	735
11	38	805	610	555	28	28	46	127	2,280	2,680	4,440	735
12	34	805	610	555	28	28	50	127	3,090	2,810	3,980	702
13	34	770	610	555	28	28	56	127	2,680	2,810	3,680	670
14	34	770	582	555	28	28	61	127	2,680	2,810	3,240	670
15	34	770	582	555	28	28	68	127	2,160	2,280	2,870	640
16	34	770	582	555	28	28	74	127	2,160	2,280	2,540	610
17	34	770	582	555	28	28	82	127	2,160	2,280	2,410	610
18	34	735	582	555	28	28	87	132	2,160	2,280	2,160	610
19	33	735	582	555	28	28	90	132	2,540	3,240	2,030	582
20	32	735	582	555	28	28	94	138	2,810	3,240	1,800	555
21	30	702	1,110	555	28	28	100	138	2,950	3,380	1,680	555
22	29	702	1,110	555	28	28	105	146	3,680	3,240	1,580	528
23	28	702	555	555	28	28	109	146	3,090	3,240	1,380	528
24	28	702	555	555	28	28	114	146	4,760	3,240	1,380	528
25	500	670	555	555	28	28	114	146	7,080	3,090	1,280	528
26	702	670	555	555	28	28	114	146	8,480	2,540	1,200	582
27	805	640	555	109	28	28	114	132	9,520	990	1,200	640
28	840	670	555	28	28	34	114	132	9,350	1,380	1,110	640
29	840	670	555	28	.....	34	114	132	9,350	1,380	1,030	640
30	840	670	555	28	.....	34	114	149	9,180	3,380	950	610
31	840	.....	555	28	.....	34	.....	132	.....	3,980	950	.....

NOTE.—Discharge interpolated Oct. 1–3.

Monthly discharge of Snake River near Moran, Wyo., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	840	28	200	12,300	B.
November	840	640	760	45,200	A.
December	1,110	555	636	39,100	A.
January	555	28	473	29,100	B.
February	28	28	28.0	1,560	D.
March	34	28	28.8	1,770	D.
April	114	34	72.2	4,360	C.
May	149	114	131	8,060	B.
June	9,520	35	3,400	202,000	B.
July	8,300	990	4,200	258,000	A.
August	6,230	950	3,020	186,000	A.
September	912	528	687	40,900	A.
The year	9,520	28	1,150	828,000	

SNAKE RIVER NEAR HEISE, IDAHO.

LOCATION.—In sec. 5, T. 3 N., R. 41 E., about 600 feet above the Anderson dam, Bonneville County, 3 miles above Heise and 25 miles below the station formerly maintained near Lyon. Several small creeks enter between the two stations.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 25, 1910, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank; installed July 8, 1913, and referred to vertical staff gage. Observer, Parley Byington.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and cobbles; two channels at low and medium stages. Control formed by crest of Anderson dam, which is a fairly permanent crib and rock structure. Stage-discharge relation affected at times by repair work on dam and injury to crest caused by ice and high water.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from water-stage recorder, 6.15 feet at 4 a. m. June 28 (discharge, 17,100 second-feet); minimum stage recorded, 1.1 feet at 10 a. m. March 10 (discharge, 2,180 second-feet).

1910–1915: Maximum stage recorded, 10.35 feet on June 16 and 17, 1911 (discharge, 36,000 second-feet); minimum stage March 10, 1915.

DIVERSIONS.—No large diversions above station. Small ditch of about 20 second-feet capacity diverts just above the station.

REGULATION.—Flow is controlled to a large extent by storage in Jackson Lake reservoir.

ACCURACY.—Stage-discharge relation practically permanent except when affected by ice. Rating curve well defined between 2,200 and 27,000 second-feet. Water-stage recorder not in operation continuously and one reading a day was obtained on staff gage except December 9 to February 21. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good.

Discharge measurements of Snake River near Heise, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec.-ft.*
Mar. 19	G. C. Baldwin.....	1.25	2,320	July 8	G. C. Baldwin.....	5.52	15,000
May 30	A. W. Harrington....	4.13	9,340	Sept. 19	A. W. Harrington....	2.06	3,840

Daily discharge, in second-feet, of Snake River near Heise, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,220	4,680	3,600	.....	2,300	3,050	8,640	10,300	16,500	7,680	4,010
2	4,220	4,440	3,600	.....	2,300	3,220	8,000	12,500	16,100	8,000	4,010
3	4,440	4,440	3,800	.....	2,300	3,600	7,060	12,900	16,100	8,000	4,220
4	4,440	4,440	3,600	.....	2,300	4,120	6,200	12,500	15,300	7,680	4,680
5	4,560	4,440	3,600	.....	2,300	4,120	5,920	12,200	14,900	8,320	4,680
6	4,680	4,440	3,600	.....	2,300	3,900	5,790	12,500	14,500	10,300	4,440
7	4,680	4,440	3,600	.....	2,300	3,900	5,530	11,800	14,900	9,990	4,220
8	4,680	4,440	3,600	.....	2,300	4,010	5,400	11,100	14,500	10,300	4,120
9	4,440	4,220	.....	.....	2,300	4,010	5,400	9,990	14,500	9,990	4,120
10	4,440	4,220	.....	.....	2,180	4,010	5,660	10,300	14,500	9,300	4,010
11	4,680	4,220	.....	.....	2,240	4,120	6,200	9,990	11,800	8,970	4,010
12	4,560	4,220	.....	.....	2,300	4,340	6,200	9,640	9,640	8,320	4,120
13	4,440	4,220	.....	.....	2,300	4,560	6,200	10,700	9,990	7,680	4,120
14	4,440	4,220	.....	.....	2,300	4,910	7,060	10,700	9,990	7,370	4,010
15	4,440	4,010	.....	.....	2,300	5,530	7,680	9,990	9,300	7,060	3,900
16	4,440	4,010	.....	.....	2,300	6,200	7,060	9,640	8,640	6,770	3,800
17	4,440	3,800	.....	.....	2,300	6,480	6,480	9,640	8,000	6,480	3,800
18	4,440	3,800	.....	.....	2,300	6,480	7,060	10,300	7,680	5,930	3,700
19	4,440	3,800	.....	.....	2,300	6,770	8,640	10,700	7,370	5,790	3,700
20	4,440	3,600	.....	.....	2,360	7,370	8,320	10,700	7,680	5,530	3,700
21	4,440	3,600	.....	.....	2,430	8,000	8,320	10,700	7,680	5,270	3,600
22	4,220	4,010	.....	2,300	2,500	8,320	8,970	10,700	8,000	5,030	3,600
23	4,220	4,010	.....	2,300	2,570	8,000	8,640	11,400	7,680	4,910	3,600
24	4,010	3,600	.....	2,300	2,720	7,370	8,640	11,400	7,680	4,910	3,600
25	4,010	3,600	.....	2,300	2,880	6,770	9,300	13,300	7,680	4,910	3,600
26	4,170	3,600	.....	2,300	2,800	6,770	9,990	15,700	7,370	4,630	4,340
27	4,340	3,600	.....	2,300	2,720	6,770	9,640	16,900	6,770	4,530	5,400
28	4,510	3,600	.....	2,300	2,720	7,060	8,970	16,900	5,790	4,440	5,030
29	4,680	3,600	.....	.....	2,960	7,370	8,970	16,500	5,920	4,220	4,560
30	4,680	3,800	.....	.....	3,140	8,320	9,300	16,500	5,790	4,220	4,440
31	4,680	.....	.....	.....	2,960	.....	9,300	.....	6,770	4,010	.....

NOTE.—Water stage recorder not in operation Oct. 1 to Mar. 19 and Aug. 29 to Sept. 7; stage observed on staff gage. Discharge interpolated Oct. 5, 12, 16, 19, 26–28, Nov. 26, Dec. 5, Feb. 26, 28, Mar. 11, 14, and 17. Discharge estimated from fragmentary gage-height graph June 23–25, 29 and July 6. No record obtained Dec. 9 to Feb. 21.

Monthly discharge of Snake River near Heise, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	4,680	4,010	4,440	273 000	A.
November	4,680	3,600	4,040	240 000	A.
December 1–8	3,800	3,600	3,620	57,500	B.
February 22–28	2,300	2,300	2,300	31.900	A.
March	3,140	2,180	2,460	151.000	A.
April	8,320	3,050	5,650	336 000	A.
May	9,990	5,400	7,570	465,000	A.
June	16,900	9,640	11,900	708 000	A.
July	16,500	5,790	10,300	633 000	A.
August	10,300	4,010	6,790	418 000	A.
September	5,400	3,600	4,100	244 000	A.

NOTE.—See footnote to table of daily discharge.

SNAKE RIVER NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 17, T. 1 N., R. 37 E., about one-fourth mile upstream from the Woodville highway bridge and 3 miles north of Shelley, Bingham County.

DRAINAGE AREA.—Not measured.

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

GAGE.—Friez water-stage recorder on right bank; standard hook gage in float well, and combination vertical and inclined staff gage outside. James Fugal, observer.

DISCHARGE MEASUREMENTS.—Made from the Woodville bridge.

CHANNEL AND CONTROL.—Control is a lava rock reef extending across the channel about 500 feet below gage. Banks high and clean at the gage and control.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.6 feet at 9 p. m. June 4 (discharge, 15,400 second-feet); minimum stage from recorder, 4.88 feet at 4 a. m September 2 (discharge, 1,800 second-feet).

DIVERSIONS.—Numerous diversions in the Idaho Falls district above the station appropriate practically the entire normal summer flow of the river.

REGULATION.—Natural flow during the irrigation season is augmented by the release of stored flood waters from Jackson Lake for use on Minidoka project.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve referred to hook gage well defined between 1,900 and 12,000 second-feet. Daily discharge ascertained by applying to rating table mean daily gage heights determined by inspection of gage-height graph. Records good.

Discharge measurements of Snake River near Shelley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 18	Baldwin and Roush..	5.93	3,510	July 10	G. C. Baldwin.....	7.52	8,480
23	L. W. Roush.....	5.85	3,220	16	.....do.....	6.27	4,300
Apr. 20	G. C. Baldwin.....	7.49	7,670	29	.....do.....	5.12	2,040
May 29	A. W. Harrington....	8.34	10,900	Sept. 20	A. W. Harrington....	5.44	2,450
June 1	.....do.....	8.19	10,300				

NOTE.—All gage heights referred to hook gage in float well.

Daily discharge, in second-feet, of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	3,750	8,340	10,400	8,840	2,180	1,960
2	.....	3,620	8,680	11,400	8,840	2,740	1,860
3	.....	3,750	8,340	14,300	8,510	3,160	1,880
4	.....	4,260	7,530	15,100	8,510	3,320	2,010
5	.....	4,940	6,890	15,100	8,020	3,230	2,280
6	.....	5,380	6,420	14,700	7,690	3,580	2,530
7	.....	5,090	6,120	13,900	7,350	4,800	2,510
8	.....	4,940	5,670	12,800	8,020	5,090	2,480
9	.....	5,090	5,380	11,400	8,020	4,800	2,430
10	.....	5,230	5,090	10,400	8,020	4,120	2,430
11	.....	5,380	5,090	9,680	8,020	4,260	2,380
12	.....	5,520	5,230	9,010	6,730	4,260	2,400
13	.....	5,670	5,380	8,510	5,520	3,870	2,620
14	.....	5,820	5,520	8,510	5,090	3,750	2,650
15	.....	6,270	6,420	7,690	4,660	3,750	2,650
16	.....	6,890	7,200	6,420	4,260	3,870	2,620
17	.....	7,530	6,890	5,520	3,600	2,920	2,600
18	3,510	7,690	6,270	4,940	3,140	2,630	2,550
19	3,510	7,690	6,890	4,800	2,780	2,560	2,500
20	3,510	8,020	8,340	4,940	2,460	2,560	2,460
21	3,280	8,340	8,680	4,800	2,370	2,430	2,450
22	3,280	8,680	9,010	4,660	2,280	2,480	2,320
23	3,280	9,010	9,680	4,530	2,250	2,710	2,250
24	3,390	9,010	10,000	4,530	2,180	2,780	2,250
25	3,390	8,340	10,000	4,800	2,140	2,840	2,340
26	3,510	8,020	10,700	5,820	2,210	2,860	2,370
27	3,620	7,530	11,400	7,850	2,370	2,860	2,710
28	3,480	7,200	11,100	9,010	2,380	2,740	3,600
29	3,460	7,040	10,700	9,010	2,020	2,630	4,120
30	3,750	7,530	10,400	8,680	2,020	2,260	4,120
31	4,000	.....	10,400	.....	1,990	2,080	.....

NOTE.—Discharge Mar. 19 and Sept. 19 interpolated on account of lack of gage heights.

Monthly discharge of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 18–31	4,000	3,280	3,500	97,200	A.
April	9,010	3,620	6,440	383,000	A.
May	11,400	5,090	7,860	483,000	A.
June	15,100	4,530	8,770	522,000	A.
July	8,840	1,990	4,930	303,000	A.
August	5,090	2,080	3,230	199,000	A.
September	4,000	1,860	2,540	151,000	A.
The period	.....	.....	.....	2,140,000	

SNAKE RIVER AT FIRTH, IDAHO.

LOCATION.—In sec. 24, T. 1 S., R. 36 E., 200 feet below county bridge, about three-fourths mile north of Firth, Bingham County, about 10 miles downstream from Woodville bridge.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1914, to May 15, 1915, when the station was discontinued. Records at this station are comparable with those at the station near Shelley established March 18, 1915.

GAGE.—Inclined staff on right bank; read by G. W. Cederberg.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—One channel except at extreme high stages. Control is a gravel bar; permanent during period of record.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 6.2 feet at 6 a. m. and 5 p. m., April 23 (discharge, 9,350 second-feet); minimum stage 3.9 feet at 11 a. m. December 16 (stage-discharge relation affected by ice, discharge less than 3,000 second-feet).

DIVERSIONS.—Practically all the natural summer flow is diverted above the station.

REGULATION.—During irrigation season water is released from Jackson Lake reservoir for use on the Minidoka project.

ACCURACY.—Stage-discharge relation constant except from December 13 to March 7, when it was affected by ice. Rating curve well defined between 3,000 and 12,000 second-feet. Gage read to half tenths twice daily. Daily discharge ascertained by applying mean gage heights to rating table. Records, except those for winter, good.

Discharge measurements of Snake River at Firth, Idaho, during the period Sept. 28, 1914, to May 28, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
Sept. 28	C. G. Paulsen	5.00	5,360	Mar. 18	G. C. Baldwin	4.17	3,380
Oct. 26	L. W. Roush	5.19	5,800	Apr. 19	do	5.72	7,450
				May 28	A. W. Harrington	6.68	11,800

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

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.
1	5,330	5,900	5,330	.....	3,450	7,850	16	5,900	5,610	.....	3,450	6,510	.....
2	5,330	5,900	4,310	.....	3,450	8,960	17	5,900	5,330	.....	3,290	7,160	.....
3	5,330	5,900	4,800	.....	3,450	8,580	18	5,900	4,800	.....	3,450	7,500	.....
4	5,900	5,900	5,060	.....	3,860	7,850	19	5,900	5,330	.....	3,290	7,500	.....
5	6,200	5,900	5,330	.....	4,550	7,160	20	6,510	5,330	.....	3,290	7,850	.....
6	6,200	5,900	5,060	.....	4,800	6,510	21	6,510	5,330	.....	3,290	8,210	.....
7	6,510	5,900	5,060	.....	4,800	6,200	22	6,510	5,330	.....	3,290	8,960	.....
8	6,510	5,900	4,800	3,450	4,550	5,610	23	6,200	5,330	.....	3,290	9,350	.....
9	6,510	5,900	4,800	3,450	4,550	5,330	24	5,900	5,330	.....	3,290	9,350	.....
10	6,200	5,900	4,080	3,450	4,800	4,800	25	5,900	5,330	.....	3,450	8,580	.....
11	5,900	5,610	4,310	3,450	4,800	4,800	26	5,900	5,330	.....	3,450	7,850	.....
12	6,200	5,610	3,650	3,450	5,060	5,060	27	5,900	5,330	.....	3,450	7,500	.....
13	6,510	5,610	.....	3,450	5,330	5,060	28	5,900	5,330	.....	3,290	7,160	.....
14	6,200	5,610	.....	3,450	5,330	5,330	29	5,900	5,060	.....	3,290	7,160	.....
15	5,900	5,610	.....	3,450	5,900	5,900	30	5,900	5,330	.....	3,450	7,500	.....
							31	5,900	.....	.....	3,650	.....	.....

NOTE.—Stage-discharge relation affected by ice Dec. 13 to Mar. 7. Mean discharge estimated from observer's notes, climatic data, and records of flow at other stations on Snake River as follows: Dec. 13–31 3,140 second-feet; Jan. 1 to Mar. 7, 3,300 second-feet.

Monthly discharge of Snake River at Firth, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6,510	5,330	6,040	371,000	A.
November	5,900	4,800	5,550	330,000	A.
December	5,330	.....	3,750	231,000	B.
January	.....	.....	3,300	203,000	C.
February	.....	.....	3,300	183,000	C.
March	3,650	3,260	3,370	207,000	B.
April	9,350	3,450	6,230	371,000	A.
May 1–15	8,960	4,800	6,330	188,000	A.
The period	.....	.....	.....	2,080,000	

NOTE.—See footnote to table of daily discharge.

SNAKE RIVER NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 31, T. 3 S., R. 34 E., about one-fourth mile below mouth of Blackfoot River and 14 miles southwest of Blackfoot, Bingham County. Blackfoot River is the only large tributary between the station and the mouth of Henrys Fork, about 60 miles above. Portneuf and Bannock rivers, together with about 2,500 second-feet of spring water, enter between this station and that at Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 6, 1910, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank; installed July 6, 1913, at same location and datum as staff gage installed October 1, 1912. Original gage used June 6, 1910, to September 30, 1912, was 50 feet above present site. Datum of gage raised 0.06 foot on June 25, 1911, and 0.03 foot on October 1, 1912, when new staff was installed. Observer, James A. Clough.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of very coarse gravel; two channels at low and three at medium stages. Control shifts slightly during high water but was permanent during 1915.

WINTER FLOW.—Floating ice sometimes present for short periods; stage-discharge relation apparently not affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 8.55 feet at 6 a. m. June 5 (discharge, 15,800 second-feet); minimum stage recorded, 1.98 feet at 5 p. m. July 27 (discharge 388 second-feet).

1910–1915: Maximum stage recorded 12.63 feet at noon June 8, 1914 (discharge 35,600 second-feet); minimum stage 1.89 feet August 11 and 15, 1910 (discharge, 238 second-feet).

DIVERSIONS.—Practically all the natural summer flow diverted above the station.

REGULATION.—Flow regulated by storage in Jackson Lake reservoir and also by storage in Blackfoot-Marsh reservoir on Blackfoot River. Practically all of present summer flow is released water from these reservoirs.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 400 and 20,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Discharge ascertained by applying to rating table mean daily gage heights obtained by inspection of gage-height graph October 1 to July 19, August 4 to 28, and September 13 to 30; July 20 to August 3, gage heights derived from graph drawn through daily staff-gage readings; August 29 to September 12 gage heights obtained by one reading a day. Records good throughout year.

Discharge measurements of Snake River near Blackfoot, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 25	G. C. Baldwin	4.51	3,130	July 12	G. C. Baldwin	5.90	6,200
Apr. 22	do	6.41	7,610	Aug. 1	do	2.02	407
May 25	A. W. Harrington	7.06	9,730	Sept. 9	A. W. Harrington	2.88	1,130
July 12	G. C. Baldwin	5.95	6,580				

Daily discharge, in second-feet, of Snake River near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,920	6,100	5,250	3,880	3,600	3,700	3,600	6,760	10,200	6,620	419	604
2	5,020	6,100	5,020	3,880	3,700	3,700	3,420	7,760	10,600	6,900	642	532
3	5,250	6,230	5,140	3,880	3,790	3,790	3,420	7,760	13,400	6,490	1,430	498
4	5,480	6,230	5,370	3,880	3,790	3,700	3,600	7,180	15,100	6,490	1,750	532
5	5,850	6,100	5,480	3,700	3,600	3,600	4,180	6,620	15,600	6,360	2,030	604
6	6,100	6,100	5,370	3,600	3,600	3,600	4,800	5,980	15,100	6,230	1,900	844
7	6,230	6,100	5,370	3,790	3,420	3,700	4,920	5,480	15,100	6,100	2,840	978
8	6,360	6,100	5,250	3,790	3,160	3,700	4,590	5,020	13,800	6,230	3,700	978
9	6,360	6,100	4,920	3,790	3,080	3,600	4,590	4,590	12,200	6,230	3,980	1,120
10	6,230	5,980	4,080	3,700	3,250	3,520	4,700	4,080	10,600	6,490	4,180	1,170
11	6,100	5,850	3,880	3,880	3,340	3,420	4,800	3,880	9,180	6,620	3,600	1,120
12	6,230	5,850	4,080	4,080	3,420	3,340	4,920	3,880	7,910	6,100	3,250	1,020
13	6,230	5,850	3,700	3,880	3,420	3,340	5,140	4,080	7,320	4,700	2,450	1,380
14	6,230	5,850	4,180	4,080	3,520	3,340	5,140	4,180	6,760	3,980	2,100	1,510
15	5,980	5,850	3,980	3,880	3,520	3,340	5,370	4,700	6,230	3,420	2,240	1,620
16	5,850	5,720	3,080	3,790	3,520	3,340	5,850	5,600	5,020	2,680	2,600	1,640
17	5,720	5,370	2,840	3,600	3,520	3,250	6,360	5,850	3,880	2,030	2,380	1,690
18	5,850	5,250	3,080	3,600	3,420	3,250	6,900	5,250	3,160	1,660	1,680	1,630
19	5,850	5,480	2,920	3,340	3,520	3,250	6,900	5,020	2,680	1,430	1,420	1,630
20	6,100	5,480	2,920	3,250	3,700	3,250	7,040	6,360	2,520	1,170	1,450	1,560
21	6,360	5,480	3,000	3,420	3,790	3,250	7,320	7,460	2,600	969	1,620	1,540
22	6,360	5,250	2,840	3,340	3,790	3,160	7,610	7,910	2,450	794	1,450	1,530
23	6,230	5,370	2,920	3,340	3,790	3,160	8,530	8,860	2,160	688	1,600	1,510
24	5,980	5,250	2,840	3,250	3,700	3,160	8,530	9,520	2,030	642	1,840	1,500
25	5,850	5,250	2,920	2,840	3,880	3,250	7,910	9,880	2,030	546	1,840	1,540
26	5,720	5,250	3,160	2,680	3,790	3,420	7,460	10,200	2,450	438	1,840	1,840
27	5,600	5,250	3,420	2,760	3,700	3,520	6,900	11,000	3,880	388	1,720	2,300
28	5,600	5,250	3,600	2,920	3,700	3,340	6,360	11,000	6,490	604	1,600	3,080
29	5,850	5,250	3,420	3,340	.....	3,250	5,980	10,600	7,040	696	1,170	3,880
30	5,850	5,250	3,790	3,790	.....	3,420	6,100	10,200	6,900	597	888	4,080
31	5,980	.....	3,790	3,700	.....	3,600	.....	10,200	.....	445	720	.....

NOTE.—Discharge estimated July 28 and Aug. 2 and 3 on account of rapidly changing stage.

Monthly discharge of Snake River near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6,360	4,920	5,910	363,000	A.
November	6,230	5,250	5,680	338,000	A.
December	5,480	2,840	3,920	241,000	B.
January	4,080	2,680	3,570	220,000	B.
February	3,880	3,080	3,570	198,000	A.
March	3,790	3,160	3,430	211,000	A.
April	8,530	3,420	5,760	343,000	A.
May	11,000	3,880	7,000	430,000	A.
June	15,600	2,030	7,480	445,000	A.
July	6,900	388	3,380	208,000	A.
August	4,180	419	2,010	124,000	A.
September	4,080	498	1,520	90,400	A.
The year	15,600	388	4,440	3,210,000	

SNAKE RIVER AT NEELEY, IDAHO.

LOCATION.—In sec. 11, T. 8 S., R. 30 E., half a mile north of Neeley post office, Power County, 4 miles southwest of American Falls, and about 32 miles above the Minidoka dam. Portneuf and Bannock rivers and about 2,500 second-feet of spring water enter Snake River between the Blackfoot gaging station and Neeley. Raft River enters about 18 miles below Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 17, 1906, to September 30, 1915.

GAGE.—Friez water-stage recorder installed August 8, 1910, on left bank at site of staff gage originally used.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Control is of lava rock, probably partly overlain with coarse gravel; permanent during 1915. Bed of river at measuring section is rough, especially near right bank. Both banks are high and clean. One channel at all stages.

WINTER FLOW.—Stage-discharge relation seriously affected by ice during parts of December and January; flow estimated principally by comparison with the record of flow at the Blackfoot station.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.22 feet at 11 p. m., June 6 (discharge, 17,400 second-feet); minimum stage, 3.98 feet at 9 p. m., July 26 (discharge 2,750 second-feet).

1906–1915: Maximum stage recorded, 12.5 feet June 11, 1909 (discharge, 41,100 second-feet); minimum stage recorded, 3.65 feet August 20–22, 1906 (discharge, 2,220 second-feet).

DIVERSIONS.—Numerous canals in the vicinity of Blackfoot and Idaho Falls divert practically the entire natural summer flow of Snake River.

REGULATION.—The summer flow at this station is augmented by stored water from Jackson Lake for use on the Minidoka project, and also by stored water from the Blackfoot-Marsh reservoir.

ACCURACY.—Stage-discharge relation permanent during year except when affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory except for short periods as noted in foot-note to table of daily discharge. Discharge ascertained by applying to rating table mean daily gage heights obtained by inspection of gage-height graph (for exceptions see footnote to table of daily discharge). Records fair for December; good for rest of year.

Discharge measurements of Snake River at Neeley, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 13	L. W. Roush	5.41	6,190	Aug. 2	G. C. Baldwin	4.02	2,790
Mar. 28	G. C. Baldwin	5.30	5,960	Sept. 7	Harrington and Cotton.[a]	4.23	3,280
June 16	A. W. Harrington	5.98	8,160	8	A. W. Harrington	4.31	3,340

[a] Special deputy State engineer.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,170	8,530	8,010	.....	5,920	6,380	6,220	8,890	12,400	8,530	2,860	3,030
2	7,840	8,530	7,840	.....	6,220	6,380	6,070	9,440	12,400	8,530	2,780	2,940
3	8,010	8,530	7,840	.....	6,380	6,380	5,920	10,400	13,700	8,770	3,030	2,860
4	8,360	8,530	7,840	.....	6,220	6,380	5,920	10,400	15,900	8,360	3,760	2,860
5	8,530	8,530	7,840	.....	6,070	6,380	6,220	9,620	17,300	8,530	4,000	2,860
6	8,890	8,530	7,840	.....	5,770	6,220	6,850	8,890	17,300	8,530	4,120	2,940
7	9,070	8,530	7,840	.....	6,070	6,070	7,340	8,360	17,300	8,360	4,120	3,120
8	9,070	8,530	7,840	.....	5,770	6,070	7,340	7,670	16,300	8,180	5,190	3,320
9	8,890	8,530	7,510	.....	5,620	6,070	7,170	7,170	15,400	8,360	5,920	3,320
10	8,710	8,530	7,180	.....	5,620	6,070	7,170	6,690	13,700	8,530	6,070	3,320
11	8,530	8,530	6,860	.....	5,770	5,920	7,340	6,220	12,400	8,770	6,070	3,420
12	8,530	8,530	6,530	.....	5,920	5,770	7,340	6,220	11,200	8,770	5,620	3,320
13	8,710	8,360	.....	6,380	6,070	5,920	7,500	6,220	10,000	7,840	5,190	3,320
14	8,710	8,360	.....	6,380	6,070	5,920	7,670	6,380	9,440	6,690	4,510	3,530
15	8,530	8,360	.....	6,380	6,070	5,920	7,670	6,530	8,890	6,070	4,250	3,760
16	8,360	8,360	5,950	6,070	6,070	5,920	8,010	7,340	8,180	5,480	4,380	3,880
17	8,180	8,010	.....	5,920	6,220	5,770	8,530	8,010	7,010	4,780	4,780	3,880
18	8,180	7,840	.....	5,770	6,070	5,770	9,070	7,840	5,770	4,250	4,250	3,880
19	8,180	7,840	.....	5,770	6,070	5,770	9,440	7,500	5,050	3,880	3,760	3,760
20	8,360	7,840	.....	5,480	6,220	5,770	9,440	8,180	4,780	3,640	3,640	3,760
21	8,710	7,840	.....	5,620	6,380	5,770	9,620	9,620	4,780	3,420	3,640	3,760
22	8,710	7,840	.....	5,620	6,530	5,770	10,000	10,000	4,780	3,320	3,640	3,760
23	8,710	7,840	.....	.....	6,530	5,620	10,800	10,800	4,510	3,120	3,530	3,640
24	8,710	7,840	.....	.....	6,380	5,770	11,200	11,600	4,250	3,030	3,760	3,640
25	8,530	8,010	.....	.....	6,380	5,770	11,200	12,000	4,120	2,940	4,000	3,760
26	8,530	8,010	.....	5,330	6,530	5,770	10,400	12,000	4,120	2,860	4,000	4,000
27	8,360	8,010	.....	5,190	6,380	5,920	10,000	12,800	4,640	2,730	3,880	4,510
28	8,180	8,010	.....	5,330	6,380	5,920	9,440	13,200	6,690	2,730	3,880	4,780
29	8,360	8,010	.....	5,620	.....	5,920	8,890	13,200	8,530	2,940	3,640	5,620
30	8,530	8,010	.....	6,220	.....	5,920	8,530	12,800	8,890	3,030	3,320	6,220
31	8,530	.....	.....	6,220	.....	6,070	.....	12,400	.....	2,940	3,220	.....

NOTE.—Stage-discharge relation affected by ice during part of December and January. No gage height record Oct. 9, Nov. 1–6, 22–27, Nov. 29 to Dec. 4, Dec. 9–11, 13–18, 20–31, Jan. 1, 3–8, and 10–12; discharge interpolated or estimated. Mean discharge estimated from observer's notes, climatic data, and record of flow at Blackfoot station, as follows: Dec. 13–15, 6,500 second-feet; Dec. 16, 5,950 second-feet; Dec. 17–25, 5,400 second-feet; Dec. 26–28, 5,800 second-feet; Dec. 29–31, 6,150 second-feet; Jan. 1–12, 6,350 second-feet; Jan. 23–25, 5,500 second-feet

Monthly discharge of Snake River at Neeley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9,070	7,170	8,470	521,000	A.
November	8,530	7,840	8,220	489,000	B.
December	.....	.....	6,480	398,000	C.
January	.....	5,190	6,000	369,000	B.
February	6,530	5,620	6,130	340,000	A.
March	6,380	5,620	5,970	367,000	A.
April	11,200	5,920	8,280	493,000	A.
May	13,200	6,220	9,300	572,000	A.
June	17,300	4,120	9,660	575,000	A.
July	8,710	2,780	5,740	353,000	A.
August	6,070	2,780	4,160	256,000	A.
September	6,220	2,860	3,690	220,000	A.
The year	17,300	2,780	6,840	4,950,000	

NOTE.—See footnote to table of daily discharge.

SNAKE RIVER NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 2, T. 9 S., R. 25 E., 100 yards below Howell's ferry, 1 mile below the Reclamation Service dam, 6 miles southeast of Minidoka post office, Minidoka County, the nearest railroad point, and about 6 miles above the Montgomery's ferry station, which was discontinued December 31, 1910. Raft River enters between the stations at Neeley and Minidoka.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1910, to September 30, 1915.

GAGE.—Friez water-stage recorder located on right bank directly across river and at same datum as staff gage used prior to August 28, 1911; also Stevens long-distance recorder installed April 1, 1915. G. H. Horne, observer.

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

CHANNEL AND CONTROL.—One channel at all stages; bed composed of coarse gravel. Control shifts slightly but infrequently.

WINTER FLOW.—Some shore ice appears in vicinity of gage; stage-discharge relation believed to have been unaffected during winter of 1914–15.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.90 feet from 4 to 5 p. m., November 15 (discharge, 21,800 second-feet); minimum stage recorded, 4.05 feet from 11 a. m. to 3 p. m. October 13 (discharge, 960 second-feet).

1910–1915: Maximum stage recorded, 14.18 feet from 4 to 5 p. m. June 8, 1914 (discharge, 36,400 second-feet); minimum stage, 4.05 feet from 11 a. m. to 3 p. m. October 13, 1914 (discharge, 960 second-feet).

DIVERSIONS.—The North and South Side Minidoka canals divert water between the Neeley and Minidoka stations (see pp. 81–84). The nearest diversions below the station are the Twin Falls North Side and South Side canals at Milner (see pp. 90–94).

REGULATION.—Flow entirely regulated by storage above Minidoka dam (storage capacity, 54,000 acre-feet).

ACCURACY.—Stage-discharge relation changed somewhat between January 28 and March 30. Rating curves well defined. Operation of water-stage recorder satisfactory except for short periods during the winter months. From October to March repairs were being made to the spillway and tailrace at the dam and water was stored during the day and released at night; discharge for practically all days during this period determined hourly. See note to table of daily discharge. Records good except for December.

COOPERATION.—United States Reclamation Service furnished gage-height record and made two discharge measurements.

Discharge measurements of Snake River near Minidoka, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 28	L. W. Roush	[a] 6.36	4,970	July 10	J. S. Longwell [b]	5.56	3,650
Mar. 30	Baldwin and Longwell	6.75	6,410	20	A. W. Harrington	5.04	2,610
30	G. C. Baldwin	6.66	6,100	21	do	5.23	2,950
May 21	A. W. Harrington	6.76	5,970	29	Aylor [b] and Stearman [b]	4.68	2,120
22	do	7.12	7,190				

[a] Stage-discharge relation slightly affected by ice.
[b] Employee of United States Reclamation Service.

Daily discharge, in second-feet, of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	7,740	6,060	12,600	7,220	7,050	6,110	5,960	7,000	10,400	4,870	2,070	2,000
2	8,350	5,730	10,000	7,000	5,780	5,890	5,900	7,280	9,680	5,100	2,070	2,070
3	8,670	8,040	8,670	6,800	6,460	6,300	5,830	7,560	10,400	5,100	2,070	2,000
4	8,350	8,730	7,630	6,640	6,460	5,670	5,830	8,140	13,400	5,100	2,210	2,070
5	8,040	9,250	6,610	7,380	6,330	7,480	5,700	8,430	15,800	4,310	2,210	2,070
6	8,040	7,880	7,240	5,950	6,190	6,090	5,700	7,840	16,200	3,990	2,360	2,070
7	8,040	7,110	8,190	6,320	6,050	5,820	6,210	6,470	15,000	4,420	3,880	2,140
8	8,040	3,110	.....	5,980	6,640	6,990	6,470	6,470	15,400	3,580	3,480	2,070
9	8,350	5,480	.....	6,580	6,310	4,760	6,470	6,210	14,200	3,480	3,580	2,000
10	8,350	7,280	.....	6,500	5,700	6,080	6,470	5,580	11,400	3,680	3,380	1,940
11	8,040	8,880	.....	6,010	6,350	6,870	6,470	5,100	7,840	3,680	3,580	1,940
12	6,860	5,080	.....	8,340	5,830	6,340	6,210	4,760	8,140	3,780	3,190	2,140
13	5,740	4,250	4,650	7,830	5,780	6,210	6,080	4,760	8,140	3,880	2,140	2,840
14	6,580	9,710	6,740	6,890	7,270	6,210	6,340	4,760	6,210	3,380	2,070	2,920
15	9,640	15,000	8,990	5,740	6,480	6,080	6,340	4,420	5,220	3,880	2,140	3,190
16	11,400	9,490	6,430	5,900	6,350	6,340	6,210	4,200	5,830	3,990	2,070	3,580
17	9,800	7,550	4,990	6,570	5,790	6,210	6,210	4,640	5,220	4,530	2,070	3,580
18	9,280	7,610	2,740	6,460	6,260	5,960	6,740	5,100	3,680	3,380	2,140	3,480
19	8,850	7,740	3,120	6,560	6,850	6,340	7,280	5,460	4,530	2,670	2,070	3,680
20	9,500	7,340	3,100	6,440	7,710	6,080	7,560	5,960	5,830	2,670	2,070	3,280
21	9,970	8,700	3,000	6,360	6,940	6,080	7,560	6,470	5,580	2,920	2,070	3,190
22	9,090	7,200	2,800	5,330	6,520	5,960	7,840	7,560	5,460	2,750	2,070	3,380
23	8,680	6,260	2,740	.....	5,670	5,830	7,840	8,140	4,980	2,750	2,070	3,580
24	8,400	7,750	3,700	.....	6,520	5,830	8,430	9,040	4,980	2,750	2,000	3,680
25	8,340	9,630	4,650	.....	7,790	6,080	8,730	9,680	5,100	2,430	2,000	3,680
26	8,040	7,430	5,360	.....	6,460	5,830	8,730	10,700	4,760	2,140	1,940	3,480
27	8,140	7,570	4,880	.....	6,530	5,830	8,140	11,100	4,640	2,140	1,940	2,840
28	8,240	7,440	5,880	5,110	6,650	6,080	7,560	11,400	4,870	2,140	1,940	2,280
29	8,340	5,810	5,880	5,480	.....	5,960	6,740	11,800	4,870	2,140	1,880	2,280
30	6,090	10,700	5,880	6,890	.....	6,340	6,470	11,800	4,870	2,070	1,940	3,280
31	5,290	.....	6,500	7,000	.....	5,960	.....	11,100	.....	2,070	1,940	.....

NOTE.—Discharge determined as follows: Oct 1 to Jan. 29 and Mar. 9 to Sept. 30, from two well-defined rating curves; Jan. 30 to Mar. 8 by shifting-control method; Nov. 15, 20, Dec. 8–12, 20–22, 24, 29, 31, Jan. 2, 3, 23–27, and 31, estimated, the mean discharge Dec. 8–12 and Jan. 23–27 being estimated at 6,000 second-feet; discharge Dec. 23, 25–28, and 30, obtained from one gage reading a day; discharge Oct. 12 to Nov. 14, Nov. 16–21, 23–30, Dec. 4–7, 14, Jan. 1, 4–12, Feb. 1, and Feb. 8 to Mar. 8 is the mean of 24 hourly determinations of discharge for each day.

Monthly discharge of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	11,400	5,290	8,270	508,000	A.
November	15,000	3,110	7,660	456,000	A.
December	12,600	2,740	5,900	363,000	C.
January	8,340	5,110	6,430	395,000	B.
February	7,790	5,670	6,450	358,000	B.
March	7,480	4,760	6,080	374,000	A.
April	8,730	5,700	6,800	405,000	A.
May	11,800	4,200	7,380	454,000	A.
June	16,200	3,680	8,090	481,000	A.
July	5,100	2,070	3,410	210,000	A.
August	3,880	1,880	2,340	144,000	A.
September	3,680	1,940	2,760	164,000	A
The year	16,200	1,880	5,960	4,310,000	

LAKE MILNER AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., in the backwater of Twin Falls companies' dam at Milner, Cassia County.

RECORDS AVAILABLE.—April 10, 1911, to September 30, 1915.

GAGE.—Staff gage at dam. A Lietz and a Friez water-stage recorder have also been used for short periods. All gages referred to same datum.

ACCURACY.—Gage heights occasionally seriously affected by wind.

COOPERATION.—Gage-height record furnished by the Twin Falls North Side Land & Water Co. and the Twin Falls Canal Co.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.50	7.50	10.25	8.70	8.65	7.00	6.80	.....	9.95	9.40	9.09	9.82
2	9.95	9.60	9.70	8.65	8.50	6.40	6.85	9.50	9.65	9.50	9.02	9.74
3	8.50	8.40	8.90	8.65	7.70	5.70	6.90	9.85	8.90	9.70	8.98	9.79
4	8.30	7.65	8.35	8.50	7.70	6.70	7.10	9.80	10.05	9.70	8.90	9.70
5	8.40	7.75	8.25	8.90	7.90	7.60	8.25	9.80	9.95	9.78	8.90	9.64
6	8.38	8.10	8.55	8.50	8.00	8.70	8.15	9.80	10.00	9.35	8.90	9.54
7	9.20	7.60	8.95	8.40	8.00	7.05	8.05	9.65	9.75	9.56	9.25	9.24
8	9.50	7.50	9.10	8.70	7.90	7.40	8.15	9.45	9.85	9.79	9.61	9.31
9	9.30	7.75	8.50	8.60	8.20	6.90	8.40	9.80	9.75	9.43	9.62	9.17
10	9.00	6.35	8.25	8.75	8.20	6.65	8.05	9.65	9.22	9.54	9.66	9.02
11	8.85	7.90	8.10	8.60	8.00	7.50	7.85	9.50	9.60	9.48	9.46	8.54
12	8.50	8.68	7.50	8.70	8.00	8.05	7.90	9.60	9.70	9.40	9.46	8.06
13	8.20	7.75	6.80	8.65	7.75	8.10	8.00	9.60	9.65	9.20	9.08	7.78
14	8.00	6.00	7.10	8.60	7.55	8.00	8.30	9.65	9.88	9.00	8.33	8.04
15	8.75	9.90	9.25	8.85	8.45	8.10	8.40	9.70	9.55	8.89	8.19	8.20
16	10.00	9.80	8.85	8.25	8.55	8.25	8.60	9.80	9.60	9.40	8.20	8.41
17	9.00	6.90	8.80	8.35	7.75	8.30	6.90	9.82	9.50	9.32	8.32	8.59
18	8.79	6.60	8.40	8.75	7.50	8.10	7.10	9.65	9.58	9.74	8.44	8.66
19	7.90	7.40	7.75	8.80	7.70	8.50	8.90	9.45	9.65	9.73	8.58	8.59
20	7.60	7.70	7.10	8.80	8.20	8.20	9.00	9.85	9.60	9.52	8.76	8.57
21	8.60	7.68	7.40	8.70	7.70	7.90	9.20	9.80	9.50	9.34	8.88	8.44
22	8.10	8.60	7.75	8.65	7.20	7.80	9.25	9.90	9.76	9.42	9.04	8.30
23	7.85	7.90	8.90	7.90	6.70	7.80	9.35	9.90	9.90	9.20	9.20	8.31
24	7.80	6.90	8.75	7.60	7.00	7.35	9.40	9.85	9.83	9.20	9.38	8.22
25	7.75	8.00	8.80	7.80	7.70	7.35	9.35	9.75	9.55	9.15	9.50	8.22
26	7.60	8.00	8.85	8.10	7.70	7.40	9.40	.....	9.90	9.18	9.74	8.37
27	7.70	8.60	8.85	8.20	6.80	8.50	9.25	.....	9.85	9.24	9.84	8.68
28	7.88	8.10	9.00	8.15	7.00	7.85	9.35	.....	9.80	9.15	9.99	9.36
29	7.90	8.20	9.25	7.90	.....	7.90	9.55	.....	9.75	9.08	9.66	9.66
30	8.00	7.20	8.90	8.10	.....	7.70	9.50	9.82	9.68	9.05	9.69	9.84
31	7.00	.....	8.80	8.90	.....	7.20	.....	9.90	.....	8.96	9.77	.....

NOTE.—All readings from staff gage.

SNAKE RIVER AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., about 300 yards below the Milner dam, at Milner, Twin Falls County. No tributaries enter Snake River between the Minidoka station and Milner, and no important amount of water between Milner and the station near Twin Falls, except some seepage and spring water.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1915.

GAGE.—Staff gage in three sections, high and low sections vertical, and middle inclined, on left bank, installed October 20, 1909; read by F. W. Deming October 1 to June 26 and by T. R. Newell, June 27 to September 30. An auxiliary low-water gage is installed on the right bank about 100 yards below the main gage, to which it bears no definite relation. The original gage used prior to October 20, 1909, was a vertical staff on the right bank at approximately the same datum as the present gage.

DISCHARGE MEASUREMENTS.—Made from a cable at the gage, from foot planks at the auxiliary low water gage, or by wading. Measurements may also be made from the suspension highway bridge one-fourth mile below the main gage, but the conditions there are poor.

CHANNEL AND CONTROL.—Control for main gage is an old crib-and-rock diversion dam and is practically permanent for medium and high stages. Bed of the stream both at the main gage and at the auxiliary gage consists of lava rock, which also forms the control for the low-water gage.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open water rating assumed applicable; observations are, however, discontinued during part of winter as gages are at times inaccessible.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 16.37 feet at 8 a. m., November 15 (discharge, 20,400 second-feet); minimum stage recorded, −1.08 feet (on auxiliary gage) August 17 and 18 (discharge, 9 second-feet).

1909–1915: Maximum stage recorded, 20.1 feet June 12, 1909 (discharge, 44,400 second-feet); minimum stage recorded, −1.08 feet (on auxiliary gage) August 17–18, 1915 (discharge, 9 second-feet).

DIVERSIONS.—The Twin Falls canals divert water at the Milner dam, just above the station. During part of the season practically the entire flow of the river is taken by these canals.

REGULATION.—Flow past the station is regulated during the irrigation season at the Milner dam.

ACCURACY.—Stage-discharge relation practically permanent during the year. Gage read to hundredths once daily, October 1 to June 26, and twice daily June 27 to September 30. Discharge ascertained by applying mean daily gage heights to rating table. Records good except for April and May when gage was not read regularly.

COOPERATION.—Gage-height record furnished by the Twin Falls Canal Co., some discharge measurements by special assistant to State engineer stationed at this station.

Discharge measurements of Snake River at Milner, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	L. W. Roush	13.36	8,890	July 29	Harrington and Newell	−0.99	10.9
May 8	G. C. Baldwin	10.09	1,680				
June 15	A. W. Harrington	[a] 4.61	553	Aug. 12	T. R. Newell	−.70	15.2
23	T. R. Newell [b]	−.76	13.4	18	Baldwin and Hoyt	−1.07	9.2
25	do	−.90	11.3	Sept. 15	T. R. Newell	−1.00	10.6
28	do	−.90	11.1	21	do	−.71	14.8
July 12	do	−.90	11.6	29	do	3.00	342
28	do	−.99	10.8				

[a] Main gage read 9.20 feet at end of measurement.
[b] Assistant to State engineer.

NOTE.—Beginning June 15 gage heights refer to datum of low-water gage.

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

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.
1	4,890	7,710	18,600	.....	5,910	4,480	1,420	7,840	12	10	13
2	5,640	8,350	13,400	.....	5,910	4,100	1,840	8,000	12	10	13
3	7,370	9,000	8,330	.....	4,660	3,710	2,260	8,170	18	10	14
4	7,060	9,000	7,060	.....	4,440	3,320	2,680	8,330	13	10	14
5	7,060	9,690	7,680	.....	5,130	3,660	2,270	.....	14	10	14
6	7,060	9,690	.....	.....	5,380	3,660	1,860	.....	12	10	14
7	7,370	8,880	.....	.....	5,910	3,660	1,460	.....	12	12	13
8	8,330	8,080	.....	.....	4,440	3,900	1,060	.....	11	16	13
9	9,000	7,280	.....	.....	4,440	4,600	.....	.....	11	16	13
10	9,000	6,470	.....	.....	3,320	.....	.....	9,340	11	16	13
11	8,660	8,330	.....	.....	4,440	.....	.....	4,440	11	15	12
12	8,330	7,400	.....	.....	4,660	.....	.....	3,880	12	15	11
13	7,680	6,470	.....	.....	4,440	.....	.....	3,320	11	14	10
14	7,370	5,910	.....	.....	4,440	.....	.....	2,540	12	13	10
15	5,910	20,700	.....	.....	4,440	4,230	.....	477	11	10	11
16	12,600	19,800	.....	.....	3,660	.....	.....	282	11	10	12
17	11,900	9,690	.....	4,440	4,030	.....	.....	245	11	9	14
18	11,900	9,340	.....	4,440	4,030	.....	.....	187	13	9	14
19	10,400	8,330	.....	4,440	4,890	.....	.....	155	12	10	14
20	9,690	8,660	.....	6,760	5,380	.....	.....	145	12	10	14
21	10,400	8,660	.....	6,760	4,030	.....	2,180	69	11	10	15
22	10,800	9,000	.....	5,910	3,660	.....	3,310	42	11	10	14
23	9,690	8,330	.....	5,130	3,660	.....	4,440	14	11	10	14
24	9,690	7,060	.....	4,440	3,660	.....	4,440	13	11	11	14
25	9,690	9,690	.....	4,890	3,480	.....	5,130	12	11	11	14
26	9,000	8,660	.....	6,470	3,480	4,030	5,640	12	10	12	14
27	8,330	7,060	.....	5,910	6,190	3,270	6,150	13	10	12	14
28	8,330	7,680	.....	5,910	5,910	2,520	6,660	12	10	13	44
29	9,000	7,680	.....	.....	5,640	1,760	7,170	12	10	13	307
30	8,660	7,680	.....	.....	5,250	1,000	7,680	12	10	11	594
31	7,060	.....	.....	.....	4,860	.....	7,680	.....	10	12	.....

NOTE.—Discharge determined from two fairly well defined rating curves applicable as follows: Oct. 1 to June 17 referred to main gage; June 18 to Sept. 30 referred to low-water gage. Discharge estimated or interpolated on account of lack of gage heights, Nov. 1, 2, 7–9, 12, Mar. 30 to Apr. 3, Apr. 6–9, 27–29, May 1–3, 5–8, 22, 26–29, June 1–3, 22, 24, and 26. Mean discharge estimated from records at other stations as follows: Apr. 10–14, 3,500 second-feet; Apr. 16–25, 3,800 second-feet; May 9–20, 1,050 second-feet; June 5–9, 11,400 second-feet. No record Dec. 6 to Feb. 16.

Monthly discharge of Snake River at Milner, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12,600	4,890	8,640	531,000	B.
November	20,700	5,910	9,010	536,000	B.
December 1–5	18,600	7,060	11,000	109,000	B.
February 17–28	6,760	4,440	5,460	130,000	B.
March	6,190	3,320	4,640	285,000	B.
April	4,600	1,000	3,580	213,000	C.
May	7,680	.....	2,840	175,000	C.
June	.....	12	3,820	227,000	B.
July	14	10	11.4	701	B.
August	16	9	11.6	713	B.
September	594	10	43.3	2,580	B.

NOTE.—See footnote to table of daily discharge.

45725°—18—WSP 413——3

SNAKE RIVER NEAR TWIN FALLS, IDAHO.

LOCATION.—In sec. 33, T. 9 S., R. 17 E., at Perrine's bridge on the I. B. Perrine Blue Lakes ranch, about 4 miles north of the city of Twin Falls, Twin Falls County, and 4 miles below Shoshone Falls. The outlet of the Blue Lakes enters Snake River about 200 feet below the gage, and Salmon Falls Creek enters about 18 miles below.

DRAINAGE AREA.—Not measured.

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

GAGE.—Inclined staff on left bank, about 100 feet above the bridge; read by employees of I. B. Perrine.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Control consists of lava boulders and solid rock, permanent. Bed of river at measuring section is very rough. Banks are high and not subject to overflow.

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

EXTREME OF DISCHARGE.—Maximum stage recorded during year, 10.6 feet at 7 a. m., November 16 (discharge, 21,500 second-feet); minimum stage recorded, 2.05 feet June 27, 29, and 30, July 1–4, 9–16, 18–20, 28–29, and 31; August 1–3, and 6, 7 (discharge, 468 second-feet).

1911–1915: Maximum stage recorded, 13.3 feet at 6 a. m. and 7 p. m., June 10, 1914 (discharge, 32,200 second-feet); minimum stage recorded, 2.05 feet, June 27, 29, and 30, July 1–4, 9–16, 18–20, 28–29, and 31, August 1–3, and 6–7, 1915 (discharge, 468 second-feet).

DIVERSIONS.—No diversions are made from the river between this station and the one at Milner except small ranch ditches.

REGULATION.—Flow past station is regulated directly by diversions of the North and South side canals at Milner, where practically the entire flow of the river is diverted during the last part of the irrigation season; flow at such times consists of inflow and seepage between this station and that at Milner.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to quarter tenths twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Records of monthly discharge excellent though parts of the records of daily discharge may be somewhat in error as a result of diurnal fluctuations due to operation of gates at Milner dam.

Discharge measurements of Snake River near Twin Falls, Idaho, during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 14	4.45	3,070
August 17	2.13	505

Daily discharge, in second-feet, of Snake River near Twin Falls, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5,520	6,530	11,800	6,270	6,270	6,790	5,520	1,940	8,440	468	468	515
2	6,020	10,200	13,000	6,530	7,060	6,530	5,520	2,220	7,600	468	468	515
3	9,020	9,300	11,100	7,060	7,060	5,520	5,520	1,940	5,280	468	468	490
4	7,880	9,020	9,900	6,790	6,020	4,820	4,160	3,180	7,060	468	490	490
5	7,600	9,300	7,600	6,270	6,020	5,280	4,590	3,740	10,500	490	490	490
6	7,060	9,900	5,520	7,060	6,020	6,530	4,590	3,740	15,100	490	468	490
7	7,600	9,900	6,530	6,020	6,020	7,060	4,590	3,180	11,100	490	468	490
8	8,440	8,720	7,600	6,020	6,020	4,820	4,590	2,520	11,800	490	490	490
9	9,900	9,300	8,160	6,020	6,270	5,520	4,820	1,570	11,100	468	490	490
10	9,300	8,160	6,530	6,020	6,020	4,160	5,520	3,940	8,440	468	490	490
11	9,300	7,060	6,530	6,270	6,020	4,379	4,590	2,520	5,280	468	490	490
12	9,300	9,300	6,530	6,020	6,020	5,040	4,160	1,510	2,830	468	490	490
13	8,160	6,790	5,760	6,270	5,760	5,040	3,540	1,140	3,360	468	490	515
14	6,020	4,590	4,160	6,790	5,520	4,820	3,540	1,090	3,180	468	490	540
15	6,790	10,500	4,820	7,320	6,020	4,160	4,160	1,000	2,670	468	490	540
16	9,900	20,000	7,320	6,020	6,270	4,160	6,270	955	1,090	468	490	540
17	12,400	8,720	7,320	5,760	6,530	4,820	5,760	955	830	490	490	515
18	11,100	8,160	6,270	6,020	5,280	4,590	2,360	1,040	720	468	490	515
19	10,200	8,160	5,520	6,020	6,020	5,280	1,820	1,000	688	468	490	515
20	9,900	8,720	3,940	6,270	6,530	6,020	5,040	2,520	625	468	490	549
21	9,900	8,440	3,360	6,020	8,160	5,520	4,820	2,360	625	490	490	540
22	10,500	9,300	3,540	6,270	6,790	5,280	4,590	3,540	568	490	490	515
23	9,900	9,020	3,940	5,520	6,020	5,520	4,160	4,820	540	490	490	540
24	9,300	7,600	4,160	4,820	4,820	4,820	4,370	5,760	515	490	490	515
25	8,720	8,440	4,820	5,040	5,040	4,820	5,040	6,790	490	490	490	540
26	8,160	8,720	4,820	5,040	7,320	5,280	4,820	6,790	490	490	490	595
27	8,160	7,600	5,280	5,520	6,530	6,270	4,590	7,880	468	490	490	595
28	8,160	7,880	5,280	5,280	5,760	6,790	4,160	8,720	490	468	490	568
29	8,160	7,880	5,520	5,040	.....	6,270	2,520	8,440	468	468	490	568
30	8,720	6,530	6,270	5,040	.....	6,270	2,080	8,720	468	490	490	655
31	7,600	.....	6,270	5,520	.....	6,020	.....	8,720	.....	468	490	.....

Monthly discharge of Snake River near Twin Falls, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12,400	5,520	8,670	533,000	A.
November	20,000	4,590	8,790	523,000	A.
December	13,000	3,360	6,420	395,000	A.
January	7,320	4,820	6,000	369,000	A.
February	8,160	4,820	6,190	344,000	A.
March	7,060	4,160	5,430	334,000	A.
April	6,270	1,820	4,390	261,000	A.
May	8,720	955	3,690	227,000	A.
June	15,100	468	4,090	243,000	A.
July	490	468	477	29,300	A.
August	490	468	486	29,900	A.
September	655	490	526	31,300	A.
The year	20,000	468	4,580	3,320,000	

SNAKE RIVER NEAR HAGERMAN, IDAHO.

LOCATION.—In sec. 2, T. 8 S., R. 13 E., at Owsley's ferry, just above Upper Salmon Falls, and about 5 miles south of Hagerman, Gooding County. Big Wood River enters about 10 miles below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1912, to September 30, 1915.

GAGE.—Vertical staff on left bank about 50 feet below the ferry; installed August 15, 1915, at same location and datum as former inclined gage. Gage No. 2 read by Clarice Owsley. An auxiliary inclined staff is also maintained at the site of a proposed power house 1¾ miles below.

DISCHARGE MEASUREMENTS.—Made from cable about 150 feet above gage.

CHANNEL AND CONTROL.—Control rocky; practically permanent during year.

WINTER FLOW.—Stage-discharge relation not affected by ice; open-water rating curves are applicable throughout winter.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet at 7.20 a. m. November 16 (discharge, 23,100 second-feet); minimum stage recorded, 3.1 feet July 15 to August 2 (discharge, 4,030 second-feet).

1912–1915: Maximum stage recorded 7.75 feet at 6 p. m., June 10, 1914 (discharge, 35,100 second-feet); minimum stage recorded, 3.1 feet July 15 to August 2, 1915 (discharge, 4,030 second-feet).

DIVERSIONS.—No diversions of importance between this station and that at Milner. Practically entire flow of the river is diverted at Milner during part of the irrigation season by the Twin Falls canals, and the flow at Owsley's ferry is maintained largely by springs and waste water from irrigation up the river.

REGULATION.—Flow regulated by diversions of Twin Falls canals at Milner.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Gage read to quarter tenths twice daily. Discharge ascertained by applying mean daily gage heights to the rating table. Records good except for a few days when gage heights are questionable.

Discharge measurements of Snake River near Hagerman, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	A. W. Harrington....	4.65	11,100	Aug. 15	A. W. Harrington....	3.23	4,520
May 30	G. C. Baldwin.....	4.69	11,800				

Daily discharge, in second-feet, of Snake River near Hagerman, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	10,700	11,900	15,800	9,540	9,540	10,700	9,000	6,060	11,900	4,410	4,030	4,600
2	10,700	11,900	12,500	9,540	10,700	10,700	9,000	6,500	12,500	4,410	4,030	4,600
3	10,700	11,900	11,900	9,540	11,300	10,700	9,000	6,500	14,400	4,410	4,220	4,600
4	10,700	11,900	11,900	9,540	10,700	9,000	9,000	7,450	15,800	4,410	4,220	4,600
5	11,300	11,900	11,900	9,540	9,000	9,000	9,000	7,950	15,800	4,410	4,220	4,600
6	10,700	11,900	10,700	9,000	9,000	9,000	9,000	7,450	17,800	4,410	4,220	4,600
7	10,700	12,500	10,700	9,000	9,000	10,700	9,000	7,450	17,100	4,410	4,220	4,600
8	10,700	11,900	10,700	9,000	9,000	7,950	9,000	7,950	14,400	4,410	4,220	4,600
9	11,900	11,300	11,300	8,460	9,000	7,950	7,950	7,950	11,900	4,410	4,220	4,600
10	10,700	11,300	11,900	8,460	9,000	9,000	7,950	7,450	10,700	4,410	4,220	4,600
11	10,700	10,100	11,300	8,460	9,000	9,000	7,950	7,950	9,540	4,220	4,220	4,600
12	11,300	11,900	11,300	9,000	9,000	9,000	7,950	7,950	7,450	4,220	4,220	4,600
13	11,300	11,900	11,300	9,000	9,000	9,000	9,000	5,620	6,500	4,220	4,320	4,600
14	11,300	10,100	11,300	9,000	9,000	9,000	9,540	5,620	6,500	4,220	4,410	4,600
15	12,500	10,100	10,700	9,540	9,000	9,000	9,540	5,620	5,620	4,030	4,600	4,600
16	13,800	22,300	10,100	10,100	9,000	9,000	9,000	5,620	5,620	4,030	4,410	4,600
17	15,800	15,100	9,540	10,100	9,000	9,000	9,000	5,620	5,210	4,030	4,410	4,600
18	16,400	12,500	9,540	9,540	9,000	7,950	9,000	6,060	5,210	4,030	4,410	4,800
19	15,100	10,700	8,460	9,540	9,000	8,460	5,620	6,060	5,210	4,030	4,410	4,800
20	13,800	10,700	8,460	9,540	9,000	9,000	5,620	6,060	4,800	4,030	4,410	4,800
21	.....	10,700	8,460	9,000	11,300	9,540	5,620	6,500	4,800	4,030	4,410	4,800
22	.....	11,300	9,000	9,000	10,700	10,100	5,620	7,950	4,800	4,030	4,410	4,800
23	.....	11,900	9,000	9,000	11,300	9,540	6,060	7,950	4,800	4,030	4,410	4,800
24	.....	11,900	9,000	9,000	11,300	9,540	6,060	9,540	4,800	4,030	4,410	4,800
25	.....	11,900	9,000	9,000	10,700	9,000	5,620	10,100	4,600	4,030	4,410	4,800
26	11,300	12,500	9,000	9,540	10,700	9,000	5,620	10,700	4,410	4,030	4,600	4,800
27	11,300	12,500	9,000	9,540	10,700	9,000	5,620	10,700	4,410	4,030	4,800	4,800
28	11,300	11,900	9,000	9,540	10,700	9,000	6,060	10,700	4,410	4,030	4,800	4,800
29	11,900	11,900	9,540	9,540	.....	9,000	6,060	10,700	4,410	4,030	4,600	4,800
30	11,900	16,400	9,540	9,540	.....	9,000	6,060	11,900	4,600	4,030	4,600	4,800
31	11,900	.....	9,540	9,540	.....	9,000	.....	11,900	.....	4,030	4,600	.....

NOTE.—Mean discharge Oct. 21–25 estimated at 13,000 second-feet from records of flow at other stations. Discharge interpolated Oct. 19 and Aug. 13.

Monthly discharge of Snake River near Hagerman, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	16,400	10,700	12,100	744,000	B.
November	22,300	10,100	12,200	72[illegible]000	A.
December	15,800	8,460	10,400	64[illegible]000	A.
January	10,100	8,460	9,280	57[illegible]000	A.
February	11,300	9,000	9,770	54[illegible]000	A.
March	10,700	7,950	9,190	56[illegible]000	A.
April	9,540	5,620	7,620	45[illegible]000	A.
May	11,900	5,620	7,860	48[illegible]000	A.
June	17,800	4,410	8,330	49[illegible]000	A.
July	4,410	4,030	4,180	25[illegible].000	B.
August	4,800	4,030	4,380	269,000	A.
September	4,800	4,600	4,690	279[illegible]000	A.
The year	22,300	4,030	8,320	6,030,000	

SNAKE RIVER AT KING HILL, IDAHO.

LOCATION.—In sec. 7, T. 5 S., R. 11 E., about 300 feet east of the Oregon Short Line Railroad station at King Hill, Elmore County. Big Wood River enters from the north about 20 miles above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 13, 1909, to September 30, 1915.

GAGE.—Inclined staff on right bank installed August 17, 1910; read by P. W. McCarthy. The original gage used May 13, 1909, to March 1, 1910, was a vertical staff on the left bank at practically the same section as the present gage, but with datum about 2.2 feet higher. Temporary staff gage about three-fourths mile above present location used March 7 to August 16, 1910.

DISCHARGE MEASUREMENTS.—Made from cable about 100 feet below gage.

CHANNEL AND CONTROL.—Bed at the gage and measuring section composed largely of gravel. The control is a lava reef partly overlain with gravel; shifts slightly.

WINTER FLOW.—Stage-discharge relation unaffected by ice; open-channel ratings applicable throughout winter.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.6 feet at 2.55 p. m. November 16 (discharge, 26,300 second-feet); minimum stage recorded, 5.1 feet June 27 and 29 (discharge, 5,740 second-feet).

1909–1915: Maximum stage recorded, 13.1 feet June 12 and 13, 1909 (discharge, 41,900 second-feet); minimum stage recorded, 4.5 feet July 7–9 and August 15 and 16, 1910 (discharge, 4,760 second-feet).

DIVERSIONS.—No important diversions for irrigation are made between the Milner station and King Hill.

REGULATION.—Flow regulated by diversions at Milner. During certain parts of the irrigation season practically the entire flow of the river is appropriated and the flow at King Hill is derived largely from springs and seepage water from the Twin Falls tracts.

ACCURACY.—Stage-discharge relation changed slightly during the year. Rating curves well defined. Gage read to quarter tenths daily. Discharge determined by applying daily gage heights to several rating tables during year. Records good.

Discharge measurements of Snake River at King Hill, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Apr. 18	G. C. Baldwin	6.75	9,190
Aug. 13	A. W. Harrington	5.27	6,250

Daily discharge, in second-feet, of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12,100	13,700	16,400	11,800	11,800	12,100	11,300	8,070	13,200	5,950	6,460	6,280
2	13,100	13,400	19,400	11,800	12,400	12,400	11,000	9,100	12,900	5,950	6,460	6,280
3	15,000	13,700	17,500	11,800	12,400	12,100	10,700	9,370	12,600	5,950	6,260	6,280
4	14,700	14,300	15,300	12,100	17,800	11,600	10,400	8,070	11,400	5,970	6,260	6,280
5	13,700	14,300	14,300	11,800	11,800	11,000	10,400	9,370	14,500	5,970	6,260	6,280
6	13,100	15,000	13,100	11,800	11,800	11,000	10,100	9,910	16,600	6,180	6,280	6,280
7	13,100	14,300	11,300	11,600	11,600	12,800	9,590	9,370	17,000	6,390	6,260	6,280
8	14,000	14,000	13,100	11,600	11,800	10,700	9,590	9,100	16,200	6,390	6,260	.....
9	14,700	14,300	13,700	11,600	11,800	10,700	9,590	9,130	15,900	6,610	6,260	.....
10	14,700	12,800	13,400	11,600	11,800	10,100	10,100	9,400	15,900	6,610	6,280	.....
11	14,300	12,100	12,100	11,800	11,800	10,400	10,100	9,130	13,900	6,390	6,280	.....
12	14,000	13,700	12,100	11,800	11,600	10,400	9,860	9,130	12,400	6,410	6,280	.....
13	13,400	12,400	11,300	11,800	11,600	10,100	9,860	8,610	12,000	6,200	6,280	.....
14	13,100	10,400	10,100	11,800	11,800	10,100	9,050	7,600	13,000	6,200	6,280	.....
15	12,100	10,400	9,860	11,800	11,800	10,100	9,050	6,900	13,300	6,200	6,280	.....
16	12,800	26,300	11,600	11,800	11,800	10,100	10,300	6,900	10,600	6,200	6,280	.....
17	17,800	17,800	11,600	11,800	12,400	10,400	10,700	6,700	6,760	5,990	6,280	.....
18	17,100	14,000	12,100	11,600	11,000	10,400	9,590	6,260	6,570	6,200	6,280	.....
19	16,400	13,700	11,800	11,600	11,800	10,400	6,180	7,150	6,350	6,200	6,280	.....
20	15,000	13,700	10,100	11,800	11,800	10,700	6,390	7,630	6,350	6,220	6,280	.....
21	15,000	13,700	9,320	11,600	12,100	10,700	9,590	8,120	6,140	6,430	6,280	.....
22	16,400	14,000	9,320	11,600	13,100	10,700	9,860	8,630	6,140	6,220	6,280	.....
23	15,300	15,000	9,050	11,600	12,400	10,700	9,620	9,430	6,140	6,220	6,280	.....
24	14,700	14,000	9,050	11,300	10,700	10,400	9,620	11,100	5,930	6,220	6,280	.....
25	14,700	13,700	9,860	11,000	11,000	10,100	9,620	11,400	6,140	6,220	6,280	.....
26	14,300	13,700	10,700	10,700	11,600	10,700	10,200	12,600	6,160	6,220	6,280	.....
27	14,000	13,100	10,700	10,700	12,100	11,800	10,400	12,600	5,740	6,460	6,280	.....
28	14,300	13,100	10,700	10,700	12,100	12,100	9,620	13,200	5,950	6,460	6,280	.....
29	15,000	13,400	10,700	10,700	.....	11,800	9,350	13,800	5,740	6,240	6,280	.....
30	14,300	16,000	11,000	10,700	.....	11,800	8,820	13,500	5,950	6,460	6,280	.....
31	14,300	.....	11,000	11,000	.....	11,800	.....	13,200	.....	6,460	6,280	.....

NOTE.—Discharge determined as follows: Oct. 1 to Apr. 18 from a well-defined rating curve; Apr. 19 to Aug. 12, by shifting-control method; Aug. 13 to Sept. 8, from a well-defined curve. Gage not read Sept. 8–30; mean discharge estimated at 6,500 second-feet.

Monthly discharge of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	17,800	12,100	14,400	885,000	A.
November	26,300	10,400	14,100	839,000	A.
December	19,400	9,050	12,000	738,000	A.
January	12,100	10,700	11,500	707,000	A
February	13,100	10,700	11,800	655,000	A
March	12,800	10,100	11,000	67[illegible],000	A.
April	11,300	6,180	9,680	57[illegible],000	A.
May	13,800	6,260	9,500	58[illegible],000	B.
June	17,000	5,740	10,200	60[illegible],000	B.
July	6,610	5,950	6,250	384,000	B.
August	6,460	6,260	6,290	387,000	A.
September	.....	6,280	6,450	38[illegible],000	B.
The year	26,300	5,740	10,300	7,42[illegible],000	

SNAKE RIVER NEAR MURPHY, IDAHO.

LOCATION.—In the NW. ¼ sec. 18, T. 2 S., R. 1 E., three-fourths mile below the Swan Falls power plant, 1¼ miles below the company ferry and 12 miles east of Murphy. The gage is on the Ada County side of the river and is 38 miles below the mouth of Bruneau River.

DRAINAGE AREA.—41,900 square miles (measured on United States Land Office maps).

RECORDS AVAILABLE.—August 21, 1913, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank one-fourth mile below house of S. H. Cantwell; installed September 7, 1914. Temporary vertical staff first installed at this site August 29, 1912, was replaced October 2, 1912, by an inclined staff, and a vertical low-stage section was added August 22, 1913. Temporarily installed water-stage recorders were in operation December 13, 1913, to June 27, 1914. All gages at practically the same location and set to the same datum. Records prior to August 21, 1913, fragmentary.

DISCHARGE MEASUREMENTS.—Made from ferryboat 1¼ miles above the gage.

CHANNEL AND CONTROL.—Bed composed of lava rock overlain with deposits of sand, silt, and gravel, where not scoured out by the current. Control practically permanent; banks not subject to overflow.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 8.52 feet at 2 p. m. November 17, 1914 (discharge 25,600 second-feet); minimum stage not definitely determined but less than —1.45 feet on several occasions during manipulation of gates at the power plant. Minimum mean daily stage, —1.2 feet July 17 and 23 (discharge 5,560 second-feet).

1912–1915: Maximum stage recorded 12.13 feet at 11.30 a. m. June 10, 1914 (discharge 39,600 second-feet); minimum stage as noted for current year.

DIVERSIONS.—A number of small pumping plants divert water for irrigation between this station and that at King Hill.

REGULATION.—Large diurnal fluctuations in stage are due to the manipulation of the gates at the dam above and to variation in load at the power plant, but because of the small amount of storage obtained at the dam the changes are of short duration.

ACCURACY.—Stage-discharge relation constant during year. Rating curve well defined. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge determined by applying to rating table mean daily gage heights obtained by inspection of recorder graph. Records good.

COOPERATION.—Gage-height record furnished by Electric Investment Co., formerly the Idaho Railway Light & Power Co.

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

May 10, 1915: Gage height, 1.70 feet; discharge, 8,780 second-feet.

Daily discharge, in second-feet, of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12,200	14,800	13,800	12,400	11,400	11,800	.....	8,420	15,300	5,980	6,130	5,840
2	11,600	13,100	13,600	12,400	12,000	12,400	.....	8,280	15,000	5,980	6,050	5,980
3	12,000	13,800	19,200	12,200	13,100	12,900	.....	8,140	14,800	5,980	6,050	5,910
4	14,000	16,300	17,900	12,900	13,300	12,400	.....	8,870	14,300	6,050	6,050	5,980
5	14,500	15,300	16,500	12,900	12,400	10,800	.....	8,720	12,600	6,130	6,050	5,910
6	14,300	15,000	14,500	12,400	12,000	11,000	.....	9,690	.....	5,980	5,980	5,910
7	13,800	15,500	13,100	12,900	11,800	11,400	10,800	10,200	.....	6,290	6,050	5,840
8	13,600	15,500	12,200	12,200	12,000	13,300	10,200	9,860	19,000	5,770	6,050	5,910
9	14,300	15,000	13,300	12,000	12,000	11,600	10,200	9,520	17,300	6,050	6,050	5,910
10	15,300	15,000	14,000	12,200	12,000	11,400	10,200	8,570	16,800	6,050	5,980	5,910
11	15,500	14,800	14,500	12,000	12,200	10,800	10,400	8,420	16,500	6,130	5,980	5,910
12	15,300	11,800	12,200	12,000	12,200	10,200	10,800	9,520	13,800	5,840	5,910	5,840
13	15,300	14,300	12,900	12,000	12,000	10,600	10,400	9,350	11,400	5,910	5,840	5,980
14	15,000	14,800	12,400	12,000	12,200	11,600	9,690	8,000	9,350	5,910	5,980	5,980
15	13,800	11,600	11,300	12,400	11,600	11,000	9,350	7,870	10,000	5,630	5,910	5,980
16	12,400	11,800	10,200	13,300	11,400	10,000	9,190	7,870	9,350	6,050	5,980	6,050
17	14,300	23,800	11,800	12,600	12,000	10,400	10,200	7,610	8,140	5,560	6,050	6,050
18	18,700	19,000	12,900	11,800	12,900	10,400	11,200	7,480	7,000	5,840	5,980	6,050
19	17,600	14,800	12,600	11,600	11,800	11,000	10,200	7,610	6,890	6,210	5,910	6,130
20	16,800	14,300	11,700	11,800	11,600	10,000	8,000	8,000	6,570	5,910	5,980	6,050
21	16,300	14,500	10,800	12,000	12,000	11,400	8,420	8,420	6,470	5,910	5,840	6,290
22	16,000	14,500	9,860	12,200	13,800	11,600	10,000	9,520	6,380	5,630	5,840	6,290
23	17,100	15,300	9,350	12,000	13,300	11,600	10,200	9,520	6,380	5,560	5,910	6,130
24	16,800	15,000	9,350	11,800	12,900	11,400	10,000	.....	6,290	5,840	5,910	6,050
25	16,300	14,800	9,520	11,000	11,600	11,400	9,690	.....	6,130	5,980	5,980	6,130
26	16,000	13,600	10,200	10,800	11,200	11,000	10,400	.....	6,210	5,840	5,910	6,130
27	15,500	15,300	10,600	11,000	12,600	11,000	10,400	.....	6,210	5,980	5,840	6,290
28	15,000	14,000	11,000	11,200	13,100	.....	10,400	.....	6,210	5,840	5,910	6,380
29	15,000	13,800	11,200	11,100	.....	.....	9,860	15,000	6,050	5,980	5,770	6,470
30	15,000	14,000	11,400	11,000	.....	.....	9,190	15,300	6,050	5,840	5,840	6,380
31	15,000	.....	12,000	11,000	.....	.....	.....	15,300	.....	6,050	5,840	.....

NOTE.—No gage height record obtained Dec. 15, 20, Jan. 29, Mar. 28 to Apr. 6, May 24–28, and June 6 and 7; discharge estimated. Mean discharge estimated as follows: Mar. 28–31, 12,300 second-feet; Apr. 1–6, 11,800 second-feet; May 24–28, 12,300 second-feet; June 7 and 8, 17,000 second-feet. During parts of certain days in July, Aug., and Sept., stage fell below range of recorder, owing to manipulation of gates at power house, but this fluctuation affected accuracy of daily discharge record but slightly.

Monthly discharge of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	18,700	11,600	15,000	922,000	A.
November	23,800	11,600	14,800	88[illegible],000	A.
December	19,200	9,350	12,400	76[illegible],000	A.
January	13,300	10,800	12,000	73[illegible],000	A.
February	13,800	11,200	12,200	67[illegible],000	A.
March	13,300	10,000	11,400	70[illegible],000	A.
April	.....	8,000	10,300	61[illegible],000	B.
May	15,300	7,480	9,890	60[illegible],000	B.
June	19,000	6,050	10,700	63[illegible],000	A.
July	6,290	5,560	5,930	365,000	B.
August	6,130	5,770	5,950	366,000	A.
September	6,470	5,840	6,060	361,000	A.
The year	23,800	5,560	10,500	7,63[illegible],000	

NOTE.—See footnote to table of daily discharge.

SNAKE RIVER AT WEISER, IDAHO.

LOCATION.—In sec. 31, T. 11 N., R. 5 W., about one-third of a mile above wagon bridge at Weiser, Washington County. Between this station and that near Murphy, Succor Creek and Owyhee and Malheur rivers enter Snake River on the left bank and Boise, Payette, and Weiser rivers on the right bank.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1910, to September 30, 1915. Fragmentary record of gage heights obtained by Weather Bureau since 1895.

GAGE.—Inclined concrete gage on right bank installed by Weather Bureau; read by J. W. Lapish. Gage used October 8, 1910, to September 30, 1914, was an inclined staff on right bank about 200 yards below wagon bridge at different datum.

DISCHARGE MEASUREMENTS.—Made from cable about 200 yards below bridge.

CHANNEL AND CONTROL.—Bed composed of rocks and coarse gravel. Control fairly permanent. One channel at all stages.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open channel rating curve used throughout the year.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.4 feet at 8 a. m., November 18 (discharge 28,600 second-feet); minimum stage, 1.5 feet at 8 a. m., August 28 and 29 (discharge 5,550 second-feet).

1910–1915: Maximum stage recorded, 14.5 feet (U. S. G. S. gage datum) June 15, 1912 (discharge 73,800 second-feet); minimum stage, 1.5 feet Weather Bureau datum) at 8 a. m. August 28 and 29, 1915 (discharge 5,550 second-feet).

DIVERSIONS.—Some water diverted between Weiser and station near Murphy but almost entirely by pumping.

ACCURACY.—Stage-discharge relation constant during year. Rating curve well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage heights to rating table. Records good.

COOPERATION.—Gage height record furnished by United States Weather Bureau.

Discharge measurements of Snake River at Weiser, Idaho, during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 25	4.17	15,600	Sept. 3	1.66	6,170
July 12	2.38	8,640			

NOTE.—Gage heights refer to United States Weather Bureau gage. United States Geological Survey gage read as follows: Apr. 25, 7 feet; July 12, 5.54 feet; Sept. 3, 4.84 feet.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12,800	18,500	17,400	14,100	14,100	17,000	22,400	17,000	26,700	7,470	6,490	5,860
2	13,300	18,000	18,500	14,100	16,500	17,000	20,700	16,500	26,700	7,470	6,810	6,170
3	13,700	17,400	19,000	14,600	18,500	16,000	19,600	15,500	26,100	7,470	6,810	6,170
4	13,700	16,500	23,000	14,600	16,500	16,000	19,600	15,000	24,800	7,140	6,490	6,170
5	15,000	21,200	22,400	14,600	18,000	16,500	19,600	14,600	23,600	7,140	6,490	6,170
6	17,400	19,000	21,200	15,000	16,500	15,000	19,000	14,100	21,200	7,470	6,490	6,490
7	17,000	19,000	20,100	15,000	15,000	14,100	18,500	14,100	21,200	7,470	6,490	6,170
8	19,000	19,000	17,400	15,000	15,000	14,600	17,400	14,600	23,000	7,810	6,490	6,170
9	16,500	20,100	15,000	15,000	15,000	16,500	17,000	14,600	26,100	8,510	6,170	6,170
10	17,000	19,000	15,500	15,000	15,500	15,000	16,000	15,000	22,400	7,470	6,170	6,170
11	19,000	19,000	16,000	14,600	15,500	14,100	16,000	15,500	21,800	8,870	6,170	6,170
12	18,500	19,000	17,000	14,600	16,000	14,600	16,000	16,500	21,200	8,510	5,860	6,170
13	18,500	15,000	16,000	14,600	15,500	13,700	17,000	19,000	18,500	7,470	5,860	6,490
14	18,500	15,000	15,500	14,600	15,000	14,600	17,400	21,800	16,500	7,470	5,860	6,490
15	18,500	15,500	15,000	14,100	15,000	15,500	17,400	19,000	13,700	6,810	5,860	6,490
16	17,400	17,400	14,100	14,100	14,600	15,500	16,500	18,500	13,300	7,470	5,860	6,810
17	15,500	20,100	12,800	14,100	14,600	15,500	16,000	18,000	12,800	7,140	5,860	6,810
18	17,400	28,600	12,800	14,100	15,000	15,000	15,500	22,400	11,600	7,140	5,860	6,810
19	23,000	23,600	12,800	13,700	18,000	15,000	15,500	26,700	10,800	6,810	5,860	6,810
20	23,000	23,600	12,400	13,700	18,000	15,000	17,400	25,400	9,990	7,140	5,860	6,810
21	22,400	23,000	12,800	13,700	17,400	15,500	15,500	23,600	9,610	7,140	5,860	6,810
22	21,800	22,400	13,300	13,700	17,400	16,500	15,000	23,600	9,240	6,490	6,170	6,810
23	21,800	20,100	13,300	14,100	17,400	16,500	16,500	23,600	8,870	6,490	5,860	6,810
24	22,400	17,400	13,700	14,100	18,000	17,000	16,500	23,600	8,510	5,860	5,860	6,810
25	21,800	17,400	13,700	14,100	17,400	18,000	16,000	25,400	8,160	6,170	5,860	6,810
26	21,200	17,400	14,100	14,600	16,500	19,000	15,500	26,100	8,160	6,490	5,860	6,810
27	20,700	18,000	14,600	14,600	15,500	19,000	15,000	25,400	8,510	6,490	5,860	6,810
28	20,100	18,000	15,000	14,100	16,000	18,000	15,500	25,400	8,510	6,490	5,550	6,810
29	19,600	18,000	14,600	13,700	.....	18,500	16,000	26,700	8,510	6,490	5,550	7,140
30	19,000	17,400	14,100	13,700	.....	20,700	16,500	26,700	7,810	6,490	5,860	7,140
31	19,000	.....	14,100	13,700	.....	21,800	.....	26,700	.....	6,490	5,860	.....

Monthly discharge of Snake River at Weiser, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	23,000	12,800	18,500	1,140,000	A.
November	28,600	15,000	19,100	1,140,000	A.
December	23,000	12,400	15,700	965,000	A.
January	15,000	13,700	14,300	879,000	A.
February	18,500	14,100	16,200	900,000	A.
March	21,800	13,700	16,300	1,000,000	A.
April	22,400	15,000	17,100	1,030,000	A.
May	26,700	14,100	20,300	1,250,000	A.
June	26,700	7,810	15,900	946,000	A.
July	8,870	5,860	7,140	439,000	A.
August	6,810	5,550	6,060	373,000	A.
September	7,140	5,860	6,540	389,000	A.
The year	28,600	5,550	14,400	10,400,000	

SNAKE RIVER NEAR BURBANK, WASH.

LOCATION.—In sec. 28, T. 9 N., R. 31 E., at the head of Fivemile Rapids, above intake of Burbank Power & Water Co.'s canal, 4 miles above Burbank, in Walla Walla County.

DRAINAGE AREA.—109,000 square miles (measured on General Land Office and Forest Service maps).

RECORDS AVAILABLE.—September 1, 1909, to September 30, 1915; fragmentary records October 2, 1907, to August 31, 1909.

GAGE.—Inclined staff 1,500 feet above canal intake; datum 300 feet above sea level; auxiliary vertical staff at lower end of power canal. Gage read daily by Harry Phelps, Lewis Dunlap, and E. B. Madden.

DISCHARGE MEASUREMENTS.—Made from Northern Pacific Railway bridge at Burbank, 4 miles below gage.

CHANNEL AND CONTROL.—Control at head of rapids; may shift at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 42.6 feet May 20 and 21 (discharge, 122,000 second-feet); minimum stage recorded, 34.6 feet September 1 and 2 (discharge, 13,000 second-feet).

1909–1915: Maximum stage recorded, 51.8 feet May 29, 1913 (discharge, 298,000 second-feet, revised); minimum stage recorded, 34.6 feet September 4, 1914 (discharge, 13,000 second-feet, revised).

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

DIVERSIONS.—A large amount of water is diverted from Snake River for irrigation in southern Idaho.

STORAGE.—Jackson Lake reservoir (capacity, 400,000 acre-feet) is the largest in operation.

ACCURACY.—Stage-discharge relation practically permanent during the year; not affected by ice. Rating curve well defined below 225,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records excellent for periods in which regular gage was read, good for those in which readings were obtained from gage in power canal, and fair when based partly on hydrographic comparison with records of flow at Lewiston and Riparia. See footnote to table of daily discharge.

COOPERATION.—Gage-height record furnished by the Burbank Co.

Discharge measurements of Snake River near Burbank, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	C. O. Brown	37.62	30,700	Sept. 23	C. O. Brown	34.96	14,500
Feb. 1	James E. Stewart	36.52	23,500	24	do	34.94	14,600

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	24,600	33,000	29,400	26,100	23,200	30,200	49,600	62,200	94,100	37,200	21,900	13,000
2	22,900	34,000	28,500	28,500	.....	29,400	52,300	62,200	94,100	36,100	21,900	13,000
3	21,200	36,100	27,700	.....	.....	32,100	52,300	57,900	99,400	34,000	21,900	13,100
4	22,500	36,100	26,900	.....	.....	32,100	53,700	55,100	94,100	32,100	21,900	13,300
5	24,600	43,000	26,900	.....	31,100	32,100	65,100	49,600	87,300	30,200	21,900	13,400
6	25,400	39,400	26,900	.....	.....	33,000	62,200	46,900	82,300	30,200	20,600	14,800
7	26,100	38,300	32,100	.....	.....	33,000	57,900	46,900	79,000	32,100	18,300	14,800
8	33,000	37,200	31,100	.....	.....	34,000	56,500	45,600	74,200	32,100	18,300	14,300
9	30,200	38,300	28,500	25,400	.....	32,100	53,700	44,300	72,700	34,000	17,800	13,400
10	28,500	34,000	.....	.....	.....	26,100	52,300	48,200	72,700	38,300	17,800	13,400
11	27,700	33,000	.....	.....	.....	27,700	48,200	48,200	72,700	41,800	17,200	13,400
12	26,100	32,100	.....	25,400	28,500	30,200	43,000	53,700	68,100	39,400	17,200	13,800
13	28,500	34,000	.....	.....	.....	27,700	44,300	55,100	72,700	35,000	17,200	14,200
14	30,200	40,800	23,200	24,600	.....	28,500	51,000	57,200	71,200	35,000	16,700	14,600
15	31,100	43,000	.....	.....	.....	27,700	62,200	59,300	68,100	33,000	16,700	14,900
16	30,200	38,300	.....	.....	.....	29,400	56,500	68,100	66,600	31,100	16,700	15,300
17	30,200	37,200	.....	.....	.....	36,100	56,500	65,100	53,700	31,100	16,200	15,700
18	30,200	36,100	.....	23,900	.....	36,100	55,100	60,800	66,600	30,200	15,200	15,700
19	28,500	33,200	21,200	.....	23,900	36,100	59,300	75,800	62,200	32,100	15,200	15,500
20	28,500	30,200	.....	22,500	.....	35,000	62,200	122,000	46,900	32,100	14,800	15,400
21	34,000	43,000	.....	.....	.....	34,000	68,100	122,000	45,600	28,500	14,800	15,200
22	44,300	33,000	.....	.....	33,000	35,000	71,200	115,000	49,600	26,900	14,800	14,800
23	37,200	30,200	18,800	19,400	30,200	36,100	68,100	101,000	46,900	25,400	14,800	14,800
24	37,200	27,700	.....	.....	31,100	36,100	62,200	101,000	43,000	24,600	14,800	14,300
25	37,200	28,500	.....	.....	30,200	40,600	59,300	92,400	40,600	23,200	14,800	14,300
26	38,300	28,100	20,600	.....	32,100	46,900	56,500	94,100	40,600	23,200	14,800	14,300
27	36,100	27,700	.....	.....	31,100	43,000	52,300	94,100	41,800	22,500	13,400	13,400
28	36,100	27,700	18,300	.....	30,600	40,600	53,700	94,100	44,300	21,200	13,400	14,300
29	35,000	27,700	.....	.....	.....	41,800	53,700	97,600	41,800	21,200	13,400	14,800
30	33,000	28,600	.....	22,500	.....	45,000	56,500	106,000	39,400	21,900	13,400	16,700
31	32,100	.....	23,900	.....	.....	48,200	.....	101,000	.....	21,900	13,400	.....

NOTE.—Determinations of discharge Oct. 5, 7–10, 12–17, 19–21, 23–26, 28–30, Nov. 1–4, 6–9, 11–17, Feb. 22–26, Mar. 1–9, 11–21, and June 16–21 based on gage heights obtained by adjusting canal-gage readings, as river gage was not read; variation between readings on canal and river gages is small. Discharge Dec. 10 to Feb. 21 estimated as follows from approximate gage heights obtained for days on which gage was not read from gage-height graph of Lewiston, Riparia, and Burbank stations: Dec. 10–13, 24,700 second-feet; Dec. 15–18, 22,400 second-feet; Dec. 20–22, 18,800 second-feet; Dec. 24–25, 19,100 second-feet; Dec. 27, 19,400 second-feet; Dec. 29–30, 19,800 second-feet; Jan. 3–8, 26,900 second-feet; Jan. 10–11, 25,400 second-feet; Jan. 13, 24,600 second-feet; Jan. 15–17, 24,100 second-feet; Jan. 19, 23,200 second-feet; Jan. 21–22, 21,900 second-feet; Jan. 24–29, 19,700 second-feet; Jan. 31, 22,500 second-feet; Feb. 2–4, 27,000 second-feet; Feb. 6–11, 30,300 second-feet; Feb. 13–18, 26,800 second-feet; and Feb. 20–21, 23,900 second-feet. Gage not read; discharge interpolated, Oct. 2; Nov. 19, 26, 28, 30; Mar. 30; May 14; Sept. 3, 4, 12–16, 19, 20, and 25.

Monthly discharge of Snake River near Burbank, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	44,300	21,200	30,700	1,890,000	B.
November	43,000	27,700	34,300	2,040,000	B.
December	32,100	.....	23,400	1,440,000	B.
January	28,500	.....	23,700	1,460,000	C.
February	33,000	23,200	28,400	1,580,000	C.
March	48,200	26,100	34,700	2,130,000	B.
April	71,200	43,000	56,500	3,360,000	A.
May	122,000	44,300	74,300	4,570,000	A.
June	99,400	39,400	64,400	3,830,000	A.
July	41,800	21,200	30,200	1,860,000	A.
August	21,900	13,400	16,800	1,030,000	A.
September	16,700	13,000	14,400	857,000	B.
The year	122,000	13,000	36,000	26,000,000	

TRIBUTARY BASINS.

HENRYS FORK AT WARM RIVER, IDAHO.

LOCATION.—In sec. 12, T. 9 N., R. 43 E., Fremont County, about 300 yards above mouth of Warm River and half a mile above Warm River station on the Yellowstone branch of the Oregon Short Line Railroad; above all main tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 3, 1910, to March 22, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank; read by Mrs. Josephine Stone.

DISCHARGE MEASUREMENT.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed composed of cobbles, gravel, and sand. Stage-discharge relation at times affected by growth of moss in channel; conditions otherwise reasonably permanent.

WINTER FLOW.—Mush ice reported in channel at various times for short periods; stage-discharge relation not seriously affected; open-channel rating curve used.

EXTREMES OF DISCHARGE.—Maximum stage recorded October to March, 4.9 feet October 3, 4, and 6 (discharge, 1,220 second-feet); minimum stage recorded, 4.2 feet January 5 and 16 (discharge, 825 second-feet).

1910–1915: Maximum stage recorded, 7.4 feet May 21, 1912 (discharge, 3,300 second-feet); minimum stage recorded, 4.1 feet March 14 and 26, 1913 (discharge, 705 second-feet).

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Records good except for December and January when stage-discharge relation may have been slightly affected by ice.

The following discharge measurement was made by G. C. Baldwin:
March 22, 1915: Gage height, 4.47 feet; discharge, 970 second-feet.

Daily discharge, in second-feet, of Henrys Fork at Warm River, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	1,100	1,100	935	935	1,000	935	16	1,160	1,080	880	825	990	.....
2	1,160	1,100	988	935	990	935	17	1,160	1,060	898	896	990	.....
3	1,220	1,100	1,040	935	990	935	18	1,160	1,040	916	968	990	.....
4	1,220	1,100	1,040	880	990	935	19	1,160	1,040	935	1,040	990	.....
5	1,220	1,100	1,040	825	990	935	20	1,160	1,040	935	1,020	990	.....
6	1,220	1,100	1,040	852	990	935	21	1,160	1,040	935	990	935	.....
7	1,160	1,100	988	880	990	935	22	1,160	1,040	935	990	935	970
8	1,160	1,100	935	908	990	935	23	1,160	1,040	935	990	935	.....
9	1,160	1,100	922	935	990	935	24	1,160	1,040	935	962	935	.....
10	1,160	1,100	908	935	962	935	25	1,160	1,040	935	935	935	.....
11	1,160	1,100	894	935	935	935	26	1,160	1,040	935	954	935	.....
12	1,160	1,100	880	935	962	935	27	1,160	1,040	935	972	935	.....
13	1,160	1,100	880	907	990	935	28	1,160	1,040	935	990	935	.....
14	1,160	1,100	880	880	990	.....	29	1,130	1,000	935	1,020	.....	.....
15	1,160	1,100	880	852	990	.....	30	1,100	970	935	1,040	.....	.....
							31	1,100	.....	935	1,020	.....	.....

NOTE.—Gage read four times a week; discharge interpolated for other days. Rating curve well defined. Mean discharge Mar. 14–21 estimated at 950 second-feet.

Monthly discharge of Henrys Fork at Warm River, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,220	1,100	1,160	71,300	B.
November	1,100	970	1,070	63,700	B.
December	1,040	880	939	57,700	C.
January	1,040	825	940	57,800	C.
February	1,600	935	971	53,900	B.
March 1–22	970	935	942	41,160	B.
The period				346,000	

HENRYS FORK NEAR REXBURG, IDAHO.

LOCATION.—In sec. 30, T. 6 N., R. 39 E., Madison County, just below highway bridge about a mile below mouth of south channel of Teton River, 7 miles below main channel of Teton River, and 7 miles due west of Rexburg; below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 13, 1909, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank about 250 feet below bridge; prior to April 5, 1913, vertical staff on right bank about 25 feet farther downstream. Datum of gages used before January 1, 1912, 0.67 foot higher than that of present gage. F. P. Hansen, observer.

DISCHARGE MEASUREMENTS.—Made from cable about one-fourth mile below gage, from highway bridge above gage, or by wading.

CHANNEL AND CONTROL.—Bed composed of mud, sand, and fine gravel; shifting. Except at the bridge left bank is overflowed at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.90 feet at 7 a. m. June 4 (discharge, 6,200 second-feet); minimum stage, 1.90 feet at 6 p. m. August 10 (discharge, 481 second-feet).

1909–1915: Maximum stage recorded, 8.7 feet (equal to 9.37 feet present datum) June 6 and 7, 1909 (discharge, 7,680 second-feet); minimum stage recorded, August 10, 1915.

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

DIVERSIONS.—Irrigation canals divert water above station but definite information as to number of canals and quantity of water diverted is not available.

REGULATION.—None except that due to opening or closing head gates of irrigation canals.

ACCURACY.—Stage-discharge relation not permanent. Rating curve well defined October 1 to June 4 (except during winter) and September 10–30. Mean daily gage heights obtained by inspecting gage-height graph. Daily discharge ascertained by applying mean daily gage heights to rating table except June 5 to September 9, for which period shifting-control method was used. Records good.

Discharge measurements of Henrys Fork near Rexburg, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 21	G. C. Baldwin	3.79	1,650	July 30	G. C. Baldwin	2.36	684
May 31	A. W. Harrington	6.59	4,000	Aug. 16	do	2.11	549
July 7	G. C. Baldwin	2.49	653	Sept. 10	A. W. Harrington	3.12	1,190
17	do	2.37	615				

Daily discharge, in second-feet, of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2,510	2,670	2,180	.....	1,510	2,340	4,100	81[illegible]	702	845
2	2,510	2,670	2,260	.....	1,450	2,420	4,950	752	762	850
3	2,760	2,670	2,420	.....	1,580	2,420	5,910	724	762	961
4	3,020	2,590	2,420	.....	1,950	2,180	6,200	675	734	967
5	3,020	2,590	2,420	.....	2,340	1,950	6,100	650	720	1,120
6	3,020	2,590	2,260	.....	2,340	1,800	5,690	645	702	1,100
7	3,020	2,510	2,260	.....	2,030	1,650	5,100	658	680	1,130
8	3,020	2,510	2,180	.....	2,260	1,410	4,510	706	600	1,170
9	2,930	2,510	2,100	.....	2,340	1,250	3,940	72[illegible]	560	1,200
10	2,840	2,510	.....	.....	2,510	1,190	3,750	825	518	1,180
11	2,840	2,510	.....	.....	2,590	1,190	3,560	1,040	556	1,210
12	2,930	2,510	.....	.....	2,590	1,280	3,270	1,070	552	1,300
13	2,840	2,510	.....	.....	2,420	1,730	3,000	961	552	1,300
14	2,760	2,510	.....	.....	2,670	1,910	2,650	856	549	1,340
15	2,760	2,420	.....	.....	2,760	2,340	2,310	781	549	1,300
16	2,840	2,420	.....	.....	2,930	2,420	1,790	711	545	1,300
17	2,840	2,340	.....	.....	3,100	2,180	1,600	61[illegible]	549	1,340
18	2,840	2,420	.....	.....	2,930	2,180	1,490	572	552	1,340
19	3,100	2,420	.....	.....	2,930	2,670	1,560	552	580	1,340
20	3,280	2,420	.....	.....	2,930	3,100	1,580	541	629	1,370
21	3,190	2,420	.....	1,650	2,930	3,550	1,570	536	830	1,370
22	3,100	2,340	.....	1,650	3,020	3,920	1,390	530	913	1,370
23	3,020	2,340	.....	1,580	3,100	4,190	1,290	52[illegible]	1,060	1,370
24	2,930	2,340	.....	1,650	3,020	4,190	1,220	522	1,130	1,370
25	2,840	2,420	.....	1,650	2,760	4,190	1,210	537	1,160	1,370
26	2,760	2,420	.....	1,650	2,510	4,380	1,230	711	1,170	1,470
27	2,760	2,420	.....	1,450	2,260	4,660	1,170	72[illegible]	1,120	1,680
28	2,760	2,340	.....	1,450	2,100	4,570	1,070	657	1,130	1,860
29	2,760	2,420	.....	1,450	1,950	4,290	978	658	934	1,780
30	2,670	2,420	.....	1,650	2,060	4,100	866	684	940	1,750
31	2,670	.....	.....	1,580	.....	4,010	.....	702	840	.....

NOTE.—Mean discharge Dec. 10–12 estimated at 2,100 second-feet. No records obtained Dec. 13 to Mar. 20.

Monthly discharge of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3,280	2,510	2,880	177,000	A.
November	2,670	2,340	2,470	147,000	A.
December 1–12	2,420	.....	2,230	53,200	B.
March 21–31	1,650	1,450	1,580	34,500	A.
April	3,100	1,450	2,460	146,000	A.
May	4,660	1,190	2,760	170,000	A.
June	6,200	866	2,840	169,000	B.
July	1,070	522	698	42,900	A.
August	1,170	518	761	46,800	B.
September	1,860	845	1,300	77,400	B.
The period	.....	.....	.....	1,060,000	

NOTE.—See footnote to table of daily discharge.

WARM RIVER AT WARM RIVER, IDAHO.

LOCATION.—In sec. 13, T. 9 N., R. 43 E., Fremont County, at highway bridge half a mile above Warm River station on Yellowstone branch of Oregon Short Line Railroad, less than a quarter of a mile above Robinson Creek, and about half a mile above confluence of Warm River and Henrys Fork.

DRAINAGE AREA.—144 square miles (measured on Forest Service maps).

RECORDS AVAILABLE.—January 24, 1912, to March 22, 1915, when station was discontinued.

GAGE.—Vertical staff attached to downstream side of bridge pier; read by Mrs. Josephine Stone.

DISCHARGE MEASUREMENTS.—Made by wading at various sections near gage.

CHANNEL AND CONTROL.—Bed rocky. One channel at all stages. Control apparently shifting. Stage-discharge relation during part of year somewhat affected by growth of moss.

EXTREMES OF DISCHARGE.—Maximum stage recorded October to March 1.50 feet October 4 and 21 (discharge, 297 second-foot); minimum stage recorded, 1.32 feet December 16 and January 9 (discharge, 215 second-feet).

1912–1915: Maximum stage recorded, 2.3 feet June 2, 1912 (discharge, 900 second-feet); minimum stage recorded, 1.3 feet February 15 and 20 May 2, 5, and 7, 1912 (discharge, 192 second-feet).

WINTER FLOW.—Stage-discharge relation unaffected by ice; open-channel rating curves assumed applicable.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Standard rating curve only fairly well defined. Gage read to quarter-tenths about three times a week. Discharge determined by shifting-control method. Records fair.

The following discharge measurement was made by G. C. Baldwin:
March 22, 1915: Gage height, 1.33 feet; discharge, 228 second-feet.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	254	243	249	.....	233	238	16	270	249	215	233	233	.....
2	270	243	262	.....	233	238	17	270	249	224	233	236	.....
3	284	243	275	229	233	238	18	270	249	234	233	238	.....
4	297	246	262	229	233	238	19	270	249	243	233	238	.....
5	292	249	249	229	233	238	20	284	249	243	233	238	.....
6	286	249	275	229	233	238	21	297	249	243	233	238	.....
7	270	249	267	229	233	224	22	284	249	243	233	238	229
8	270	249	259	222	233	224	23	270	249	243	233	238	.....
9	270	249	258	215	233	224	24	243	249	.....	233	238	.....
10	270	249	256	229	233	224	25	248	249	.....	233	238	.....
11	270	249	255	236	233	224	26	254	249	.....	233	238	.....
12	270	249	254	243	233	224	27	254	249	.....	233	238	.....
13	270	249	229	241	233	224	28	254	249	.....	233	238	.....
14	270	249	225	238	233	.....	29	248	249	.....	233	.....	.....
15	270	249	220	235	233	.....	30	243	249	.....	233	.....	.....
							31	243	.....	.....	233	.....	.....

NOTE.—Gage read about three times a week and discharge interpolated on intervening days. Mean discharge estimated as follows: Dec. 24 to Jan. 2, 236 second-feet; March 14–21, 226 second-feet.

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

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	297	243	268	16,500	B.
November	249	243	248	14,800	B.
December	275	215	244	15,000	B.
January	243	215	232	14,300	B.
February	238	233	235	13,100	B.
March 1–22	238	224	229	9,980	B.
The period	.....	.....	.....	83,700	

NOTE.—See footnote to table of daily discharge.

ROBINSON CREEK AT WARM RIVER, IDAHO.

LOCATION.—In sec. 13, T. 9 N., R. 43 E., Fremont County, at Oregon Short Line Railroad bridge, about one-third mile above Warm River station on the Yellowstone branch, and about 300 yards above mouth of creek.

DRAINAGE AREA.—About 41 square miles (measured on Forest Service map).

RECORDS AVAILABLE.—January 24, 1912, to March 22, 1915, when station was discontinued.

GAGE.—Vertical staff attached to pile on downstream side of railroad bridge; read by Mrs. Josephine Stone.

DISCHARGE MEASUREMENTS.—Made by wading or from bridge.

CHANNEL AND CONTROL.—Bed of stream composed of coarse gravel. Control is a well-defined cobble riffle about 150 feet below gage; apparently shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded October to March, 2.25 feet at 4.40 p. m. October 6 (discharge, 151 second-feet); minimum stage recorded, 1.70 feet January 3 and 5 (discharge, 66 second-feet).

1912–1915: Maximum stage recorded, 4.3 feet May 28, 1912 (discharge, 1,140 second-feet); minimum stage recorded, 1.5 feet February 15, 1912 (discharge, 51 second-feet).

WINTER FLOW.—Stage-discharge relation affected, during parts of the winter, by shore ice at control and by anchor ice; flow for such periods estimated from observer's notes and by comparison with records of flow at other stations.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Rating curve well defined. Records good except for periods in which stage-discharge relation was affected by ice.

The following discharge measurement was made by G. C. Baldwin:
March 22, 1915: Gage height, 1.80 feet; discharge, 79 second-feet.

Daily discharge, in second-feet, of Robinson Creek at Warm River, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	100	93	86	.....	79	70	16	112	89	.....	.....	72	.....
2	100	93	86	.....	79	72	17	116	85	.....	.....	70	.....
3	112	93	86	66	79	70	18	129	81	.....	.....	68	.....
4	125	93	86	66	79	68	19	142	81	.....	.....	68	.....
5	138	93	86	66	79	68	20	142	81	.....	.....	68	.....
6	151	93	86	69	79	68	21	142	81	.....	.....	72	.....
7	133	93	.....	72	77	68	22	138	79	.....	.....	72	79
8	124	93	.....	76	74	68	23	133	79	.....	.....	72	.....
9	116	93	.....	79	72	68	24	133	79	.....	.....	72	.....
10	116	93	.....	86	72	68	25	116	79	.....	.....	72	.....
11	116	93	.....	84	72	68	26	100	79	.....	.....	72	.....
12	116	93	.....	81	72	68	27	96	79	.....	.....	72	.....
13	116	93	.....	.....	72	68	28	96	79	.....	.....	68	.....
14	112	93	.....	.....	72	.....	29	94	81	.....	.....	.....	.....
15	108	93	.....	.....	72	.....	30	93	83	.....	.....	.....	.....
							31	93	.....	.....	.....	.....	.....

NOTE.—Gage read about three times a week; discharge for those days determined from a fairly well defined rating curve; interpolated for intervening days except when stage-discharge relation was affected by ice—Dec. 7 to Jan. 2 and Jan. 13–31. Mean discharge estimated as follows: Dec. 7–31, 80 second-feet; Jan. 1 and 2, 66 second-feet; Jan. 13–31, 75 second-feet; Mar. 14–21, 75 second-feet.

Monthly discharge of Robinson Creek at Warm River, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	151	93	118	7,260	B.
November	93	79	87.0	5,180	B.
December	86	.....	81.2	4,990	D.
January	86	66	74.3	4,570	D.
February	79	68	73.1	4,060	B.
March 1–22	79	68	71.4	3,120	C.
The period	.....	.....	.....	29,200	

NOTE.—See footnote to table of daily discharge.

IDAHO (GOVERNMENT) CANAL NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 31, T. 1 N., R. 37 E., Bingham County, 600 feet below the canal head gates, 1½ miles southwest of Shelley, and 10 miles above point where Sand Creek crosses canal.

RECORDS AVAILABLE.—June 20, 1912, to September 30, 1915. No water diverted during 1913 because of break in canal.

GAGE.—Inclined staff set in concrete of rating section on right bank; read by Ed. Hanks. Bristol water-stage recorder operated during previous seasons; inclined staff always used as reference gage.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge about 3 feet below gage.

CHANNEL AND CONTROL.—Trapezoidal concrete rating section. Collection of brush and growth of aquatic plants cause changes in stage-discharge relation, but bottom of rating section evidently furnishes a permanent point of zero flow at about 0.0 on gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 2.83 feet at 1.30 p. m. August 5; maximum discharge at gage height 2.7 feet June 28 (discharge, 142 second-feet); minimum flow practically zero probably about 0.0 on gage but has not been definitely determined as no records are kept when head gates are shut down.

1912–1915: Maximum stage recorded, 3.7 feet July 29, 1912 (discharge, 308 second-feet); minimum as stated in preceding paragraph.

WINTER FLOW.—Canal not operated during winter.

DIVERSIONS.—None above station and none between station and outlet into Blackfoot River.

REGULATION.—Flow controlled at head gates about 600 feet above.

ACCURACY.—Stage-discharge relation affected by growth of weeds. Records fair.

Idaho canal diverts water from the left bank of Snake River in sec. 31, T. 1 N., R. 37 E., and discharges it into Blackfoot River in sec. 24, T. 2 S., R. 36 E. The canal receives water from Sand Creek about 10 miles below this station. For record at station below Sand Creek see page 64. Water discharged into Blackfoot River during the irrigation season is diverted by the Fort Hall upper and lower canals for use on Fort Hall reservation.

Discharge measurements of Idaho (Government) canal near Shelley, Idaho, during the year ending Sept. 30, 1915.

[Made by G. C. Baldwin.]

Month.	Gage height.	Discharge.	Month.	Gage height.	Discharge.	Month.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
July 9	2.09	88.4	Aug. 5	2.01	66.7	Aug. 5	2.81	121
9	1.70	59.0	5	1.15	23.5			

Daily discharge, in second-feet, of Idaho (Government) canal near Shelley, Idaho, during the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1		102	53	11		104		21	62	54	
2		102	61	12		104		22	73	54	
3		97	67	13		90		23	8[illegible]	54	
4		89	67	14		86		24	10[illegible]	53	
5		89	63	15		85		25	11[illegible]	53	
6		89	36	16		73		26	12[illegible]	53	
7		89	10	17	12	69		27	13[illegible]	58	
8		89		18	46	65		28	142	58	
9		89		19	59	62		29	10[illegible]	51	
10		105		20	56	61		30	10[illegible]	51	
								31		50	

NOTE.—Discharge determined from two fairly well defined rating curves and by shifting-control method. Head gates of canal closed Oct. 1 to June 16 and Aug. 8 to Sept. 30.

Monthly discharge of Idaho (Government) canal near Shelley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 17–30	142	12	86.9	2,410	C.
July	105	50	75.1	4,620	C.
August 1–7	67	10	51.0	708	B.
The period				7,740	

BLACKFOOT RIVER ABOVE RESERVOIR, NEAR HENRY, IDAHO.

LOCATION.—Approximately in sec. 9, T. 7 S., R. 42 E., at Cully's ranch, 1½ miles above flow line of Blackfoot-Marsh reservoir, 7 miles south of Henry, Bannock County.

DRAINAGE AREA.—360 square miles (measured on Land Office map).

RECORDS AVAILABLE.—March 25, 1914, to September 30, 1915.

GAGE.—Vertical staff on right bank, half a mile above Cully's house and about 200 feet below the shearing plant; read by Mrs. T. W. Cully. Original gage, used March 25 to September 30, 1914, was vertical staff attached to streamward side of right bridge pier about three-fourths mile above present site.

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

CHANNEL AND CONTROL.—Bed composed of loose rock, boulders, and gravel; rough, One channel at all stages. Right bank near gage probably subject to overflow at high stages. Control is of loose rock; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.6 feet at 10.30 a. m. May 22 (discharge, 537 second-feet); minimum stage recorded, 1.40 feet at 9.30 a. m., September 1 (discharge, 55 second-feet). Minimum discharge may have occurred during the winter, when stage-discharge relation was affected by ice.

1914–15: Maximum stage recorded, 6.45 feet at 3.15 p. m., April 24, 1914 (discharge, 1,450 second-feet); minimum, September 1, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, the discharge measurement of January 24, weather records, and by comparison with record of flow at Little Blackfoot River.

DIVERSIONS.—A few small ranch diversions only are made above gage.

REGULATION.—None. Entire flow passing gage is impounded in Blackfoot-Marsh reservoir, 1½ miles below.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 8 to March 21. Two well-defined rating curves used, one applicable October 23 to December 7 and June 5 to September 30, the other March 22 to April 26. Gage read once daily during open water and three times a week during winter. Daily discharge ascertained by applying daily gage heights to rating table; shifting-control method used April 27 to June 4. Open-water records good; winter records poor.

Discharge measurements of Blackfoot River above reservoir, near Henry, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 31	L. W. Roush	1.81	106	June 5	A. W. Harrington	3.02	356
Jan. 24	do	[a] 2.34	55.4	July 26	G. C. Baldwin	1.68	86.4
Apr. 26	G. C. Baldwin	2.33	219	Sept. 30	A. W. Harrington	1.68	84.1

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blackfoot River above reservoir, near Henry, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	101	137	.....	233	254	303	130	88	55
2	.....	101	146	.....	265	329	252	130	88	56
3	.....	101	152	.....	296	329	238	122	88	70
4	.....	101	157	.....	296	316	194	122	88	76
5	.....	101	163	.....	322	288	351	122	88	82
6	.....	101	154	.....	377	288	351	115	88	65
7	.....	101	146	.....	419	250	351	122	88	70
8	.....	108	.....	.....	419	213	298	138	88	70
9	.....	115	.....	.....	448	224	298	130	82	70
10	.....	101	.....	.....	477	247	272	130	76	70
11	.....	115	.....	.....	506	233	247	138	76	70
12	.....	130	.....	.....	536	222	224	122	76	76
13	.....	122	.....	.....	477	200	247	115	76	82
14	.....	108	.....	.....	506	188	260	115	76	82
15	.....	101	.....	.....	448	220	260	115	70	76
16	.....	130	.....	.....	391	188	213	115	70	76
17	.....	134	.....	.....	350	176	202	108	76	76
18	.....	138	.....	.....	322	206	202	101	76	76
19	.....	133	.....	.....	309	329	202	101	76	74
20	.....	127	.....	.....	258	423	202	94	76	70
21	.....	122	.....	.....	322	480	182	94	76	70
22	.....	122	.....	108	377	537	172	94	70	70
23	115	122	.....	112	322	507	163	88	70	65
24	108	122	.....	115	283	448	154	88	70	65
25	108	122	.....	115	258	446	130	88	70	65
26	101	117	.....	115	223	446	122	88	70	88
27	108	113	.....	115	200	417	146	88	65	146
28	115	108	.....	153	211	359	146	88	65	122
29	115	117	.....	191	231	359	138	88	63	88
30	122	127	.....	196	231	359	130	88	60	88
31	101	.....	.....	202	.....	303	.....	88	58	.....

NOTE.—No gage height record Oct. 1–22. Stage-discharge relation affected by ice Dec. 8 to Mar. 21. Discharge estimated from observer's notes, climatic data, and records at other stations, as follows: Oct. 1–22, 140 second-feet; Dec. 8 to Jan. 23, 70 second-feet; Jan. 24, 55 second-feet; Jan. 25–31, 65 second-feet; Feb. 1–28, 85 second-feet; Mar. 1–21, 100 second-feet.

Monthly discharge of Blackfoot River above the reservoir near Henry, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	101	131	8,060	C.
November	138	101	115	6,840	B.
December	163	.....	88.2	5,420	D.
January	.....	.....	68.4	4,210	D.
February	.....	.....	85.0	4,720	D.
March	202	.....	114	7,010	C.
April	536	200	344	20,500	B.
May	537	176	316	19,400	B.
June	351	122	222	13,200	A.
July	138	88	109	6,700	A.
August	88	58	75.7	4,650	B.
September	146	55	77.0	4,580	A.
The year	537	.....	145	105,000	

NOTE.—See footnote to table of daily discharge.

BLACKFOOT-MARSH RESERVOIR NEAR HENRY, IDAHO.

LOCATION.—In sec. 12, T. 5 S., R. 40 E., about 12 miles northwest of Henry, Bannock County.

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1915.

GAGE.—Vertical staff near spillway at right end of dam; read twice daily to hundredths by J. B. Curtis. Zero of gage, 6,100 feet above sea-level.

EXTREMES OF STAGE.—Maximum stage recorded during year, 59.25 feet June 12, 13, and 15; minimum stage 48.72 feet at 6.15 p. m. September 30.

1912–1915: Maximum stage recorded 68.60 feet June 27–30, 1912; minimum stage 48.72 at 6.15 p. m. September 30, 1915.

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

Daily gage height, in feet, of Blackfoot-Marsh reservoir near Henry, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	58.00	56.80	55.87	56.00	56.18	56.39	58.14	59.00	57.62	54.08	51.12
2	.....	57.98	56.78	55.87	56.05	56.18	56.42	58.16	59.00	57.53	53.95	51.02
3	.....	57.82	56.76	55.85	56.08	56.19	56.49	58.20	59.00	57.42	53.81	50.92
4	.....	57.79	56.75	55.87	56.10	56.20	56.50	58.20	59.00	57.31	53.70	50.84
5	.....	57.76	56.72	55.90	56.10	56.22	56.50	58.18	59.08	57.19	53.58	50.74
6	.....	57.71	56.70	55.90	56.09	56.22	56.55	58.21	59.16	57.02	53.48	50.66
7	.....	57.68	56.70	55.90	56.08	56.20	56.68	58.19	59.19	56.90	53.40	50.56
8	.....	57.64	56.68	55.88	56.05	56.20	56.80	58.18	59.20	56.79	53.32	50.47
9	.....	57.59	56.65	55.86	56.08	56.18	56.87	58.18	59.14	56.68	53.18	50.38
10	.....	57.49	56.60	55.85	56.08	56.19	56.94	58.15	59.16	56.54	53.08	50.30
11	.....	57.41	56.58	55.85	56.08	56.20	57.00	58.15	59.18	56.42	52.96	50.20
12	.....	57.38	56.55	55.85	56.08	56.25	57.02	58.16	59.24	56.29	52.84	50.10
13	.....	57.32	56.50	55.85	56.10	56.28	57.08	58.21	59.25	56.14	52.77	50.02
14	.....	57.26	56.48	55.85	56.10	56.29	57.12	58.25	59.21	55.98	52.70	49.92
15	.....	57.19	56.44	55.87	56.10	56.31	57.16	58.26	59.24	55.89	52.62	49.82
16	.....	57.15	56.40	55.89	56.12	56.32	57.19	58.28	59.15	55.77	52.54	49.74
17	.....	57.12	56.36	55.90	56.15	56.31	57.26	58.28	58.95	55.60	52.46	49.66
18	58.45	57.10	56.31	55.88	56.15	56.33	57.30	58.29	58.90	55.49	52.38	49.56
19	58.42	57.05	56.27	55.87	56.15	56.34	57.36	58.30	59.00	55.38	52.32	49.47
20	58.42	57.00	56.25	55.88	56.15	56.32	57.48	58.34	58.95	55.30	52.25	49.38
21	58.40	56.95	56.20	55.95	56.18	56.33	57.62	58.40	58.88	55.20	52.16	49.30
22	58.39	56.92	56.15	56.00	56.18	56.34	57.76	58.52	58.80	55.10	52.10	49.22
23	58.38	56.90	56.09	55.90	56.20	56.36	57.87	58.59	58.72	54.98	52.02	49.12
24	58.35	56.90	56.05	55.87	56.20	56.38	57.96	58.64	58.68	54.89	51.92	49.02
25	58.28	56.86	56.00	55.90	56.22	56.40	58.02	58.69	58.49	54.78	51.82	48.96
26	58.22	56.85	55.92	55.90	56.21	56.40	58.10	58.76	58.38	54.68	51.72	48.91
27	58.15	56.85	55.90	55.90	56.20	56.40	58.11	58.80	58.27	54.57	51.60	48.86
28	58.14	56.87	55.90	56.00	56.18	56.40	58.10	58.78	58.18	54.48	51.50	48.88
29	58.11	56.88	55.87	56.00	.....	56.38	58.08	58.84	58.00	54.38	51.40	48.80
30	58.10	56.82	55.86	56.00	.....	56.38	58.11	58.90	57.76	54.29	51.32	48.74
31	58.05	.....	55.90	56.00	.....	56.36	.....	58.96	.....	54.20	51.22	.....

NOTE.—No record received Oct. 1–17.

BLACKFOOT RIVER NEAR HENRY, IDAHO.

LOCATION.—In sec. 11, T. 5 S., R. 40 E., 200 feet below wagon bridge at Rockyford crossing, 1 mile below Blackfoot-Marsh dam of the United States Indian Service, and about 12 miles northwest of Henry, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 15, 1908, to September 30, 1915.

GAGE.—Friez water-stage recorder installed September 18, 1912, in wooden shelter on left bank; referred to outside vertical staff gage. Prior to September 18, 1912, gage was a vertical staff a few feet downstream from site of present gage. Original gage settled 0.11 foot between July 15, 1908, and May 25, 1912; datum of present gage same as that of original gage May 25, 1912. Recorder inspected and staff gage read daily by J. B. Curtis.

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

CHANNEL AND CONTROL.—Bed composed of lava rock, boulders, and gravel. One channel at all stages. Control fairly permanent. State-discharge relation at times affected by growth of moss.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.50 feet June 25–28 and July 1–4 (discharge, 1,060 second-feet); minimum stage recorded, 0.70 foot at 1.30 p. m. January 21 (measured discharge, 3.3 second-feet).

1908–1915: Maximum stage recorded, 4.15 feet May 14, 1909 (discharge, 1,640 second-feet); minimum stage recorded January 21, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice; owing to proximity of station to reservoir, channel remains open.

DIVERSIONS.—Only a few small diversions are made for irrigation from river and tributaries above reservoir.

REGULATION.—Flow controlled by gates at dam.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants. Two well-defined rating curves used, one applicable October 1 to February 4, the other February 5 to September 30. Recorder not in operation October 1 to March 31; stage determined from daily readings on staff gage; mean daily gage heights for rest of year obtained by inspecting recorder graph. Daily discharge ascertained by applying daily gage heights to rating table. Records good.

Discharge measurements of Blackfoot River near Henry, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 4	L. W. Roush	2.42	493	Apr. 25	G. C. Baldwin	1.97	254
4	do	2.12	325	June 3	A. W. Harrington	2.00	274
Jan. 20	do	1.55	141	3	do	2.29	404
20	do	1.01	38.6	3	do	2.60	551
21	do	.70	3.3	July 24	G. C. Baldwin	2.98	761
Apr. 24	G. C. Baldwin	1.98	250	25	do	2.98	762

Daily discharge, in second-feet, of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	628	522	424	127	111	112	234	268	272	1,060	753	553
2	656	497	448	127	49	112	238	272	276	1,060	747	553
3	656	497	472	127	49	112	253	272	326	1,060	741	553
4	656	472	472	127	44	117	253	272	276	1,060	741	548
5	656	472	497	127	47	117	253	272	276	1,030	741	543
6	741	472	497	127	57	117	261	264	280	1,030	741	543
7	886	497	522	127	57	117	245	264	280	1,030	741	543
8	916	522	522	127	59	112	234	264	276	1,030	741	538
9	916	574	522	127	59	115	257	264	280	1,000	741	538
10	857	628	522	127	59	117	272	264	280	1,000	741	533
11	684	656	522	133	59	115	272	264	276	1,000	712	528
12	.....	684	522	130	59	112	272	264	272	1,000	601	528
13	.....	741	522	130	59	112	272	264	272	1,000	574	528
14	.....	574	522	130	59	112	272	264	272	1,000	574	528
15	.....	334	522	130	59	112	268	264	272	946	574	528
16	.....	272	522	127	59	128	268	264	356	828	569	522
17	.....	234	522	127	59	144	272	264	684	770	569	517
18	378	216	522	127	59	144	272	264	770	753	564	517
19	378	209	522	133	59	144	272	264	770	758	559	517
20	378	199	522	121	59	144	272	264	770	747	559	517
21	378	156	472	103	59	144	272	268	770	741	559	517
22	401	133	378	182	59	155	272	268	758	753	553	517
23	424	127	378	182	59	167	272	272	753	770	553	522
24	448	169	378	182	63	167	268	272	887	764	553	512
25	448	216	378	182	63	199	264	272	1,060	758	559	522
26	472	216	378	182	87	234	264	272	1,060	758	559	528
27	472	216	284	182	112	234	264	272	1,060	758	559	502
28	497	234	169	182	112	234	264	272	1,060	758	559	492
29	497	334	133	182	.....	234	264	272	1,030	753	548	487
30	522	401	121	182	.....	234	268	272	1,030	758	548	482
31	522	.....	127	189	.....	234	.....	272	.....	758	548	.....

NOTE.—No record obtained Oct. 12–17, mean discharge estimated at 480 second-feet.

Monthly discharge of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	916	378	560	34,400	B.
November	741	127	382	22,700	B.
December	522	121	429	26,400	B.
January	189	103	145	8,920	B.
February	112	44	641	3,560	C.
March	234	112	150	9,220	B.
April	272	234	263	15,600	B.
May	272	264	268	16,500	A.
June	1,060	272	567	33,700	A.
July	1,060	741	887	54,500	A.
August	753	548	625	38,400	A.
September	553	482	525	31,200	A.
The year	1,060	44	408	295,000	

BLACKFOOT RIVER NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 7, T. 2 S., R. 38 E., Bingham County, 1½ miles above mouth of canyon, 3 miles above the N. A. Just ranch, 10 miles southeast of Shelley; below all important tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 26, 1909, to September 30, 1915. From April 17, 1903, to December 31, 1909, records were obtained near Presto, about 5 miles below site of present station; no tributaries enter between the two sites, but during the irrigation season several ditches divert probably 50 second-feet.

GAGE.—Friez water-stage recorder on right bank; observer, Rufus E. Reid.

CHANNEL AND CONTROL.—Bed rocky and rough. One channel at all stages. Control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.50 feet at 2.30 p. m. June 26 and 2 p. m. July 3 (discharge, 1,120 second-feet); minimum stage recorded, 3.33 feet at 3 p. m. February 12 (discharge, 85 second-feet). Lower stages may have occurred during January or the first part of February, when the stage-discharge relation was affected by ice.

1909–1915. Maximum stage recorded, 5.80 feet at 11.45 p. m. April 1, 1913 (discharge, 1,370 second-feet); minimum stage recorded about 3.1 feet December 29, 1911 (discharge, 45 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements and comparison with record of flow at station near Henry.

DIVERSIONS.—No important diversions from river or tributaries above station.

REGULATION.—Flow regulated largely by storage in the Blackfoot-Marsh reservoir of the United States Indian Service, about 40 miles upstream.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December, January, and February. Rating curves well defined by measurements except during winter months. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge, except for periods during which stage-discharge relation was affected by ice, ascertained by applying daily gage heights to rating table. Records good.

Discharge measurements of Blackfoot River near Shelley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 27	L. W. Roush	4.53	524	May 24	A. W. Harrington	4.30	433
28	do	4.51	519	Aug. 4	G. C. Baldwin	5.03	774
Jan. 16	do	a 4.41	131	Sept. 23	A. W. Harrington	4.59	525
Mar. 26	G. C. Baldwin	4.23	372				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	534	560	429	.....	.....	140	353	393	425	1,120	829	576
2	702	560	439	.....	.....	140	366	389	425	1,120	822	576
3	702	560	468	.....	.....	140	388	385	425	1,120	816	582
4	690	560	473	.....	.....	140	397	381	425	.....	810	587
5	.....	545	468	.....	.....	142	366	378	425	.....	810	576
6	.....	571	483	.....	.....	142	370	374	416	.....	810	576
7	.....	582	478	.....	.....	140	379	370	411	.....	803	571
8	.....	632	493	.....	.....	140	366	366	406	.....	810	571
9	.....	649	503	.....	.....	142	357	362	397	.....	796	566
10	1,000	684	545	.....	.....	142	379	375	393	.....	790	566
11	.....	733	519	.....	.....	142	379	375	388	.....	784	571
12	.....	777	519	.....	.....	145	379	370	393	.....	764	576
13	.....	784	539	.....	113	150	379	366	388	1,040	649	576
14	.....	739	.....	.....	115	150	379	370	384	1,040	643	576
15	.....	444	.....	.....	126	150	379	366	379	1,040	638	571
16	.....	397	.....	131	137	150	379	362	375	897	633	571
17	458	384	.....	.....	128	172	379	362	582	863	628	566
18	458	375	.....	.....	124	175	375	375	796	810	624	560
19	458	348	.....	.....	117	172	370	379	829	803	619	550
20	458	340	.....	.....	117	172	370	379	.....	796	614	545
21	458	303	.....	.....	117	178	388	425	.....	790	609	539
22	458	303	.....	.....	119	193	406	429	.....	784	604	534
23	463	276	.....	.....	117	231	406	425	.....	816	598	529
24	534	276	.....	.....	117	272	388	434	.....	816	593	545
25	534	276	.....	.....	122	307	379	434	.....	816	587	545
26	529	280	.....	.....	122	357	375	429	1,120	810	582	604
27	524	280	.....	.....	135	344	366	420	1,120	816	576	555
28	514	284	.....	.....	140	362	362	420	1,120	816	582	534
29	529	311	.....	.....	.....	416	357	420	1,120	810	582	529
30	545	425	.....	.....	.....	362	379	406	1,120	810	576	529
31	560	.....	.....	.....	.....	348	.....	402	.....	816	576	.....

NOTE.—Discharge estimated on account of ice and lack of gage heights as follows: Oct. 5–9, 832 second-feet; Oct. 11–16, 690 second-feet; Dec. 14–21, 550 second-feet; Dec. 22–28, 410 second-feet; Dec. 29–31, 170 second-feet; Jan. 1–15 and 17–21, 160 second-feet; Jan. 22–31, 220 second-feet; Mar. 1–12, 105 second-feet; June 20–25, 875 second-feet., and July 4–12, 1,080 second-feet.

Monthly discharge of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	458	626	38,500	B.
November	784	276	475	28,300	B.
December	.....	.....	456	28,000	C.
January	.....	.....	178	10,900	C.
February	140	.....	115	6,390	C.
March	416	140	205	12,600	B.
April	406	353	376	22,400	A.
May	434	362	391	24,000	B.
June	1,120	375	650	38,700	B.
July	1,120	784	944	58,000	B.
August	829	576	682	41,900	A.
September	604	529	562	33,400	A.
The year	1,120	.....	474	343,000	

NOTE.—See footnote to table of daily discharge.

BLACKFOOT RIVER NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 27, T. 3 S., R. 34 E., Bingham County, at the Jarvis ranch, 2 miles above junction of Blackfoot River with Snake River and 8 miles southwest of Blackfoot.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 27, 1913, to September 30, 1915. Records obtained only when stored water from Jackson Lake is being carried in Snake River.

GAGE.—Inclined staff on right bank half a mile south of the Jarvis ranch house; read by Ardell Olmstead.

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

CHANNEL AND CONTROL.—Bed composed of gravel; control presumably of the same material; fairly permanent. One channel at all stages. Banks covered with a heavy growth of brush and willows which may affect stage-discharge relation at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.6 feet at 6.10 p. m., September 29 (discharge, 643 second-feet); water below gage 7.20 p. m., June 17 (discharge estimated at 40 second-feet).

1913–1915. Maximum stage recorded, 8.7 feet September 21–22, 1914 (discharge, 673 second-feet); water below gage June 17, 1915.

WINTER FLOW.—No records.

DIVERSIONS.—Principal diversions above gage are the Fort Hall canals near Blackfoot, but several smaller diversions are made in the vicinity of Blackfoot.

REGULATION.—Flow regulated by storage in the Blackfoot-Marsh Reservoir of the United States Indian Service.

ACCURACY.—Stage-discharge relation permanent during period of record. Rating curve fairly well defined. Gage read to hundredths once daily Daily discharge ascertained by applying gage heights to rating table. Records good.

Discharge measurements of Blackfoot River near Blackfoot, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 10	A. W. Harrington....	6.73	347	Aug. 3	G. C. Baldwin.....	6.48	300
July 11	G. C. Baldwin.....	6.90	349	Sept. 21	A. W. Harrington....	7.09	384
15	.....do.....	7.00	383				

Daily discharge, in second-feet, of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	214	228	174	16	56	316	187	394
2	.....	228	271	187	17	40	256	174	394
3	.....	228	301	187	18	124	174	174	378
4	.....	228	331	200	19	161	148	174	378
5	.....	242	316	214	20	161	154	151	410
6	.....	256	316	256	21	200	136	174	394
7	.....	242	346	256	22	148	136	200	378
8	.....	286	346	271	23	97	118	214	426
9	.....	286	346	316	24	82	124	214	426
10	331	316	331	316	25	78	124	200	426
11	292	362	410	331	26	161	124	174	507
12	253	410	286	331	27	200	136	174	609
13	214	410	256	346	28	242	142	187	626
14	175	394	200	410	29	242	142	174	643
15	136	378	187	410	30	228	161	174	626
					31	.....	174	174	.....

NOTE.—Station not in operation prior to June 10. No gage heights received June 11–14 and 17. Discharge interpolated June 11–14 and estimated from notes by observer June 17.

Monthly discharge of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 10–30	331	40	172	7,160	B.
July	410	118	227	14,000	B.
August	410	161	239	14,700	B.
September	643	174	374	22,300	B.
The period				58,200	

LITTLE BLACKFOOT RIVER AT HENRY, IDAHO.

LOCATION.—In sec. 10, T. 6 S., R. 42 E., on Skinner's ranch, at Henry, Bannock County, a short distance above flow line of Blackfoot-Marsh reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 24, 1914, to September 30, 1915.

GAGE.—Vertical staff fastened to log across stream just below Skinner's barn. Read by Beatrice Skinner.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of rock, sand, and gravel. Control is rock crest of an 8-foot falls. Stage-discharge relation affected by growth of aquatic plants during large part of year.

WINTER FLOW.—Stage-discharge relation not affected by ice; channel kept open by warm springs.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.6 feet at 7 p. m., April 6 (discharge, 124 second-feet); minimum stage, 1.33 feet January 1 and 3 (discharge, 11 second-feet). Minimum discharge may have occurred in August.

1914–15. Maximum stage recorded, 3.5 feet at 8 p. m., April 19, 1914 (discharge, determined from extension of rating curve, about 292 second-feet); minimum stage, 1.20 feet March 24, April 1 and 2, and from 6 p. m., July 4, to July 7, 1914; minimum discharge, determined by shifting-control method, 6.9 feet July 5, 6, and 7, 1914.

DIVERSIONS.—A ditch for watering stock takes out about 300 feet above station and a small ditch diverts water from the warm springs that enter the river between station and reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants, but changes up to July 23 are well defined by measurements. Rating curve fairly well defined January 22 to April 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily gage heights to rating table January 22 to April 30 and by shifting-control method for rest of year except October 1–3 and July 24 to September 28. Records fair, except those for July 23 to September 30, which are poor.

Discharge measurements of Little Blackfoot River at Henry, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	L. W. Roush	1.38	17.7	June 4	A. W. Harrington	1.85	29.6
Jan. 22	do	1.46	15.0	July 23	G. C. Baldwin	1.78	15.8
Apr. 26	G. C. Baldwin	1.52	18.0	Sept. 29	A. W. Harrington	1.46	15.7

Daily discharge, in second-feet, of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.
1	.....	16	13	11	16	26	41	22	47	21	.....
2	.....	16	13	11	16	26	35	26	50	21	.....
3	.....	16	13	11	16	26	51	29	37	21	.....
4	13	16	13	11	16	26	50	20	29	21	.....
5	14	15	14	12	16	27	62	20	29	21	.....
6	14	15	16	12	16	27	88	19	29	20	.....
7	14	15	15	12	16	27	72	18	27	26	.....
8	14	15	14	13	16	29	51	18	26	23	.....
8	17	15	14	14	16	29	35	16	25	20	.....
10	20	15	14	13	18	29	29	26	25	19	.....
11	19	14	14	14	19	29	29	21	25	19	.....
12	21	14	14	14	19	30	24	24	24	19	.....
13	24	14	14	14	19	32	21	20	25	22	.....
14	21	14	15	14	19	33	19	18	24	25	.....
15	19	14	17	13	19	33	18	18	24	25	.....
16	17	14	17	13	19	33	19	17	24	24	.....
17	17	14	15	13	19	32	19	19	24	25	.....
18	16	14	14	14	20	33	17	24	24	24	.....
19	17	14	14	13	21	33	18	31	23	24	.....
20	15	14	12	14	22	34	19	41	23	24	.....
21	17	14	12	14	23	33	23	56	23	22	.....
22	17	14	12	14	24	30	27	55	22	22	.....
23	17	14	12	14	25	29	22	50	22	16	.....
24	16	14	12	14	25	29	18	44	22	.....	.....
25	16	14	12	14	25	29	18	40	22	.....	.....
26	16	14	12	14	26	27	17	35	22	.....	.....
27	16	14	12	14	26	33	16	31	22	.....	.....
28	16	14	12	14	26	43	16	29	22	.....	.....
29	16	14	11	14	.....	36	16	40	21	.....	18
30	16	13	11	15	.....	38	20	51	21	.....	17
31	16	.....	11	15	.....	50	.....	33	.....	.....	.....

NOTE.—Discharge estimated as follows: Oct. 1–3, 14 second-feet; July 24–31, 15 second-feet; Aug. 1–31, 13 second-feet; Sept. 1–28, 14 second-feet.

Monthly discharge of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	24	13	16.5	1,010	C.
November	16	13	14.4	857	B.
December	17	11	13.4	824	C.
January	15	11	13.3	818	B.
February	26	16	19.9	1,110	B.
March	50	26	31.3	1,920	B.
April	88	16	30.3	1,800	B.
May	56	16	29.4	1,810	B.
June	50	21	26.1	1,550	B.
July	26	.....	20.1	1,240	C.
August	.....	.....	13.0	799	D.
September	.....	.....	14.2	845	C.
The year	88	.....	20.2	14,600	

MEADOW CREEK NEAR HENRY, IDAHO.

LOCATION.—In sec. 3, T. 6 S., R. 42 E., half a mile above flow line of Blackfoot-Marsh reservoir, three-fourths mile below Goose Lake or Pelican Slough, and 1½ miles northeast of Henry, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 17, 1914, to September 30, 1915.

GAGE.—Stevens water-stage recorder installed June 27, 1914, on left bank. Vertical staff at same site and datum used April 17 to June 26, 1914. Mrs. John B. Curtis, observer.

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

CHANNEL AND CONTROL.—Control consisted originally of an old-rock diversion dam about 100 feet below gage, but this dam was torn out August 17–19 and stage-discharge relation entirely changed. New control is of rocks and gravel; somewhat shifting. One channel at all stages, but banks are very brushy and stage-discharge relation may be affected.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.94 feet at 3 p. m. May 26 (discharge, 50 second-feet); minimum stage recorded, 1.36 feet at 2 p. m. September 1 (discharge, 2.2 second-feet).

1914–15: Maximum stage recorded, 4.39 feet April 17, 1914 (discharge, 281 second-feet); minimum stage recorded September 1, 1915.

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

DIVERSIONS.—No known diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves used, each fairly well defined, one applicable October 2 to November 20 and April 25 to August 16, the other August 20 to September 30. Records lacking for several short periods, owing to unsatisfactory operation of water-stage recorder. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying gage heights to rating tables. Records good for June and July and fair for other months.

Discharge measurements of Meadow Creek near Henry, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	L. W. Roush	2.47	18.8	June 4	A. W. Harrington	2.76	34.4
Jan. 19	do	[a] 2.11	7.8	July 24	G. C. Baldwin	1.99	4.4
Apr. 25	G. C. Baldwin	2.79	39.4	Sept. 29	A. W. Harrington	2.06	21.7

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	18	.....	28	37	6.0	4.6	2.3
2	16	18	.....	30	37	5.4	4.8	2.6
3	16	17	.....	34	36	5.4	4.8	.....
4	16	17	.....	33	35	5.4	4.6	.....
5	20	17	.....	32	34	5.2	4.6	.....
6	20	17	.....	32	32	5.0	4.6	.....
7	20	17	.....	31	30	5.0	4.6	.....
8	25	17	.....	30	29	5.2	4.8	.....
9	25	16	.....	.....	27	5.8	4.8	.....
10	31	16	.....	.....	24	6.0	4.4	.....
11	31	16	.....	.....	23	5.8	4.6	.....
12	31	16	.....	.....	22	5.2	4.6	.....
13	25	16	.....	.....	21	5.0	4.6	.....
14	25	15	.....	.....	20	5.0	4.4	.....
15	20	11	.....	22	20	4.8	4.4	.....
16	20	11	.....	20	19	4.4	4.6	.....
17	20	10	.....	19	17	4.6	.....	.....
18	20	10	.....	24	16	4.6	.....	.....
19	20	10	.....	29	15	4.4	.....	.....
20	20	10	.....	34	13	4.4	5.2	8.4
21	20	.....	.....	39	13	4.3	5.0	8.5
22	20	.....	.....	44	12	4.6	4.8	8.6
23	20	.....	.....	45	11	5.0	4.6	8.7
24	20	.....	.....	48	10	4.4	4.4	8.8
25	20	.....	37	49	9.5	4.4	4.4	8.9
26	20	.....	34	49	8.9	4.3	3.8	15
27	20	.....	32	47	8.4	4.3	3.3	18
28	20	.....	29	44	8.2	4.4	3.0	20
29	20	.....	27	40	7.1	4.6	2.7	22
30	19	.....	27	36	6.6	4.3	2.5	21
31	19	.....	.....	37	.....	4.3	2.3	.....

NOTE.—No record Nov. 21 to Apr. 24. Discharge interpolated on account of lack of gage heights Oct. 1, May 4–7, 18–21, Sept. 21–24, 27, and 28. Discharge estimated as follows: Nov. 21–30, 10 second-feet; May 9–14, 30 second-feet; Aug. 17–19, 4.9 second-feet; Sept. 3–19, 5.0 second-feet.

Monthly discharge of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	31	16	21.2	1,300	C.
November	18	.....	13.2	786	C.
April 25–30	37	27	31.0	369	B.
May	49	19	34.1	2,100	C.
June	37	6.6	20.1	1,200	A.
July	6.0	4.3	4.89	301	B.
August	5.2	2.3	4.34	267	C.
September	22	2.3	7.93	472	D.

NOTE.—See footnote to table of daily discharge.

IDAHO (GOVERNMENT) CANAL NEAR FIRTH, IDAHO.

LOCATION.—In sec. 13, T. 2 S., R. 36 E., Bingham County, 100 feet above double metal flume by which canal crosses the Eastern Idaho Slough, one-fourth mile below nearest highway bridge, 1½ miles below the point where Sand Creek crosses the canal, 5 miles southeast of Firth, and about 5 miles above point where canal discharges into Blackfoot River.

RECORDS AVAILABLE.—March 29, 1914, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank, inspected by J. A. Vaughn.

DISCHARGE MEASUREMENTS.—Made by wading or from one of the highway bridges above station.

CHANNEL AND CONTROL.—Bed of canal composed of silt, sand, and fine gravel; probably shifts slightly; flume heading just below gage furnishes what should be a permanent control for high stages. Point of zero flow about gage height 0.6 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.20 feet at 6 p. m May 12 (discharge, 288 second-feet); minimum discharge practically zero, but can not be exactly determined as water was below inlet pipe to float well.

1914–15: Maximum stage recorded, 4.29 feet at 5 a. m., May 9, 1914 (discharge, 315 second-feet); minimum practically zero, as stated in preceding paragraph.

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Data insufficient to warrant determinations.

DIVERSIONS.—None above station or between station and outlet of canal into Blackfoot River.

REGULATION.—Flow regulated partly by Snake River head gates, 12 miles above station, and partly by gates at the Sand Creek crossing, about 1½ miles above.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice from December 9 to about March 13. Rating curve well defined above 40 second-feet. Recorder not operated during winter; outside staff gage read weekly December 9 to March 13. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying gage heights to rating table. Records of flow exceeding 40 second-feet excellent; for lower flow records are less reliable because of poorer definition of rating curve and possible shifting of canal bed.

Idaho (Government) canal diverts water from left bank of Snake River in sec. 31, T. 1 N., R. 37 E., and discharges into Blackfoot River in sec. 24, T. 2 S., R. 36 E. The canal receives water from Sand Creek about 1½ miles above this station. Water discharged into Blackfoot River during the irrigation season is diverted by the Fort Hall upper and lower canals for use on Fort Hall reservation. For record at station at head of canal see page 51.

Discharge measurements of Idaho (Government) canal near Firth, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 28	L. W. Roush	1.98	51.8	Apr. 21	G. C. Baldwin	2.48	85.5
Jan. 15	do	2.65	7.6	May 23	A. W. Harrington	3.67	212
Mar. 26	G. C. Baldwin	1.24	11.6	Aug. 4	G. C. Baldwin	2.18	67.6
27	do	1.38	18.2	Sept. 23	A. W. Harrington	2.37	81.0

Daily discharge, in second-feet, of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	142	88	66	.....	22	90	158	73	40	.....
2	136	90	63	.....	20	142	164	72	5[illegible]	.....
3	142	87	56	.....	24	170	226	70	5[illegible]	.....
4	152	87	59	.....	47	176	240	75	6[illegible]	.....
5	158	89	54	.....	94	170	233	83	8[illegible]	.....
6	152	81	54	.....	102	158	226	79	4[illegible]	.....
7	129	79	59	.....	124	152	220	107	16	14
8	136	80	52	.....	152	134	200	147	9	17
9	136	65	.....	.....	176	170	170	188	10	20
10	131	73	.....	.....	176	182	118	226	10	20
11	124	76	.....	.....	158	188	75	214	.....	17
12	127	70	.....	.....	170	274	76	164	.....	15
13	120	57	.....	.....	176	267	57	104	.....	23
14	115	61	.....	.....	176	240	51	92	.....	50
15	113	68	.....	.....	164	158	28	73	.....	53
16	106	51	.....	.....	158	113	13	52	.....	61
17	93	46	.....	13	142	110	46	35	.....	62
18	76	62	.....	10	125	96	44	35	.....	59
19	51	54	.....	8	113	120	56	44	.....	67
20	49	62	.....	11	94	142	44	50	4	73
21	49	63	.....	13	87	164	66	47	13	66
22	52	59	.....	16	88	188	61	45	2[illegible]	68
23	50	67	.....	15	142	220	52	44	6[illegible]	82
24	64	62	.....	12	147	246	67	44	35	95
25	65	64	.....	13	136	220	68	39	9	96
26	61	71	.....	13	126	200	76	39	4	96
27	55	76	.....	18	116	194	115	41	.....	134
28	55	70	.....	17	107	194	100	42	.....	194
29	64	70	.....	15	98	194	76	40	.....	164
30	84	76	.....	18	90	194	75	39	.....	108
31	85	.....	.....	28	.....	176	.....	38	.....	.....

NOTE.—Water surface below inlet to recorder well Aug. 11–19 and Aug. 27 to Sept. 6, mean discharge estimated at 3 second-feet.

Monthly discharge of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	158	49	99.1	6,[illegible]90	A.
November	90	46	70.1	4,170	A.
December 1–8	66	52	57.9	[illegible]19	B.
March 17–31	28	8	14.7	437	B.
April	176	20	118	7,[illegible]20	B.
May	274	90	176	10,[illegible]80	A.
June	240	13	107	6,[illegible]70	A.
July	226	35	78.7	4,[illegible]40	A.
August	64	.....	17.5	1,[illegible]80	D.
September	194	.....	55.7	3,[illegible]10	B.

NOTE.—See footnote to table of daily discharge.

FORT HALL UPPER CANAL NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 13, T. 3 S., R. 35 E., Bingham County, 500 feet below the head gates and 3½ miles southeast of Blackfoot.

RECORDS AVAILABLE.—May 8, 1912, to September 30, 1915.

GAGE.—Vertical staff in stilling well on the right bank and sloping gage painted on the right side and about midway of concrete rating section. Bristol water stage recorder used during 1912 and parts of 1913 and 1914. All gages set to same datum and at practically same location. Gage read by the ditch rider and gate tender.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension foot bridge at gage.
CHANNEL AND CONTROL.—Concrete trapezoidal rating section.
EXTREMES OF DISCHARGE.—Maximum stage recorded during 1912–1915, 4.30 feet July 7–13, 17, and 23–26, 1915 (discharge, 341 second-feet); minimum flow occurs during winter months when small amount of water is run for stock.
WINTER FLOW.—No records obtained; small amount of water run for stock.
DIVERSIONS.—No diversions above station and none for several miles below.
REGULATION.—Flow regulated at head gates 500 feet above.
ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 300 second-feet. Gage read to half tenths twice daily. Discharge determined by applying mean daily gage heights to rating table. Results good.

Fort Hall upper canal diverts from the left bank of Blackfoot River in sec. 12, T. 3 S., R. 35 E. Water is used for irrigation on Fort Hall Indian Reservation.

Discharge measurements of Fort Hall upper canal near Blackfoot, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	G. C. Baldwin	2.59	146	Aug. 3	G. C. Baldwin	3.27	222
May 26	A. W. Harrington	2.49	138	Sept. 22	A. W. Harrington	2.03	88.2

Daily discharge, in second-feet, of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	84	.....	190	131	329	245	168
2	86	.....	201	131	329	223	168
3	86	.....	201	136	329	223	168
4	96	.....	190	136	329	223	168
5	106	.....	190	146	341	223	168
6	106	.....	190	131	341	223	157
7	106	.....	190	86	341	201	157
8	106	.....	190	116	341	201	146
9	111	.....	190	157	341	201	126
10	111	.....	201	201	341	201	126
11	101	.....	190	190	341	201	126
12	101	.....	201	190	341	201	126
13	101	.....	190	190	341	201	126
14	101	10	157	179	329	201	106
15	96	42	126	190	329	201	101
16	68	66	126	168	329	201	96
17	11	79	157	190	341	201	96
18	2.5	101	168	234	329	201	96
19	2.5	136	168	234	329	179	96
20	2.5	136	157	269	329	179	96
21	2.5	146	126	293	329	179	96
22	2.5	136	136	293	329	179	91
23	2.5	168	136	305	329	179	96
24	2.5	168	136	305	341	168	96
25	2.5	168	136	305	341	168	91
26	2.5	146	136	317	341	168	91
27	2.5	157	136	329	317	168	91
28	2.5	168	136	329	293	168	96
29	2.5	157	136	329	293	168	96
30	2.5	157	131	317	281	168	96
31	2.5	.....	131	.....	245	168	.....

NOTE.—Canal head gates closed Nov. 1 to Apr. 13; practically no water flowing.

Monthly discharge of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	111	2.5	52.0	3,200	B.
April 14–30	168	10	126	4,250	B.
May	201	126	163	10,000	A.
June	329	86	218	13,000	A.
July	341	245	327	20,100	A.
August	245	168	194	11,900	A.
September	168	91	119	7,080	A.

FORT HALL LOWER CANAL NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 15, T. 3 S., R. 35 E., Bingham County, 200 feet below ford where road to head gates half a mile above crosses canal and about 2½ miles southeast of Blackfoot.

RECORDS AVAILABLE.—May 15, 1912, to September 30, 1915.

GAGE.—Inclined staff on right bank near center of concrete rating section; read by the ditch rider for the United States Indian Service. Bristol water-stage recorder at same site but at datum 1.53 feet lower than that of staff gage was used from 1912 to 1914.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge at gage.

CHANNEL AND CONTROL.—Channel at gage is trapezoidal concrete rating section at sides of which mud and silt have been deposited. Principal control is a wooden check across the canal about a third of a mile below gage; this control remained unchanged from April 20 to September 30, 1915, but variations in the amount of water carried in a large lateral that diverts between the gage and the check and the growth of moss and weeds in the canal caused several changes in the stage-discharge relation during the season.

EXTREMES OF DISCHARGE.—1912–1915; maximum stage recorded, 1.70 feet July 14, 1915 (discharge, 156 second-feet), corresponding to about 3.23 feet on old gage; canal reported dry on many dates.

WINTER FLOW.—No winter records obtained. Small quantities of water are run at times for use of stock but during most of the winter the head gates are closed.

DIVERSIONS.—None above gage; a large lateral diverts water about a quarter of a mile below gage, and one small ditch diverts between the gage and the check that acts as the main control.

REGULATION.—Flow regulated at head gates half a mile above gage.

ACCURACY.—Stage-discharge relation not permanent; affected by variation in quantity of water diverted by large lateral below gage and by growth of moss and weeds in canal. Rating curves fairly well defined; applicable as follows: October 1–10; April 20–30; and August 3 to September 30; May 23 to July 11. Gage read to tenths or half tenths twice daily. Daily discharge ascertained by applying daily gage heights to rating tables; shifting-control method used May 1–22 and July 12 to August 2. Records fair.

Fort Hall lower canal diverts from left bank of Blackfoot River in sec. 11, T. 3 S., R. 35 E. Water is used for irrigation on Fort Hall Indian reservation.

Discharge measurements of Fort Hall lower canal near Blackfoot, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	G. C. Baldwin	0.29	16.5	July 11	G. C. Baldwin	1.68	154
May 26	A. W. Harrington	.64	53.6	Aug. 3	do	1.03	77.4
26	do	.46	40.3	Sept. 22	A. W. Harrington	.54	36.0
June 11	do	.59	50.2	22	do	1.14	90.1
11	do	.84	75.3				

Daily discharge, in second-feet, of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	.....	33	41	138	111	44
2	17	.....	37	42	138	111	44
3	18	.....	38	45	138	76	44
4	18	.....	38	46	138	53	44
5	20	.....	20	48	138	53	44
6	23	.....	28	56	138	53	47
7	25	.....	39	60	138	53	44
8	32	.....	40	60	138	58	36
9	34	.....	43	56	148	55	28
10	32	.....	52	59	148	44	28
11	.....	.....	61	61	154	44	28
12	.....	.....	64	73	147	44	28
13	.....	.....	64	53	147	59	28
14	.....	.....	51	41	157	66	28
15	.....	.....	38	49	146	66	28
16	.....	.....	41	47	145	67	28
17	.....	.....	40	49	130	63	28
18	.....	.....	36	60	124	67	28
19	.....	.....	43	51	118	71	28
20	.....	9	48	56	123	71	28
21	.....	17	50	28	117	71	28
22	.....	18	52	69	117	71	44
23	.....	20	56	86	116	74	32
24	.....	21	56	93	116	80	32
25	.....	23	56	113	125	66	32
26	.....	24	49	133	125	58	32
27	.....	32	38	138	124	58	32
28	.....	28	38	138	123	54	32
29	.....	32	38	138	123	53	32
30	.....	32	38	138	122	58	32
31	.....	.....	38	.....	116	50	.....

NOTE.—No record obtained Oct. 11 to Apr. 19; head gates closed most of the time. Discharge interpolated Apr. 22–25.

Monthly discharge of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy
	Maximum.	Minimum.	Mean.		
October 1–10	34	16	23.5	466	D.
April 20–30	32	9	23.3	508	C.
May	64	20	44.0	2,710	C.
June	138	28	76.9	4,220	C.
July	154	116	133	8,180	B.
August	111	44	63.8	3,920	B.
September	47	28	33.7	2,010	B.

BIG LOST RIVER NEAR CHILLY, IDAHO.

LOCATION.—In sec. 30, T. 8 N., R. 21 E., at Howell's ranch, 12 miles southwest of Chilly, Custer County, and 30 miles above Mackay. Thousand Springs Creek and Warm Springs Creek are the principal tributaries that enter Big Lost River between the station and Mackay.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25, 1904, to August 31, 1906; July 1, 1907, to November 14, 1914, when the station was discontinued.

GAGE.—Vertical staff on left bank near Howell's tool house; read by Mrs. John Howell. Prior to June 7, 1912, several gages differing slightly in location and datum.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel; control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during October and November, 1914, 4.24 feet, October 1, 2, and 3 (discharge, 233 second-feet); minimum stage recorded, 4.09 feet, October 13–17, October 31 to November 2, and November 12–14 (discharge, 179 second-feet).

1904–1914: Maximum stage recorded, 6.28 feet, June 20, 1911 (discharge, 3,420 second-feet); minimum stage recorded, 3.35 feet, April 1, 1912 (discharge, 27 second-feet).

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

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Rating curve fairly well defined. Gage read to hundredths twice daily. Records good.

Daily discharge, in second-feet, of Big Lost River near Chilly, Idaho, for the period Oct. 1 to Nov. 14, 1914.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1	233	179	11	196	196	21	233	.....
2	233	179	12	196	179	22	214	.....
3	233	196	13	179	179	23	196	.....
4	225	196	14	179	179	24	196	.....
5	214	196	15	179	.....	25	196	.....
6	203	196	16	179	.....	26	196	.....
7	196	196	17	179	.....	27	196	.....
8	196	196	18	214	.....	28	196	.....
9	196	196	19	233	.....	29	196	.....
10	196	196	20	233	.....	30	189	.....
						31	179	.....

Monthly discharge of Big Lost River near Chilly, Idaho, for the period Oct. 1 to Nov. 14, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	233	179	203	12,500	B.
November 1–14	196	179	190	5,280	B.
The period	.....	.....	.....	17,800	

BIG LOST RIVER NEAR MACKAY, IDAHO.

LOCATION.—In sec. 17, T. 7 N., R. 24 E., at A. D. Streeter's ranch, about 2 miles above the village of Mackay, Custer County, and about 2½ miles below the partly constructed Mackay dam.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 12, 1903, to September 1, 1906; May 12, 1912, to March 15, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank, one-fourth mile from Streeter's house, installed April 29, 1913; read by A. D. Streeter. A vertical staff gage installed June 6 1912, at the Olsen suspension bridge, about a mile above present gage, was in use until April 28, 1913. Streeter ditch diverts water between the old and new stations.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just below the Olsen bridge. The flow in Streeter ditch must be deducted in order to obtain the flow of the river past the gage.

CHANNEL AND CONTROL.—Rocky; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet October 21 to 25 (discharge, 308 second-feet); minimum stage recorded, 1.24 feet February 21 to March 15 (discharge, 196 second-feet).

1903–1915: Maximum stage recorded, 5.4 feet at 9.30 a. m., June 4, 1914 (discharge, 1,880 second-feet); minimum stage recorded, 0.36 foot March 26–28, 1914 (discharge, 41 second-feet).

WINTER FLOW.—Stage-discharge relation unaffected by ice; open-channel rating assumed applicable.

DIVERSIONS.—Numerous diversions are made from the river above the gage. Sharp ditch and Streeter ditch divert water between the gage and the dam.

REGULATION.—None, though the flow past the gage may be regulated by the gates at the Mackay dam when that structure is completed.

ACCURACY.—Rating curve well defined below 1,000 second-feet but not verified by discharge measurements since July 28, 1914. Gage read to half-tenths once daily. Records fair.

Daily discharge, in second-feet, of Big Lost River near Mackay, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1....	264	293	236	209	196	196	16....	293	293	209	209	196	.....
2....	264	293	236	209	196	196	17....	293	293	209	209	196	.....
3....	264	293	222	209	196	196	18....	293	278	209	209	196	.....
4....	278	293	222	209	196	196	19....	293	278	209	209	196	.....
5....	278	293	222	209	196	196	20....	293	264	209	209	196	.....
6....	278	308	222	209	196	196	21....	308	250	209	209	196	.....
7....	293	308	222	209	196	196	22....	308	250	209	209	196	.....
8....	293	308	222	209	196	196	23....	308	250	209	209	196	.....
9....	293	308	222	209	196	196	24....	308	236	209	209	196	.....
10....	293	293	222	209	196	196	25....	308	236	209	209	196	.....
11....	293	293	222	209	196	196	26....	308	236	209	209	196	.....
12....	293	293	222	209	196	196	27....	308	236	209	196	196	.....
13....	293	293	222	209	196	196	28....	293	236	209	196	196	.....
14....	293	293	222	209	196	196	29....	293	236	209	196	.....	.....
15....	293	293	209	209	196	196	30....	293	236	209	196	.....	.....
							31....	293	.....	209	196	.....	.....

Monthly discharge of Big Lost River near Mackay, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	308	264	292	18 000	B.
November	308	236	275	16 400	B.
December	236	209	216	13 300	C.
January	209	196	207	12.700	C.
February	196	196	196	10,900	C.
March 1–15	196	196	196	5 830	C.
The period				77,100	

SHARP DITCH NEAR MACKAY, IDAHO.

LOCATION.—In sec. 12, T. 27 N., R. 23 E., 250 feet below head of ditch, half a mile below the Mackay dam, and 3½ miles northwest of Mackay, Custer County.

RECORDS AVAILABLE.—June 6, 1912, to October 24, 1914, when station was discontinued.

GAGE.—Vertical staff on left bank; installed June 26, 1913; read by F. McIntosh. Original gage was vertical staff attached to inside of rating flume, on left side, 40 feet below head gates and 200 feet above site of present gage. Relation between present and original gage not determined.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 100 feet below gage.

CHANNEL AND CONTROL.—Control consists of gravel and sand and is poorly defined. Stage-discharge relation affected at times by backwater from moss and weeds in channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during October, 6.55 feet October 1–2, 12, and 14 (discharge, 9.5 second-feet); minimum stage recorded, 6.3 feet October 7 and 8 (discharge, 5.3 second-feet).

1912–1914: Maximum discharge recorded, 38 second-feet June 24, 1912 (corresponding to 6.9 feet on original gage); minimum discharge recorded, 1 second-foot June 10, 1913 (corresponding to 5.2 feet on original gage); accuracy of recorded minimum doubtful on account of unstable condition of gage. Ditch reported practically dry May 1–7, 1913.

WINTER FLOW.—Presumably derived from leakage through head gates; no winter records.

DIVERSIONS.—Station is above all points of diversion for irrigation, but there is a small wasteway above the present gage.

REGULATION.—Flow controlled by head gates and by small wasteway above gage.

ACCURACY.—Records poor; applicability of rating curve not closely defined by discharge measurements.

Sharp ditch diverts water from east side of Big Lost River in sec. 12, T. 7 N., R. 23 E., a mile above heading of Streeter ditch and half a mile below Mackay dam. The water is used for irrigation on land northwest of Mackay and above Streeter ditch.

Daily discharge, in second-feet, of Sharp ditch near Mackay, Idaho, for the period Oct. 1–24, 1914.

Day.	Oct.	Day.	Oct.	Day.	Oct.
1	9.5	11	7.8	21	8.9
2	9.5	12	9.5	22	8.9
3	8.9	13	9.5	23	8.9
4	7.4	14	9.5	24	8.9
5	6.0	15	9.2		
6	5.6	16	8.9		
7	5.3	17	8.9		
8	5.3	18	8.7		
9	6.0	19	8.5		
10	6.0	20	8.7		

NOTE.—Mean discharge Oct. 1-24, 8.1 second-feet. Total run-off, 385 acre-feet.

STREETER DITCH NEAR MACKAY, IDAHO.

LOCATION.—In sec. 17, T. 7 N., R. 24 E., at A. D. Streeter's ranch, three-fourths mile below head of ditch and 2 miles northwest of Mackay, Custer County.

RECORDS AVAILABLE.—May 16, 1913, to November 20, 1914, when station was discontinued.

GAGE.—Vertical staff; read by A. D. Streeter.

DISCHARGE MEASUREMENTS.—Made by wading or from a bridge 10 feet below gage.

CHANNEL AND CONTROL.—Control indefinite. Stage-discharge relation at times affected by backwater from moss and weeds.

EXTREMES OF DISCHARGE.—Maximum stage recorded October-November, 2.50 feet October 29 and 30 (discharge, 18 second-feet); minimum stage recorded, 1.40 feet November 7–20 (discharge, 0.5 second-foot).

1913–1914: Maximum stage recorded, 2.8 feet June 11, 1913 (discharge, 42 second-feet); ditch reported practically dry December 6–31, 1913.

WINTER FLOW.—Not recorded. Head gates are closed during winter, but there is a small amount of leakage and the ditch receives also water from a small spring.

DIVERSIONS.—None from ditch above gage.

REGULATION.—Flow regulated by head gates at point of diversion from Big Lost River.

ACCURACY—Records poor, as applicability of rating curve is not definitely established by discharge measurements.

Streeter ditch diverts water from the east side of Big Lost River in sec. 18, T. 7 N., R. 24 E., about 3 miles above Mackay. The water is used for irrigation by several ranches northwest of Mackay.

Daily discharge, in second-feet, of Streeter ditch near Mackay, Idaho, for the period Oct. 1 to Nov. 20, 1914.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1	1.0	17	11	.7	.5	21	.8	.....
2	1.0	17	12	.7	.5	22	.8	.....
3	1.0	17	13	.7	.5	23	.8	.....
4	0.9	17	14	.7	.5	24	.8	.....
5	.9	17	15	.7	.5	25	.8	.....
6	.9	0.8	16	.8	.5	26	.8	.....
7	.9	.5	17	.8	.5	27	.8	.....
8	.7	.5	18	.8	.5	28	17	.....
9	.7	.5	19	.8	.5	29	18	.....
10	.7	.5	20	.8	.5	30	18	.....
						31	17	.....

Monthly discharge of Streeter ditch near Mackay, Idaho, for the period Oct. 1 to Nov. 20, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	18	0.7	2.96	182	D.
November 1–20	17	.5	4.64	184	D.
The period				366	

ANTELOPE CREEK NEAR DARLINGTON, IDAHO.

LOCATION.—In sec. 29 (approximately), T. 5 N., R. 25 E., at the John G. Richardson ranch, 6 miles west of Moore, 8 miles southwest of Darlington, Blaine County, and 12 miles above mouth of creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1913, to September 30, 1915.

GAGE.—Inclined staff with vertical high-water section on left bank, 150 yards above Richardson's house; read by John G. Richardson.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 300 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel. One channel at all stages though high water may overflow banks. Control changes each year with the spring break-up.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.05 feet June 1 and 2 (discharge, 192 second-feet) minimum stage recorded, 1.06 feet August 4, 6, 7, and 9 (discharge, 3 second-feet).

1913–1915: Maximum stage recorded, 4.4 feet May 28, 1913 (discharge, 581 second-feet); minimum stage recorded August 4, 6, 7, and 9, 1915. Stages exceeding 4.4 feet may have occurred during winter months, but stage-discharge relation was seriously affected by ice.

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

DIVERSIONS.—Small ditches divert water for ranch irrigation from Antelope Creek and its tributaries above gage; quantity diverted not known.

REGULATION.—None. Abrupt changes indicated by the daily-discharge record may possibly be due to diversions a short distance above gage.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during winter. Two fairly well defined rating curves used, one applicable October 1 to November 23, the other April 4 to December 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying daily gage heights to rating table. Records fair.

Discharge measurements of Antelope Creek near Darlington, Idaho, during the year ending Sept. 30, 1915.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 13	1.88	38.7
14	1.86	36.1

Daily discharge, in second-feet, of Antelope Creek near Darlington, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	34	.....	148	192	37	7	11
2	27	33	.....	156	192	45	5	11
3	33	32	.....	156	165	45	5	11
4	36	33	53	140	140	45	3	14
5	37	33	53	124	124	55	3	14
6	35	33	45	110	124	67	3	14
7	34	32	53	84	124	84	3	14
8	31	32	53	84	140	78	3	14
9	27	29	53	72	156	61	3	17
10	30	29	53	84	140	53	14	18
11	32	29	53	96	124	53	14	22
12	33	30	63	96	110	53	14	28
13	33	31	72	124	108	37	14	34
14	30	32	78	132	90	37	14	34
15	29	33	78	124	84	37	16	34
16	27	33	96	132	72	34	17	31
17	27	32	110	148	72	30	14	30
18	27	31	110	165	78	30	13	30
19	30	30	103	174	96	28	14	27
20	33	33	110	140	84	24	17	27
21	36	26	132	148	72	22	17	24
22	39	11	124	140	72	21	14	21
23	41	20	117	140	78	18	14	21
24	37	.....	110	148	78	18	14	21
25	35	.....	96	156	72	24	14	21
26	35	.....	96	148	72	21	14	34
27	37	.....	96	140	68	18	14	37
28	38	.....	124	148	63	11	14	35
29	36	.....	140	156	43	11	14	30
30	36	.....	140	165	37	11	13	30
31	35	.....	.....	174	.....	11	11	.....

NOTE.—Stage-discharge relation affected by ice Nov. 24 to Dec. 8. No record obtained Dec. 9 to Apr. 3. Mean discharge Nov. 24–30 estimated at 20 second-feet.

Monthly discharge of Antelope Creek near Darlington, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	41	26	33.0	2,030	B.
November	34	11	27.7	1,650	C.
April 4–30	140	45	89.3	4,780	B.
May	174	72	134	8,240	B.
June	192	37	102	6,070	B.
July	84	11	36.1	2,220	B.
August	17	3	11.3	695	D.
September	37	11	23.6	1,400	C.

PORTNEUF RIVER BELOW RESERVOIR, NEAR CHESTERFIELD, IDAHO.

LOCATION.—In sec. 30, T. 6 S., R. 39 E., one-fourth mile below dam of Portneuf-Marsh Valley Canal Co., and 2½ miles west of Chesterfield, Bannock County. Topons Creek enters Portneuf River 3 miles below.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 23, 1912, to April 9, 1915, when station was discontinued.

GAGE.—Vertical staff on right bank, directly under the Hess-McGinnis flume, which carries the Portneuf diversion canal across the river; read about once a week by employees of the Portneuf-Marsh Valley Canal Co.

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

CHANNEL AND CONTROL.—Bed consists of fine gravel. Stage-discharge relation seriously affected by moss in channel during summer. A wooden control, effective at low stages only, was installed July 27, 1912, about 6 feet below gage; a natural control farther downstream becomes effective at medium and high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded October to April, 2.50 feet February 6, 13, and 20 and March 13 and 20 (discharge, 7.1 second-feet); minimum stage recorded, 2.30 feet January 23 (discharge, 1.5 second-feet).

1912–1915: Maximum stage recorded, 4.80 feet April 19–22, 1914 (discharge, 81 second-feet); minimum stage recorded January 23, 1915.

WINTER FLOW.—Stage-discharge relation not affected by ice, probably because of proximity of station to reservoir. Open-channel rating curves assumed applicable.

DIVERSIONS.—The Portneuf diversion canal takes water from river just below reservoir, one-fourth mile above station; present capacity of reservoir about 28,000 acre-feet; supply from Portneuf River augmented by feeder canal from Topons Creek. Main canal diverts about 23 miles below station; numerous ranch diversions between dam and point of diversion of main canal.

REGULATION.—Flow regulated by gates at dam and by diversion into Portneuf diversion canal.

ACCURACY.—Stage-discharge relation not permanent. Two poorly defined rating curves used, one applicable October 1 to December 15, the other December 16 to April 9. Gage read once or twice a week. Discharge ascertained by applying daily gage heights to rating table and interpolating for days on which gage was not read. Records poor.

Daily discharge, in second-feet, of Portneuf River below reservoir, near Chesterfield, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	3.7	3.0	5.1	3.7	5.1	3.7	3.7
2	3.7	3.0	5.1	3.7	5.5	3.7	3.7
3	3.7	3.0	5.1	3.7	5.9	3.7	3.7
4	3.7	3.0	5.1	3.7	6.3	3.7	3.7
5	3.7	3.0	5.1	3.7	6.7	3.7	3.7
6	3.7	3.0	5.1	3.7	7.1	3.7	3.7
7	3.7	3.0	5.1	3.7	7.1	4.2	3.7
8	3.7	3.0	5.1	3.7	7.1	4.6	3.7
9	3.7	3.0	5.1	3.7	7.1	5.1	3.7
10	3.7	3.0	5.1	3.7	7.1	5.6	.....
11	3.6	3.0	5.1	3.7	7.1	6.1	.....
12	3.5	3.0	5.1	3.7	7.1	6.6	.....
13	3.4	3.0	5.1	3.7	7.1	7.1	.....
14	3.3	3.0	5.1	3.7	7.1	7.1	.....
15	3.2	3.0	5.1	3.7	7.1	7.1	.....
16	3.1	3.0	5.1	3.4	7.1	7.1	.....
17	3.0	3.0	5.1	3.2	7.1	7.1	.....
18	3.0	3.0	5.1	2.9	7.1	7.1	.....
19	3.0	3.0	5.1	2.6	7.1	7.1	.....
20	3.0	4.4	4.9	2.4	7.1	7.1	.....
21	3.0	5.7	4.7	2.1	6.6	6.6	.....
22	3.0	5.5	4.5	1.8	6.1	6.1	.....
23	3.0	5.4	4.3	1.5	5.6	5.6	.....
24	3.0	5.2	4.1	1.9	5.1	5.1	.....
25	3.0	5.1	3.9	2.3	4.6	4.6	.....
26	3.0	5.1	3.7	2.7	4.2	4.2	.....
27	3.0	5.1	3.7	3.1	3.7	3.7	.....
28	3.0	5.1	3.7	3.5	3.7	3.7	.....
29	3.0	5.1	3.7	3.9	.....	3.7	.....
30	3.0	5.1	3.7	4.3	.....	3.7	.....
31	3.0	.....	3.7	4.7	.....	3.7	.....

Monthly discharge of Portneuf River below reservoir, near Chesterfield, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3.7	3.0	3.29	202	C.
November	5.7	3.0	3.79	226	D.
December	5.1	3.7	4.69	288	D.
January	4.7	1.5	3.28	202	D.
February	7.1	3.7	6.27	348	D.
March	7.1	3.7	5.22	321	D.
April 1–9	3.7	3.7	3.70	66	D.
The period				1,650	

PORTNEUF RIVER AT TOPAZ, IDAHO.

LOCATION.—In sec. 23, T. 9 S., R. 37 E., just below the Oregon Short Line Railroad bridge one-fourth mile west of Topaz flag station, Bannock County, 1¼ miles above diversion dam of the Portneuf-Marsh Valley Canal Co., and 6 miles southwest of McCammon.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 12, 1913, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank 100 feet below railroad bridge; read daily by employees of the Portneuf-Marsh Valley Canal Co.

DISCHARGE MEASUREMENTS.—Made from downstream side of highway bridge half a mile above gage.

CHANNEL AND CONTROL.—Control is a loose rock riffle 500 feet below gage. Blasting operations in March, 1915, removed some of the rock forming this control and changed stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.55 feet October 1–3 (discharge, 276 second-feet); maximum discharge, 284 second-feet June 23 and 25 (corresponding to a gage height of 2.92 feet). Minimum stage recorded 1.98 feet August 27–29 and 31 (discharge, 127 second-feet).

1913–1915. Maximum stage recorded, 6.1 feet, April 3, 1913 (discharge, 902 second feet); minimum stage recorded August 27–29 and 31, 1915.

WINTER FLOW.—No records obtained during winter of 1914–15.

DIVERSIONS.—Numerous ranch diversions are made above the station. The storage reservoir of the Portneuf-Marsh Valley Canal Co. (present capacity about 28,000 acre-feet) is near Chesterfield.

REGULATION.—Flow during irrigation season regulated to large extent from the Portneuf-Marsh Valley reservoir.

ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used, one applicable October 1–30 and the other June 8 to September 30. No records obtained November 1 to June 7. Daily discharge ascertained by applying daily gage heights to rating tables. Records good.

COOPERATION.—Gage-height record furnished by the Portneuf-Marsh Valley Canal Co.

Discharge measurements of Portneuf River at Topaz, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 7	L. W. Roush	3.04	182	July 28	G. C. Baldwin	2.57	222
Apr. 28	G. C. Baldwin	2.80	262	Sept. 25	A. W. Harrington	2.17	150
June 8	A. W. Harrington	2.42	199				

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

Day.	Oct.	June.	July.	Aug.	Sept.	Day.	Oct.	June.	July.	Aug.	Sept.
1	285	.....	262	193	130	16	211	262	244	138	153
2	285	.....	262	193	138	17	211	262	244	138	153
3	285	.....	262	185	145	18	194	280	244	130	161
4	211	.....	244	177	145	19	194	280	262	130	161
5	211	.....	244	169	145	20	194	280	244	138	153
6	211	.....	262	161	145	21	194	280	244	138	145
7	211	.....	262	153	138	22	194	280	227	130	138
8	211	202	244	145	130	23	194	280	244	130	138
9	211	210	262	145	130	24	194	280	227	130	138
10	211	262	262	145	130	25	194	280	227	130	161
11	211	227	244	145	145	26	194	280	227	130	193
12	211	262	262	145	138	27	194	280	227	130	210
13	211	280	262	138	138	28	194	280	227	130	193
14	211	262	262	138	153	29	194	262	210	130	161
15	211	262	262	138	161	30	194	262	202	130	161
						31	194	.....	193	130	.....

Monthly discharge of Portneuf River at Topaz, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	285	194	210	12,900	B.
June 8–30	280	202	265	12,100	B.
July	262	193	244	15,000	B.
August	193	130	145	8,920	B.
September	210	130	151	8,980	B.

PORTNEUF RIVER AT POCATELLO, IDAHO.

LOCATION.—In sec. 27, T. 6 S., R. 34 E., about 20 feet above old slaughterhouse bridge at foot of Carson Street, in west end of Pocatello, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 31, 1911, to September 30, 1915. For station about a mile upstream, May 18, 1897, to October 14, 1899.

GAGE.—Vertical staff on left bank just below highway bridge constructed in 1914; read by W. S. Hutson. The gage in use 1897–1899 was a vertical staff spiked to pier of wagon bridge one-eighth mile below plant of Pocatello Electric Light Co.

DISCHARGE MEASUREMENTS.—Made by wading or from upstream side of old slaughterhouse bridge.

CHANNEL AND CONTROL.—Bed of stream at gage and measuring section consists of rocks and medium sized boulders; very rough. One channel at all stages. Control fairly permanent, although it shifts within well-defined limits.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet at 1 p. m. April 23 and 24 (discharge, 473 second-feet); minimum stage recorded, 2.0 feet at 1 p. m. July 4 (discharge, 52 second-feet).

1911–1915: Maximum stage recorded, 6.4 feet May 23 and 24, 1912 (discharge, 1,240 second-feet); minimum stage recorded July 4, 1915.

1897–1899: Maximum stage recorded, 12.80 feet May 18, 1897 (discharge, 1,880 second-feet); minimum stage recorded, 6.10 feet July 4–11, 13, and 17–18, 1898 (discharge, 14 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated chiefly from observer's notes, which are fairly complete.

DIVERSIONS.—Numerous ranch diversions are made above the gage. The largest single diversion is that made by the canal of the Portneuf-Marsh Valley Canal Co., which diverts water for use in irrigating lands in the vicinity of Downey.

REGULATION.—None below the head of the Portneuf-Marsh Valley Canal Co.'s canal. The storage reservoir of this company is near Chesterfield and has a capacity of about 28,000 acre-feet.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 15 to January 17, January 19–22, and January 26 to February 2. Two well-defined rating curves used, one applicable October 1 to December 14 and the other during open-water period in 1915. Daily discharge ascertained by applying daily gage heights to rating table. Open-water records good except those for fall of 1914.

Discharge measurements of Portneuf River at Pocatello, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 29	G. C. Baldwin.....	3.98	371	July 28	G. C. Baldwin.....	2.23	70.8
June 9	A. W. Harrington....	2.79	139	Sept. 24	A. W. Harrington....	2.51	103

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	288	308	308	.....	300	349	371	349	228	55	68	78
2	308	308	308	.....	300	327	349	349	210	55	68	83
3	308	308	308	.....	306	327	371	327	192	52	68	89
4	329	308	308	.....	306	327	371	327	183	52	68	89
5	351	308	308	.....	286	327	420	306	183	59	68	95
6	398	308	308	.....	257	327	420	286	166	64	64	101
7	398	308	308	.....	286	327	420	266	158	68	64	101
8	398	308	329	.....	286	327	420	228	150	73	64	101
9	398	308	308	.....	286	327	420	192	142	78	64	101
10	398	308	308	.....	286	327	420	166	127	89	64	101
11	398	308	308	.....	286	327	395	166	134	89	68	101
12	398	308	308	.....	286	327	371	166	142	89	68	101
13	398	308	308	.....	286	349	371	158	142	89	68	101
14	398	308	268	.....	286	371	395	150	134	83	68	101
15	374	308	.....	.....	306	371	420	142	134	83	68	107
16	351	308	.....	.....	306	395	420	134	134	78	68	107
17	351	308	.....	.....	327	420	420	127	127	78	68	113
18	351	308	.....	228	349	473	420	120	120	78	64	113
19	374	308	.....	.....	371	420	420	120	113	78	64	113
20	374	308	.....	.....	371	395	420	175	.....	142	59	113
21	351	308	.....	.....	349	371	420	192	.....	142	59	113
22	351	308	.....	.....	349	371	446	210	.....	127	59	113
23	351	308	.....	210	349	371	473	210	.....	101	68	113
24	329	308	.....	247	349	371	473	228	.....	64	83	101
25	329	308	.....	266	349	371	446	247	.....	64	78	101
26	329	308	.....	.....	349	371	420	247	.....	64	78	158
27	329	308	.....	.....	349	371	395	247	.....	64	78	192
28	329	308	.....	.....	349	371	371	247	.....	68	78	201
29	329	308	.....	.....	.....	371	371	247	.....	68	73	192
30	308	308	.....	.....	.....	371	371	247	.....	68	73	183
31	308	.....	.....	.....	.....	371	.....	247	.....	68	78	.....

NOTE.—Observer absent June 20 to July 22; mean discharge June 20–30 estimated at 85 second-feet. July 1–22 as in table. Mean discharge estimated, because of ice, from observer's notes and weather records as follows: Dec. 15 to Jan. 17, 230 second-feet; Jan. 19–22, 220 second-feet; Jan. 26–31, 290 second-feet; Feb. 1 and 2, 300 second-feet.

Monthly discharge of Portneuf River at Pocatello, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	398	288	354	21,800	B.
November	308	308	308	18,300	C.
December	329	.....	265	16,300	D.
January	.....	.....	241	14,800	D.
February	371	257	317	17,600	C.
March	473	327	362	22,300	B.
April	473	349	407	24,200	A.
May	349	120	220	13,500	A.
June	228	.....	128	7,620	C.
July	142	52	78.4	4,820	A.
August	83	59	68.6	4,220	A.
September	201	78	116	6,900	A.
The year	473	52	238	172,000	

See footnote to table of daily discharge.

TOPONS CREEK NEAR CHESTERFIELD, IDAHO.

LOCATION.—In sec. 34, T. 6 S., R. 38 E., at the Butterfield ranch, half a mile below head of diversion canal into the Portneuf-Marsh Valley reservoir and 7 miles west of Chesterfield, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 25, 1912, to November 6, 1914, when station was discontinued.

GAGE.—Vertical staff on right bank, back of Butterfield's barn and about 100 yards downstream.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed rocky. Channel likely to be partly clogged at times by drift and fallen trees.

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

EXTREMES OF DISCHARGE.—1912–1915: Maximum stage recorded, 8.0 feet May 21, 1912 (discharge, 355 second-feet); minimum discharge probably occurred during winter months.

DIVERSIONS AND STORAGE.—A few small ditches take out above and below station, but the main diversion, at least in flood period, is into the Portneuf-Marsh Valley reservoir on Portneuf River by means of a feeder canal heading about half a mile above the gage.

ACCURACY.—Stage-discharge relation not permanent. No discharge measurements made after September 18, 1914. Rating curve poorly defined. Gage read twice a week. Daily discharge ascertained by applying daily gage heights to rating table and interpolating for days of missing gage heights. Records poor.

Daily discharge, in second-feet, of Topons Creek near Chesterfield, Idaho, for the year ending Sept. 30, 1915.

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

NOTE.—Mean discharge for October, 9.2 second-feet; run-off, 566 acre-feet.

RAFT RIVER NEAR BRIDGE, IDAHO.

LOCATION.—In sec. 7, T. 15 S., R. 27 E., one-fourth mile above the Olson ranch and 2 miles southwest of Bridge, Cassia County. Clear Creek enters Raft River below Bridge but surface flow from this stream seldom reaches the river.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 18, 1909, to March 22, 1915, when station was discontinued

GAGE.—Inclined staff on right bank; installed February 24, 1911; read by Andrew Olson. A supplementary gage is also installed about 1 mile southeast of the main gage in a slough which carries water at flood times unless dammed off. Prior to February 24, 1911, two different gages were used, at the Langford ranch, about 1¾ miles above site of present gage.

DISCHARGE MEASUREMENTS.—Made by wading near the gage or from a bridge one-fourth mile downstream, at Olson's house.

CHANNEL AND CONTROL.—Bed of stream is of clay overlain with gravel, and may be expected to shift during flood period. The high water channel is dammed off and carried no water during the year ending September 30, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during open water periods—October to March—3.55 feet November 30 and December 5 and 7 (discharge, 21 second-feet); minimum stage recorded, 3.25 feet March 21 and 22 (discharge, 10 second-feet).

1909–1915: Maximum stage recorded, 6.5 feet June 12, 1912 (discharge, 457 second-feet); does not represent actual maximum for period on account of breaks in the record. Minimum stage recorded, 2.8 feet August 15, 18, 21, 24, and 30, and September 2 and 4, 1911 (discharge, 1.5 second-feet).

WINTER FLOW.—Stage-discharge relation greatly affected by ice; flow estimated from observer's notes and weather records.

DIVERSIONS.—Many small ranch diversions made above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice November 15–27, December 1–4, and December 8 to February 19. Rating curve fairly well defined. Daily discharge ascertained by applying daily gage heights to rating table except for periods in which stage-discharge relation was affected by ice. Open-water records fair; winter records poor.

The following discharge measurements was made by L. W. Roush:

November 11, 1914: Gage height, 3.51 feet; discharge, 19.4 second-feet.

Daily discharge, in second-feet, of Raft River near Bridge, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Feb.	Mar.
1	15	19	.....	.....	19	16	18	.....	.....	.....	13
2	16	19	.....	.....	19	17	18	.....	.....	.....	13
3	19	19	.....	.....	19	18	19	.....	.....	.....	13
4	18	19	.....	.....	17	19	19	.....	.....	.....	12
5	18	19	21	.....	15	20	19	.....	.....	15	12
6	19	19	21	.....	15	21	19	.....	.....	13	10
7	19	19	21	.....	13	22	19	.....	.....	13	10
8	19	19	.....	.....	13	23	19	.....	.....	13	.....
9	19	19	.....	.....	13	24	19	.....	.....	14	.....
10	19	19	.....	.....	12	25	19	.....	.....	15	.....
11	19	19	.....	.....	12	26	19	.....	.....	17	.....
12	19	19	.....	.....	12	27	19	.....	.....	19	.....
13	18	19	.....	.....	13	28	19	19	.....	19	.....
14	18	19	.....	.....	13	29	19	20	.....	.....	.....
15	18	.....	.....	.....	13	30	19	21	.....	.....	.....
						31	19	.....	.....	.....	.....

NOTE.—Mean discharge estimated because of ice from observer's notes and weather records as follows: Nov. 15–27, 17 second-feet; Dec. 1–4, 21 second-feet; Dec. 8–31, 15 second-feet; Jan. 1 to Feb. 19, 11 second-feet. Discharge interpolated on account of missing gage heights, Nov. 29, Dec. 6, Feb. 22, 24, 26, Mar. 2, 4, 8, 11, 17, and 19.

Monthly discharge of Raft River near Bridge, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	19	15	18.5	1,140	B.
November	21	.....	18.2	1,080	C.
December	21	.....	16.3	1,000	D.
January	.....	.....	11.0	676	D.
February	19	.....	12.4	689	D.
March 1-22	19	10	13.7	597	C.
The period	.....	.....	.....	5,180	

NOTE.—See footnote to table of daily discharge.

NORTH SIDE MINIDOKA CANAL NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 1, T. 9 S., R. 25 E., 650 feet below Minidoka dam, 6 miles south of Minidoka, Minidoka County.

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

GAGE.—Friez water-stage recorder on left bank, 300 feet below site of gage used prior to October 31, 1914.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge a few feet above present gage.

CHANNEL AND CONTROL.—Rock cut; practically permanent but rough.

WINTER FLOW.—No records.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.32 feet, July 5 (discharge, 1,493 second-feet); no flow from about noon September 18 to September 24 and also at times during period of no record.

1909–1915: Maximum stage recorded, 9.44, May 20, 1914 (discharge, 1,520 second-feet); no flow at various times when head gates were closed.

DIVERSIONS.—None above station and none close enough to affect stage-discharge relation.

REGULATION.—Flow controlled by head gates at Minidoka dam.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Records good.

COOPERATION.—Records furnished by United States Reclamation Service.

North Side Minidoka canal diverts from the right bank of Snake River in sec. 1, T. 9 S., R. 25 E. Water is used for irrigating the North Side Minidoka project of the United States Reclamation Service. Project has about 20 miles of main canal and about 260 miles of laterals.

Discharge measurements of North Side Minidoka canal near Minidoka, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	Aylor and Stearman..	6.50	794	June 4	M. Aylor.....	7.14	948
10	.....do.....	2.98	206	10	.....do.....	9.10	1,418
Jan. 29	L. W. Roush.....	3.25	154	16	.....do.....	9.16	1,451
Mar. 30	G. C. Baldwin.....	1.75	70.9	24	.....do.....	9.24	1,452
Apr. 1	M. Aylor.....	2.66	170	July 1	.....do.....	9.24	1,478
5	.....do.....	4.20	398	16	.....do.....	9.02	1,451
10	.....do.....	5.16	560	21	A. W. Harrington....	8.79	1,320
14	.....do.....	7.48	1,037	22	.....do.....	8.92	1,360
19	.....do.....	8.10	1,173	22	M. Aylor.....	8.92	1,376
23	.....do.....	9.12	1,458	26	.....do.....	9.20	1,412
30	.....do.....	6.15	729	Aug. 3	.....do.....	7.35	1,006
May 5	.....do.....	7.11	938	12	.....do.....	8.05	1,148
12	.....do.....	6.72	846	19	.....do.....	8.68	1,313
21	.....do.....	6.43	803	25	.....do.....	8.11	1,151
21	A. W. Harrington....	6.42	800	Sept. 1	.....do.....	7.78	1,086
27	M. Aylor.....	6.42	790				

NOTE.—All measurements except those made by Baldwin, Roush, and Harrington furnished by U. S. Reclamation Service.

Daily discharge, in second-feet, of North Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	792	149	741	903	1,465	1,077	1,092
2	783	173	778	928	1,452	1,006	1,084
3	570	221	921	939	1,470	988	1,060
4	461	318	936	941	1,470	1,006	981
5	419	379	934	936	1,493	1,034	921
6	354	470	919	967	1,484	1,072	814
7	305	517	870	1,044	1,443	1,077	770
8	310	528	923	1,125	1,440	1,084	770
9	267	529	930	1,262	1,440	1,116	715
10	219	553	947	1,400	1,446	1,118	679
11	218	665	956	1,454	1,416	1,142	623
12	225	794	826	1,451	1,405	1,160	605
13	232	897	839	1,454	1,427	1,200	601
14	232	997	841	1,459	1,429	1,207	601
15	227	1,087	847	1,462	1,435	1,225	692
16	223	1,200	820	1,454	1,421	1,265	784
17	221	1,283	782	1,459	1,394	1,278	790
18	220	1,359	788	1,462	1,367	1,297	389
19	55	1,079	794	1,456	1,364	1,313	0
20	24	1,311	786	1,459	1,362	1,319	0
21	389	1,391	786	1,456	1,356	1,319	0
22	564	1,427	780	1,456	1,375	1,286	0
23	373	1,437	782	1,470	1,410	1,257	0
24	.....	1,429	784	1,470	1,446	1,235	83
25	.....	1,402	782	1,459	1,459	1,192	505
26	.....	1,365	784	1,454	1,459	1,157	648
27	.....	1,394	790	1,451	1,421	1,157	652
28	.....	1,400	820	1,459	1,332	1,155	652
29	.....	1,356	845	1,470	1,263	1,137	648
30	.....	732	849	1,465	1,192	1,135	650
31	.....	.....	847	.....	1,123	1,135	.....

NOTE.—No record received Oct. 24 to Mar. 31, small amount of water flowing most of the period.

Monthly discharge of North Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October 1-23	792	24	334	15,200
April	1,437	149	928	55,200
May	956	741	840	51,600
June	1,470	903	1,320	78,600
July	1,493	1,123	1,400	86,100
August	1,319	988	1,170	71,900
September	1,092	0	594	35,300

SOUTH SIDE MINIDOKA CANAL NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 12, T. 9 S., R. 25 E., Cassia County, 300 yards below head gates at Minidoka dam, 6 miles south of Minidoka.

RECORDS AVAILABLE.—April 21, 1909, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank. Prior to irrigation season of 1910 gage was 200 or 300 feet upstream. Datum unchanged since spring of 1910.

DISCHARGE MEASUREMENTS.—Made from suspension footbridge a few feet above gage.

CHANNEL AND CONTROL.—Canal section is in earth; may shift. Stage-discharge relation affected by growth of aquatic plants.

WINTER FLOW.—No records.

EXTREMES OF DISCHARGE.—1909–1915: Maximum stage recorded, 5.43 feet June 25, 1915 (discharge, 938 second-feet); probably no flow during periods of no record.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates at Minidoka dam.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants, but a large number of measurements were made and records are believed good.

COOPERATION.—Records furnished by United States Reclamation Service.

South Side Minidoka canal diverts from the left bank of Snake River in sec. 1, T. 9 S., R. 25 E. Water is used for irrigating the South Side Minidoka project of the United States Reclamation Service. Project has about 13 miles of main canal and about 20 miles of laterals.

Discharge measurements of South Side Minidoka canal near Minidoka, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 10	M. Aylor	2.55	257	June 24	M. Aylor	5.48	956
Apr. 1	do	1.58	146	July 1	do	5.28	880
5	do	2.14	230	10	do	5.48	872
10	do	2.63	313	16	do	5.37	855
14	do	3.11	402	22	A. W. Harrington	5.43	888
19	do	3.90	565	22	M. Aylor	5.43	869
23	do	4.50	718	29	do	5.12	797
30	do	4.46	682	Aug. 3	do	4.90	760
May 5	do	3.01	381	12	do	5.00	773
12	do	3.32	438	19	do	5.08	794
21	A. W. Harrington	3.24	398	25	do	4.91	767
21	M. Aylor	3.22	411	Sept. 4	do	4.32	632
29	do	3.36	439	11	do	4.15	583
June 4	do	3.39	443	20	do	3.76	478
10	do	4.49	704	25	do	3.88	528
15	do	5.24	884				

NOTE.—All measurements except those made by A. W. Harrington furnished by U. S. Reclamation Service.

Daily discharge, in second-feet, of South Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	248	150	646	448	901	776	790
2	186	157	613	448	899	766	747
3	211	186	577	450	899	756	680
4	216	206	435	452	914	752	641
5	225	228	384	452	907	749	623
6	223	229	396	454	894	747	618
7	225	232	398	458	878	742	626
8	228	235	400	537	814	776	629
9	226	232	412	595	875	766	590
10	248	286	429	677	878	766	572
11	244	331	437	742	878	766	572
12	248	364	437	811	875	771	547
13	230	369	439	835	871	786	528
14	241	383	444	838	871	795	499
15	241	410	446	856	878	781	495
16	235	475	450	886	848	781	486
17	228	508	465	886	835	783	475
18	235	549	435	909	871	788	462
19	235	570	408	924	871	790	465
20	235	627	410	933	878	788	482
21	236	689	416	924	850	783	501
22	260	699	420	927	835	778	510
23	260	740	422	930	871	776	519
24	185	680	425	935	871	768	512
25	151	675	437	938	835	766	515
26	110	670	435	927	853	768	477
27	119	660	433	899	846	776	423
28	119	672	452	899	823	781	418
29	119	694	469	930	813	781	418
30	120	696	439	909	798	793	416
31	123	.....	439	.....	773	795	.....

NOTE.—No record obtained Nov. 1 to Apr. 1.

Monthly discharge of South Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	260	110	207	12,700
April	740	150	453	27,000
May	646	384	447	27,500
June	938	448	760	45,200
July	907	783	866	53,200
August	795	742	774	47,600
September	790	416	541	32,200

GOOSE CREEK ABOVE TRAPPER CREEK, NEAR OAKLEY, IDAHO.

LOCATION.—In sec. 13, T. 15 S., R. 21 E., Cassia County, about 200 feet above upper dam site on Goose Creek, 5 miles above Trapper Creek, and 10 miles south of Oakley.

DRAINAGE AREA.—Not measured.

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

GAGE.—Friez water-stage recorder on right bank. Gage used prior to flood of July 30, 1912, was on right bank about 200 feet farther downstream and at a different datum.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 250 feet upstream from gage.

CHANNEL AND CONTROL.—Bed rocky; shifts slightly. Banks high and not subject to overflow. Point of zero flow, according to measurements made July 31, 1915, gage height 0.9 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.55 feet at 11 p. m. April 23 (discharge, 80 second-feet); minimum stage recorded, 1.19 feet at 9 a. m. August 13 (discharge, 1.1 second-feet).

1911–1915: Maximum stage recorded, 4.4 feet May 22, 1912 (discharge, 493 second-feet); minimum stage recorded August 13, 1915.

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

DIVERSIONS.—A number of small canals and ditches divert water above station chiefly for irrigation of lands belonging to the Utah Construction Co.

REGULATION.—None except such as might be caused by changes of head gates of ditches and canals.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Operation of water-stage recorder not satisfactory and gage-height record unreliable at times. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to rating table. Records for greater part of year fair, but at times are poor, chiefly because of unreliability of gage-height record.

COOPERATION.—Gage-height record furnished by Twin Falls-Oakley Land & Water Co.

Discharge measurements of Goose Creek above Trapper Creek, near Oakley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	L. W. Roush	2.11	30.7	July 31	A. W. Harrington	1.35	2.6
May 6	G. C. Baldwin	2.48	65.8				

Daily discharge, in second-feet, of Goose Creek above Trapper Creek, near Oakley, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	17	23	.....	61	65	67	12	3	6
2	17	23	.....	59	76	65	11	3	6
3	17	23	.....	59	78	62	8	3	6
4	20	23	50	63	78	67	8	3	7
5	20	23	45	66	73	66	8	3	7
6	20	23	42	66	67	61	8	2	7
7	20	23	37	65	65	56	10	2	7
8	23	23	40	68	62	54	11	2	7
9	23	27	41	69	60	50	10	2	6
10	23	27	41	67	60	45	9	2	7
11	23	27	43	66	59	40	8	1	8
12	23	30	45	65	57	35	8	1	8
13	23	30	47	63	56	31	7	2	9
14	23	30	49	63	57	29	9	3	9
15	23	30	49	63	54	29	7	4	10
16	23	30	50	65	51	28	7	5	11
17	23	35	50	63	49	27	7	5	10
18	23	40	50	59	50	26	6	5	11
19	23	40	48	58	59	27	6	4	10
20	23	40	46	60	61	27	6	4	9
21	23	40	46	60	62	26	5	4	9
22	23	39	47	62	65	24	5	4	8
23	23	38	48	76	69	24	4	4	8
24	23	37	49	80	77	22	4	5	9
25	23	36	50	76	77	19	4	6	9
26	23	36	51	74	76	17	4	6	13
27	23	35	52	73	73	16	3	6	16
28	23	35	54	69	69	15	3	6	13
29	23	35	57	63	71	14	3	6	13
30	23	35	60	59	72	13	3	6	13
31	23	.....	61	.....	69	.....	3	6	.....

NOTE.—Discharge interpolated Oct. 24, Nov. 3–5, 21–26, 28–30, Mar. 22–24, July 24–28, and 30. No record obtained Dec. 1 to Mar. 3.

Monthly discharge of Goose Creek above Trapper Creek, near Oakley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	23	17	22.0	1,350	C.
November	40	23	31.2	1,860	C.
Mar. 4-31	61	37	48.1	2,670	C.
April	80	58	65.3	3,890	C.
May	78	49	65.1	4,000	C.
June	67	13	36.1	2,150	C.
July	12	3	6.68	411	D.
August	6	1	3.81	234	D.
September	16	6	9.07	540	D.

TRAPPER CREEK NEAR OAKLEY, IDAHO.

LOCATION.—In sec. 33, T. 14 S., R. 21 E., Cassia County, 1½ miles above Shaw's ranch, 1 mile west of east boundary of Minidoka National Forest, 5 miles above dam of the Twin Falls-Oakley project, and 9 miles southwest of Oakley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank since April 8, 1913. From May 1, 1911, to August 27, 1912, a Lietz water-stage recorder was used, half a mile downstream from site of present gage and at different datum; from August 28, 1912, to April 7, 1913, fragmentary records were obtained from a staff gage opposite Shaw's house, 1½ miles below site of present gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Stream bed composed of small boulders and coarse gravel; fairly permanent except at extremely high stages. Banks brushy and not likely to be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.59 feet at 7 a. m. June 1 (discharge, 35 second-feet); minimum stage recorded, 1.96 feet September 3–8, inclusive (discharge, 9.1 second-feet).

1911–1915: Maximum stage recorded, 3.17 feet at 10 p. m. February 28, 1914 (discharge, 70 second-feet); minimum flow undoubtedly occurred in the winter, when stage-discharge relation is affected by ice.

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

DIVERSIONS.—None of consequence above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage-height record not fully reliable at times. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating table. Records good.

COÖPERATION.—Gage-height record furnished by Twin Falls-Oakley Land & Water Co.

Discharge measurements of Trapper Creek near Oakley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	L. W. Roush	2.04	11.4	Aug. 1	A. W. Harrington	1.99	9.6
May 7	G. C. Baldwin	2.16	16.0				

Daily discharge, in second-feet, of Trapper Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	11	11	.....	14	17	21	11	10	11
2	11	11	12	.....	14	17	19	11	10	10
3	11	11	12	11	15	17	18	11	10	9
4	11	11	12	11	15	17	18	11	10	9
5	12	11	12	11	15	16	18	11	10	9
6	12	11	12	11	15	16	17	11	10	9
7	12	11	12	11	14	16	16	11	10	9
8	12	11	12	11	14	15	16	11	10	9
9	12	11	.....	12	14	15	16	11	10	9
10	12	11	.....	11	14	15	15	11	10	9
11	12	11	.....	11	14	15	15	11	9	9
12	11	11	.....	11	14	16	15	11	9	9
13	11	11	.....	12	14	16	15	11	9	10
14	11	11	.....	12	14	16	14	11	9	10
15	11	12	.....	12	14	15	14	10	9	10
16	11	.....	.....	12	15	15	14	10	9	11
17	11	.....	.....	12	15	16	14	10	9	11
18	11	.....	.....	12	14	18	13	10	9	11
19	12	.....	.....	12	14	18	13	10	9	10
20	11	.....	.....	12	14	17	13	10	9	10
21	11	.....	.....	12	15	17	12	10	9	10
22	11	.....	.....	12	17	17	12	10	9	10
23	12	.....	.....	12	17	18	12	10	10	10
24	12	.....	.....	13	17	19	12	10	11	10
25	12	.....	.....	13	16	19	11	10	10	10
26	12	.....	.....	13	16	18	12	10	10	10
27	12	.....	.....	13	16	18	12	10	10	10
28	12	.....	.....	13	16	18	11	10	10	11
29	11	.....	.....	14	16	18	11	10	10	11
30	11	.....	.....	14	16	17	11	10	9	11
31	11	.....	.....	14	.....	17	.....	10	10	.....

NOTE.—Discharge interpolated, for lack of gage heights, Oct. 13 and 22–24. Discharge Nov. 16–30 estimated at 12 second-feet. No gage height record Nov. 16–30 or Dec. 9 to Mar. 2.

Monthly discharge of Trapper Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	12	11	11.5	707	B.
November	.....	.....	11.5	684	D.
December 1–8	12	11	11.9	189	C.
March 3–31	14	11	12.1	696	B.
April	17	14	14.9	887	B.
May	19	15	16.7	1,030	B.
June	21	11	14.3	851	B.
July	11	10	10.5	646	B.
August	11	9	9.61	591	B.
September	11	9	9.90	589	B.

BIRCH CREEK NEAR OAKLEY, IDAHO.

LOCATION.—In sec. 24, T. 14 S., R. 23 E., Cassia County, 600 feet below head gates of Birch Creek feeder canal, three-fourths mile below Martindale's house, and 5 miles southeast of Oakley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 21, 1914, to September 30, 1915, for present location; January 1, 1912, to May 31, 1913, for station above feeder canal.

GAGE.—Friez water-stage recorder on left bank about 50 feet from the road; at station above the canal a vertical staff gage was used, supplemented at times by a Lietz water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of boulders which contract the channel just below the gage and make a good control; permanent under ordinary conditions of flow. Banks high; overflow unlikely. Point of zero flow, according to measurements made May 6, 1915, gage height 0.08 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 1.24 feet at 7 p. m. April 16 (discharge, 20 second-feet); gage heights for period of minimum flow not available.

1912–1915: Maximum stage recorded, 4.5 feet April 8, 1912 (discharge, 55 second-feet); minimum stage recorded, 0.12 foot at 9 p. m. August 26, 1914 (discharge practically zero).

WINTER FLOW.—Observations discontinued during winter.

DIVERSIONS.—The Birch Creek feeder canal diverts water from the stream about 600 feet above the gage and discharges into the Goose Creek reservoir of the Twin Falls-Oakley Land & Water Co. Practically no water was diverted through this canal during 1915.

REGULATION.—The flow can be entirely or partly regulated at the head gates of the feeder canal.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve poorly defined October 1 to December 6, fairly well defined March to July. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating tables. Records fair.

COOPERATION.—Gage-height record furnished by the Twin Falls-Oakley Land & Water Co.

Discharge measurements of Birch Creek near Oakley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	L. W. Roush	0.69	3.1	Aug. 1	A. W. Harrington	0.52	1.9
May 6	G. C. Baldwin	.88	8.5				

Daily discharge, in second-feet, of Birch Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	July.
1	2.2	2.7	2.7	.....	8.2	7.4	.....
2	2.3	3.2	2.7	.....	8.7	8.2	.....
3	3.0	3.2	2.9	.....	9.6	11	.....
4	2.9	3.2	3.0	.....	8.4	10	.....
5	3.1	3.2	3.0	.....	8.2	9.3	.....
6	3.3	3.2	3.0	.....	8.0	8.4	.....
7	3.2	3.2	.....	.....	7.7	8.0	.....
8	3.2	3.2	.....	.....	7.4	7.4	3.2
9	3.2	3.3	.....	2.7	7.2	7.2	3.4
10	3.1	3.3	.....	2.8	6.7	7.4	3.1
11	3.1	3.3	.....	2.8	6.7	7.2	2.8
12	3.0	3.2	.....	3.1	6.7	7.4	2.6
13	3.0	3.1	.....	3.4	6.2	7.2	2.6
14	2.9	2.9	.....	3.4	7.0	7.2	2.5
15	2.7	2.8	.....	5.2	6.4	.....	.....
16	1.9	3.0	.....	5.8	7.7	.....	.....
17	1.8	3.1	.....	2.9	7.2	.....	.....
18	2.4	2.8	.....	1.9	6.4	.....	.....
19	2.9	2.7	.....	1.9	6.2	.....	.....
20	2.9	2.6	.....	2.3	6.7	.....	.....
21	2.9	2.5	.....	4.1	8.4	.....	.....
22	2.9	2.5	.....	7.0	10	.....	.....
23	3.0	2.5	.....	8.2	9.3	.....	.....
24	3.0	2.5	.....	9.0	7.7	.....	.....
25	3.0	2.6	.....	8.2	7.4	.....	.....
26	3.1	2.6	.....	7.4	7.4	.....	.....
27	3.1	2.6	.....	7.2	6.7	.....	.....
28	3.1	2.6	.....	7.7	6.2	.....	.....
29	3.2	2.6	.....	8.7	6.0	.....	.....
30	3.2	2.7	.....	8.7	7.0	.....	.....
31	3.2	.....	.....	8.2	.....	.....	.....

NOTE.—No gage height record obtained Oct. 23–28, Nov. 19, 20, 22–28, Dec. 7 to Mar. 8, May 15 to July 7 or July 15 to Sept. 30. Discharge interpolated Oct. 23–28, Nov. 19 20, and 22–28.

Monthly discharge of Birch Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	3.3	1.8	2.90	178	C.
November	3.3	2.5	2.90	173	C.
December 1–6	3.0	2.7	2.88	34.3	C.
March 9–31	9.0	1.9	5.33	244	C.
April	10	6.0	7.45	443	B.
May 1–14	11	7.2	8.09	225	B.
July 8–14	3.4	2.5	2.89	40.1	C.

NORTH SIDE TWIN FALLS CANAL AT MILNER, IDAHO.

LOCATION.—In sec. 20, T. 10 S., R. 21 E., Minidoka County, at highway bridge half a mile north of Milner post office and about three-fourths mile below head gates at Milner dam.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1915.

GAGE.—Vertical staff attached to downstream side of bridge pier near left bank; read by F. W. Deming, October 1, 1914, to June 26, 1915, and by T. R. Newell, June 27, to September 30, 1915. Datum of gage has remained unchanged since the establishment of the station and the original gage is still in use. A slide gage was installed on the bridge in 1911 and was set to read the same as the vertical staff, but its use was discontinued in 1913. A Lietz water-stage recorder was installed in 1912, in a shelter over the staff gage, but it never operated entirely satisfactorily and its use was abandoned in 1913. At the present time the vertical staff is used exclusively.

DISCHARGE MEASUREMENTS.—Made from a cable about 150 feet below the gage.

CHANNEL AND CONTROL.—Channel is a permanent concrete-lined section. Moss growth is heavy during the summer months and stage-discharge relation is greatly affected. Control section apparently indeterminate.

WINTER FLOW.—Stage-discharge relation not affected by ice; open-channel rating curves used throughout year.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.6 feet at 8 a. m. June 14 (discharge, 2,600 second-feet); canal reported dry October 7 to November 25.

1909–1915: Maximum discharge recorded, 2,800 second-feet, July 13, 14, 19, and 20, 1913, corresponding to a gage height of 7.9 feet. Canal reported dry at various times in 1909, 1910, and 1914.

DIVERSIONS.—None between gage and head gates and none for some distance below gage. Surplus water may be discharged into the river through waste gates about 200 feet below head of canal.

REGULATION.—Flow regulated by the head gates and waste gates.

ACCURACY.—Stage-discharge relation not permanent. Gage read once daily October 1 to June 26 and twice daily June 27 to September 30. Daily discharge ascertained by shifting-control method. Records excellent for periods in which discharge measurements were made daily; good for rest of year.

COOPERATION.—Most of the discharge measurements have been made by the hydrographer stationed at this point by the State during the irrigation season in connection with the delivery of stored water from Jackson Lake.

The North Side Twin Falls canal diverts water from the north side of Snake River at the Milner dam. This canal furnishes water for stock and for irrigation of about 240,000 acres of land in Minidoka, Lincoln, and Gooding counties. The distribution system comprises about 100 miles of main canal and about 625 miles of laterals.

Discharge measurements of North Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
May 8	G. C. Baldwin	7.10	2,220	Aug. 4	T. R. Newell	3.70	541
June 12	A. W. Harrington	7.35	2,460	5	do	3.79	554
15	Harrington and Newell [a]	7.05	2,360	6	do	3.86	574
				7	do	3.83	553
17	T. R. Newell [a]	7.30	2,480	8	do	6.66	1,730
18	do	7.32	2,490	8	do	6.74	1,760
19	do	6.50	2,170	9	do	6.80	1,850
19	do	6.30	2,040	10	do	6.83	1,900
20	do	6.46	2,110	11	do	6.65	1,880
21	do	6.98	2,330	12	do	6.75	1,970
22	do	6.80	2,240	13	do	6.58	1,860
23	do	6.84	2,260	14	do	5.94	1,610
24	do	6.80	2,250	15	do	2.09	275
25	do	6.70	2,150	16	do	2.03	274
27	do	6.78	2,150	17	do	2.00	267
27	do	6.82	2,210	18	do	2.00	258
28	do	6.83	2,210	18	Baldwin and Hoyt	1.98	245
29	do	6.82	2,170	19	T. R. Newell	1.99	248
30	do	6.89	2,180	20	do	2.03	255
July 1	do	6.86	2,170	21	do	2.05	256
2	do	6.89	2,190	22	do	2.05	255
3	do	7.00	2,250	23	do	2.08	258
3	do	7.00	2,200	24	do	2.05	255
4	do	7.05	2,240	25	do	2.03	255
5	do	7.05	2,210	26	do	2.01	255
7	do	6.60	2,000	27	do	1.98	248
8	do	6.43	1,920	28	do	1.98	254
9	do	6.40	1,900	28	do	4.30	982
10	do	6.45	1,920	29	do	4.22	973
11	do	6.38	1,870	30	do	1.92	253
12	do	6.42	1,890	31	do	1.92	259
13	do	6.34	1,830	Sept. 1	do	3.30	648
14	do	6.43	1,890	2	do	4.44	1,080
15	do	6.20	1,730	3	do	4.43	1,080
15	do	2.62	428	4	do	4.38	1,070
16	do	2.31	340	5	do	4.35	1,060
16	do	5.90	1,540	6	do	4.30	1,050
17	do	5.90	1,520	7	do	4.25	1,020
18	do	5.90	1,530	8	do	4.26	1,030
18	do	3.82	770	9	do	4.22	1,020
19	do	3.75	715	10	do	4.15	991
20	do	3.86	759	11	do	4.00	935
21	do	3.85	739	12	do	3.80	862
22	do	3.98	732	13	do	3.66	780
23	do	5.01	1,140	14	do	3.72	795
24	do	5.28	1,270	15	do	5.02	1,340
25	do	4.54	1,000	16	do	6.06	1,790
26	do	3.50	645	17	do	6.36	1,900
27	do	3.51	651	18	do	6.34	1,900
28	do	3.58	650	19	do	6.26	1,909
28	do	3.56	631	20	do	6.30	1,880
29	do	3.58	634	21	do	5.50	1,530
29	Harrington and Newell	3.61	572	22	do	5.36	1,470
				23	do	5.90	1,706
30	T. R. Newell	3.62	582	24	do	5.77	1,650
30	A. W. Harrington	3.65	567	25	do	5.77	1,650
31	T. R. Newell	3.66	592	26	do	5.86	1,690
Aug. 1	do	3.58	572	27	do	2.14	307
2	do	3.62	537	29	do	1.87	269
3	do	3.62	539				

[a] Special assistant to State engineer.

Daily discharge, in second-feet, of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,490	.....	171	181	853	828	1,180	2,310	2,300	2,150	568	500
2	1,750	.....	114	181	840	684	1,180	2,330	2,190	2,200	547	961
3	1,410	.....	97	171	828	684	1,220	2,350	2,070	2,240	529	1,080
4	1,370	.....	151	151	828	828	1,220	2,400	2,210	2,240	538	1,080
5	1,410	.....	203	181	828	141	1,640	2,400	2,350	2,220	568	1,040
6	1,370	.....	1,060	171	904	82	1,640	2,260	2,490	2,120	568	1,040
7	.....	.....	1,140	171	904	1,220	1,640	2,240	2,450	1,970	1,080	1,040
8	.....	.....	1,220	161	866	1,560	1,730	2,220	2,500	1,910	1,710	1,040
9	.....	.....	1,100	584	904	1,520	1,820	2,400	2,410	1,890	1,820	1,000
10	.....	.....	1,140	616	904	1,560	1,820	2,360	2,280	1,880	1,880	1,000
11	.....	.....	1,060	584	866	1,520	1,910	2,230	2,280	1,860	1,910	923
12	.....	.....	1,020	553	866	1,640	1,840	2,280	2,460	1,860	2,020	885
13	.....	.....	1,020	584	828	1,690	1,770	2,280	2,490	1,860	1,880	737
14	.....	.....	980	616	828	1,640	1,690	2,330	2,600	1,860	1,620	847
15	.....	.....	1,020	616	904	1,730	1,640	2,380	2,400	1,020	272	1,080
16	.....	.....	1,020	553	980	1,730	904	2,330	2,350	866	248	1,580
17	.....	.....	1,000	553	828	1,770	1,060	2,290	2,490	1,520	248	1,880
18	.....	.....	1,000	616	866	1,690	1,470	2,290	2,490	1,140	248	1,930
19	.....	.....	980	584	866	1,300	2,080	2,380	2,080	720	248	1,880
20	.....	.....	412	616	942	1,220	2,080	2,300	2,130	755	248	1,880
21	.....	.....	438	616	828	1,220	2,040	2,390	2,310	755	272	1,540
22	.....	.....	438	650	684	1,140	2,080	2,390	2,260	980	248	1,490
23	.....	.....	438	755	584	1,140	2,220	2,440	2,260	1,220	248	1,620
24	.....	.....	438	866	980	1,390	2,260	2,490	2,260	1,260	248	1,660
25	.....	.....	438	828	980	1,370	2,130	2,450	2,100	792	248	1,660
26	.....	1,300	438	866	1,060	1,340	2,180	2,410	2,200	616	248	1,710
27	.....	897	438	828	1,140	1,320	2,240	2,500	2,200	616	248	885
28	.....	494	236	828	1,220	1,290	2,300	2,370	2,200	650	547	296
29	.....	494	236	828	.....	1,270	2,350	2,380	2,150	607	950	260
30	.....	494	192	866	.....	1,250	2,330	2,420	2,150	568	248	248
31	.....	.....	181	866	.....	1,220	.....	2,420	.....	600	255	.....

NOTE.—Canal reported dry Oct. 7 to Nov. 25. No gage-height record received; discharge interpolated Nov. 27, Feb. 1, 2, 26, 27, Mar. 25–30, Apr. 8, 12, 13, 26–28, 30, May 2, 7, 14, 16, 25, June 1, 2, and 5.

Monthly discharge of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,750	0	284	17,500	C.
November	1,300	0	123	7,320	C.
December	1,220	97	639	39,300	B.
January	866	151	556	34,200	B.
February	1,220	584	890	49,400	B.
March	1,770	82	1,260	77,500	B.
April	2,350	904	1,790	107,000	B.
May	2,500	2,220	2,360	145,000	A.
June	2,600	2,070	2,300	137,000	A.
July	2,240	568	1,390	85,500	A.
August	2,020	248	726	44,600	A.
September	1,930	248	1,160	69,000	A.
The year	2,600	0	1,120	813,000	

SOUTH SIDE TWIN FALLS CANAL AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., at the wagon bridge about one-eighth of a mile below the head gates at the village of Milner, Twin Falls County.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1915.

GAGE.—Vertical staff in two sections, read by F. W. Deming October 1, 1914, to June 26, 1915, and by T. R. Newell from June 27 to September 30, 1915. The main or upper section of the gage is on the left bank of the canal about 100 feet upstream from the highway bridge, to the lower side of which the low-water section is fastened. This low-water section is the original gage, but on account of the difficulty in making readings accurately at high stages the high-water section was installed early in the summer of 1912 and has since been used exclusively for stages above 5.3 feet. The two sections read practically the same, although the datum of the upstream section is about 0.1 foot higher than the other. A Friez water-stage recorder is installed opposite the upper staff gage, but was not in use during the year ending September 30, 1915.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Channel at gage is blasted out of rock and is practically permanent, but slight changes of control occasionally occur due to washing in and deposit of silt.

WINTER FLOW.—Stage-discharge relation seldom affected by ice; open-channel rating curves used throughout year. Because of the close proximity of the gaging station to the head gates, ice never forms in the immediate vicinity of the gage, but it has been known to form to a sufficient extent farther down the canal to affect the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.8 feet May 1–9, June 12–14 and 17 (discharge, 3,250 second-feet); minimum stage recorded, 1.8 feet March 10 and April 3 (discharge, 94 second-feet).

1909–1915: Maximum stage recorded in May and June, 1915; minimum stage recorded, 0.8 foot April 7, 1913 (discharge, 11 second-feet).

DIVERSIONS.—None from canal above gage and none of consequence for several miles below.

REGULATION.—Flow regulated at head gates.

ACCURACY.—Stage-discharge relation practically permanent, but may have been changed slightly by effect of ice during winter months. Rating curve well defined. Gage read once daily October 1 to June 26 and twice daily June 27 to September 30. Discharge determined by applying mean daily gage height to rating table. Open-water records good; winter records somewhat uncertain, owing to unknown effect of ice.

COOPERATION.—Gage-height record furnished and part of the discharge measurements made by employees of the Twin Falls Canal Co. and of the Idaho State Engineer.

The South Side Twin Falls canal diverts water from the south side of Snake River at the Milner dam. This canal furnishes water for stock and for the irrigation of about 200,000 acres of land in the vicinity of Twin Falls. The distribution system comprises about 110 miles of main canal and about 590 miles of laterals.

Discharge measurements of South Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 9	L. W. Roush	4.91	870	June 29	T. R. Newell	9.35	2,980
June 13	A. W. Harrington	9.81	3,150	July 29	A. W. Harrington	7.33	1,850
21	Lyman	9.39	2,950	Aug. 15	T. R. Newell	7.57	1,950

Daily discharge, in second-feet, of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,320	809	776	1,090	712	532	398	3,250	2,190	2,950	1,830	1,700
2	1,200	842	712	1,090	712	532	398	3,250	2,190	3,010	1,830	1,480
3	1,090	809	712	1,090	776	590	94	3,250	2,470	3,010	1,830	1,400
4	1,010	809	712	1,010	776	590	504	3,250	2,470	3,010	1,980	1,400
5	1,050	809	712	1,050	842	590	561	3,250	2,470	3,010	1,980	1,400
6	1,010	809	776	1,010	842	590	561	3,250	2,250	2,950	1,980	1,400
7	909	809	744	1,010	875	590	744	3,250	2,250	1,880	1,980	1,400
8	909	809	744	1,010	875	590	681	3,250	3,070	1,880	1,980	1,400
9	809	809	744	1,010	875	590	776	3,250	3,070	1,880	1,980	1,400
10	809	809	909	978	809	94	1,120	1,700	3,070	1,880	1,980	1,880
11	809	809	978	978	809	776	1,440	2,300	3,190	1,980	1,980	1,880
12	809	809	776	842	809	102	1,700	2,030	3,250	2,250	1,980	2,030
13	809	809	909	842	809	650	1,790	2,030	3,250	2,300	1,980	2,190
14	809	809	978	842	809	650	1,830	2,030	3,250	2,300	1,980	2,250
15	809	909	1,120	842	809	650	1,880	2,030	3,190	2,650	1,980	2,250
16	776	809	1,160	842	809	650	1,880	2,030	3,130	2,650	1,980	2,190
17	809	809	1,160	842	809	875	1,440	2,360	3,250	2,650	1,980	2,140
18	809	809	1,200	842	325	373	160	2,190	3,010	2,590	1,930	2,140
19	809	809	1,200	842	325	650	1,280	2,030	2,890	2,590	1,880	2,140
20	776	809	1,200	842	325	650	1,280	1,980	2,890	2,590	1,880	2,140
21	776	744	1,200	909	424	744	1,700	1,930	3,010	2,590	1,880	2,140
22	776	744	1,200	978	424	477	2,030	1,980	3,010	2,140	1,880	2,190
23	776	142	1,280	909	424	102	2,190	1,980	3,010	1,980	1,880	2,300
24	776	744	1,280	909	424	532	2,530	1,830	3,010	1,980	1,880	2,300
25	776	744	1,280	909	424	532	2,530	1,830	3,010	1,930	1,880	2,300
26	842	744	1,240	909	424	398	3,010	1,880	3,010	1,830	1,830	2,300
27	809	744	978	842	424	398	3,070	1,930	3,010	1,830	1,830	2,190
28	809	744	978	776	450	398	3,130	1,980	3,010	1,830	1,830	2,080
29	809	744	1,120	776	.....	590	3,190	2,030	3,010	1,830	1,830	1,980
30	809	744	1,120	744	.....	744	3,190	2,080	3,010	1,830	1,830	1,930
31	809	.....	1,090	776	.....	744	.....	2,190	.....	1,830	1,830	.....

NOTE.—No gage-height record received May 26–29; discharge interpolated.

Monthly discharge of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,320	776	868	53,400	A.
November	909	142	772	45,900	B.
December	1,280	712	1,000	61,500	D.
January	1,090	744	914	56,200	D.
February	875	325	648	36,000	C.
March	875	94	548	33,700	B.
April	3,190	94	1,570	93,400	A.
May	3,250	1,700	2,370	146,000	B.
June	3,250	2,190	2,900	173,000	A.
July	3,010	1,830	2,310	142,000	A.
August	1,980	1,830	1,910	117,000	A.
September	2,300	1,400	1,930	115,000	A.
The year	3,250	94	1,480	1,070,000	

BIG COTTONWOOD CREEK NEAR OAKLEY, IDAHO.

LOCATION.—In sec. 19, T. 13 S., R. 21 E., one-fourth mile above heading of Twin Falls-Oakley Land & Water Co. feeder canal, 1 mile above J. H. Roark's house, 2 miles above mouth of Cedar Creek, and 10 miles northwest of Oakley, Cassia County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 27, 1909, to January 10, 1915, when station was discontinued.

GAGE.—Friez water-stage recorder on left bank half a mile above site of vertical staff gage which was used November 27, 1909, to April 27, 1913. Present gage read 0.72 foot July 28, 1913, when old gage read 1.20 feet.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge at old station.

CHANNEL AND CONTROL.—Bed composed chiefly of small cobblestones and boulders; may shift at high stages. Banks fairly high; overflow unlikely. Point of zero flow estimated August 25, 1915, gage height 0.3 foot.

EXTREMES OF DISCHARGE.—Gage heights for the year ending September 30, 1915, too incomplete to warrant publication of maximum and minimum.

1909–1914: Maximum stage recorded, 3.7 feet (old gage datum) May 30, 1912 (discharge, 125 second-feet); minimum discharge practically zero and was observed in both 1910 and 1915.

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

DIVERSIONS.—During the late summer most of the flow of the stream is diverted around the station in order to minimize loss by seepage. The capacity of the diversion ditch is not definitely known.

REGULATION.—None except that due to diversion.

ACCURACY.—Stage-discharge relation practically permanent throughout the year. Rating curve fairly well defined. Gage-height record fragmentary. Mean daily gage heights determined by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating table. Records fair above and poor below 2 second-feet.

COOPERATION.—Gage-height record furnished by the Twin Falls-Oakley Land & Water Co.

Discharge measurements of Big Cottonwood Creek near Oakley, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 14	L. W. Roush	0.58	1.8	July 30	A. W. Harrington	0.51	1.2
May 5	G. C. Baldwin	.91	14.4				

Daily discharge, in second-feet, of Big Cottonwood Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Day.	Oct.	Nov.	Dec.	Jan
1	1.4	2.2	1.4	0.8	16	1.9	1.4	1.2	.....
2	1.6	2.2	1.5	.8	17	2.1	1.5	1.1	.....
3	1.9	2.2	1.6	.8	18	2.2	1.5	1.0	.....
4	2.2	2.2	1.6	.8	19	2.1	1.6	.9	.....
5	2.2	2.2	1.5	.8	20	2.1	1.6	.8	.....
6	2.5	2.2	1.5	.8	21	2.2	1.5	.8	.....
7	2.2	2.2	1.1	.8	22	2.5	1.5	.8	.....
8	2.1	2.1	1.2	.8	23	2.5	1.4	.8	.....
9	2.2	2.1	1.2	.8	24	2.5	1.4	.8	.....
10	2.2	2.1	1.3	.8	25	2.2	1.4	.8	.....
11	2.2	2.1	1.4	.....	26	2.2	1.4	.8	.....
12	2.2	2.2	1.4	.....	27	2.2	1.4	.8	.....
13	2.1	2.1	1.5	.....	28	2.2	1.4	.8	.....
14	1.9	1.9	1.4	.....	29	2.2	1.5	.8	.....
15	1.9	1.5	1.3	.....	30	2.2	1.5	.8	.....
					31	2.2	.....	.8	.....

NOTE.—Discharge interpolated on account of lack of gage heights Dec. 10–12, 14–19, 21–26, Dec. 28 to Jan. 2, and Jan. 4–9.

Monthly discharge of Big Cottonwood Creek near Oakley, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	2.5	1.4	2.14	132	C.
November	2.2	1.4	1.78	106	C.
December	1.6	.8	1.15	68.9	D.
January	.8	.8	.80	15.9	D.
The period				323	

SALMON FALLS CREEK ABOVE UPPER VINEYARD DITCH, NEAR CONTACT, NEV.

LOCATION.—In sec. 5, T. 44 N., R. 63 E., three-fourths mile above head gates of Upper Vineyard ditch, 3 miles above ranch house on Vineyard ranch, and 10½ miles southwest of Contact, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 17, 1914, to July 25, 1915, when station was discontinued.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just above gage.

CHANNEL AND CONTROL.—Bed composed of rocks, gravel, and sand. Control permanent during period covered by record.

WINTER FLOW.—Stage-discharge relation probably affected by ice for short periods winter gage-height record fragmentary.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 6.69 feet from 2 to 8 p. m. May 17 (discharge, 207 second-feet); minimum stage, 5.17 feet July 17, 18, 23, and 24 (discharge, 24 second-feet). Both maximum and minimum stages probably occurred during period of no records.

1914–1915: Maximum discharge recorded, 596 second-feet May 17–19, 1914 (estimated from hydrograph); minimum stage recorded in July, 1915.

DIVERSIONS.—Station is above all diversions on Vineyard and San Jacinto ranches.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory but instrument not inspected regularly. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating table. Records good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Utah Construction Co.

Discharge measurements of Salmon Falls Creek above Upper Vineyard ditch, near Contact, Nev., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 5	L. W. Beason[a]	5.39	39.4	May 2	G. C. Baldwin	6.55	176
17	do	5.38	39.1	July 25	A. W. Harrington	5.18	26.5

[a] Employee of Utah Construction Co.

Daily discharge, in second-feet, of Salmon Falls Creek above Upper Vineyard ditch, near Contact, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	38	40	33	45	.....	36	84	202	.....	38
2	38	39	32	44	.....	36	87	188	.....	36
3	39	39	33	45	.....	36	96	177	.....	33
4	38	39	33	45	.....	35	100	161	.....	34
5	38	39	34	45	.....	35	101	145	.....	36
6	38	39	34	45	.....	33	101	130	.....	36
7	38	38	32	45	.....	33	105	121	.....	38
8	39	38	30	46	.....	33	108	116	.....	37
9	44	36	32	46	.....	34	99	112	.....	37
10	42	36	.....	47	.....	35	100	112	.....	34
11	41	36	.....	47	.....	36	106	109	.....	32
12	40	36	.....	48	.....	38	116	130	.....	31
13	39	36	.....	49	.....	38	120	150	.....	30
14	38	36	.....	43	.....	39	126	153	.....	28
15	38	32	.....	.....	.....	41	123	140	.....	27
16	38	31	.....	.....	.....	42	121	176	.....	26
17	38	32	.....	.....	.....	44	121	209	.....	24
18	38	30	.....	.....	.....	47	127	198	.....	24
19	38	29	.....	.....	.....	47	139	.....	.....	26
20	37	29	.....	.....	.....	46	147	.....	.....	26
21	40	28	43	.....	36	47	163	.....	.....	27
22	45	28	44	.....	35	52	191	.....	.....	25
23	45	32	43	.....	35	64	181	.....	.....	24
24	44	31	44	.....	35	78	163	.....	.....	24
25	43	32	44	.....	36	82	156	.....	.....	25
26	42	32	45	.....	38	81	152	.....	.....	.....
27	42	34	44	.....	37	82	145	.....	47	.....
28	41	35	44	.....	35	84	145	.....	48	.....
29	40	33	44	.....	.....	92	155	.....	43	.....
30	40	32	44	.....	.....	96	182	.....	39	.....
31	40	.....	45	.....	.....	88	.....	.....	.....	.....

NOTE.—Discharge Dec. 10-20 estimated at 35 second-feet. No records obtained Jan. 15 to Feb. 20 and May 19 to June 26.

Monthly discharge of Salmon Falls Creek above Upper Vineyard ditch, near Contact, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	45	37	40.0	2,460	B.
November	40	28	34.2	2,040	B.
December	.....	.....	37.5	2,310	C.
January 1-14	49	43	45.7	1,270	C.
February 21-28	38	35	35.9	570	B.
March	96	33	51.9	3,190	B.
April	191	84	129	7,680	B.
May 1-18	202	109	151	5,390	B.
June 27-30	48	39	44.2	351	B.
July 1-25	38	24	30.3	1,506	B.

SALMON FALLS CREEK NEAR SAN JACINTO, NEV.

LOCATION.—In sec. 23, T. 47 N., R. 64 E., in canyon 200 yards below county highway bridge and 5 miles north of San Jacinto, Elko County. Shoshone Creek enters 250 yards above station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 17, 1909, to September 30, 1915.

GAGE.—Barrett and Lawrence water-stage recorder on the right bank; installed November 20, 1911. Gage used prior to June 30, 1910, was a vertical staff on right bank a short distance upstream from site of present gage and at different datum. From July 1, 1910, to November 19, 1911, record was obtained from a Friez recorder at present site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable 20 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control shifts slightly. At high stages left bank is subject to overflow, and creek may flow in two channels.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.79 feet May 25 and 26 (discharge, 246 second-feet); minimum stage recorded, 2.18 feet September 14 and 16 (discharge, 14 second-feet).

1909–1915: Maximum stage recorded, 7.5 feet May 22, 1912 (discharge, 1,280 second-feet); minimum stage recorded 2.18 feet September 14 and 16, 1915 (discharge, 14 second-feet).

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

DIVERSIONS.—A large number of diversions on the ranches of the Vineyard Land & Stock Co. above the station appropriate practically all the low-water flow of Salmon Falls Creek and Shoshone Creek.

REGULATION.—None above the gage. The dam of the Twin Falls-Salmon River Land & Water Co. is about 15 miles below the station and the Salmon reservoir has a capacity of about 180,000 acre-feet.

ACCURACY.—Stage-discharge relation not permanent. Rating curves fairly well defined October 1 to December 15 and December 30 to September 30. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating tables; shifting-control method used December 16–29. Records good.

COOPERATION.—Gage-height record furnished and part of discharge measurements made by the Twin Falls-Salmon River Land & Water Co.

Discharge measurements of Salmon Falls Creek near San Jacinto, Nev., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 28	C. E. Tappan [a]	2.89	76.9	May 1	G. C. Baldwin	3.48	179
Mar. 30	do	3.49	171	July 24	A. W. Harrington	2.26	18.1

[a] Employee of Twin Falls-Salmon River Land & Water Co.

Daily discharge, in second-feet, of Salmon Falls Creek near San Jacinto, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	38	66	51	51	60	77	165	178	202	31	15	15
2	39	66	50	51	63	77	159	198	211	28	15	16
3	41	66	60	51	62	77	155	209	220	26	15	15
4	42	65	62	50	61	76	159	200	218	25	15	15
5	42	66	62	49	60	76	172	193	211	25	15	15
6	42	71	62	48	57	74	176	204	191	25	15	15
7	43	69	52	50	58	72	174	168	176	25	15	15
8	45	68	52	53	61	71	174	151	159	24	15	15
9	48	66	48	53	62	72	174	133	144	24	15	15
10	49	65	51	52	64	72	170	124	126	23	15	15
11	50	60	62	53	64	74	165	112	117	22	15	15
12	49	60	60	53	65	76	165	108	114	22	15	15
13	50	60	52	54	64	80	165	105	112	22	15	15
14	57	62	44	54	64	80	172	107	.....	21	15	14
15	58	59	43	55	64	82	182	107	.....	20	15	15
16	59	59	47	54	65	84	182	105	.....	20	15	14
17	59	58	49	52	68	86	180	108	.....	20	15	15
18	58	56	50	51	72	86	176	136	.....	20	15	15
19	57	54	50	51	74	89	172	148	.....	20	15	15
20	58	52	49	50	74	89	170	176	.....	18	15	15
21	59	52	49	50	74	90	170	200	.....	18	15	15
22	70	54	50	49	75	94	180	220	.....	19	15	15
23	69	62	49	46	72	99	198	225	.....	18	15	15
24	68	63	49	45	71	104	200	243	.....	18	15	15
25	65	63	51	44	72	119	200	246	.....	17	16	15
26	66	63	51	43	75	131	195	246	.....	16	16	16
27	64	62	50	43	74	146	184	239	.....	16	15	16
28	65	60	50	43	75	151	176	230	.....	16	15	15
29	65	60	50	47	.....	159	170	230	.....	16	15	15
30	66	52	50	52	.....	174	172	220	32	16	15	16
31	65	.....	50	55	.....	176	.....	207	.....	16	15	.....

NOTE.—Discharge June 14–29 estimated at 72 second-feet on account of lack of gage heights.

Monthly discharge of Salmon Falls Creek near San Jacinto, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	70	38	55.0	3,380	C.
November	71	52	61.3	3,650	C.
December	62	43	51.8	3,190	C.
January	55	43	50.1	3,080	C.
February	75	57	66.8	3,710	B.
March	176	71	97.2	5,980	B.
April	200	155	175	10,400	B.
May	246	105	176	10,800	A.
June	220	32	113	6,720	C.
July	31	16	20.9	1,290	B.
August	16	15	15.1	928	B.
September	16	14	15.1	898	B.
The year	246	14	74.7	54,000	

SHOSHONE CREEK NEAR SAN JACINTO, NEV.

LOCATION.—In sec. 17, T. 47 N., R. 65 E., half a mile above headworks of North Side ditch, 2 miles above house on Shoshone Creek ranch, and 11 miles northeast of San Jacinto, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 14, 1914, to August 24, 1915, when station was discontinued.

GAGE.—Stevens water-stage recorder on right bank; installed August 27, 1914; May 14 to August 27, staff gage about 500 feet downstream at different datum, used also as a reference gage for Lietz water-stage recorder June 15 to July 31, 1914, and Stevens recorder August 3 to 27, 1914.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable about 500 feet downstream.

CHANNEL AND CONTROL.—Bed consists of gravel and loose rocks. Control not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.94 feet 9 to 11 p. m. May 23 (discharge, 151 second-feet); minimum stage, 3.58 feet at 10 a. m. July 27 (discharge, 7.6 second-feet).

1914–15: Maximum stage recorded, 5.94 feet 9 to 11 p. m. May 23, 1915 (discharge, 151 second-feet); minimum stage, 0.26 foot (old staff gage datum) August 22–27, 1914 (discharge, 7.4 second-feet).

WINTER FLOW.—Stage-discharge relation probably affected by ice. No winter records obtained.

DIVERSIONS.—Station above all diversions on Shoshone ranch. Numerous diversions made in Shoshone basin about 10 miles above station.

ACCURACY.—Stage-discharge relation not permanent; changed during the winter. Rating curves well defined October 1 to December 6 and February 15 to August 24. Gage-height record incomplete owing to lack of attention to recorder. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating tables. Records fair.

COOPERATION.—Gage-height record furnished by Utah Construction Co.

Discharge measurements of Shoshone Creek near San Jacinto, Nev., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	C. C. Baldwin	4.52	47.0
July 27	A. W. Harrington	3.58	7.6

Daily discharge, in second-feet, of Shoshone Creek near San Jacinto, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	11	14	14	.....	18	84	48	92	9.4	8.9
2	11	14	15	.....	17	78	48	104	9.2	8.9
3	12	14	16	.....	17	84	47	87	8.9	8.7
4	12	14	14	.....	17	96	45	77	8.9	8.7
5	12	14	16	.....	17	99	43	67	8.9	8.7
6	13	13	14	.....	14	90	38	61	8.9	9.2
7	13	13	.....	.....	16	87	34	55	8.9	9.6
8	14	13	.....	.....	17	86	33	49	.....	9.6
9	14	13	.....	.....	17	81	36	43	.....	9.2
10	13	13	.....	.....	18	76	.....	41	.....	8.9
11	13	13	.....	.....	18	71	.....	38	.....	8.9
12	13	13	.....	.....	18	71	.....	37	.....	8.9
13	12	13	.....	.....	18	70	.....	38	.....	9.2
14	12	14	.....	.....	20	73	.....	38	.....	9.2
15	12	14	.....	18	21	73	.....	33	.....	8.5
16	12	13	.....	17	22	67	.....	28	.....	8.0
17	12	13	.....	18	22	65	.....	26	.....	8.0
18	12	14	.....	18	22	64	.....	24	.....	8.2
19	13	13	.....	19	21	58	.....	21	.....	8.2
20	13	14	.....	19	21	55	.....	18	.....	8.0
21	14	15	.....	19	22	58	.....	17	.....	8.0
22	14	16	.....	19	24	62	139	16	.....	8.2
23	14	15	.....	18	28	66	144	14	.....	8.7
24	14	13	.....	18	33	63	146	14	.....	8.7
25	14	13	.....	19	41	59	149	13	.....	.....
26	14	14	.....	20	60	54	142	12	.....	.....
27	14	14	.....	18	66	45	130	11	7.6	.....
28	14	13	.....	18	72	41	122	11	7.9	.....
29	14	14	.....	.....	91	41	118	10	8.2	.....
30	14	16	.....	.....	104	46	110	9.6	8.5	.....
31	14	.....	.....	.....	94	.....	94	.....	8.7	.....

NOTE.—No gage height record received Oct. 9–13, May 2, 10–21, July 8–26, 28, or 29. Discharge interpolated Oct. 9–13, May 2, July 28 and 29. Discharge May 10–21 estimated at 80 second-feet and July 8–26 at 8.2 second-feet.

Monthly discharge of Shoshone Creek near San Jacinto, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	11	13.0	799	C.
November	16	13	13.7	815	C.
December 1–6	16	14	14.8	176	C.
February 15–28	20	17	18.4	511	B.
March	104	14	32.5	2,000	B.
April	99	41	68.8	4,090	B.
May	149	.....	84.6	5,200	C.
June	104	9.6	36.8	2,190	B.
July	.....	.....	8.38	515	C.
August 1–24	9.6	8.0	8.71	415	C.

CEDAR CREEK NEAR ROSEWORTH, IDAHO.

LOCATION.—In sec. 12, T. 14 S., R. 13 E., 200 yards upstream from dam site of West End Twin Falls Irrigation Co., 10 miles south of Roseworth, Twin Falls County, and 12 miles above mouth of creek. House Creek, the principal tributary of Cedar Creek, enters 2½ miles above gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 30, 1909, to December 16, 1914, when station was temporarily discontinued.

GAGE.—Vertical staff on right bank, in two sections; high-water section, reading from 4.6 to 7.5 feet, was installed May 3, 1912. Gage read by Frank Clark.

DISCHARGE MEASUREMENTS.—Made by wading or from a plank footbridge near gage.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifting. During summer months stage-discharge relation is often seriously affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.35 feet October 11–12 (discharge, 28 second-feet); minimum stage recorded, 1.92 feet December 11 (discharge, 17 second-feet).

1909–1914: Maximum stage recorded, 5.2 feet March 5, 1913 (discharge, 167 second-feet); on March 1, 1910, water was above gage and discharge for day was estimated at 200 second-feet; minimum stage recorded, 1.85 feet August 27, 1910, and August 23 and 25, 1911 (discharge, 8 second-feet).

WINTER FLOW.—Stage-discharge relation not seriously affected by ice; open water rating curves assumed applicable except for short periods.

DIVERSIONS.—Several small ranch diversions are made above the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Daily discharge ascertained by applying gage heights to rating table. Records good.

The following discharge measurement was made by A. W. Harrington: October 2, 1914: Gage height, 2.04 feet; discharge, 20.3 second-fee .

Daily discharge, in second-feet, of Ceddr Creek near Roseworth, Idaho, for the period Oct. 1 to Dec. 16, 1914.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	20	20	18	11	28	23	17	21	26	23	.....
2	21	20	20	12	28	24	18	22	24	20	.....
3	24	20	20	13	27	23	18	23	24	20	.....
4	24	19	20	14	27	24	18	24	23	20	.....
5	26	19	20	15	26	23	18	25	23	19	.....
6	26	20	20	16	26	23	18	26	24	20	.....
7	26	20	18	17	27	23	.....	27	23	20	.....
8	27	23	18	18	26	23	.....	28	21	20	.....
9	27	21	18	19	26	24	.....	29	23	20	.....
10	27	23	18	20	24	24	.....	30	21	21	.....
								31	20	.....	.....

NOTE.—Discharge Dec. 14–16 estimated on account of effect of ice.

Monthly discharge of Cedar Creek near Roseworth, Idaho, for the period Oct. 1 to Dec. 16, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	28	20	24.7	1,520	B.
November	24	19	21.4	1,270	B.
December, 1–16	20	17	18.6	590	C.
The period	.....	.....	.....	3,380	

BIG WOOD RIVER AT HAILEY, IDAHO.

LOCATION.—In sec. 9, T. 2 N., R. 18 E., at steel highway bridge one-fourth mile southwest of Hailey, Blaine County.

DRAINAGE AREA.—640 square miles (measured on topographic maps).

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

GAGE.—Inverted stadia board spiked to pile near left abutment of bridge; read by G. C. Hendrickson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel fairly straight above and below station. Banks low, covered with light brush, and subject to overflow at high stages, when river may flow in from one to three channels, the number depending on the stage. Bed consists of coarse gravel and sand; clean. Low-water control consists of sheet piling used to protect a water main crossing river; high-water control subject to shift but permanent during 1915. Point of zero flow, determined August 5, 1915, gage height 5.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.23 feet June 25 (discharge, 883 second-feet); minimum stage recorded, 4.88 feet September 29–30 (discharge, 21 second-feet).

WINTER FLOW.—No information.

DIVERSIONS.—Only a few small diversions for irrigation are made above the station. The Hailey power plant, half a mile upstream, utilizes as a tailrace a natural channel on the east side of the river known as Big Wood Slough; a large amount of water diverted from main channel in this manner is returned to river below station. A record of the flow of Big Wood Slough is obtained, and the total flow of Big Wood River is represented by the amount of water passing both stations.

REGULATION.—Variation in the amount of water used at the power plant causes some diurnal fluctuation in flow passing the gage. Observations on the river and on Big Wood Slough are taken practically at the same hour each day, so that the effect of regulation is probably eliminated.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined for low and medium stages. Gage read to hundredths daily. Daily discharge ascertained by applying gage heights to rating table. Records good.

COOPERATION.—Gage-height record furnished and most of the discharge measurements made by the Idaho Irrigation Co.

For record of Big Wood Slough see page 110.

Discharge measurements of Big Wood River at Hailey, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 11	Crosby [a] and Beebe [a]	3.44	751	Aug. 3	Harrington and Crosby [a]	4.52	119
17	L. Crosby [a]	3.57	614	5	A. W. Harrington	4.54	116
July 7	do	3.52	677	9	L. Crosby [a]	4.59	96.1
12	do	3.84	448	16	Crosby [a] and Denecke [a]	4.68	68.0
19	do	4.16	276	Sept. 2	L. Crosby [a]	4.70	63.4
24	do	4.28	217	2	do	4.71	61.4
29	do	4.44	147				

[a] Employee of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River at Hailey, Idaho, for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		644	140	40	16	644	355	69	66
2		609	136	66	17	644	306	66	53
3		644	124	53	18	644	296	66	40
4		609	121	48	19	644	281	66	40
5		679	114	46	20	644	256	66	40
6		609	107	46	21	644	247	66	40
7		716	104	43	22	716	228	66	40
8		542	104	43	23	752	237	66	43
9		576	96	43	24	790	224	66	38
10		576	96	40	25	868	233	66	43
11	716	478	96	40	26	644	228	66	38
12	679	510	87	40	27	542	201	66	38
13	609	510	84	40	28	542	193	43	25
14	576	478	69	40	29	576	155	43	21
15	576	388	69	40	30	609	144	40	21
					31		142	40	

NOTE.—Discharge interpolated July 31 and Sept. 17.

Monthly discharge of Big Wood River at Hailey, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 11–30	868	542	653	25,900	B.
July	716	142	397	24,400	A.
August	140	40	80.9	4,970	A.
September	66	21	41.8	2,490	A.
The period				57,800	

BIG WOOD RIVER NEAR BELLEVUE, IDAHO.

LOCATION.—In sec. 20, T. 1 S., R. 18 E., three-fourths mile below Blair's ranch 1¼ miles above flow line of Magic reservoir, and 10 miles southwest of Bellevue, Blaine County. Camas Creek enters the reservoir about 3 miles below station.

DRAINAGE AREA.—823 square miles (measured on topograhic and Land Office maps).

RECORDS AVAILABLE.—July 6, 1911, to September 30, 1915.

GAGE.—Lallie water-stage recorder in wooden shelter on right bank; outside vertical staff gage at same section. Staff gage read daily by the Idaho Irrigation Co. in addition to the record obtained from the Lallie recorder.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 30 feet above the gage.

CHANNEL AND CONTROL.—Control is coarse gravel; shifts at times. Banks are clean and may be overflowed in extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, from Lallie recorder, 2.58 feet at 8 p. m. May 24 (discharge, 751 second-feet); minimum stage recorded, 0.73 foot at 10 a. m. December 20 (discharge, 69 second-feet).

1911–1915: Maximum stage recorded, 9.2 feet, May 18, 1911 (discharge, 5,070 second-feet); minimum stage recorded, 0.69 foot, August 21, 1914 (discharge, 64 second-feet).

WINTER FLOW.—Record temporarily discontinued during winter.

DIVERSIONS.—Numerous small diversions are made for irrigation in the vicinity of Bellevue and Hailey. Flood waters are stored in the Magic reservoir of the Idaho Irrigation Co. Magic dam is about 9 miles downstream.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two well-defined rating curves used, one applicable October 1 to December 28 and the other March 1 to September 30. Staff gage read to hundreths once daily. Mean daily gage heights obtained by inspecting recorder graph used November 6–19 and April 26 to August 29. Daily discharge ascertained by applying gage heights to rating table. Records good.

COOPERATION.—Gage-height record furnished and most of the discharge measurements made by the Idaho Irrigation Co.

Discharge measurements of Big Wood River near Bellevue, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.ft.*
April 26	Crosby and Hall	1.94	376	July 2	L. Crosby	2.03	433
May 7	Wilkie and Crosby	2.10	461	8	do	2.13	481
7	Wilkie and Badley	2.10	472	13	do	1.88	341
17	Crosby and Denecke	2.33	593	19	do	1.40	179
28	Baldwin and Crosby	2.30	578	29	do	1.16	126
June 17	L. Crosby	1.85	342	Aug. 6	Harrington and Crosby	1.16	133
26	Crosby and Denecke	1.98	396	17	Crosby and Denecke	1.05	106

NOTE.—All of the above with the exception of Baldwin and Harrington were employees of the Idaho Irrigation Co., or of the Idaho State engineer.

Daily discharge, in second-feet, of Big Wood River near Bellevue, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	162	233	175	89	126	578	620	369	131	92
2	158	236	172	91	128	590	688	393	129	101
3	162	236	172	92	133	566	620	364	133	93
4	160	236	168	95	137	526	520	388	133	91
5	158	233	160	92	148	504	444	379	129	99
6	153	230	158	88	172	482	413	403	124	99
7	151	227	160	85	185	460	384	434	117	101
8	153	224	148	99	185	434	350	476	113	102
9	153	227	135	95	174	418	403	449	119	104
10	153	227	137	102	185	455	429	434	113	99
11	155	230	140	107	188	504	418	374	119	101
12	155	230	133	112	199	537	384	369	124	102
13	155	224	127	115	208	561	360	350	119	104
14	153	230	121	115	241	590	324	337	122	109
15	151	222	117	119	260	620	303	294	120	107
16	151	199	104	117	278	590	315	263	120	105
17	158	202	87	119	319	584	324	231	112	102
18	191	202	79	98	364	620	307	202	117	99
19	207	188	71	93	364	694	311	182	115	95
20	216	184	69	91	388	700	298	164	113	91
21	227	180	76	92	439	675	303	164	115	88
22	224	178	79	89	465	632	315	199	112	88
23	224	178	95	91	499	663	332	182	112	91
24	230	180	102	101	413	700	350	154	112	93
25	233	183	106	104	388	700	408	146	112	96
26	233	186	109	107	364	644	408	141	109	99
27	239	183	117	110	346	578	324	131	107	99
28	236	180	133	117	360	566	286	126	104	96
29	230	183	.....	124	374	596	298	120	101	93
30	236	172	.....	124	460	584	324	119	96	91
31	236	.....	.....	126	.....	584	.....	129	95	.....

NOTE.—Discharge interpolated Nov. 20, Sept. 11, 12, 15, 19, 23, and 24 on account of lack of gage heights. No record obtained Dec. 29 to Feb. 28.

Monthly discharge of Big Wood River near Bellevue, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	239	151	187	11,500	B.
November	236	172	207	12,300	B.
December 1–28	175	69	123	6,830	B.
March	126	85	103	6,330	B.
April	465	126	281	16,700	B.
May	700	418	579	35,600	A.
June	688	286	385	22,900	A.
July	476	119	273	16,800	A.
August	133	95	116	7,130	A.
September	109	88	97.7	5,810	B.

BIG WOOD RIVER BELOW MAGIC DAM, NEAR RICHFIELD, IDAHO.

LOCATION.—In sec. 18, T. 2 S., R. 18 E, Blaine County, half a mile below the Magic dam of the Idaho Irrigation Co., and 18 miles northwest of Richfield. No tributaries between dam and station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 19, 1911, to September 30, 1915.

GAGE.—Lallie water-stage recorder on right bank; referred to an outside vertical staff.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable about 10 feet above the gage.

CHANNEL AND CONTROL.—Bed of stream and control composed of clean, coarse gravel and small boulders; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.49 feet June 16 and 22 (discharge, 1,180 second-feet); "zero discharge" reported February 3 by Lothrop Crosby, of the Idaho Irrigation Co.

1911–1915: Maximum stage recorded, 9.2 feet May 18, 1911 (discharge, 5,070 second-feet); "zero discharge" reported February 3, 1915.

WINTER FLOW.—Records discontinued during winter; winter discharge estimated by Lothrop Crosby, of the Idaho Irrigation Co., from record of gate openings at Magic dam.

DIVERSIONS.—No diversions are made by the Idaho Irrigation Co. above this station but numerous ranch diversions are made in the upper drainage basin, the largest quantity of water probably being used in the district around Hailey. Flood waters are stored in the Magic reservoir, just above the station, and the first diversion by the company is the Richfield canal about 2 miles below.

REGULATION.—Flow past station completely regulated by gates in outlet tunnel at Magic dam.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined October 1 to November 2, November 10–29, and December 7–15; well defined curve used March 27 to September 30. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying daily gage heights to rating table. Open-water records good; winter records fair.

COOPERATION.—Gage-height record and estimates of flow December 16 to March 26 furnished by the Idaho Irrigation Co., which also made most of the discharge measurements.

Discharge measurements of Big Wood River below Magic dam, near Richfield, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	Crosby and Hall	3.22	410	July 20	L. Crosby	4.03	879
26	do	3.87	771	30	Crosby and Lisle	3.38	475
May 17	Crosby and Denecke	2.76	232	31	do	3.21	403
28	G. C. Baldwin	3.26	425	31	L. Crosby	2.93	292
June 12	Crosby and Beebe	4.20	1,020	Aug. 7	Harrington and Crosby	2.80	247
24	Crosby and Denecke	4.46	1,160	Sept. 3	L. Crosby	2.19	96.7
July 9	Crosby and Lisle	3.11	350	13	S. E. Vance, jr	2.18	93.9
10	do	2.96	298				
12	do	2.68	201				

NOTE.—Baldwin and Harrington are engineers of the Geological Survey, S. E. Vance, jr., assistant to the State engineer, and the other men employees of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River below Magic dam, near Richfield, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	110	98	223	.....	92	.....	176	732	455	1,100	284	96
2	98	98	217	.....	46	.....	174	605	480	1,090	281	96
3	97	98	217	.....	0	.....	182	548	522	1,080	277	96
4	97	98	217	.....	46	.....	192	527	522	1,080	277	98
5	97	98	217	.....	.....	.....	195	527	537	1,080	280	92
6	97	98	217	.....	.....	25	195	543	543	1,070	243	93
7	97	98	217	.....	.....	.....	195	554	571	1,070	243	93
8	97	98	217	.....	.....	.....	228	617	623	1,060	240	93
9	97	98	214	.....	.....	.....	263	646	664	791	234	92
10	97	83	214	.....	.....	53	292	652	752	296	243	92
11	97	92	211	.....	.....	61	330	652	894	212	280	93
12	97	106	211	.....	.....	51	372	407	1,040	206	253	93
13	97	106	211	.....	85	42	398	274	1,060	334	253	95
14	98	106	209	.....	.....	63	412	231	1,160	929	246	95
15	98	106	209	.....	.....	123	436	204	1,160	1,030	243	154
16	98	106	.....	.....	.....	135	495	204	1,180	1,070	240	204
17	98	106	.....	.....	.....	.....	571	228	1,180	1,030	234	204
18	98	106	.....	115	64	.....	646	182	1,180	999	228	192
19	98	106	.....	100	58	72	683	212	1,170	929	221	182
20	98	106	.....	.....	51	84	832	257	1,160	887	228	126
21	98	106	.....	.....	.....	.....	832	281	1,160	839	270	107
22	98	106	.....	.....	.....	.....	752	346	1,180	805	260	103
23	98	117	.....	.....	.....	.....	752	426	1,180	791	237	102
24	98	206	.....	.....	.....	.....	752	431	1,160	784	221	100
25	98	229	.....	.....	.....	.....	765	422	1,120	791	240	98
26	98	229	.....	.....	.....	.....	778	407	1,100	798	243	105
27	98	226	.....	.....	.....	145	805	426	1,100	752	159	116
28	98	229	.....	.....	.....	174	798	426	1,110	726	90	116
29	98	229	.....	.....	.....	218	798	426	1,100	611	90	78
30	98	229	.....	.....	.....	231	805	426	1,100	490	92	54
31	98	.....	.....	.....	.....	204	.....	440	.....	334	93	.....

NOTE.—Discharge Nov. 3–9, Nov. 30 to Dec. 6, and Dec. 16 to Mar. 26 estimated by engineers of the Idaho Irrigation Co. from record of gate openings at dam as shown in above table and as follows: Dec. 16–21, 250 second-feet, Dec. 22–26, 300 second-feet; Dec. 27–31, 290 second-feet; Jan. 1–17, 254 second-feet; Jan. 20–31, 78 second-feet; Feb. 5–12, 92 second-feet; Feb. 14–17, 74 second-feet; Feb. 21 to Mar. 5, 40 second-feet; Mar. 7–9, 37 second-feet; Mar. 17 and 18, 67 second-feet; Mar. 21–23, 142 second-feet; Mar. 24–26, 144 second-feet.

Monthly discharge of Big Wood River below Magic dam, near Richfield, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	110	97	98.0	6,030	B.
November	229	83	131	7,800	B.
December	.....	209	247	15,200	C.
January	.....	.....	176	10,800	C.
February	.....	0	64.1	3,560	C.
March	231	.....	96.3	5,920	C.
April	832	174	503	29,900	A.
May	732	182	428	26,300	A.
June	1,180	455	939	55,900	A.
July	1,100	206	809	49,700	A.
August	284	90	225	13,800	A.
September	204	54	112	6,660	A.
The year	1,180	0	320	232,000	

NOTE.—See foot-note to table of daily discharge.

BIG WOOD RIVER BELOW NORTH GOODING CANAL, NEAR SHOSHONE, IDAHO.

LOCATION.—In sec. 15, T. 4 S., R. 18 E., 300 yards below head of North Gooding canal, 13 miles northeast of Shoshone, Lincoln County and about 14 miles below the Magic dam.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1915.

GAGE.—Vertical staff on left bank.

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

CHANNEL AND CONTROL.—Channel is cut in lava rock. Stream bed rough. Control somewhat shifting. On account of rough cross section and irregular velocities conditions for making measurements are poor.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 9.4 feet at 7 p. m. July 11 (discharge, 242 second-feet); minimum stage recorded, 7.48 feet September 25 and 27 (discharge, 22 second-feet).

1911–1915: Maximum stage recorded, 15.0 feet May 18, 1911 (discharge, 3,180 second-feet); minimum stage recorded 1.22 feet February 14, 1911 (discharge, zero). Zero discharge also recorded February 9–13 and March 5–6, 1911, and October 19–20 and 26, 1912.

WINTER FLOW.—Observations discontinued during the winter.

DIVERSIONS.—Station is below all diversions of the Idaho Irrigation Co. The North Gooding and Richfield canals divert between the station and the Magic dam.

REGULATION.—Flow past station is regulated by gates at Magic dam and by the head gates of the North Gooding and Richfield canals.

ACCURACY.—Stage-discharge relation practically permanent during 1915. Rating curve fairly well defined. Gage read to hundredths twice daily during irrigation season. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good.

COOPERATION.—Gage-height record furnished and part of discharge measurements made by Idaho Irrigation Co.

Discharge measurements of Big Wood River below North Gooding canal, near Shoshone, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 27	Baldwin and Crosby.	8.30	84.9	Aug. 7	Harrington and Crosby	8.20	80.4
27	....do	8.30	94.0	26	L. Crosby	8.00	58.2
July 17	L. Crosby	8.80	144	Sept. 22	....do	7.57	27.1
21	....do	8.56	116				

NOTE.—L. Crosby was an employee of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River, below North Gooding canal, near Shoshone, Idaho, for the year ending Sept. 30, 1915.

Day.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				110	84	121	58	64
2				99	84	121	74	64
3				89	89	131	64	64
4				94	84	121	69	69
5				79	89	121	79	64
6				79	89	121	79	64
7				84	84	127	79	64
8				79	89	139	79	64
9				94	79	145	69	64
10				99	89	145	69	60
11				89	99	186	69	60
12			69	94	94	30	69	60
13			62	79	99	110	64	60
14			55	79	99	158	69	64
15			48	60	104	145	64	58
16			69	44	104	172	59	55
17			69	44	110	145	60	56
18			110	47	110	145	58	50
19			110	26	110	139	58	33
20	72		104	44	110	145	56	30
21			99	69	110	116	60	29
22			110	84	116	110	60	28
23			121	99	145	89	59	24
24			121	99	145	89	60	23
25	62		121	99	145	89	60	22
26			110	99	110	89	58	28
27			116	89	110	89	48	22
28			127	94	99	89	60	23
29			116	89	99	89	64	23
30		52	116	89	99	84	64	22
31				94		79	64	

NOTE.—Discharge Nov. 20 and 25 determined from rating curve applicable during 1914. Discharge interpolated Apr. 13, 14, 22, and May 22, on account of lack of gage heights. No record obtained during months of October, December, January, February and Apr. 1–11.

Monthly discharge of Big Wood River below North Gooding canal, near Shoshone, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 12–30	127	48	97.5	3,680	B.
May	110	26	81.2	4,990	B.
June	145	79	103	6,130	B.
July	186	30	118	7,260	B.
August	79	48	64.6	3,970	B.
September	69	22	47.0	2,800	B.
The period				28,800	

BIG WOOD SLOUGH AT HAILEY, IDAHO.

LOCATION.—In sec. 9, T. 2 N., R. 18 E., at highway bridge about one-eighth mile northeast of the steel highway bridge across Big Wood River and one-eighth mile southwest of Hailey, Blaine County.

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

GAGE.—Inverted stadia board spiked to center pile on downstream side of highway bridge; read by G. C. Hendrickson.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Banks covered with brush and subject to overflow. One channel at all stages. Control consists of top of a wood-stave water pipe laid in bed of stream about 15 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.64 feet July 9 (discharge, 207 second-feet); minimum stage recorded, 2.03 feet August 27 (discharge, 117 second-feet).

WINTER FLOW.—No information.

DIVERSIONS.—None.

REGULATION.—Amount of water passing gage affected by load at power plant half a mile upstream and there is considerable diurnal fluctuation. River is affected inversely by any such regulation, so that the accuracy of the summation of the two records is presumably affected only slightly by this factor.

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

COOPERATION.—Gage-height record furnished and part of the discharge measurements made by the Idaho Irrigation Co.

Big Wood Slough is a natural channel of Big Wood River that is utilized also as a tailrace for the Hailey power plant. The record at this station represents a portion of the natural flow of Big Wood River and taken in conjunction with the record at the nearby station on the river will show the total flow of the river at this point. For record of station on the river see page 103.

Discharge measurements of Big Wood Slough at Hailey, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 11	Crosby[a] and Beebee	1.79	183	Aug. 9	L. Crosby	1.92	140
Aug. 3	Harrington and Crosby[a]	1.81	161	16	Crosby[a] and Denecke[a]	1.99	125

[a] Employee of the Idaho Irrigation Co.

NOTE.—Aug. 3, A. W. Harrington estimated point of zero flow to be at gage height 3.4 feet.

Daily discharge, in second-feet, of Big Wood Slough at Haily, Idaho, for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	.....	165	174	128	16	165	156	128	146
2	.....	156	174	165	17	165	165	128	142
3	.....	165	165	156	18	165	165	128	137
4	.....	165	165	156	19	156	165	128	137
5	.....	156	156	146	20	165	165	128	137
6	.....	165	156	146	21	156	165	128	137
7	.....	165	156	137	22	165	156	128	137
8	.....	174	156	137	23	165	146	128	128
9	.....	194	146	137	24	165	146	128	128
10	.....	174	137	146	25	174	137	128	128
11	165	165	128	137	26	156	146	128	146
12	165	165	128	137	27	156	156	123	146
13	156	165	128	174	28	146	156	137	146
14	156	165	137	146	29	156	165	146	146
15	165	165	137	146	30	156	174	137	156
					31	.....	174	128	.....

NOTE.—Discharge interpolated Sept. 17.

Monthly discharge of Big Wood Slough at Hailey, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
June 11–30	174	146	161	6,390
July	194	137	163	10,000
August	174	123	139	8,550
September	174	128	143	8,510
The period	.....	.....	.....	33,400

CAMAS CREEK[1] NEAR BLAINE, IDAHO.

LOCATION.—In sec. 15, T. 1 S., R. 16 E., Blaine County, 500 feet below the sheep bridge, one-fourth mile north of Coyote Springs siding on the Central Idaho branch of the Oregon Short Line, 1½ miles below the Malad bridge of the Central Idaho Railroad, 2½ miles above backwater of the Magic reservoir, and 4 miles southeast of Blaine. No tributaries or diversions between station and Magic reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 9, 1912, to September 30, 1915, and results of discharge measurements made in 1911 by the Idaho Irrigation Co.

GAGE.—Lallie water-stage recorder on left bank.

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

CHANNEL AND CONTROL.—One channel at all stages. Bed of stream rocky. Control practically permanent except for extreme low stages. Stage of zero flow estimated August 6 at gage height 0.60 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.33 feet about March 24, reported by L. Crosby, of the Idaho Irrigation Co., from position of flood marks (discharge, 644 second-feet); minimum stage recorded, 1.00 foot at 12.45 p. m. September 2 (discharge, 2.5 second-feet).

1911–1915: Maximum stage recorded, 10.73 feet at 4 p. m. April 8, 1914 (discharge by measurement, 3,850 second-feet); minimum stage recorded September 2, 1915.

[1] Not Malad River; revision of previous decision of United States Geographic Board.

WINTER FLOW.—Records are discontinued during the winter.

DIVERSIONS.—Many small diversions are made above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; changed during the winter of 1914–15. Two fairly well defined rating curves used, one applicable October 1 to November 23 and the other April 14 to September 30. Gage-height record fragmentary. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good for October, November, and May; poor for June and July owing to interpolations necessary because of fragmentary gage-height record.

COOPERATION.—Gage-height record furnished and part of discharge measurements made by the Idaho Irrigation Co.

Discharge measurements of Camas Creek near Blaine, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	Crosby and Hall	2.56	127	Aug. 6	Harrington and Crosby	1.11	5.1
27	do	2.31	87.9	17	Crosby and Denecke	1.01	2.8
May 27	Baldwin and Crosby	2.40	109				

NOTE.—Crosby, Hall, and Denecke were employees of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Camas Creek near Blaine, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Apr.	May.	June.	July	Aug.	Sept.
1	15	24			51	11		
2	15	23			50	10		2.5
3	18	24			48	10		
4	19	23			47	9		
5	18	23			45	9		
6	15	23			44	8	5	
7	16	23			42	11		
8	16	23		93	40	9		
9	16	23			39	9		
10	18	23			37	9		
11	18	23			36	9		
12	17	23			34	8		
13	16	23			32	8		
14	17	23	128		30	8		
15	16	23			28	8		
16	16	23			26	7		
17	18	23			26	7	3	
18	23	23		107	26	6		
19	25	23		112	26	6		
20	23	23		117	26	5		
21	27	28		122	26	5		
22	32	22		125	24	5		
23	32	23		124	22	5		
24	32			122	20	5		
25	31			116	19	5		
26	29			110	16	5		
27	25		91	104	14	5		
28	24			103	12	5		
29	23			98	12	5		
30	24			86	11	5		
31	23			69		5		

NOTE.—Discharge interpolated May 19, 20, 25, 26, June 2–13, 19, 20, June 29 to July 5, July 9–14, 16–19 22–27, 30, and 31.

Monthly discharge of Camas Creek near Blaine, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	32	15	21.2	1,300	B.
November 1-23	24	22	23.0	1,050	B.
May 18-31	125	69	108	3,000	B.
June	51	11	30.3	1,800	D.
July	11	5	7.16	440	

LITTLE WOOD RIVER NEAR RICHFIELD, IDAHO.

LOCATION.—In sec. 30, T. 4 S., R. 20 E., half a mile above head of the Dietrich canal of the Idaho Irrigation Co. and about a mile east of the railroad station at Richfield, Lincoln County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1911, to September 30, 1915.

GAGE.—Vertical staff on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from a suspension footbridge a few feet below the gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small rocks; rough. Control probably permanent. Stage-discharge relation may be slightly affected during summer months by a light growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 2.90 feet May 26 and 30 (discharge, 169 second-feet); minimum stage recorded, 2.15 feet June 13 (discharge, 45 second-feet).

1911–1915: Maximum stage recorded, 4.5 feet May 17 and 18, 1911 (discharge, 722 second-feet); minimum stage recorded, 2.06 feet June 23, 1912 (discharge, 35 second-feet).

WINTER FLOW.—Stage-discharge relation greatly affected by ice. No records obtained during winter of 1914-15.

DIVERSIONS.—Small ditches serving ranches divert water above station. The Dietrich canal of the Idaho Irrigation Co. diverts a short distance below.

REGULATION.—None.

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

COOPERATION.—The Idaho Irrigation Co. furnished gage-height record and made most of the discharge measurements.

Discharge measurement of Little Wood River near Richfield, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 12	Crosby and Hall	2.67	132	May 29	G. C. Baldwin	2.81	150
23	do	2.46	88	Aug. 3	Harrington and Crosby	2.40	74.6
28	do	2.38	77.6	23	Walker and Denecke	2.43	89.4
May 5	do	2.60	117	23	do	2.43	85.1
25	Crosby and Denecke	2.82	162	Sept. 14	Crosby and Vance	2.63	112

NOTE.—Crosby, Hall, Denecke, and Walker were employees of the Idaho Irrigation Co.; Vance was an employee of the State engineer.

Daily discharge, in second-feet, of Little Wood River near Richfield, Idaho, for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	66	150	55	74	104	16	114	104	62	74	76	122
2	.....	78	131	54	78	104	17	110	113	57	72	82	122
3	.....	90	113	57	80	104	18	107	113	55	71	83	122
4	.....	102	113	61	83	104	19	104	113	58	74	85	122
5	.....	113	96	65	91	104	20	100	122	57	74	83	122
6	.....	104	91	65	85	104	21	96	131	51	72	83	122
7	.....	104	104	77	74	104	22	93	140	51	71	86	113
8	.....	104	104	72	78	113	23	90	150	52	71	83	113
9	.....	86	78	82	76	113	24	88	150	52	70	85	113
10	.....	93	77	88	77	113	25	86	150	54	70	90	113
11	.....	104	77	82	78	113	26	82	169	55	66	86	122
12	122	104	57	80	80	113	27	80	169	52	64	93	131
13	122	104	45	80	76	113	28	77	160	55	65	96	140
14	122	104	49	82	76	122	29	78	150	58	66	104	140
15	118	104	65	78	78	122	30	66	169	58	70	96	136
							31	.....	160	.....	70	104	.....

NOTE.—Discharge interpolated, on account of lack of gage heights, Apr. 15-20, 22, 24-27, May 2-4 and 14. No record obtained Oct. 1 to April 11.

Monthly discharge of Little Wood River near Richfield, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 12-30	122	66	97.6	3,680	C.
May	169	66	120	7,380	B.
June	150	45	72.6	4,320	B.
July	88	54	70.9	4,360	B.
August	104	74	83.8	5,150	B.
September	140	104	117	6,960	B.
The period	.....	.....	.....	31,800	

BRUNEAU RIVER NEAR ROWLAND, NEV.

LOCATION.—In sec. 29, T. 47 N., R. 56 E., at Hiram Salls's ranch, half a mile below Taylor Creek, 1½ miles above McDonald Creek and Rowland post office, and 100 miles north of Elko, the nearest railroad point.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 19, 1913, to September 30, 1915.

GAGE.—Vertical staff in two sections spiked to left abutment of footbridge; read by Mrs. Hiram Salls.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed consists of gravel. Banks are high but left bank might be overflowed by extremely high stages. Control is a well-defined gravel riffle; practically permanent. Point of zero flow September 1, 1915, 1.0 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 3.25 feet May 20, 21, and June 1 (discharge, 271 second-feet); minimum stage, 1.50 feet August 30 and 31 (discharge, 6.5 second-feet).

1913–1915: Maximum stage recorded, 5.8 feet April 17, 1914 (discharge, 972 second-feet); minimum stage recorded August 30 and 31, 1915.

WINTER FLOW.—Stage-discharge relation not seriously affected by ice but estimates for short periods are based on observer's notes and weather records.

DIVERSIONS.—A few small ditches serving ranches divert water above station.
REGULATION.—None.
ACCURACY.—Stage-discharge relation practically permanent; affected by ice January 7–23. Rating curve well defined. Gage read to quarter-tenths twice daily. Daily discharge ascertained by applying gage heights to rating table. Records good.

Discharge measurements of Bruneau River near Rowland, Nev., during the year ending Sept. 30, 1915.

[Made by A. B. Purton.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 25	3.14	247	May 26	3.08	226
25	3.14	236	Sept. 1	1.57	7.4

Daily discharge, in second-feet, of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	29	.....	14	27	35	150	171	271	50	14	7.2
2	20	29	.....	14	27	33	150	171	259	45	14	7.9
3	24	29	.....	14	27	31	192	171	236	45	14	8.2
4	27	27	.....	14	27	31	192	160	214	43	14	9.3
5	24	27	.....	14	27	27	192	150	192	41	14	9.0
6	24	27	.....	14	27	27	192	140	192	41	14	8.6
7	26	27	.....	.....	27	20	192	130	182	55	13	8.6
8	27	27	.....	.....	27	19	192	120	171	44	12	8.6
9	27	27	.....	.....	35	19	182	111	171	40	12	8.6
10	35	27	.....	.....	31	21	171	107	171	37	12	8.6
11	31	27	.....	.....	31	26	150	107	171	35	10	8.6
12	27	27	.....	.....	31	27	171	171	171	35	10	9.3
13	27	27	.....	.....	27	33	192	171	171	35	10	9.6
14	27	27	.....	.....	27	35	192	150	160	32	9.3	10
15	27	27	.....	.....	24	35	182	150	150	27	9.3	12
16	24	27	.....	.....	24	45	171	140	130	26	9.3	14
17	27	27	.....	.....	27	58	171	140	130	23	9.3	13
18	27	.....	.....	.....	27	74	182	150	130	20	9.3	12
19	27	.....	.....	.....	27	74	182	182	120	20	9.3	11
20	27	.....	.....	.....	27	83	182	271	107	18	9.3	11
21	35	.....	.....	.....	29	92	214	271	107	19	9.3	11
22	45	.....	.....	.....	29	92	236	259	102	19	8.2	11
23	45	.....	.....	.....	31	111	236	236	94	19	8.2	10
24	40	.....	14	25	31	150	214	236	92	19	10	10
25	40	.....	14	26	31	171	214	259	88	19	11	16
26	35	.....	14	27	33	171	192	236	88	19	10	31
27	35	.....	14	27	33	171	171	214	81	18	10	24
28	33	.....	14	27	35	150	171	225	72	15	9.6	20
29	33	.....	14	27	.....	192	171	236	64	14	7.9	18
30	31	.....	14	27	.....	171	171	214	57	14	6.5	17
31	31	.....	14	27	.....	150	.....	214	.....	14	6.5	.....

NOTE.—Gage heights not recorded Nov. 18 to Dec. 23; discharge estimated at 20 second-feet Nov. 18–20 and 15 second-feet Dec. 1–23. Discharge estimated, because of ice, Jan. 7–23, 20 second-feet.

Monthly discharge of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	45	20	29.9	1,840	A.
November	29	.....	24.2	1,440	C.
December	.....	.....	14.7	904	D.
January	.....	14	20.5	1,260	C.
February	35	24	28.8	1,600	B.
March	192	19	76.6	4,710	A.
April	236	150	186	11,100	A.
May	271	107	183	11,300	A.
June	271	57	145	8,630	A.
July	55	14	29.1	1,790	A.
August	14	6.5	10.5	646	B.
September	31	7.2	12.1	720	B.
The year	271	6.5	63.3	45,900	

BRUNEAU RIVER NEAR HOT SPRING, IDAHO.

LOCATION.—In sec. 34, T. 7 S., R. 6 E., at the Dunham ranch, 1 mile below Hot Creek, 2 miles upstream from Hot Spring post office, Owyhee County, about 13 miles below confluence with East Fork of Bruneau River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 3, 1909, to March 15, 1915, when station was discontinued.

GAGE.—Vertical staff on right bank near Dunham's house; read by Sid Dunham. Original gage (in use July 3, 1909, to March 1, 1910, inclusive) was a vertical staff on the right bank a quarter of a mile upstream from site of present gage. Relation between the two gages not determined.

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

CHANNEL AND CONTROL.—Bed of stream and control composed of coarse gravel, shifting during floods. One channel at all stages, although right bank may be overflowed in times of flood; left bank rocky and high.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.21 feet May 1 (discharge, 607 second-feet); minimum stage recorded, 3.7 feet December 10–21 (discharge, 59 second-feet).

1909–1915: Maximum stage recorded, 10.6 feet (on old gage) March 1, 1910 (discharge, 5,660 second-feet); minimum stage recorded, 3.20 feet January 10, 1913 (discharge, 2 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice. Hot springs along the river keep the temperature of the water above the freezing point.

DIVERSIONS.—A few small ditches serving ranches divert water from the tributaries of Bruneau River above the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent October to March. Rating curve fairly well defined. Gage read to half tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good.

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

May 1, 1915: Gage height, 5.21 feet; discharge, 607 second-feet.

Daily discharge, in second-feet, of Bruneau River near Hot Spring, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1....	98	149	98	122	136	149	16....	136	110	59	110	122	.....
2....	98	149	76	122	122	149	17....	136	98	59	110	149	.....
3....	98	149	76	122	122	149	18....	136	76	59	110	136	.....
4....	98	149	110	122	122	149	19....	149	76	59	110	136	.....
5....	98	149	122	122	122	149	20....	179	76	59	110	136	.....
6....	122	149	110	110	122	149	21....	196	76	59	98	136	.....
7....	122	149	76	122	122	149	22....	213	76	68	98	136	.....
8....	122	149	76	110	122	122	23....	213	76	122	98	136	.....
9....	122	136	136	110	122	122	24....	196	98	122	98	149	.....
10....	136	136	59	110	122	122	25....	196	98	122	98	149	.....
11....	136	122	59	110	149	149	26....	179	98	122	98	149	.....
12....	136	122	59	110	149	136	27....	179	98	76	110	149	.....
13....	136	122	59	110	149	136	28....	149	98	76	110	149	.....
14....	136	122	59	122	122	149	29....	149	98	122	122	.....	.....
15....	136	110	59	110	149	149	30....	149	98	122	136	.....	.....
							31....	149	.....	122	136	.....	.....

Monthly discharge of Bruneau River near Hot Spring, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	213	98	145	8 920	B.
November	149	76	114	6 780	B.
December	136	59	85.9	5 280	B.
January	136	98	112	6 890	B.
February	149	122	135	7.500	B.
March 1-15	149	122	142	4.220	B.
The period	.....	.....	.....	39 600	

BRUNEAU RIVER NEAR GRANDVIEW, IDAHO.

LOCATION.—In sec. 1, T. 6 S., R. 4 E., 500 yards below the Grandview dam and the head of the Grandview canal, 1½ miles above mouth of Bruneau River, and 11 miles southeast of Grandview, Owyhee County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1895, to December 31, 1903; May 1, 1909, to September 30, 1915.

GAGE.—Vertical staff on left bank; installed March 10, 1910; read by S. A. Mullenix. Gages used prior to March 10, 1910, differed slightly in location and were at a datum 0.87 foot higher than that of present gage.

DISCHARGE MEASUREMENTS.—Made by wading or from cable just above gage.

CHANNEL AND CONTROL.—Bed and control consist of coarse gravel which shifts during extreme floods. Banks clean. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.2 feet at 11 a. m. May 22 (discharge, 1,210 second-feet); minimum stage recorded, 1.9 feet July 31 to August 8 (discharge, 5 second-feet).

1895–1903 and 1909–1915: Maximum stage recorded March 2, 1910, determined by observing position of flood marks, equal to 11.0 feet on present gage (discharge estimated from extension of rating curve, 5,700 second-feet); minimum stage recorded, 1.7 feet August 27 and September 3–7, 1911 (discharge, 1 second-foot).

WINTER FLOW.—Stage-discharge relation not affected by ice, presumably because of the numerous hot springs in the vicinity of Hot Spring and Bruneau.

DIVERSIONS.—Grandview canal and Buckaroo ditch are the principal diversions above the station, but a number of small ditches also divert water from the Bruneau and its tributaries for use on ranches.

REGULATION.—Practically no water is stored above the station. The Grandview dam, which is a diversion structure only, impounds in its reservoir a relatively small quantity of water.

ACCURACY.—Stage-discharge relation practically permanent during the year. Rating curve well defined. Gage read to tenths once daily. Observations October to December not entirely reliable. Daily discharge ascertained by applying daily gage heights to rating table. Records poor October to December, good for rest of year.

Discharge measurements of Bruneau River near Grandview, Idaho, during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 30	3.20	432	Aug. 19	2.00	11.6
May 2	3.24	468			

Daily discharge, in second-feet, of Bruneau River near Grandview, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	42	115	131	12	147	238	406	532	1,210	270	5	12
2	63	115	115	12	147	285	406	532	1,210	183	5	12
3	63	115	101	25	147	238	348	435	1,210	183	5	12
4	75	115	147	42	183	238	406	435	1,030	183	5	12
5	75	115	147	42	183	195	406	376	863	147	5	12
6	75	115	147	42	183	195	406	376	784	147	5	12
7	87	115	147	25	147	158	348	376	784	147	5	12
8	87	115	147	25	147	195	348	321	784	183	5	12
9	87	115	115	42	115	158	348	270	708	147	12	12
10	87	115	115	42	115	158	348	321	708	147	12	12
11	87	115	147	87	115	158	285	321	708	115	12	12
12	87	115	131	87	115	158	285	321	708	87	12	25
13	87	115	147	115	115	158	285	435	635	87	12	25
14	87	115	115	115	158	158	285	435	565	87	12	25
15	87	115	87	115	158	195	348	435	565	63	12	25
16	87	115	25	115	158	195	348	435	498	63	12	25
17	183	115	25	115	158	195	348	565	435	42	12	25
18	183	115	42	87	158	238	406	784	435	42	12	25
19	183	115	42	87	195	238	532	784	376	42	12	25
20	147	115	63	87	195	238	348	945	708	42	12	25
21	147	101	63	87	195	238	348	1,030	635	42	12	25
22	147	101	63	115	195	285	406	1,210	635	25	12	25
23	165	115	63	115	195	348	466	1,120	635	25	12	25
24	165	147	63	115	195	348	466	1,030	565	25	12	25
25	165	147	63	115	195	348	466	863	565	12	12	25
26	147	147	63	115	238	348	466	863	435	12	12	25
27	131	147	63	115	238	348	466	784	435	12	12	25
28	131	147	42	147	238	348	406	863	435	12	12	25
29	131	147	42	147	.....	406	406	945	376	12	12	25
30	115	147	.....	147	.....	532	406	945	321	12	12	25
31	115	.....	.....	147	.....	466	.....	1,030	.....	5	12	.....

Monthly discharge of Bruneau River near Grandview, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	183	42	113	6,950	B.
November	147	101	122	7,260	C.
December	147	25	87.8	5,400	C.
January	147	12	86.6	5,320	B.
February	238	115	169	9,390	B.
March	532	158	258	15,900	A.
April	532	285	385	22,900	A.
May	1,210	270	649	39,900	A.
June	1,210	321	665	39,600	A.
July	270	5	83.9	5,160	B.
August	12	5	10.2	627	C.
September	25	12	20.2	1,200	B.
The year	1,210	5	220	160,000	

NOTE.—Discharge Dec. 30 and 31 estimated at 30 second-feet on account of doubtful gage heights.

MARYS CREEK NEAR OWYHEE, NEV.

LOCATION.—In the SE. ¼ sec. 19, T. 15 S., R. 4 E. in Idaho, about a mile below the dam site of the Three Creek reservoir project of the United States Indian Service, 7 miles north of the Idaho-Nevada line and about 12 miles north of Owyhee, Nev.

DRAINAGE AREA.—27 square miles at the Three Creek reservoir dam site (measured by United States Indian Service).

RECORDS AVAILABLE.—December 11, 1913, to September 30, 1915.

GAGE.—Stevens water-stage recorder on right bank.

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

CHANNEL AND CONTROL.—One channel at all stages but left bank is overflowed in high water. Stream bed of boulders and silt; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.66 feet at 5 a. m. May 19 (discharge, 120 second-feet); minimum stage recorded, 1.73 feet August 29 (discharge, 1.3 second-feet).

1913–1915: Maximum stage recorded, 3.98 feet April 5, 1914 (discharge, 160 second-feet); minimum stage August 29, 1915.

WINTER FLOW.—Stage-discharge relation affected by ice. Recording gage not in operation during winter of 1914–1915.

DIVERSIONS.—No diversions above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during the winter of 1914–15. Rating curve for period October 1 to November 5 well defined below 5 second-feet; that for period March 22 to September 30 fairly well defined above 5 second-feet. Daily discharge ascertained by applying daily gage heights to rating table. Records fair.

The following discharge measurement was made by E. A. Porter:

July 31, 1915: Gage height, 1.93 feet; discharge, 3.0 second-feet.

Daily discharge, in second-feet, of Marys Creek near Owyhee, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.2	3.8	.....	63	32	39	5.2	3.5	.....
2	4.5	3.8	.....	78	38	27	5.1	3.3	.....
3	6.1	4.0	.....	62	40	23	5.2	3.0	.....
4	6.8	4.2	.....	50	39	20	5.4	2.9	.....
5	7.3	3.2	.....	50	31	18	5.6	2.9	.....
6	7.3	.....	.....	46	27	16	6.4	2.9	.....
7	7.3	.....	.....	42	25	14	9.1	2.9	.....
8	7.6	.....	.....	36	24	13	8.1	2.9	.....
9	9.7	.....	.....	34	22	11	7.8	3.0	.....
10	8.8	.....	.....	33	24	10	7.3	3.0	.....
11	8.5	.....	.....	34	24	11	7.1	3.0	.....
12	7.6	.....	.....	34	28	18	6.8	3.1	.....
13	7.0	.....	.....	42	36	20	6.8	3.1	.....
14	6.8	.....	.....	41	32	16	6.6	3.2	.....
15	6.6	.....	.....	35	27	12	6.4	3.3	.....
16	6.3	.....	.....	30	24	9.7	6.1	3.2	.....
17	6.3	.....	.....	.....	36	8.4	5.6	3.1	.....
18	10	.....	.....	.....	83	.....	5.6	3.1	.....
19	9.7	.....	.....	.....	101	.....	5.6	2.9	.....
20	9.1	.....	.....	.....	56	.....	5.2	3.0	.....
21	10	.....	.....	.....	48	.....	4.7	3.0	.....
22	11	.....	9.4	.....	41	.....	4.7	3.0	.....
23	9.4	.....	15	.....	34	.....	4.9	3.2	.....
24	7.6	.....	22	.....	35	.....	4.6	3.2	.....
25	5.2	.....	24	35	33	.....	4.0	3.1	.....
26	4.8	.....	34	32	30	.....	3.6	3.0	.....
27	4.8	.....	44	29	26	.....	3.5	2.6	.....
28	4.5	.....	65	27	26	6.4	3.1	2.3	.....
29	4.0	.....	77	27	29	5.9	2.9	1.7	1.7
30	4.0	.....	51	29	25	5.4	2.9	1.9	1.7
31	4.2	.....	48	.....	24	.....	3.2	1.9	.....

NOTE.—Stage-discharge relation affected by ice Nov. 6–19; discharge not determined. Water-stage recorder not in operation Nov. 20 to Mar. 21, Apr. 17–24, May 21 and 22, June 18–27, and Sept. 1–28; discharge estimated as follows: Apr. 17–24, 32 second-feet; May 21, 48 second-feet; May 22, 41 second-feet; June 18–27, 7.4 second-feet; Sept. 1–28, 1.8 second-feet.

Monthly discharge of Marys Creek near Owyhee, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
October	11	4.0	7.00	430
November 1–5	4.2	3.2	3.80	37.7
March 22–31	77	9.4	38.9	772
April	78	27	38.2	2,270
May	101	22	35.5	2,180
June	39	5.4	12.6	750
July	9.1	2.9	5.45	335
August	3.5	1.7	2.91	179
September	.....	.....	1.79	106

EAST FORK OF BRUNEAU RIVER NEAR HOT SPRING, IDAHO.

LOCATION.—On unsurveyed land in Owyhee County, at the ranch known as Winter Camp, 22 miles southeast of Hot Spring post office.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 13, 1910, to April 3, 1915, when station was discontinued.

GAGE.—Vertical staff on left bank half a mile below house at Winter Camp ranch; read by J. M. Campbell, who is employed on the ranch.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge 10 feet below gage.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; clean. Control shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 4.7 feet February 20-23 (discharge, 42 second-feet); minimum stage recorded, 3.7 feet on several days in October and November (discharge, 10 second-feet).

1910–1915: Maximum stage recorded, 10.65 feet March 8, 1911 (discharge, 450 second-feet); minimum stage recorded, 2.78 feet September 2, 1911; minimum discharge recorded, 0.4 second-feet August 28, 29, and September 13, 1910, corresponding to a gage height of 2.8 feet.

WINTER FLOW.—Stage-discharge relation seriously affected by ice in December and January; flow not determined as no discharge measurements were made. Accuracy of gage heights doubtful during a part of this period and observer's notes in regard to ice poor.

DIVERSIONS.—Numerous small ditches divert water from the river and its tributaries above the station, principally in the Three Creek country.

REGULATION.—None.

ACCURACY.—Permanence of stage-discharge relation not verified by discharge measurements. Rating curve fairly well defined, applicable prior to October 14, used for open-water periods October to April. Gage read to tenths once daily. Daily discharge ascertained by applying gage heights to rating table. Records poor.

No discharge measurements were made during the year.

Daily discharge, in second-feet, of East Fork of Bruneau River near Hot Spring, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	Day.	Oct.	Nov.	Feb.	Mar.	Apr.
1	10	12	17	20	23	16	10	10	30	30	.....
2	12	12	17	20	23	17	12	12	38	30	.....
3	10	12	17	20	23	18	12	12	38	17	.....
4	10	10	17	20	.....	19	12	12	38	17	.....
5	12	10	17	20	.....	20	12	.....	42	17	.....
6	15	10	17	20	.....	21	15	.....	42	17	.....
7	12	10	30	23	.....	22	15	.....	42	17	.....
8	10	10	30	23	.....	23	15	.....	42	17	.....
9	10	10	30	23	.....	24	15	.....	38	15	.....
10	17	10	30	23	.....	25	15	17	38	12	.....
11	17	10	30	30	.....	26	15	17	26	15	.....
12	12	10	30	30	.....	27	15	20	20	15	.....
13	12	10	30	30	.....	28	15	20	20	17	.....
14	12	10	30	30	.....	29	15	23	.....	17	.....
15	12	10	30	30	.....	30	12	17	.....	17	.....
						31	12	.....	.....	17	.....

NOTE.—Discharge Nov. 20–24 estimated at 13 second-feet. Discharge Dec. 1 to Jan. 31 not estimated on account of unreliable gage heights and unknown effect of ice.

Monthly discharge of East Fork of Bruneau River near Hot Spring, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	17	10	12.9	793	C.
November	23	10	12.7	756	D.
February	42	17	29.5	1,640	D.
March	30	12	20.9	1,280	C.

NOTE.—See footnote to table of daily discharge.

GRANDVIEW CANAL NEAR GRANDVIEW, IDAHO.

LOCATION.—In sec. 35, T. 5 S., R. 4 E., at the wagon road which crosses the canal 1½ miles below the heading at the Grandview dam across Bruneau River and about 10 miles southeast of Grandview, Owyhee County.

RECORDS AVAILABLE.—April 11, 1912, to August 20, 1915, when station was discontinued.

GAGE.—Vertical staff attached to downstream side of wagon bridge, near right bank; read by S. A. Mullenix, of the Grandview Canal Co.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel above and below gage consists of dirt section; control indefinite. Stage-discharge relation seriously affected by heavy growth of aquatic plants during the summer months and is often affected by the removal of material from channel below gage; canal is usually cleaned in the spring.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 128 second-feet May 1 and June 20; canal reported dry March 15–21 and May 24.

1912–1915: Maximum discharge recorded, 161 second-feet May 24, 1914; canal reported dry at various times during each year in which records have been kept.

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

DIVERSIONS.—Two small ditches divert water for use on ranches above the gage.

REGULATION.—Discharge controlled by gates at head of canal.

ACCURACY.—Stage-discharge relation not permanent; affected by growth of aquatic plants and shifting control. Two poorly defined rating curves used, one applicable October 1 to March 14, the other April 1 to May 23. Gage read to tenths once daily. Daily discharge ascertained by applying gage heights to rating table; shifting-control method used May 25 to August 20. Records poor.

Grandview canal, the largest diversion from Bruneau River, furnishes water for irrigation to a tract of some 4,000 acres in northern Owyhee County. No water is returned to Bruneau River.

Discharge measurements of Grandview canal near Grandview, Idaho, during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 2	4.82	111
Aug. 19	4.37	39.6

Daily discharge, in second-feet, of Grandview canal near Grandview, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	57	62	18	18	18	18	18	128	62	115	63
2	62	52	18	18	18	18	18	110	61	120	62
3	62	52	18	18	18	18	18	110	60	113	57
4	72	52	18	18	18	18	18	110	60	113	56
5	62	52	18	18	18	18	18	116	60	118	56
6	62	52	18	18	18	18	26	116	64	117	55
7	66	44	18	18	18	18	43	122	64	116	55
8	66	44	18	18	18	18	43	122	68	116	50
9	66	29	18	18	18	18	43	116	77	115	30
10	66	29	18	18	18	18	61	122	76	12[illegible]	30
11	62	29	18	18	18	18	66	122	76	114	36
12	62	29	18	18	18	18	86	122	76	113	36
13	62	29	18	18	18	18	110	122	121	113	37
14	62	29	18	18	18	18	104	26	120	112	37
15	62	21	18	18	18	0	122	20	119	117	38
16	62	21	18	18	18	0	122	20	119	116	38
17	62	21	18	18	18	0	122	20	118	116	39
18	62	21	18	18	18	0	122	20	123	10[illegible]	39
19	72	21	18	18	18	0	122	20	122	10[illegible]	40
20	72	21	18	18	18	0	116	43	128	103	40
21	72	21	18	18	18	0	110	43	127	9[illegible]	.....
22	72	21	18	18	18	0	116	43	127	9[illegible]	.....
23	72	18	18	18	18	0	116	43	126	9[illegible]	.....
24	72	18	18	18	18	0	116	0	125	87	.....
25	66	18	18	18	18	0	116	51	125	83	.....
26	62	18	18	18	18	0	122	55	124	8[illegible]	.....
27	62	18	18	18	18	0	122	55	123	80	.....
28	62	18	18	18	18	0	122	54	116	80	.....
29	62	18	18	18	.....	0	122	64	116	74	.....
30	62	18	18	18	.....	0	122	63	115	7[illegible]	.....
31	62	.....	18	18	.....	0	.....	62	.....	6[illegible]	.....

Monthly discharge of Grandview canal near Grandview, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	72	57	64.7	3,980	B.
November	62	18	29.9	1,780	C.
December	18	18	18.0	1,110	D.
January	18	18	18.0	1,110	D.
February	18	18	18.0	1,000	D.
March	18	0	8.13	500	D.
April	122	18	86.1	5,120	D.
May	128	0	72.3	4,450	D.
June	128	60	99.9	5,940	D.
July	121	68	103	6,330	D.
August 1–20	68	36	44.7	1,770	D.
The period	.....	.....	.....	33,100	

NOTE.—Water out of canal Mar. 15–31, and May 24.

OWYHEE RIVER NEAR OWYHEE, NEV.

LOCATION.—In sec. 21, T. 46 N., R. 53 E., 40 feet above mouth of Jones Brook, half a mile above the J. P. Jones ranch, 8 miles southeast of Owyhee, and 14 miles above the Nevada-Idaho State line; 5,550 feet above sea level.

DRAINAGE AREA.—380 square miles (measured on Forest Service maps).

RECORDS AVAILABLE.—November 29, 1913, to September 30, 1915.

GAGE.—Stevens water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 125 feet above gage.

CHANNEL AND CONTROL.—Bed consists of ledge rock and boulders filled in with sand and gravel; should be fairly permanent. One channel at all stages. Banks covered with brush; both subject to overflow. At low stages there is a riffle between the gage and Jones Brook but at high stages the rapids below the brook may become the control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.77 feet at 11 p. m. April 16 (discharge, 432 second-feet); minimum stage, 1.35 feet at 11 p. m. August 23 (discharge, 7.5 second-feet).

1913–1915: Maximum stage recorded, 9.36 feet April 15, 1914 (discharge, 1,360 second-feet); minimum stage recorded August 23, 1915.

WINTER FLOW.—Discharge relation is affected by ice. No records obtained during the winter of 1914–15.

DIVERSIONS.—No important diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean gage heights to rating table. Records good.

The following discharge measurement was made by E. A. Porter:

July 31, 1915: Gage height, 1.58 feet; discharge, 9.7 second-feet.

Daily discharge, in second-feet, of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	231	231	239	26	11	8.4
2	.....	282	231	248	22	11	8.6
3	.....	282	215	215	22	11	8.6
4	.....	248	207	193	22	11	8.4
5	.....	231	189	177	24	10	8.3
6	.....	223	173	159	25	11	8.1
7	.....	248	159	148	31	10	8.0
8	.....	264	151	137	26	10	8.1
9	.....	248	143	128	22	10	8.2
10	.....	239	141	118	20	9.8	8.2
11	.....	248	143	118	19	9.5	8.4
12	.....	248	191	149	18	9.3	8.2
13	.....	239	215	164	17	9.1	8.3
14	.....	239	204	140	16	8.8	8.4
15	.....	256	183	114	16	8.5	8.5
16	.....	360	162	98	15	8.5	8.5
17	64	388	199	86	14	8.4	8.8
18	.....	324	256	75	14	8.4	8.8
19	.....	290	378	65	13	8.4	8.8
20	52	273	378	59	12	8.0	8.8
21	.....	248	342	46	12	7.9	8.8
22	.....	245	369	43	12	7.9	8.6
23	.....	243	342	39	12	7.7	8.5
24	.....	240	333	36	11	7.7	9.2
25	.....	238	342	35	11	7.9	9.7
26	.....	236	298	36	11	7.9	13
27	.....	233	273	34	10	7.9	13
28	.....	231	264	32	9.8	7.9	12
29	324	231	256	30	9.6	7.9	12
30	.....	231	231	28	9.5	7.8	12
31	.....	.....	223	.....	9.8	7.9	.....

NOTE.—No record obtained Oct. 1 to Mar. 16.

Monthly discharge of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April	388	223	258	15 400	B.
May	378	141	239	14 700	B.
June	248	28	106	6 310	B.
July	31	9.5	16.5	1 010	A.
August	11	7.7	8.97	552	A.
September	13	8.0	9.17	546	A.
The period				38 500	

OWYHEE RIVER NEAR OWYHEE, OREG.

LOCATION.—In sec. 2, T. 21 S., R. 46 E., at the county bridge 1½ miles southwest of Owyhee, Malheur County, 3 miles above mouth of river and 10 miles southwest of Nyssa.

DRAINAGE AREA.—About 11,100 square miles. Watershed not well defined on available maps.

RECORDS AVAILABLE.—March 26, 1890, to October 3, 1896; August 27, 1903, to September 30, 1915.

GAGE.—Chain gage on upstream side of highway bridge; read by Mrs. S. J. Watson.

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

CHANNEL AND CONTROL.—Bed consists of gravel and small rock; may shift during high stages. Stage of zero flow determined September 4, 1915, as 1.85 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.5 feet March 31 (discharge 4,420 second-feet); minimum stage recorded, 2.05 feet September 4–5 (discharge, 6 second-feet).

1890–1896 and 1903–1915: Maximum stage recorded, 12.9 feet March 2, 1910 (discharge, 23,200 second-feet); minimum stage recorded, 2.00 feet September 13–27, 1914 (discharge, 1 second-foot).

WINTER FLOW.—Stage-discharge relation often seriously affected by ice; flow estimated from discharge measurments, observer's notes, and weather records.

DIVERSIONS.—The Owyhee canal, the principal diversion above the station, heads about 6 miles above the gage. This canal diverts practically all of the natural low-water flow of Owyhee River; maximum diversion about 250 second-feet.

REGULATION.—Variation in the flow at the station may be caused by manipulation of the gates at the head of Owyhee canal.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 12 to February 10. Rating curve poorly defined used October 1 to December 11; curve fairly well defined used February 11 to September 30. Gage read to quarter-tenths once daily. Gage height record doubtful at times. Daily discharge ascertained by applying gage heights to rating table. Records fair.

Discharge measurements of Owyhee River near Owyhee, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	A. W. Harrington	[a] 3.22	178	Apr. 26	A. W. Harrington	3.48	584
Jan. 30	do	[a] 3.80	231	July 14	do	2.23	33.3
Mar. 16	L. W. Roush	3.09	335	Sept. 4	do	2.00	5.58

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Owyhee River near Owyhee, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	61	118	.....	.....	528	3,160	636	1,040	35	23	10
2	23	73	118	.....	.....	528	2,270	599	952	29	23	10
3	23	61	118	.....	.....	599	2,020	599	870	23	23	10
4	23	61	118	.....	.....	528	2,020	636	870	23	23	6
5	23	61	118	.....	.....	528	1,900	673	829	23	23	6
6	23	61	154	.....	.....	599	1,560	750	712	23	23	10
7	23	61	173	.....	.....	599	1,360	750	712	82	23	10
8	23	61	216	.....	.....	461	1,310	750	636	11	23	10
9	23	61	239	.....	.....	461	1,260	673	564	23	23	10
10	23	61	178	.....	.....	430	1,080	599	494	313	23	10
11	30	61	118	.....	369	398	993	528	430	313	22	10
12	30	61	.....	.....	528	340	870	461	369	40	10	10
13	30	61	.....	.....	494	286	910	461	313	40	10	10
14	30	61	.....	.....	461	286	870	398	271	23	10	11
15	40	61	.....	.....	461	286	829	461	247	23	10	12
16	40	61	178	.....	398	340	750	553	223	23	10	13
17	40	61	.....	.....	286	430	750	645	201	23	10	14
18	40	61	.....	.....	286	673	750	737	201	23	10	15
19	61	73	.....	.....	313	1,080	750	829	271	23	10	15
20	61	87	.....	.....	313	1,080	750	1,120	180	23	10	15
21	61	87	.....	.....	340	1,260	673	1,040	180	23	10	15
22	61	194	.....	.....	340	1,220	599	1,410	180	16	10	15
23	61	173	.....	.....	398	1,170	599	1,780	180	16	10	15
24	61	194	.....	.....	461	1,260	564	1,670	143	16	10	22
25	61	194	.....	.....	461	1,410	564	1,560	112	11	10	29
26	61	154	.....	.....	461	3,000	599	1,560	82	11	10	29
27	61	154	.....	.....	461	3,000	673	1,410	71	11	10	29
28	61	154	.....	.....	494	2,270	673	1,310	60	11	10	29
29	61	118	.....	.....	.....	2,720	673	1,310	50	14	10	29
30	61	118	.....	231	.....	3,160	673	1,220	40	17	10	29
31	61	.....	.....	240	.....	4,420	.....	1,120	.....	20	10	.....

NOTE.—Discharge estimated, because of ice, from discharge measurements, observer's notes, and weather records, as follows: Dec. 12–15, 130 second-feet; 17–31, 140 second-feet; Jan. 1–29, 180 second-feet Jan. 30, 240 second-feet; Feb. 1–10, 300 second-feet; interpolated Sept. 13–17.

Monthly discharge of Owyhee River near Owyhee, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean		
October	61	11	41.6	2,560	C.
November	194	61	93.7	5,580	C.
December	.....	.....	144	8,850	D.
January	.....	.....	184	11,300	D.
February	528	.....	369	20,500	C.
March	4,420	286	1,140	70,100	B.
April	3,160	564	1,080	64,300	B.
May	1,780	398	911	56,000	B.
June	1,040	40	383	22,800	B.
July	313	11	42.1	2,590	C.
August	23	10	14.6	898	D.
September	29	6	15.3	910	D.
The year	4,420	6	368	266,000	

NOTE.—See footnote to daily-discharge table.

JACK CREEK NEAR TUSCARORA, NEV.

LOCATION.—In sec. 35, T. 42 N., R. 52 E., at R. M. Woodward's ranch on the Elko-Mountain City stage road, 8 miles above confluence with South Fork of Owyhee River and 12 miles northeast of Tuscarora, Elko County.

DRAINAGE AREA.—31 square miles (measured on Forest Service maps).

RECORDS AVAILABLE.—May 15, 1913, to September 30, 1915.

GAGE.—Vertical staff on left bank 500 feet below Woodward's house; read by R. M. Woodward. Datum raised 1.50 feet September 1, 1914.

CHANNEL AND CONTROL.—Bed consists of coarse gravel and small boulders; practically permanent; slope steep. Banks low and lined with willows; may be overflowed to some extent during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet May 24 to 26 (determined from water marks; no gage-height record; discharge, 168 second-feet); minimum stage recorded, 0.3 foot February 14 and August 18–26 (discharge, 1.5 second-feet). Flow was probably as low as 1 second-foot for a few days in December and January and possibly between August 27 and 31.

1913–1915: Maximum stage recorded, 2.17 feet (present datum) April 10, 1914 (discharge, 244 second-feet). Minimum occurred in 1915.

WINTER FLOW.—Stream freezes over; stage-discharge relation affected by ice. During the early spring there is considerable diurnal fluctuation. Determinations of discharge based on observer's notes, weather records and observations made during short periods in which there was practically no effect from ice.

DIVERSIONS.—No important diversions above gage.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice November 15 to February 1. Rating curve well defined. Gage read to half tenths once or twice daily before September 3 and to hundredths after that date. Daily discharge ascertained by applying mean daily gage heights to rating table. See footnote to table of daily discharge. Open-water records good; others fair.

Discharge measurements of Jack Creek near Tuscarora, Nev., during the year ending Sept. 30, 1915.

[Made by A. B. Purton.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
May 27	1.62	109	Sept. 3	0.33	1.9
27	1.62	107			

Daily discharge, in second-feet, of Jack Creek near Tuscarora, Nev., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	5	12	3	5	30	104	139	43	5	1.6
2	5	12	3	5	30	121	130	43	5	1.7
3	5	10	3	5	30	88	139	38	5	1.8
4	7	10	3	6	29	73	130	38	5	1.6
5	7	10	5	6	28	60	130	34	5	1.6
6	7	9	5	6	27	54	139	34	5	1.6
7	12	9	5	6	26	48	139	29	4	2.0
8	12	8	5	6	26	43	130	29	4	2.0
9	12	8	5	6	26	38	121	26	4	2.0
10	12	7	5	6	29	43	121	26	3	2.2
11	12	8	5	6	26	48	112	22	3	2.0
12	12	5	5	6	29	54	88	22	3	2.0
13	10	5	3	7	34	73	73	19	2	2.2
14	10	5	1.5	8	38	73	66	16	2	2.2
15	8	.....	3	8	34	80	66	14	2	2.2
16	8	.....	3	8	46	88	66	12	2	2.0
17	8	.....	3	10	43	121	66	12	2	2.3
18	8	.....	3	12	54	112	66	12	1.5	2.3
19	8	.....	3	12	60	130	66	10	1.5	2.3
20	8	.....	3	12	73	139	66	10	1.5	2.2
21	12	.....	3	16	88	148	60	10	1.5	2.3
22	14	.....	3	20	96	130	60	8	1.5	2.3
23	14	.....	3	26	88	121	54	8	1.5	2.3
24	12	.....	3	30	88	.....	54	8	1.5	3.0
25	12	.....	3	28	73	.....	54	8	1.5	3.7
26	12	.....	5	26	88	.....	54	7	1.5	4.3
27	12	.....	5	26	88	104	48	7	.....	4.3
28	12	.....	5	26	88	121	48	7	.....	4.3
29	12	.....	.....	26	88	130	48	5	.....	4.5
30	12	.....	.....	26	73	139	43	5	.....	4.6
31	12	.....	.....	30	.....	139	.....	5	.....	.....

NOTE.—Discharge Mar. 4 to Apr. 6 estimated on account of diurnal fluctuation from a study of morning and evening gage readings. Discharge estimated, on account of ice, as follows: Nov. 15–30, 5 second-feet; Dec. 1–20, 4 second-feet; Dec. 21 to Jan. 31, 2 second-feet; and Feb. 1, 3 second-feet. Discharge estimated for lack of gage readings as follows: May 24–26, 140 second-feet; Aug. 27–31, 1.5 second-feet. Discharge interpolated Sept. 1, 2, 24, 25, and 30.

Monthly discharge of Jack Creek near Tuscarora, Nev., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	14	5	10.1	621	C.
November	12	.....	6.60	393	D.
December	.....	.....	3.29	202	D.
January	.....	.....	2.00	123	D.
February	5	1.5	3.73	207	C.
March	30	5	13.7	842	C.
April	96	26	52.5	3,120	B.
May	.....	38	98.1	6,030	B.
June	139	43	85.9	5,110	B.
July	43	5	18.3	1,130	B.
August	5	.....	2.65	163	C.
September	4.6	1.6	2.51	149	C.
The year	.....	.....	25.0	18,100	

NOTE.—See footnote to daily-discharge table.

JORDAN CREEK NEAR JORDAN VALLEY, OREG.

LOCATION.—In sec. 9, T. 30 S., R. 45 E., in canyon at lower end of Jordan Valley, 9 miles below Jordan Valley post office, Malheur County. Cow Creek enters Jordan Creek 7 miles below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28, 1911, to September 30, 1915.

GAGE.—Inclined staff on right bank, one-eighth mile below upper end of the canyon; read by Marcos Renteria.

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

CHANNEL AND CONTROL.—One channel. Control consists of lava rock; probably permanent. During the summer months growth of moss frequently affects the stage-discharge relation to a marked degree.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.6 feet at 9 a. m., May 20 (discharge, 655 second-feet); creek dry at gage August 17 to September 30.

1911–1915: Maximum stage recorded, 9.9 feet April 24, 1912 (discharge, 2,150 second-feet); creek reported dry for periods of several weeks in 1911, 1914, and 1915.

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

DIVERSIONS.—Practically the entire summer flow of the stream is used by the many small diversions in the valley above the gage. Flood water is also diverted into the Antelope reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice November 19–24 and December 1 to February 28, and by growth of moss during the summer. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for periods during which stage-discharge relation was affected by ice or moss.

The following discharge measurements was made by G. C. Baldwin:
June 28, 1915: Gage height, 3.05 feet; discharge, 8.6 second-feet.

Daily discharge, in second-feet, of Jordan Creek near Jordan Valley, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	4.7	39	293	184	202	9.4	0.6
2	.....	5.6	37	271	193	202	7.5	.6
3	.....	6.4	36	318	176	193	5.6	.5
4	.....	5.0	36	364	160	168	3.9	.5
5	.....	5.6	37	340	152	146	4.2	.5
6	.....	5.6	31	316	145	124	4.5	.4
7	.....	6.4	31	304	124	112	15	.4
8	.....	6.4	34	316	99	93	29	.4
9	.....	6.9	36	293	88	80	23	.4
10	.....	7.5	37	260	112	68	19	.3
11	.....	6.9	39	260	131	56	22	.2
12	.....	7.2	41	250	193	53	22	.1
13	.....	7.5	45	271	220	61	19	.1
14	0.9	7.3	47	264	293	61	16	.1
15	1.7	7.1	59	257	415	60	11	.....
16	2.0	6.9	71	250	389	47	9.0	.....
17	1.7	6.4	82	220	340	44	6.9	.....
18	1.7	5.6	93	211	389	41	5.8	.....
19	2.5	.....	112	220	499	31	4.5	.....
20	2.5	.....	105	220	655	24	3.5	.....
21	2.5	.....	112	211	590	20	3.0	.....
22	2.5	.....	132	211	499	18	2.3	.....
23	2.3	.....	152	202	499	15	1.7	.....
24	2.5	.....	193	193	457	13	1.3	.....
25	3.2	9.4	212	168	415	11	.9	.....
26	3.9	10	230	153	364	10	.8	.....
27	3.9	9.4	211	138	307	10	.7	.....
28	3.9	8.4	211	131	250	8.4	.6	.....
29	3.4	7.5	240	142	260	8.4	.6	.....
30	4.5	7.5	304	152	260	9.4	.6	.....
31	5.6	.....	304	.....	231	.....	.6	.....

NOTE.—Shifting-control method used June 12–24 and July 18 to Aug. 16, during period of moss effect. Discharge estimated because of ice from weather records and observer's notes as follows: Nov. 19–24, 7.5 second-feet; Dec. 1–31, 10 second-feet; Jan. 1–31, 15 second-feet; Feb. 1–28, 30 second-feet. Discharge interpolated for various days for which gage heights are not available. No flow Oct. 1–13 and Aug. 15 to Sept. 30.

Monthly discharge of Jordan Creek near Jordan Valley, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	5.6	0.0	1.65	101	C.
November	10	4.7	7.07	421	C.
December	.....	.....	10.0	615	D.
January	.....	.....	15.0	922	D.
February	.....	.....	30.0	1,670	D.
March	304	31	108	6,640	A.
April	364	131	240	14,300	A.
May	655	88	293	18,000	A.
June	202	8.4	66.3	3,950	B.
July	29	.6	8.19	504	C.
August	.6	.0	.16	9.8	
September	.0	.0	.00	.0	
The year	655	.0	65.1	47,100	

NOTE.—See footnote to table of daily discharge.

OWYHEE CANAL NEAR OWYHEE, OREG.

LOCATION.—In sec. 6, T. 21 S., R. 46 E., at the bridge which crosses the canal at the Wilson ranch, 2½ miles below head of canal, 5 miles southwest of Owyhee, Malheur County, and 15 miles southwest of Nyssa.

RECORDS AVAILABLE.—May to October, 1904; May to September, 1905; October 5, 1911, to September 30, 1915.

GAGE.—Inclined staff on right bank at upstream side of bridge; read during the irrigation season by the ditch rider. Gage used during 1904 and 1905, was one-fourth mile upstream from site of present gage.

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

CHANNEL AND CONTROL.—Bed of canal is clean and smooth. Control not well defined but fairly permanent.

EXTREMES OF DISCHARGE.—1904–1905 and 1911–1915: Maximum stage recorded, 5.2 feet May 18 and 23, 1915 (discharge 240 second-feet); no flow June 18–19, June 24, and July 10–11, 1915, and at various times in 1912, 1913, 1914, and 1915.

WINTER FLOW.—Canal freezes. Winter gage readings not available; flow estimated from discharge measurements and observer's notes.

DIVERSIONS.—Surplus water is returned to the Owyhee River through two wasteways between the gage and the station on the river near Owyhee; one of these wasteways is a quarter of a mile below the gage. Two small ditches with a combined capacity probably not exceeding 3 second-feet divert from the canal above the station.

REGULATION.—Abrupt changes of stage due to manipulation of head gates not to be expected, as water is kept at nearly constant stage.

ACCURACY.—Stage-discharge relation not changed during the year; affected by ice during the winter. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good during irrigation season but poor for winter.

The Owyhee canal diverts water from Owyhee River in sec. 18, T. 21 S., R. 46 E., and in 1915 supplied water for irrigation to about 9,000 acres of land in the vicinity of Owyhee, Nyssa, and Ontario. During the winter the flow past the gage is derived from snow and from leakage through the head gates and is returned to the river through the wasteway a quarter of a mile below the station.

Discharge measurements of Owyhee canal near Owyhee, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec.-ft.*
Dec. 16	A. W. Harrington....	[a] 1.68	4.9	Apr. 26	A. W. Harrington....	5.02	221
Jan. 30	.....do.....	[a] 2.36	1.7	July 14	.....do.....	4.85	211
Mar. 15	L. W. Roush.....	3.93	133	Sept. 4	.....do.....	3.66	108

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Owyhee canal near Owyhee, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	144	136	128	.....	.....	222	231	213	195	105
2	144	136	128	.....	.....	222	231	213	152	105
3	144	136	128	.....	.....	222	231	213	152	105
4	136	136	128	.....	.....	231	231	213	152	105
5	136	136	128	.....	.....	231	231	204	152	105
6	136	136	.....	.....	.....	231	231	222	136	105
7	136	136	.....	.....	.....	231	231	204	136	105
8	136	136	.....	.....	.....	231	231	222	136	112
9	136	136	.....	.....	.....	231	231	222	136	120
10	136	136	.....	.....	.....	231	231	0	136	120
11	136	136	.....	.....	.....	222	231	0	136	120
12	136	136	.....	65	.....	222	231	222	120	120
13	136	136	.....	130	.....	222	231	213	120	120
14	136	136	.....	130	.....	222	222	213	120	120
15	136	136	.....	132	.....	222	231	204	120	120
16	136	136	.....	.....	.....	231	231	195	136	136
17	136	136	.....	.....	.....	231	231	195	136	136
18	136	136	.....	.....	.....	240	0	195	136	136
19	136	136	.....	.....	.....	231	0	186	120	136
20	136	136	.....	.....	.....	231	231	186	105	136
21	136	136	.....	.....	.....	231	231	177	120	136
22	136	136	.....	.....	.....	231	222	177	120	136
23	136	128	.....	.....	.....	240	231	168	120	136
24	136	128	.....	.....	.....	231	0	168	105	136
25	136	128	.....	.....	.....	231	222	160	105	136
26	136	128	.....	.....	222	231	222	160	120	136
27	136	128	.....	.....	231	231	222	160	120	136
28	136	128	.....	.....	222	231	222	152	105	136
29	136	128	.....	.....	222	231	222	152	105	136
30	136	128	.....	.....	222	231	213	152	105	136
31	136	.....	.....	.....	.....	222	.....	152	120	.....

NOTE.—Discharge estimated as follows: Dec. 6–15, 5 second-feet; Dec. 17–31, 4 second-feet; Mar. 1–11, 3 second-feet; Mar. 12, 65 second-feet; Mar. 13–14, 130 second-feet; Mar. 16–31, 140 second-feet; Apr. 1, 25, 180 second-feet.

Monthly discharge of Owyhee canal near Owyhee, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
Ootober	144	136	137	8,420	B.
November	136	128	134	7,970	B.
December	128	.....	24.4	1,500	D.
January	.....	.....	[a] 3.0	184	D.
February	.....	.....	[a] 2.0	111	D.
March	.....	.....	88.1	5,420	D.
April	231	.....	187	11,100	C.
May	240	222	229	14,100	A.
June	231	0	205	12,200	B
July	222	0	178	10,900	B.
August	195	105	128	7,870	B.
September	136	105	124	7,380	C.
The year	240	0	120	87,200	

[a] Estimated.

BOISE RIVER NEAR TWIN SPRINGS, IDAHO.

LOCATION.—On unsurveyed land, approximately in sec. 23, T. 4 N., R. 6 E., a quarter of a mile above Birch Creek, 1½ miles above flow line of the Arrowrock reservoir, 4 miles below Twin Springs, Boise County, and 18 miles above Arrowrock.

DRAINAGE AREA.—830 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 22, 1911, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank; installed April 4, 1915. March 22, 1911, to April 1, 1915, inclined staff, and April 2–3, 1915, vertical staff at practically the same site and set to the same datum. Roy Call, observer.

DISCHARGE MEASUREMENTS.—Made from cable about 50 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Banks not subject to overflow. One channel at all stages. Control practically permanent except under conditions of unusual heavy ice or extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 4.30 p. m. January 26 (water backed up by ice jam); maximum discharge at gage height, 4.62 at 6 a. m., April 19 (discharge, 3,140 second-feet); minimum discharge not definitely known, but about 188 second-feet, December 17, 22, and 25, and on January 22 and 23 at gage heights varying from 2.0 to 4.4 feet; minimum gage height, 1.9 at 4 p. m., December 8.

1911–1915: Maximum stage recorded during period, 7.4 feet, June 13, 1912 (discharge, 7,900 second-feet); minimum discharge, December 17, 22, and 25, 1914, and January 22 and 23, 1915; minimum gage height recorded December 8, 1914.

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

DIVERSIONS.—No important diversions above station and none between it and the station at Dowling.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during the winter of 1914–15. Affected by ice December 9 to February 6, February 8–11 and 16–21. Two well-defined rating curves used, one applicable October 1 to December 8, the other February 7 to September 30. Gage read to hundredths once daily during open-water season and about three times a week during winter. Mean daily gage heights after April 4 obtained by inspecting recorder graph. Daily discharge ascertained by applying daily gage heights to rating tables.

COOPERATION.—Occasional discharge measurements made by employees of the United States Reclamation Service.

Discharge measurements of Boise River near Twin Springs, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 12	A. W. Harrington	[a]4.43	364	June 14	A. C. Price	3.29	1,350
Mar. 26	do	2.67	768	July 1	do	2.96	1,020
29	do	2.99	994	15	Harrington and Price	2.65	729
Apr. 4	do	3.15	1,180	29	A. C. Price	2.26	477
May 5	Steward and Price	3.24	1,240	Aug. 12	do	2.13	373
7	do	3.13	1,160	21	G. C. Baldwin	2.08	324
26	A. C. Price	3.88	2,120				

[a] Stage-discharge relation affected by ice.

NOTE.—Steward and Price are employees of the United States Reclamation Service.

Daily discharge, in second-feet, of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	451	515	362	.....	374	779	1,880	2,570	977	518	324
2	483	515	330	.....	374	996	1,630	2,500	977	468	475
3	515	515	391	.....	374	1,140	1,490	2,140	968	441	374
4	1,120	515	452	.....	390	1,160	1,380	1,940	941	427	355
5	802	500	412	.....	407	1,090	1,300	1,880	915	414	342
6	484	484	371	.....	360	1,100	1,230	1,940	1,020	407	330
7	484	452	330	374	312	1,120	1,180	1,880	1,100	407	324
8	452	452	290	.....	336	1,070	1,160	2,010	1,060	400	318
9	452	452	.....	.....	360	1,060	1,220	2,080	1,050	388	318
10	515	452	.....	.....	383	1,090	1,500	1,940	1,030	374	312
11	515	452	.....	.....	407	1,140	1,570	1,810	915	362	312
12	515	452	.....	342	418	1,260	1,750	1,630	838	355	324
13	484	452	.....	312	430	1,630	2,280	1,470	804	355	355
14	484	452	.....	312	441	1,690	2,500	1,340	779	342	342
15	484	396	.....	275	467	1,540	2,360	1,280	730	355	330
16	484	340	.....	.....	493	1,630	2,210	1,330	698	348	330
17	484	354	.....	.....	520	1,880	2,210	1,370	667	342	324
18	500	367	.....	.....	546	1,880	2,720	1,400	643	330	312
19	515	340	.....	.....	571	1,940	3,030	1,400	613	336	312
20	586	362	.....	.....	595	1,940	2,800	1,350	590	336	299
21	657	385	.....	.....	620	2,080	2,570	1,310	568	330	299
22	583	407	.....	407	745	1,940	2,430	1,310	546	324	299
23	583	430	.....	407	871	1,690	2,280	1,320	532	318	299
24	583	452	.....	407	996	1,540	2,360	1,330	503	324	299
25	572	423	.....	407	863	1,450	2,210	1,380	489	324	293
26	560	394	.....	390	779	.....	2,080	1,280	482	305	330
27	549	394	.....	374	698	.....	1,940	1,110	475	287	448
28	538	394	.....	374	738	.....	2,080	1,000	461	281	381
29	526	394	.....	.....	996	.....	2,210	968	455	281	362
30	515	394	.....	.....	950	.....	2,210	977	448	281	342
31	515	.....	.....	.....	821	.....	2,280	.....	482	281	.....

NOTE.—Discharge estimated, on account of ice, from discharge measurement, weather records, and observer's notes, as follows: Dec. 9–25, 226 second-feet; Dec. 26–31, 302 second-feet; Jan. 1–16, 345 second-feet; Jan. 17–31, 265 second-feet; Feb. 1–6, 407 second-feet; Feb. 8–11, 342 second-feet; Feb. 16–21, 336 second-feet. Discharge Apr. 26–30 estimated at 1,600 second-feet. Discharge interpolated, because of lack of readings on numerous days from Oct. 1 to Dec. 7 and Feb. 23 to Mar. 23.

Monthly discharge of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 830 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,120	451	548	0.660	0.76	33,700	B.
November	515	340	430	.518	.58	25,600	B.
December	452	.....	277	.334	.39	17,000	C.
January	.....	.....	306	.369	.43	18,800	C.
February	.....	.....	365	.440	.46	20,300	C.
March	996	312	569	.686	.79	35,000	B.
April	2,080	779	1,460	1.76	1.96	86,900	A.
May	3,030	1,160	2,000	2.41	2.78	123,000	A.
June	2,570	968	1,570	1.89	2.11	93,400	A.
July	1,100	448	734	.884	1.02	45,100	A.
August	518	281	356	.429	.49	21,900	A.
September	475	293	335	.404	.45	19,900	A.
The year	3,030	.....	747	.900	12.22	541,000	

NOTE.—See footnote to table of daily discharge.

BOISE RIVER AT DOWLING'S RANCH, NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 15, T. 3 N., R. 4 E., at Dowling station on Boise and Arrowrock Railroad, Elmore County, three-fourths mile above Moore Creek, 2 miles below Highland power dam, and 4 miles below Arrowrock.

DRAINAGE AREA.—2,230 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 13, 1911, to September 30, 1915.

GAGE.—Friez water-stage recorder on left bank; installed March 19, 1915, to replace an inclined staff set to same datum and at practically the same site.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. One channel at all stages. Control subject to slight changes.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.85 feet at 8 a. m. April 20 (discharge, 3,340 second-feet); minimum stage recorded, 2.08 feet at 6 p. m. May 13 (discharge, 307 second-feet.)

1911–1915: Maximum stage recorded 8.7 feet June 13, 1911 (discharge, 15,100 second-feet); minimum stage recorded May 13, 1915.

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

DIVERSIONS.—No diversions of importance above the station and none between it and next station below.

REGULATION.—On and after February 21, 1915, flow was regulated at Arrowrock dam, 4 miles upstream. Storage capacity of Arrowrock reservoir is about 280,000 acre-feet. Water is stored during the winter and spring and released during the irrigation season.

ACCURACY.—Stage-discharge relation changed slightly during the winter of 1914-15; affected by ice December 14 to February 18. Two well-defined rating curves used, one applicable October 1 to December 13, the other February 19 to September 30. Staff gage read daily throughout the year. Mean daily gage heights after March 19 obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to rating table. Records excellent for open-water season, good for December and February, and fair for January.

COOPERATION.—A large number of current-meter measurements made by employees of the United States Reclamation Service and of the Idaho State engineer have been furnished to the Survey.

Discharge measurements of Boise River at Dowling's ranch, near Arrowrock, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 10	A. W. Harrington	[a] 3.25	720	Aug. 12	E. T. Lakin [c]	3.90	1,810
Feb. 20	A. C. Price [b]	3.18	1,000	16	do	3.85	1,670
24	Purton and Price	[a] 2.51	485	18	do	3.85	1,730
25	do	2.47	491	19	do	3.88	1,750
26	Baldwin and Price [b]	2.27	400	20	G. C. Baldwin	3.88	1,770
27	G. C. Baldwin	2.21	354	21	E. T. Lakin [c]	3.96	1,860
Mar. 21	A. W. Harrington	3.39	1,190	26	do	3.75	1,610
26	Paul [b] and Elford [b]	3.81	1,770	27	do	3.7[illegible]	1,600
Apr. 7	G. C. Baldwin	3.92	1,830	30	Lakin [c] and McConnel [c]	3.67	1,450
9	Steward [b] and Price [b]	4.22	2,330	31	W. N. McConnel [c]	3.63	1,440
9	Price [b] and Elford [b]	4.14	2,220	Sept. 1	do	3.60	1,410
17	do	4.43	2,520	2	do	3.50	1,400
24	do	4.82	3,290	3	do	3.65	1,500
29	do	4.60	2,780	7	Price [b] and McConnel [c]	3.53	1,340
May 4	Steward [b] and Price [b]	4.16	2,160	8	W. N. McConnel [c]	3.48	1,360
7	A. W. Harrington	4.01	1,960	9	do	3.46	1,320
15	Harrington and Price [b]	2.87	735	10	do	3.36	1,140
25	A. C. Price [b]	3.57	1,400	13	do	3.30	1,130
July 10	E. T. Lakin [c]	4.54	2,830	14	do	3.26	1,090
13	do	4.39	2,690	15	Price [b] and Steward [b]	3.20	1,030
22	do	3.96	1,920	15	W. N. McConnel [c]	3.24	1,060
24	A. C. Price [b]	4.00	1,990	16	do	3.27	1,070
30	E. T. Lakin [c]	3.93	1,830	17	do	3.28	1,120
Aug. 1	do	3.96	1,900	20	do	3.27	1,070
2	do	3.94	1,840	21	do	3.24	1,060
3	do	3.92	1,820	22	do	3.26	1,100
4	do	3.97	1,860	23	do	3.20	1,010
5	do	3.87	1,750	24	do	3.16	978
6	do	3.77	1,630	27	do	3.27	1,100
9	do	3.84	1,730	28	do	3.35	1,190
10	do	3.84	1,730	29	do	3.28	1,110

[a] Stage-discharge relation affected by ice.
[b] Employee of United States Reclamation Service.
[c] Employee of Idaho State engineer.

Daily discharge, in second-feet, of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	800	971	722	.....	405	1,740	2,160	1,670	2,970	1,870	1,470
2	842	971	761	.....	484	1,800	2,080	1,940	2,970	1,870	1,440
3	1,020	971	800	.....	570	1,800	2,080	2,080	2,970	1,870	1,470
4	971	927	971	.....	890	1,870	2,080	2,230	2,970	1,800	1,450
5	927	927	883	.....	810	1,870	2,160	2,380	2,970	1,670	1,350
6	883	883	800	.....	772	1,740	2,010	2,710	2,880	1,650	1,320
7	883	883	722	.....	736	1,800	1,940	2,880	2,880	1,650	1,350
8	883	842	686	.....	700	1,940	2,010	2,880	2,880	1,670	1,340
9	883	842	581	.....	700	2,160	2,080	3,060	2,800	1,740	1,290
10	883	883	581	.....	810	2,230	1,800	3,060	2,800	1,740	1,220
11	971	883	581	.....	849	2,230	1,560	3,060	2,800	1,740	1,170
12	971	883	649	.....	849	2,310	1,430	3,060	2,630	1,800	1,160
13	927	927	649	.....	890	2,310	765	3,060	2,540	1,800	1,130
14	883	883	.....	.....	931	2,380	546	2,800	2,540	1,740	1,080
15	842	800	.....	.....	975	2,460	736	2,630	2,460	1,800	1,060
16	842	800	.....	.....	1,020	2,460	841	2,880	2,310	1,740	1,070
17	883	761	.....	.....	1,070	2,630	940	3,060	2,080	1,740	1,090
18	1,160	761	.....	.....	1,210	2,800	1,030	3,150	1,940	1,740	1,080
19	1,210	649	.....	975	1,270	3,060	1,120	3,150	1,940	1,740	1,060
20	1,260	722	.....	975	1,210	3,240	1,190	3,240	1,940	1,800	1,070
21	1,260	800	.....	772	1,190	3,240	1,240	3,240	1,870	1,800	1,070
22	1,160	800	.....	810	1,310	3,240	1,280	3,150	1,870	1,740	1,060
23	1,110	800	.....	736	1,490	3,240	1,310	3,150	1,940	1,740	1,050
24	1,060	842	.....	511	1,550	3,240	1,340	3,150	1,940	1,740	1,050
25	1,060	842	.....	484	1,640	3,240	1,390	3,150	2,010	1,670	1,050
26	1,060	800	.....	405	1,670	3,240	1,410	3,240	2,010	1,640	1,010
27	1,060	800	.....	358	1,670	3,240	1,440	3,150	1,940	1,560	1,060
28	1,020	800	.....	315	1,670	3,060	1,470	3,060	1,870	1,500	1,140
29	971	800	.....	.....	1,650	2,880	1,490	3,060	1,870	1,520	1,130
30	971	800	.....	.....	1,590	2,460	1,510	3,060	1,870	1,480	1,080
31	971	.....	.....	.....	1,640	.....	1,540	.....	1,870	1,480	.....

NOTE.—Discharge estimated on account of ice from discharge measurements, weather records and observer's notes as follows: Dec. 14–23, 495 second-feet; Dec. 24–31, 681 second-feet; Jan. 1–17, 733 second-feet; Jan. 18–31, 615 second-feet; Feb. 1–18, 867 second-feet.

Monthly discharge of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,260	800	983	60,800	A.
November	971	649	842	50,100	A.
December	971	.....	637	39,200	B.
January	.....	.....	680	41,800	C.
February	975	315	784	43,500	B.
March	1,670	405	1,100	67,600	A.
April	3,240	1,740	2,530	151,000	A.
May	2,160	546	1,480	91,000	A.
June	3,240	1,670	2,880	171,000	A.
July	2,970	1,870	2,370	146,000	A.
August	1,870	1,480	1,710	105,000	A.
September	1,470	1,010	1,180	70,200	A.
The year	3,240	315	1,430	1,040,000	

NOTE.—See footnote to table of daily discharge.

BOISE RIVER NEAR HIGHLAND, IDAHO.

LOCATION.—In sec. 32, T. 3 N., R. 4 E., Ada County, one-fourth mile above Smythe's ranch, half a mile below Kirks, the nearest station on the Boise & Arrowrock Railroad, 2 miles below Moore Creek, and about 3 miles southwest of the old Highland post office.

DRAINAGE AREA.—2,650 square miles (measured on topographic maps).

RECORDS AVAILABLE.—December 15, 1894, to October 31, 1904, at the old station near Boise, 8 miles downstream; March 18, 1905, to August 24, 1915, at the station herein described; August 25 to September 30, 1915, at a new site, 1½ miles upstream.

GAGE.—Friez water-stage recorder installed on left bank March 21, 1915, and used until August 24. August 25 to September 30, 1915, vertical staff installed on left bank about 1½ miles farther upstream and at a different datum. March 18 to July 31, 1905, a temporary gage on right bank below Smythe's house; August 1, 1905, to November 21, 1909, sloping gage at different datum on right bank about one-fourth mile above Smythe's house; November 22, 1909, to March 20, 1915, vertical and inclined staffs on left bank about 50 feet farther upstream and reading the same at low stages as the one across the river at the same datum but 50 feet below the water-stage recorder. Edgar Kirk, observer.

DISCHARGE MEASUREMENTS.—Made from a cable about 50 feet above the Friez gage.

CHANNEL AND CONTROL.—Bed of stream composed of sand, gravel, and boulders. Control shifts frequently, owing to deposition or washing out of tailings from placer mines above. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.54 feet at 3 a. m. June 26; maximum discharge recorded during year, 3,650 second-feet at 11 a. m. April 20, at gage height 7.16 feet. Minimum discharge 463 second-feet December 17 and 21 (gage height 3.2 and 3.3; ice present); minimum stage recorded, 3.01 feet at 9 a. m. February 28.

1905–1915: Maximum stage recorded, 13.7 feet April 15, 1907 (discharge, 17,000 second-feet); minimum stage recorded, 2.7 feet December 10 and 11, 1905 (discharge, 450 second-feet).

A maximum discharge of 40,100 second-feet occurred June 14, 1896, at the old station near Boise.

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

DIVERSIONS.—No important diversions above the station. The New York canal of the Boise project, United States Reclamation Service, diverts about 6 miles below and has a maximum capacity of about 2,500 second-feet. Below this a number of smaller canals divert from the river, their total maximum capacity amounting to about 2,500 second-feet.

REGULATION.—Flow since February 21, 1915, regulated at Arrowrock dam, about 6 miles above.

ACCURACY.—Stage-discharge relation not permanent, changes being well defined by numerous discharge measurements. Affected by ice December 15 to about February 10. Several well-defined rating curves used. Mean daily gage heights March 21 to August 24 obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to rating tables or by shifting-control method. Open-water records good; winter records fair.

COOPERATION.—Numerous discharge measurements made by employees of the United States Reclamation Service and of the Idaho State engineer.

Discharge measurements of Boise River near Highland, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	Purton and Price	3.93	920	June 26	A. C. Price	7.54	3,380
Jan. 9	L. W. Roush	[a] 4.09	925	30	do	7.28	3,130
Feb. 20	A. C. Price	[a] 4.30	1,110	July 3	do	7.21	3,070
24	Purton and Price	3.48	707	8	Lakin and Price	7.15	3,080
25	do	3.53	696	9	E. T. Lakin	7.16	3,140
26	Baldwin and Price	3.26	584	10	do	7.12	3,060
27	Price and Steward	3.15	561	11	do	7.08	3,010
Mar. 4	D. J. Paul	4.15	1,130	13	do	6.80	2,730
8	do	3.78	817	14	do	6.77	2,720
21	A. W. Harrington	4.78	1,520	17	A. W. Harrington	6.28	2,260
25	Paul and Elford	5.43	2,080	18	E. T. Lakin	6.24	2,150
Apr. 7	G. C. Baldwin	5.64	2,130	19	do	6.23	2,070
9	Steward and Price	6.09	2,570	20	do	6.20	2,070
17	A. W. Harrington	6.54	2,930	20	Price and Lakin	6.19	2,000
24	Price and Elford	7.10	3,490	21	E. T. Lakin	6.16	2,020
29	do	6.77	3,050	22	do	6.14	1,990
May 4	Steward and Price	6.09	2,420	24	Price and Steward	6.19	2,010
6	A. W. Harrington	5.89	2,150	26	E. T. Lakin	6.30	2,100
14	Price and Tallman	4.96	1,470	27	do	6.13	1,990
15	A. W. Harrington	5.08	1,480	28	do	6.10	1,960
25	A. C. Price	5.81	2,000	29	do	6.06	1,990
June 4	Price and Tallman	6.45	2,490	30	do	6.03	1,930
11	G. C. Baldwin	7.30	3,490	Aug. 20	G. C. Baldwin	5.77	1,760
16	A. C. Price	7.24	3,280				

[a] Stage-discharge relation affected by ice.

NOTE.—Price, Paul, Steward, and Elford were employees of the United States Reclamation Service; Tallman and Lakin of the Idaho State engineer.

Daily discharge, in second-feet, of Boise River near Highland, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	898	1,170	898	.....	.....	651	2,060	2,390	2,120	3,170	2,020	1,440
2	961	1,100	783	.....	.....	651	2,110	2,350	2,420	3,170	1,980	1,440
3	1,170	1,100	898	.....	.....	746	2,150	2,380	2,450	3,070	1,980	1,540
4	1,100	1,100	1,100	.....	.....	1,120	2,230	2,400	2,550	3,060	1,890	1,520
5	1,030	1,100	1,030	.....	.....	980	2,220	2,400	2,770	3,090	1,760	1,490
6	1,030	1,100	961	.....	.....	980	2,050	2,230	3,140	3,100	1,710	1,460
7	1,030	1,030	783	.....	.....	980	2,080	2,200	3,390	3,130	1,720	1,440
8	1,030	1,030	731	.....	.....	856	2,170	2,230	3,260	3,150	1,770	1,340
9	1,030	1,030	683	.....	.....	856	2,410	2,360	3,500	3,030	1,820	1,290
10	1,030	961	638	.....	.....	916	2,560	2,220	3,500	3,030	1,780	1,200
11	1,100	961	783	.....	1,050	1,050	2,540	1,940	3,490	3,030	1,740	1,180
12	1,030	961	961	.....	980	1,120	2,570	1,870	3,460	2,820	1,800	1,170
13	1,030	1,030	731	.....	980	1,120	2,720	1,700	3,440	2,770	1,840	1,150
14	1,030	1,030	638	.....	856	1,190	2,820	1,460	3,150	2,730	1,800	1,060
15	961	961	.....	898	746	1,190	2,790	1,490	3,000	2,620	1,800	1,100
16	961	788	.....	1,030	856	1,270	2,720	1,480	3,230	2,500	1,810	1,150
17	961	839	.....	898	980	1,350	3,000	1,640	3,450	2,220	1,810	1,150
18	1,170	898	.....	.....	.....	1,350	3,100	1,910	3,430	2,120	1,780	1,130
19	1,410	731	.....	.....	.....	1,610	3,340	2,150	3,530	2,120	1,780	1,120
20	1,330	839	.....	.....	.....	1,610	3,570	2,070	3,500	2,060	1,790	1,100
21	1,410	839	.....	.....	1,120	1,540	3,540	2,010	3,480	2,010	.....	1,100
22	1,410	839	.....	.....	1,120	1,660	3,520	1,990	3,450	2,010	.....	1,100
23	1,330	961	.....	.....	1,050	1,880	3,490	1,970	3,280	2,010	.....	1,060
24	1,250	1,030	.....	.....	651	2,010	3,480	2,060	3,260	2,060	.....	1,020
25	1,250	961	.....	.....	697	2,110	3,480	1,990	3,230	2,120	1,740	1,030
26	1,170	961	.....	.....	609	2,100	3,480	1,970	3,340	2,170	1,690	1,040
27	1,170	898	.....	.....	570	2,030	3,480	1,950	3,220	2,060	1,640	1,150
28	1,170	961	.....	.....	501	2,020	3,220	1,930	3,240	1,960	1,640	1,200
29	1,100	1,030	.....	.....	.....	2,110	3,090	2,010	3,140	1,910	1,640	1,150
30	1,100	961	.....	.....	.....	1,990	2,700	1,990	3,170	1,910	1,640	1,100
31	1,170	.....	.....	.....	.....	1,980	.....	1,980	.....	2,020	1,540	.....

NOTE.—Discharge estimated, on account of ice, from weather records, observer's notes, and discharge measurements as follows: Dec. 15–23, 532 second-feet; Dec. 24–31, 774 second-feet; Jan. 1–14, 886 second-feet; Jan. 18–31, 726 second-feet; Feb. 1–5, 992 second-feet; Feb. 6–10, 1,040 second-feet; Feb. 18–20, 1,090 second-feet. Discharge, Aug. 21–24, estimated at 1,770 second-feet. Discharge interpolated on various days between Aug. 25 and Sept. 30.

Monthly discharge of Boise River near Highland, Idaho, for the year ending Sept. 30. 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,410	898	1,120	68,900	A.
November	1,170	731	973	57,900	A.
December	1,100	.....	729	44,800	C.
January	1,030	.....	819	50,400	C.
February	1,120	501	936	52,000	B.
March	2,110	651	1,390	85,500	A.
April	3,570	2,050	2,820	168,000	A.
May	2,400	1,460	2,020	124,000	A.
June	3,530	2,120	3,190	190,000	A.
July	3,170	1,910	2,520	155,000	A.
August	2,020	1,540	1,770	109,000	A.
September	1,540	1,020	1,210	72,000	A.
The year	3,570	.....	1,630	1,180,000	

NOTE.—See footnote to table of daily discharge.

COTTONWOOD CREEK NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 35, T. 4 N., R. 5 E., Boise County, 200 feet above the bridge where the Twin Springs-Arrowrock road crosses the creek and one-fourth mile north of the south boundary of the Boise National Forest; 1½ miles above moutl of creek and about 13 miles, by road, from Arrowrock.

DRAINAGE AREA.—23 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 7, 1914, to September 30, 1915.

GAGE.—Vertical staff reading from 0.0 to 3.0 feet, spiked to a large cottonwood tree on left bank, 15 feet from road; read by Mrs. Eldora Hedrock.

DISCHARGE MEASUREMENTS.—Made by wading, usually at a section about 100 feet above the gage.

CHANNEL AND CONTROL.—Bed consists of boulders and gravel with pockets of fine sand; rough. Control shifts during high stages. No weeds grow in channel, but backwater from drift on control may be expected at times. A reinforced concrete artificial control was completed about 15 feet below the gage October 24, 1915.

EXTREMES OF DISCHARGE.—Maximum stage during year, 1.00 foot at 8 a. m. May 19 (discharge, 29 second-feet); minimum stage, 0.03 foot August 12 to 15 (discharge, 0.4 second-foot).

1914–15: Maximum stage recorded, 1.95 feet at 6 p. m. April 15, 1914 (discharge, 108 second-feet); minimum stage recorded August 12–15, 1915.

WINTER FLOW.—Observations discontinued December 13 to February 28. Stage-discharge relation apparently not affected by ice during period of record.

DIVERSIONS.—No known diversions above gage. One small ditch diverts water at brush dam 250 feet below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; four fairly well-defined rating curves used during the year. Gage-height record inaccurate at times. Daily discharge ascertained by applying daily gage heights to rating table or by shifting-control method. Records fair.

COOPERATION.—Some discharge measurements were made by engineers of the United States Reclamation Service.

Discharge measurements of Cottonwood Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 12	A. W. Harrington	0.36	4.1	July 1	Price and Elford	0.38	4.9
Mar. 24	do	.76	14.4	15	Harrington and Price	.29	3.2
April 12	do	.77	13.6	29	A. C. Price	.15	1.3
May 26	W. G. Steward	.87	21.4	Aug. 21	Baldwin and Hoyt	.07	.6
June 14	Steward and Price	.58	9.6				

NOTE.—Steward, Price, and Elford were employees of the United States Reclamation Service.

Daily discharge, in second-feet, of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.2	3.5	4.0	6.4	12	13	18	5.0	2.1	1.0
2	3.0	3.9	3.9	6.4	14	13	16	4.1	1.7	1.6
3	4.4	3.9	3.9	6.4	14	12	16	3.7	1.5	1.4
4	3.7	4.0	3.7	6.6	14	11	15	4.1	1.2	1.2
5	3.1	4.0	3.7	6.6	13	11	14	3.7.	1.2	1.2
6	3.0	4.0	3.5	6.4	14	11	13	4.4	1.2	1.0
7	3.0	4.0	3.5	6.4	14	11	12	5.9	1.1	.8
8	3.0	4.0	3.5	6.4	13	10	12	4.4	.8	.8
9	3.0	4.0	3.3	6.6	13	11	11	5.0	.8	1.0
10	3.0	4.0	3.3	6.6	13	14	10	4.1	.7	1.0
11	3.0	4.0	3.3	7.1	13	14	10	4.1	.6	1.4
12	3.0	4.0	3.3	7.1	13	15	12	3.7	.6	2.4
13	3.0	4.0	.....	7.4	18	17	11	3.5	.5	3.7
14	3.0	4.0	.....	7.4	16	23	9.9	3.3	.5	3.0
15	2.6	4.2	.....	7.9	14	22	8.2	3.2	.5	1.8
16	2.6	4.2	.....	8.5	15	21	8.2	3.0	.5	1.6
17	2.6	4.2	.....	8.8	14	22	7.6	2.7	.5	1.5
18	3.0	4.2	.....	9.6	14	27	7.6	2.7	.6	1.4
19	3.1	4.2	.....	9.6	14	28	7.9	2.4	.6	1.4
20	3.1	4.2	.....	10	14	27	7.6	2.4	.8	1.4
21	3.3	4.2	.....	11	14	25	7.6	2.1	.6	1.3
22	3.5	4.0	.....	12	13	23	6.6	2.1	.6	1.3
23	3.3	4.0	.....	13	12	24	5.9	1.8	.6	1.3
24	3.3	4.0	.....	14	12	25	5.4	1.8	1.2	1.6
25	3.0	4.0	.....	14	12	23	5.9	1.6	.8	1.6
26	3.1	4.0	.....	13	11	21	5.7	1.3	.7	1.8
27	3.3	4.0	.....	14	11	19	5.7	1.0	.6	1.8
28	3.5	4.0	.....	14	11	20	5.2	1.0	.6	1.8
29	3.5	4.0	.....	16	11	20	5.4	1.1	.5	1.8
30	3.5	4.0	.....	14	13	17	5.2	1.2	.5	1.8
31	3.5	.....	.....	13	.....	16	.....	2.1	.5	.....

NOTE.—No record obtained Dec. 13 to Feb. 28.

Monthly discharge of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 23 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	4.4	2.2	3.14	0.137	0.158	193	C.
November	4.2	3.5	4.02	.175	.195	239	C.
December 1-12	4.0	3.3	3.58	.156	.070	85.2	D.
March	16	6.4	9.55	.415	.478	587	C.
April	18	11	13.3	.578	.645	791	C.
May	28	10	18.3	.796	.918	1,130	B.
June	18	5.2	9.52	.414	.462	566	B.
July	5.9	1.0	2.98	.130	.150	183	C.
August	2.1	.5	0.813	.035	.040	50.0	D.
September	3.7	.8	1.56	.068	.076	92.8	D.

SOUTH FORK OF BOISE RIVER NEAR LENOX, IDAHO.

LOCATION.—In sec. 24, T. 2 N., R. 6 E., in the canyon at R. S. Sandlin's ranch, 1 mile above mouth of Smith Creek, 4 miles above flow line of Arrowrock reservoir, 14 miles above mouth of South Fork, and 18 miles above Arrowrock dam. The station is about 7 miles south of Lenox post office, Elmore County, and it was originally described as "near Prairie," Idaho.

DRAINAGE AREA.—1,090 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 24, 1911, to September 30, 1915.

GAGE.—Friez water-stage recorder on right bank; installed April 11, 1915, at the same datum as the original inclined gage but about 25 feet downstream. Observer, R. S. Sandlin.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable 100 feet upstream from gage.

CHANNEL AND CONTROL.—Bed consists of mud and gravel, one channel at all stages. The control consists of rock and coarser material and is practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.20 feet at 10 p. m. May 18 (discharge, 2,100 second-feet); minimum stage recorded, 2.04 feet at 10 a. m. August 31 (discharge, 266 second-feet).

1911–1915: Maximum stage recorded, 8.4 feet June 13, 1911 (discharge, 6,420 second-feet); minimum stage recorded August 31, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice for short periods only.

DIVERSIONS.—None of importance either above or below gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice December 15 to January 29. Rating curve well defined. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to rating table, except for period during which stage-discharge relation was affected by ice. Records for April to September excellent, for other months fair.

COOPERATION.—Occasional discharge measurements are made by employees of the United States Reclamation Service.

Discharge measurements of South Fork of Boise River near Lenox, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 14	A. W. Harrington.....	[a] 2.51	342	July 2	Price and Elford.....	3.28	703
Apr. 7	.....do.....	4.08	1,160	16	Harrington and Price..	2.91	517
9	.....do.....	4.00	1,120	30	A. C. Price.....	2.44	334
May 6	Steward and Price.....	4.15	1,240	Aug. 13	.....do.....	2.22	258
27	A. C. Price.....	4.51	1,440	22	G. C. Baldwin.....	2.14	250
June 15	Steward and Price.....	3.88	1,100				

[a] Stage-discharge relation affected by ice.

NOTE.—Steward, Price, and Elford were employees of the United States Reclamation Service.

Daily discharge, in second-feet, of South Fork of Boise River near Lenox, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	391	469	355	416	391	869	1,770	1,860	736	373	237
2	430	469	355	429	391	928	1,600	1,910	715	366	307
3	469	469	391	420	391	1,050	1,440	1,730	704	338	304
4	469	469	429	410	391	1,190	1,370	1,560	694	319	286
5	429	469	391	397	391	1,120	1,290	1,440	673	310	281
6	429	449	373	385	391	1,120	1,220	1,440	736	304	272
7	429	449	355	373	391	1,190	1,150	1,440	730	304	262
8	429	429	322	401	391	1,120	1,120	1,480	736	292	254
9	429	429	322	429	391	1,120	1,150	1,520	684	284	254
10	429	449	307	410	410	1,120	1,290	1,480	704	278	256
11	429	410	322	391	429	1,190	1,480	1,400	638	275	256
12	449	429	322	373	449	1,260	1,520	1,330	595	272	262
13	430	469	322	355	469	1,400	1,820	1,260	576	270	284
14	410	449	307	346	469	1,480	1,910	1,120	580	267	292
15	400	418	.....	338	469	1,400	1,860	1,050	534	264	284
16	391	386	.....	364	490	1,480	1,770	1,050	516	262	281
17	391	355	.....	391	512	1,640	1,770	1,080	482	249	275
18	486	338	.....	410	534	1,640	2,000	1,080	478	244	270
19	580	322	.....	429	557	1,640	2,050	1,080	465	239	262
20	568	322	.....	429	604	1,690	1,860	1,050	445	239	259
21	557	307	.....	429	604	1,730	1,820	1,050	425	242	259
22	546	322	.....	410	704	1,690	1,730	989	410	242	256
23	534	338	.....	391	816	1,600	1,690	989	395	239	256
24	512	355	.....	391	928	1,400	1,730	989	387	246	259
25	512	391	.....	391	869	1,330	1,640	989	369	262	270
26	469	391	.....	391	869	1,290	1,560	989	359	264	278
27	512	391	.....	391	812	1,290	1,480	898	345	249	335
28	490	391	.....	391	869	1,370	1,520	812	338	242	325
29	469	382	.....	.....	1,190	1,520	1,640	779	332	235	307
30	469	373	.....	.....	1,120	1,820	1,640	752	332	230	295
31	469	.....	.....	.....	928	.....	1,690	.....	335	230	.....

NOTE.—Discharge estimated, because of ice, from discharge measurement, weather records, and observer's notes as follows: Dec. 15–24, 268 second-feet; Dec. 25–31, 330 second-feet; Jan. 1–15, 338 second-feet; Jan. 16–26, 279 second-feet; Jan. 27–29, 345 second-feet. Discharge interpolated on numerous days from Oct. 1 to Mar. 23.

Monthly discharge of South Fork of Boise River near Lenox, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	580	391	465	0.427	0.49	28,600	B.
November	469	307	403	.370	.41	24,000	B.
December	429	.....	318	.292	.33	19,600	C.
January	.....	.....	322	.295	.33	19,800	C.
February	429	338	396	.363	.38	22,000	B.
March	1,190	391	601	.551	.64	37,000	B.
April	1,820	869	1,360	1.25	1.40	80,900	A.
May	2,050	1,120	1,600	1.47	1.70	98,400	A.
June	1,910	752	1,220	1.12	1.25	72,600	A.
July	736	332	531	.487	.56	32,600	A.
August	373	230	272	.250	.29	16,700	A.
September	335	237	276	.253	.28	16,400	A.
The year	2,050	230	647	594	8.08	469,000	

NOTE.—See footnote to table of daily discharge.

MOORE CREEK NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 21, T. 3 N., R. 4 E., Boise County, one-fourth mile above highway bridge on Boise-Arrowrock road, half a mile above mouth, and about 5 miles southwest of Arrowrock.

DRAINAGE AREA.—426 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1914, to September 30, 1915 (discharge measurements only).

GAGE.—Graduations to feet and tenths chiseled on the face of a rock ledge on the left bank of the stream and marked with white paint.

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

CHANNEL AND CONTROL.—Bed consists of boulders, cobbles and sand. Control shifts frequently owing to deposition of sand in low stages and cutting out in high stages. Stream usually carries much sand and silt as a result of placer operations in Boise Basin. One channel at all stages.

WINTER FLOW.—Stage-discharge relation ordinarily not seriously affected by ice. Effect of ice presumably diminished by the proximity of a group of hot springs just above station.

DIVERSIONS.—No important diversions above station.

REGULATION.—None.

COOPERATION.—Discharge measurements made during year by employees of United States Reclamation Service.

Discharge measurements of Moore Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	Purton and Price	1.11	56.8	Aug. 1	E. T. Lakin	1.15	55.2
Jan. 9	A. W. Harrington	1.22	79.0	2	do	1.08	48.1
Feb. 23	Purton and Price	1.95	137	3	do	1.04	48.1
24	do	1.97	141	4	do	1.01	41.5
25	do	2.08	135	6	do	.93	34.0
26	Baldwin and Price	2.10	181	11	do	.87	26.3
26	do	2.10	150	12	do	.81	25.8
27	Price and Steward	2.10	170	13	do	.81	26.5
27	G. C. Baldwin	2.10	165	16	do	.78	22.0
Apr. 9	W. G. Steward	2.71	334	19	do	.73	20.3
17	Price and Elford	3.00	400	26	do	.70	22.9
24	do	2.60	311	27	do	.70	19.2
29	do	2.43	296	30	Lakin and McConnel	.67	17.8
May 4	Price and Steward	2.37	258	31	W. N. McConnel	.69	18.8
14	Price and Tallman	4.10	900	Sept. 1	do	.76	24.4
15	C. F. Elford	3.85	841	2	do	1.02	42.8
25	Price and Steward	3.65	585	3	do	.88	34.0
June 30	do	1.60	129	7	do	.82	28.8
July 3	Price and Elford	1.45	95.4	8	do	.79	25.8
6	A. C. Price	1.47	98.7	9	do	.79	25.1
8	Lakin and Price	1.62	121	10	do	.81	27.6
9	E. T. Lakin	1.73	139	13	do	.91	34.0
11	do	1.53	116	14	do	.91	36.1
12	do	1.47	101	15	do	.92	35.8
13	do	1.45	89.3	16	do	.92	35.1
14	do	1.40	82.2	17	do	.92	38.2
17	do	1.30	78.7	20	do	.89	32.0
19	do	1.25	79.4	21	do	.88	30.9
20	Price and Lakin	1.21	61.0	22	do	.88	31.4
23	E. T. Lakin	1.10	47.3	23	do	.88	31.3
24	do	1.05	43.8	24	do	.88	32.5
26	do	1.00	34.4	27	do	.96	37.2
28	do	.99	37.8	28	do	.96	37.5
30	do	.98	36.9	29	do	.98	38.5

NOTE.—Steward, Price and Elford were employees of the United States Reclamation Service; Tallman, Lakin and McConnel, of the Idaho State engineer.

MALHEUR RIVER AT WARM SPRINGS RESERVOIR SITE, NEAR RIVERSIDE, OREG.

LOCATION.—In sec. 7, T. 23 S., R. 37 E., 500 feet above the dam site of the proposed Warm Springs reservoir, 2 miles south of Armstrong's house, 4 miles above mouth of South Fork, and 5 miles northwest of Riverside.

DRAINAGE AREA.—About 1,100 square miles.

RECORDS AVAILABLE.—December 9, 1914, to September 30, 1915. From January 3, 1906, to March 31, 1907, and from December 15, 1908, to May 25, 1910, records were obtained at a station about 4 miles below.

GAGE.—Stevens water-stage recorder on left bank. Staff gage about 200 feet above mouth of South Fork, used 1906 to 1910. E. L. Armstrong, observer.

DISCHARGE MEASUREMENTS.—Made by wading or from cable half a mile below gage.

CHANNEL AND CONTROL.—Gravel and small stones likely to shift in floods. One channel for medium and high stages, but during low stages water crosses riffle in two or more channels.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 3.20 feet at 9 a. m., April 5 (discharge, 820 second-feet); minimum stage recorded, 0.73 foot July 28 to 30 (discharge, 4 second-feet).

1906–1915: Maximum discharge, 5,490 second-feet for a stage of 10 feet on lower gage March 2, 1910; minimum discharge, 2 second-feet August 5 to 30, 1909.

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

DIVERSIONS.—A large area of bottom land is irrigated with flood water above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not changed during the year; affected by ice December 9 to February 23. Rating curve fairly well defined between 5 and 100 second-feet and well defined between 100 and 1,500 second-feet. Gage read about twice weekly during winter; operation of recorder satisfactory beginning March 1. Daily discharge ascertained by applying gage heights to rating table. Records good for open water and poor for winter.

Discharge measurements of Malheur River at Warm Springs reservoir site, near Riverside, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 9	A. W. Harrington	a 1.23	34.9	Mar. 9	L. W. Roush	1.44	119
Jan. 24	do	a 1.64	34.9	Apr. 20	A. W. Harrington	1.62	185
25	do	a 1.63	37.6	21	do	1.60	180
Mar. 9	L. W. Roush	1.46	118	Aug. 29	do	.82	7.0

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Malheur River at Warm Springs reservoir site, near Riverside, Oreg., for the year ending Sept. 30, 1915.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1				152	510	176	145	15	6	9
2				187	510	176	131	14	9	10
3				176	530	184	117	12	12	10
4				176	686	176	101	10	12	10
5				212	739	180	80	10	10	10
6				138	578	166	75	10	9	8
7				124	494	145	65	12	8	7
8				120	478	128	60	12	7	8
9	35			124	406	134	55	12	7	8
10				128	362	145	52	24	6	8
11				142	346	187	50	15	6	11
12				170	334	229	45	12	6	13
13				201	322	278	46	10	6	16
14				306	302	302	55	8	5	17
15				458	266	314	53	7	7	18
16				550	243	314	48	7	8	19
17				466	229	294	43	6	7	20
18				402	218	286	40	6	8	21
19				382	208	278	36	7	9	21
20				330	190	258	34	6	8	21
21				346	184	243	32	5	7	22
22				382	184	232	32	5	6	23
23				414	180	232	29	4	7	23
24		35	180	498	180	222	26	4	7	23
25		38	171	506	173	215	21	5	7	23
26			162	394	159	212	15	5	7	22
27			154	326	145	194	15	5	6	21
28			145	322	134	187	15	5	6	23
29				442	120	176	15	4	7	23
30				634	131	170	15	5	7	24
31				522		159		5	8	

NOTE.—Discharge estimated, on account of ice, as follows: Dec. 10–15, 40 second-feet; Dec. 16–25, 30 second-feet; Dec. 26–31, 60 second-feet; Jan. 1–20, 45 second-feet; Jan. 21–23, 40 second-feet; Jan. 26–31, 40 second-feet; Feb. 1–2, 90 second-feet; Feb. 3–23, 120 second-feet.

Monthly discharge of Malheur River at Warm Springs reservoir site, near Riverside, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
December 9–31			40.7	1 860	D.
January			43.0	2 640	D.
February			125	6 940	D.
March	634	120	314	19 300	A.
April	739	120	318	18 900	A.
May	314	128	213	13 100	A.
June	145	15	51.5	3 060	A.
July	24	4	8.6	529	B.
August	12	5	7.5	461	B.
September	24	7	16.4	976	A.
The period				67,800	

MALHEUR RIVER AT RIVERSIDE, OREG.

LOCATION.—In sec. 22, T. 23 S., R. 37 E., at the county highway bridge 100 yards below mouth of South Fork and 1 mile northwest of Riverside townsite, in Malheur County.

DRAINAGE AREA.—About 1,910 square miles (measured on Land Office maps).

RECORDS AVAILABLE.—January 16, 1909, to January 23, 1915, when station was discontinued.

GAGE.—Chain gage on downstream side of highway bridge; read daily by W. L. Blaylock. The original gage (used January 16, 1909, to June 12, 1910), was a vertical staff attached to the right bridge abutment. The chain gage, which has been used since June 12, 1910, is referred to practically the same datum as the original staff.

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

CHANNEL AND CONTROL.—Bed of stream and control consist of gravel and cobbles; shift in high water and as a result of ice jams. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum discharge recorded October to January: 98 second-feet October 4–12 (gage height 1.6 feet); minimum discharge presumably occurred during December, when stage-discharge relation was affected by ice.

1909–1915: Maximum stage recorded, 11.6 feet, morning of March 2, 1910, from high-water marks (discharge estimated from extension of rating curve as 16,400 second-feet); minimum discharge recorded, 2.6 second-feet July 28 to August 5, 1914 (gage height, 0.7 foot).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from discharge measurements, observer's notes, and comparison with records at other stations.

DIVERSIONS.—Numerous ranch diversions are made from both South Fork and Malheur River above station.

REGULATION.—None.

ACCURACY.—Records for October and November, fair; those for December and January poor.

Discharge measurements of Malheur River at Riverside, Oreg., during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 10	[a] 1.95	65.8
Jan. 23	[a] 2.56	65.0

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Malheur River at Riverside, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Day.	Oct.	Nov.	Day.	Oct.	Nov.
1	63	80	11	98	80	21	80	71
2	63	80	12	98	80	22	80	.....
3	63	80	13	63	80	23	80	.....
4	98	80	14	63	80	24	80	.....
5	98	80	15	63	80	25	80	.....
6	98	80	16	63	71	26	80	.....
7	98	80	17	63	71	27	80	.....
8	98	80	18	80	71	28	80	.....
9	98	80	19	80	71	29	80	.....
10	98	80	20	80	71	30	80	.....
						31	80	.....

NOTE.—Discharge determined from a fairly well defined rating curve. Stage-discharge relation affected by ice Nov. 22 to Jan. 23. Discharge Nov. 22–30 estimated at 70 second-feet.

Monthly discharge of Malheur River at Riverside, Oreg., for the year ending Sept 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	98	63	80.8	4,970	C.
November	80		75.2	4,470	C.
December			a 55.0	3,380	D.
January 1–23			a 65.0	2,970	D.
The period				15,800	

a Mean discharge estimated.

MALHEUR RIVER NEAR NAMORF, OREG.

LOCATION.—In sec. 2, T. 21 S., R. 40 E., at F. J. Froman's ranch, 1 mile south of east portal of tunnel No. 1 on the Oregon & Eastern Railroad, 3 miles west of Namorf flag station, and 15 miles west of Harper post office, Malheur County. North Fork of Malheur River enters near Juntura, 20 miles above.

DRAINAGE AREA.—2,560 square miles (measured on United States Land Office map).

RECORDS AVAILABLE.—May 24, 1913, to September 30, 1915.

GAGE.—Inclined staff on right bank, 300 feet above Froman's house; read by F. J. Froman.

DISCHARGE MEASUREMENTS.—Low-stage measurements made by wading; medium and high-stage measurements made from a flume about 400 feet above gage.

CHANNEL AND CONTROL.—Control, 400 feet below gage, consists of cobbles and coarse gravel; clean. Channel between riffle and gage and above gage is wide and current is sluggish. One channel at all stages at the gage. Stage of zero flow estimated August 30 at gage height 1.88 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet April 5–6 (discharge 1,110 second-feet); minimum stage recorded, 2.32 feet July 30 and August 1 (discharge, 18 second-feet).

1913–1915: Maximum stage recorded, 5.8 feet March 18, 1914 (discharge, 2,970 second-feet); minimum discharge recorded, 15 second-feet August 8–10, 1914 (gage height, 2.40 feet).

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

DIVERSIONS.—Many small diversions are made from the river and its branches above the gage, the largest being made near Drewsey and from North Fork near Juntura.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during the winter; affected by ice November 21 to February 13. Two fairly well defined rating curves used, one applicable October 1 to November 20, the other February 14 to September 30. Daily discharge ascertained by applying daily gage heights to rating tables. Open-water records good; winter records poor.

Discharge measurements of Malheur River near Namorf, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft*
Jan. 27	A. W. Harrington	a 3.60	109	Apr. 22	A. W. Harrington	3.38	329
Mar. 11	L. W. Roush	3.25	274	23	do	3.40	362
12	do	3.30	308	Aug. 30	do	2.38	23.5

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug	Sept.
1	104	157	.....	276	811	301	312	57	18	25
2	104	157	.....	250	635	357	301	57	25	23
3	131	157	.....	301	811	346	276	53	25	25
4	139	157	.....	329	907	357	250	53	25	25
5	121	146	.....	329	1,110	346	276	53	25	27
6	139	146	.....	301	1,110	301	182	53	27	31
7	121	157	.....	276	859	301	161	53	27	31
8	104	157	.....	276	811	276	161	53	25	35
9	139	157	.....	250	766	250	154	53	25	37
10	139	146	.....	250	635	276	154	53	27	37
11	139	157	.....	276	635	346	144	57	31	37
12	139	157	.....	301	596	388	144	57	31	37
13	139	157	.....	346	556	556	133	57	31	37
14	139	146	301	556	556	556	126	53	31	40
15	139	146	276	720	520	635	126	50	27	53
16	139	146	301	958	484	596	126	45	27	57
17	139	146	312	907	418	556	126	45	27	57
18	139	146	357	811	418	556	112	45	27	57
19	157	146	418	720	406	556	112	45	35	57
20	178	139	451	635	388	484	112	45	63	63
21	178	.....	357	720	357	484	112	45	45	63
22	178	.....	301	635	346	484	112	45	37	63
23	169	.....	260	811	357	451	97	40	35	63
24	169	.....	260	811	357	418	97	37	35	63
25	157	.....	301	1,010	346	418	85	27	31	53
26	157	.....	276	907	329	418	73	27	35	57
27	157	.....	276	720	301	406	73	25	27	57
28	157	.....	276	635	276	357	63	25	27	57
29	157	.....	.....	635	260	357	57	20	25	57
30	157	.....	.....	811	250	346	57	18	24	57
31	157	.....	.....	1,010	.....	329	.....	20	23	.....

NOTE.—Discharge estimated from measurements, observer's notes, and weather records as follows: Nov. 21-30, 130 second-feet; Dec. 1-31, 100 second-feet; Jan. 1-31, 115 second-feet; Feb. 1-13, 200 second-feet.

Monthly discharge of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	178	104	145	8,920	B.
November	157	.....	144	8,570	C.
December	.....	.....	100	6,150	D.
January	.....	.....	115	7,070	D.
February	451	.....	262	14,600	C.
March	1,010	250	573	35,200	B.
April	1,110	250	554	33,000	B.
May	635	250	413	25,400	B
June	312	57	144	8,570	B.
July	57	18	44.1	2,710	B.
August	63	18	29.8	1,830	B.
September	63	23	46.0	2,740	B.
The year	1,110	18	214	155,000	

MALHEUR RIVER AT VALE, OREG.

LOCATION.—In sec. 29, T. 18 S., R. 45 E., at the highway bridge at Vale, Malheur County, half a mile below Bully Creek and 2½ miles above Willow Creek.

DRAINAGE AREA.—About 4,860 square miles; watershed not well defined on available maps.

RECORDS AVAILABLE.—March 20, 1890, to June 30, 1891; January 1, 1895, to September 30, 1896; May 20, 1903, to April 1, 1907; May 29, 1908, to October 15, 1914, when station was discontinued.

GAGE.—Chain gage on downstream side of bridge; read daily by E. F. Johnson. Datum of gage unchanged since May 20, 1903; prior to this date gage was an inclined staff set on right bank just above bridge at different datum.

DISCHARGE MEASUREMENTS.—Made by wading or from a suspension footbridge about one-fourth mile below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts. At low stages river flows in two or more channels above and below gage.

EXTREMES OF DISCHARGE.—October 1–15: Maximum stage recorded, 3.75 feet October 3 (discharge, 95 second-feet); minimum discharge recorded, 59 second-feet October 1 (corresponding to gage height, 3.62 feet).

1890–1914: Maximum stage recorded, 19.5 feet at 2 a. m. March 2, 1910 (discharge, 22,800 second-feet); minimum stage recorded, 3.18 feet August 23, 1906 (discharge, 4 second-feet); a discharge of 4 second-feet (corresponding to gage height, 0.50 foot) is also recorded in July, 1895.

WINTER FLOW. No winter record in present year.

DIVERSIONS.—Many important diversions for irrigation both above and below station.

REGULATION.—None.

ACCURACY.—Records fair.

Discharge measurements of Malheur River at Vale, Oreg., during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 13	3.72	90.9
Aug. 26	(*a*)	26.4

a Gage height not determined; chain gage removed in January, 1915.

Daily discharge, in second-feet, of Malheur River at Vale, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Day.	Oct.	Day.	Oct.
1	59	11	85	21	
2	68	12	85	22	
3	95	13	85	23	
4	85	14	80	24	
5	85	15	80	25	
6	85	16		26	
7	61	17		27	
8	61	18		28	
9	72	19		29	
10	85	20		30	
				31	

NOTE.—Daily discharge determined from a fairly well-defined rating curve, except Oct. 1 to 3, for which it was obtained by shifting-control method. Mean discharge Oct. 1–15, 78.1 second-feet; total run-off, 2,320 acre-feet.

SOUTH FORK OF MALHEUR RIVER AT RIVERSIDE, OREG.

LOCATION.—In sec. 27, T. 23 S., R. 37 E., 1,000 feet above mouth and 1 mile northwest of village of Riverside, Malheur County.

DRAINAGE AREA.—About 800 square miles (measured on Land Office and other available maps).

RECORDS AVAILABLE.—May 25, 1910, to January 23, 1915, when station was discontinued.

GAGE.—Inclined staff on right bank; read daily by W. L. Blaylock. Present gage has been in use since February 16, 1912; prior to that date gage used was a vertical staff in three sections on right bank about 200 feet below site of present gage.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable at site of original gage.

CHANNEL AND CONTROL.—Bed consists of lava rock and boulders covered with gravel. Control fairly permanent; effect of moss and weeds slight.

EXTREMES OF DISCHARGE.—1914–15: Maximum discharge recorded, 20 second-feet October 4 to 12 (corresponding to a gage height of 1.9 feet); minimum stage recorded, 1.65 feet at time of measurement August 27 (discharge, 7.8 second-feet). Lower discharges, of which there is no record, probably occurred during the summer.

1910–1915: Maximum stage recorded, 6.1 feet April 25, 1912 (discharge, 1,990 second-feet); minimum stage recorded, 1.00 foot July 30 to August 1, 1914 (discharge, zero); zero discharge also recorded July 18 to 20, 1913, at gage height 1.20 feet.

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

DIVERSIONS.—Practically entire summer flow of stream is used for irrigation by ranches above station.

REGULATION.—None.

ACCURACY.—Open-water records good, winter records poor. Rating curve well defined but gage-height record only fair.

Discharge measurements of South Fork of Malheur River at Riverside, Oreg., during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Dec. 11	[a] 2.12	15.0
Jan. 23	[a] 1.97	9.17
Aug. 27	1.65	7.77

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of South Fork of Malheur River at Riverside, Oreg., for the year ending Sept. 30, 1915.

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

NOTE.—Daily discharge determined from a fairly well defined rating curve. Discharge Nov. 22–30 estimated at 14 second-feet.

Monthly discharge of South Fork of Malheur River at Riverside, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	20	14	16.0	984	B
November	.....	.....	14.0	833	C
December	.....	.....	[a] 12.0	738	D
January 1–23	.....	.....	[a] 12.0	547	D
The period	.....	.....	.....	3,100	

[a] Discharge estimated.

BULLY CREEK AT WARM SPRINGS, NEAR VALE, OREG.

LOCATION.—In sec. 4, T. 18 S., R. 43 E., one-fourth mile east of Warm Springs stage station on the Vale-Westfall road, one-fourth mile below mouth of Cottonwood Creek, and 14 miles west of Vale, Malheur County.

DRAINAGE AREA.—569 square miles (measured on Land Office map).

RECORDS AVAILABLE.—August 11, 1903, to March 10, 1904; January 24, 1905, to March 31, 1907; January 1, 1911, to September 30, 1915. Records are also available for a station about 12 miles below from April 8, 1904, to December 31, 1905.

GAGE.—Two-section staff gage on left bank, upper inclined and lower vertical; read once daily by F. D. O'Neil and Walter Keele. Several gages have been in use at this station; they have been maintained at present datum since June, 1911, and probably since 1905.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed consists of coarse gravel; shifts during high stages; one channel at all stages. Stage-discharge relation seriously affected during the summer months by the heavy growth of aquatic plants in the channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.0 feet at 7 a. m., March 15 (discharge, 185 second-feet); minimum stage recorded, 0.50 foot March 19–23 (discharge zero).

1903–15: Maximum stage recorded, 8.6 feet March 1, 1910 (discharge estimated from extension of partially developed rating curve as 6,240 second-feet). Creek dry March 19–23, 1915, owing to water being held back by dam above; water standing in pools August 2 to September 15, 1911, and the discharge at gage during this and other periods probably zero.

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Discharge estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Numerous small ranch diversions are made both above and below the gage. The reservoir of the Vale-Oregon Irrigation Co. is about 3 miles above the gage, but no diversions have yet been made into the company's canals.

REGULATION.—Flow regulated to a certain extent by the dam of the Vale-Oregon Irrigation Co., the effect during the past year having apparently been to increase the natural summer flow by storage and gradual release of flood waters.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 13 to January 11, January 15–31, and February 12–15; affected by moss growth June 6 to July 6 and July 17 to September 30. Rating curve fairly well defined used February 1 to June 5 and July 7–16. Gage-height record poor. Daily discharge ascertained by applying daily gage heights to rating table and October 1 to December 12 and January 12–14 by shifting-control method. See footnote to daily discharge table. Records poor.

Discharge measurements of Bully Creek at Warm Springs, near Vale, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 12	A. W. Harrington	0.84	4.94	Apr. 24	A. W. Harrington	0.91	12.3
Jan. 29	do	a1.04	8.33	July 13	do	1.01	6.15
Mar. 13	L. W. Roush	1.42	68.0	Aug. 25	do	1.20	4.73
14	do	1.76	126				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Bully Creek at Warm Springs, near Vale, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	6	5	2	.....	12	12	12	12	15	.....
2	6	5	2	.....	12	12	12	12	15	.....
3	6	5	6	.....	12	12	12	12	15	.....
4	7	5	4	.....	18	13	.....	12	15	.....
5	7	5	4	.....	13	13	.....	12	15	.....
6	7	5	2	.....	13	15	.....	12	.....	.....
7	7	5	4	.....	12	12	.....	12	.....	5
8	9	5	4	.....	12	12	.....	12	.....	5
9	9	5	4	.....	12	12	.....	12	.....	5
10	9	5	4	.....	12	13	.....	12	.....	5
11	9	5	5	.....	12	15	12	12	.....	5
12	9	6	5	8	.....	32	12	12	.....	5
13	9	5	.....	8	.....	64	12	12	.....	6
14	7	5	.....	8	.....	137	18	15	.....	6
15	7	2	.....	.....	.....	185	18	18	.....	6
16	7	4	.....	.....	12	160	18	18	.....	6
17	7	4	.....	.....	12	97	12	18	.....	.....
18	6	4	.....	.....	12	18	12	18	.....	.....
19	5	4	.....	.....	12	0	12	18	.....	.....
20	5	5	.....	.....	12	0	18	18	.....	.....
21	5	4	.....	.....	12	0	18	18	.....	.....
22	5	4	.....	.....	12	0	18	18	.....	.....
23	5	4	.....	.....	12	0	12	18	.....	.....
24	5	8	.....	.....	12	0	12	12	.....	.....
25	5	4	.....	.....	12	7	12	18	.....	.....
26	5	4	.....	.....	12	12	12	18	.....	.....
27	5	4	.....	.....	12	12	12	18	.....	.....
28	5	4	.....	.....	12	12	12	18	.....	.....
29	5	4	.....	8	.....	12	15	18	.....	.....
30	5	2	.....	.....	.....	12	15	18	.....	.....
31	5	.....	.....	.....	.....	12	.....	18	.....	.....

NOTE.—Discharge estimated, on account of ice, from discharge measurements, observer's notes and weather records, as follows: Dec. 13–31, 4 second-feet; Jan. 1–11, 6 second-feet; Jan. 15–28 9 second-feet; Jan. 30–31, 10 second-feet; Feb. 12–15, 12 second-feet; interpolated Apr. 4–10; estimated on account of growth of aquatic plants as follows: June 6–15, 12 second-feet; June 15-24, 10 second-feet; June 25–30, 8 second-feet; July 1–4, 7 second-feet; July 5–6, 175 second-feet; and July 17–31, 6 second-feet.

Monthly discharge of Bully Creek at Warm Springs, near Vale, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	9	5	6.42	395	C.
November	8	0.4	4.41	262	D.
December	.....	.....	3.94	242	D.
January	.....	.....	7.87	484	D.
February	18	.....	12.3	683	C.
March	185	0	29.5	1,810	C.
April	18	.....	13.4	797	C.
May	18	12	15.2	935	C.
June	15	.....	11.1	660	C.
July	.....	5	16.8	1,030	D.
August	.....	.....	[a] 5.0	307	C.
September	.....	.....	[a] 4.0	238	D.
The year	185	0	10.8	7,840	

[a] Estimated.

WILLOW CREEK NEAR MALHEUR, OREG.

LOCATION.—In sec. 6, T. 14 S., R. 41 E., about half a mile above the flow line of reservoir No. 3 of the Willow River Land & Irrigation Co., and about 2 miles south of Malheur, Malheur County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27, 1912, to September 30, 1915. Records were also obtained in this vicinity November 20, 1904, to August 14, 1906, and March 19, 1910, to August 2, 1911.

GAGE.—Barret & Lawrence water-stage recorder on left bank, referred to vertical staff on right bank. Gage reader, James Minonghan.

DISCHARGE MEASUREMENTS.—Made by wading or from a bridge a short distance below gage.

CHANNEL AND CONTROL.—Stream flows in an artificial channel. Control shifts somewhat at high water.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.55 feet at 4 p. m. May 13 (discharge, 34 second-feet). Channel dry at times.

1904–1906 and 1910–1915: Maximum discharge (computed from cross section and estimated velocities), 1,400 second-feet March 20, 1910.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated by observer.

Diversions.—About 5,000 acres of land are partly irrigated from Willow Creek above station; entire summer flow is diverted.

ACCURACY.—Stage-discharge relation not permanent; affected by ice November 15 to February 13. Three poorly defined rating curves used, October 1 to November 14, February 14 to April 15, and April 20 to June 19. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage heights to ratings tables. Records poor.

Discharge measurements of Willow Creek near Malheur, Oreg., during the year ending Sept. 30. 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec. ft.*
Mar. 12	C. G. Paulsen	2.73	13.3	Apr. 27	H. K. Donnelly	2.47	2.0
17	do	2.81	14.5	May 7	do	2.49	2.1
Apr. 8	H. K. Donnelly	2.52	5.6	July 10	do		a.5

a Estimated.

Daily discharge, in second feet, of Willow Creek near Malheur, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.
1	1.6	6.3	.....	12	10	5.4	6.0
2	1.9	6.3	.....	13	11	5.6	6.0
3	2.3	6.3	.....	17	12	6.7	6.7
4	2.4	6.3	.....	17	12	6.9	8.0
5	2.7	6.5	.....	14	12	5.1	6.0
6	2.9	6.5	.....	13	10	2.4	4.7
7	3.0	6.7	.....	13	7.2	1.8	3.3
8	3.0	6.7	.....	13	5.5	1.8	3.0
9	3.0	6.7	.....	13	5.3	1.8	2.1
10	3.3	7.2	.....	13	4.9	2.4	1.6
11	3.6	7.8	.....	13	2.9	2.8	1.2
12	3.8	8.5	.....	13	1.6	12	1.5
13	4.0	9.0	9.0	13	1.1	23	1.8
14	4.1	9.0	8.6	14	.8	20	1.8
15	4.3	.....	8.6	17	.6	17	1.8
16	4.0	.....	8.6	16	.5	13	1.4
17	4.4	.....	11	15	.5	13	1.1
18	4.4	.....	13	14	.5	14	.8
19	4.4	.....	14	14	.5	13	.6
20	4.4	.....	14	13	.9	12	.....
21	4.4	.....	14	13	1.1	12	.....
22	5.9	.....	14	13	2.5	17	.....
23	5.9	.....	14	13	4.7	20	.....
24	5.6	.....	13	13	6.0	19	.....
25	5.6	.....	18	12	4.7	16	.....
26	5.6	.....	24	11	2.5	12	.....
27	5.9	.....	18	10	1.8	11	.....
28	5.9	.....	12	12	2.5	12	.....
29	5.9	.....	.....	13	3.6	13	.....
30	6.1	.....	.....	12	6.7	11	.....
31	6.1	.....	.....	11	.....	8	.....

NOTE.—Discharge estimated as follows: Nov. 15–30, 5 second-feet; Dec. 1–14, 4 second-feet; Dec. 15–31, 2.5 second-feet; Jan. 1–13, 4 second-feet; Jan. 14–31, 5 second-feet; Feb. 1–12, 11 second-feet; Apr. 16–19 0.5 second-foot; June 20–30, 0.4 second-foot. Discharge also interpolated for many single days. Practically no flow July to September.

Monthly discharge of Willow Creek near Malheur, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6.1	1.6	4.21	259	C.
November	9.0	.....	5.99	356	C.
December	.....	.....	3.18	196	D.
January	.....	.....	4.42	272	D.
February	24	.....	12.4	689	C.
March	17	10	13.3	818	B.
April	12	.5	4.53	270	C.
May	23	1.8	10.7	658	C.
June	8	.....	2.13	127	D.
The period	.....	.....	.....	3,640	

PAYETTE RIVER NEAR HORSESHOE BEND, IDAHO.

LOCATION.—In sec. 14, T. 7 N., R. 2 E., 100 feet east of the tracks of the Idaho Northern branch of the Oregon Short Line Railroad, and 1½ miles northeast of Horseshoe Bend, Boise County.

DRAINAGE AREA.—2,160 square miles at present site (measured on topographic and Land Office maps).

RECORDS AVAILABLE.—May 3, 1912, to September 30, 1915, at present site; February 3, 1906, to November 22, 1912, at old site in sec. 2, 2 miles farther upstream. Two small creeks enter on left between the two stations.

GAGE.—Barrett and Lawrence water-stage recorder on right bank about 200 feet above the railroad crossing; inclined staff on right bank at former site. S. H. McAllister, observer.

DISCHARGE MEASUREMENTS.—Made from a cable about 200 feet below the gage.

CHANNEL AND CONTROL.—Bed consists of cobbles and coarse gravel with a few large rocks. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.76 feet at noon May 19 (discharge, 9,380 second-feet); minimum stage, 1.00 foot at 10 p. m. August 31, and 2 a. m. September 1 (discharge, 751 second-feet).

1906–1915: Maximum stage recorded, 11.5 feet (on original gage) June 7, 1909 (discharge, 19,500 second-feet); minimum stage recorded August 31 and September 1, 1915.

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated by comparison with Boise River records, and from weather records.

DIVERSIONS.—Only a few small ranch diversions are made above the station; record gives practically the total flow from the upper Payette basin.

REGULATION.—None.

ACCURACY.—State-discharge relation permanent; affected by ice December 16 to February 12. Rating curve well defined. Mean daily gage heights obtained by inspecting recorder graph. Daily discharge ascertained by applying daily gage heights to rating table. Open-water records excellent, winter records fair.

COOPERATION.—Gage-height record furnished by the Electric Investment Co.

Discharge measurements of Payette River near Horseshoe Bend, Idaho, during the year ending Sept. 30, 1915.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 8	4.20	5,450
Sept. 3	1.22	914

Daily discharge, in second-feet, of Payette River near Horseshoe Bend, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	950	1,320	959	.....	1,050	2,680	5,580	7,970	2,600	1,310	770
2	958	1,340	848	.....	1,050	2,680	5,280	8,220	2,450	1,310	936
3	1,090	1,340	1,010	.....	1,060	2,930	4,980	7,720	2,300	1,240	906
4	1,120	1,330	1,120	.....	1,060	3,110	4,680	7,240	2,150	1,190	862
5	1,100	1,320	1,070	.....	1,080	3,200	4,470	6,520	2,080	1,150	842
6	1,060	1,310	1,030	.....	1,030	3,110	4,160	6,280	2,220	1,120	808
7	1,060	1,280	950	.....	1,020	3,110	3,860	6,050	2,450	1,120	795
8	1,060	1,250	848	.....	998	3,020	3,760	5,810	2,600	1,110	789
9	1,050	1,240	814	.....	998	2,930	3,760	5,700	2,600	1,060	782
10	1,040	1,240	808	.....	1,020	2,930	4,470	5,470	2,680	1,060	789
11	1,100	1,220	890	.....	1,030	2,930	5,120	5,240	2,450	1,030	789
12	1,120	1,240	982	.....	1,050	3,110	6,050	5,010	2,300	1,010	814
13	1,110	1,260	898	958	1,060	3,290	6,520	4,790	2,150	1,010	862
14	1,090	1,290	814	936	1,100	4,060	7,000	4,470	2,010	998	890
15	1,070	1,230	782	906	1,120	4,680	7,000	4,260	1,950	990	876
16	1,060	1,040	.....	920	1,170	4,580	6,760	4,060	1,880	974	862
17	1,070	1,060	.....	958	1,230	4,580	7,000	3,960	1,820	958	848
18	1,300	1,120	.....	958	1,300	4,680	8,220	3,860	1,760	943	828
19	1,420	1,080	.....	1,120	1,370	5,010	9,220	3,860	1,700	906	814
20	1,640	1,040	.....	1,120	1,380	5,120	8,970	3,760	1,610	890	814
21	1,640	1,060	.....	1,120	1,470	5,470	8,720	3,660	1,520	883	808
22	1,600	1,010	.....	1,120	1,610	5,470	8,470	3,470	1,510	869	801
23	1,510	1,090	.....	1,100	1,880	5,350	8,220	3,380	1,470	862	789
24	1,420	1,210	.....	1,080	2,080	5,120	7,970	3,290	1,420	869	789
25	1,380	1,170	.....	1,090	2,370	4,900	7,720	3,290	1,400	855	789
26	1,340	1,120	.....	1,100	2,370	4,580	7,480	3,380	1,330	842	782
27	1,320	1,080	.....	1,090	2,220	4,580	7,000	3,200	1,330	828	898
28	1,300	1,120	.....	1,060	2,220	4,680	7,000	2,930	1,310	808	876
29	1,290	1,210	.....	.....	2,450	4,900	7,480	2,850	1,290	801	848
30	1,280	1,070	.....	.....	2,850	5,350	7,480	2,680	1,260	795	828
31	1,300	.....	.....	.....	2,760	.....	7,480	.....	1,290	770	.....

NOTE.—Discharge estimated, because of ice, from weather records and by comparison with records of flow of Boise River as follows: Dec. 16–31, 800 second-feet; Jan. 1–31, 950 second-feet; Feb. 1–12, 1,000 second-feet. Discharge interpolated Dec. 1, May 2, 3, July 2 and 3 for lack of gage heights.

Monthly discharge of Payette River near Horseshoe Bend, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 2,160 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	1,640	950	1,220	0.565	0.651	75,000	A.
November	1,340	1,010	1,190	.551	.615	70,800	A.
December	1,120	.....	859	.398	.459	52,800	C.
January	.....	.....	950	.440	.507	58,400	D.
February	1,120	.....	1,020	.472	.492	56,600	B.
March	2,850	998	1,500	.694	.800	92,200	A.
April	5,470	2,680	4,070	1.88	2.10	242,000	A.
May	9,220	3,760	6,510	3.01	3.47	400,000	A.
June	8,220	2,680	4,750	2.20	2.46	283,000	A.
July	2,680	1,260	1,900	.880	1.01	117,000	A.
August	1,310	770	986	.456	.526	60,600	A.
September	936	770	829	.384	.428	49,300	A.
The year	9,220	770	2,150	.995	13.5	1,560,000	

NOTE.—See foot note to table of daily discharge.

NORTH FORK OF PAYETTE RIVER AT LARDO, IDAHO.

LOCATION.—In sec. 8, T. 18 N., R. 3 E., about one-fourth mile below Lardo, Boise County, and the outlet of Big Payette Lake. No tributaries enter between the lake and the gage.

DRAINAGE AREA.—131 square miles (measured on topographic and Land Office maps).

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

GAGE.—Inclined staff on left bank installed July 25, 1911; read daily by Neal Boydstun. Original temporary gage (used Sept. 1 to Oct. 8, 1908) was about 1 mile below site of present gage; permanent vertical staff gage (used until July 25, 1911) was installed October 14, 1908, on left bank about 30 feet below present site. Gage datum unchanged since October 14, 1908.

DISCHARGE MEASUREMENTS.—Made by wading or from cable one-half mile below gage.

CHANNEL AND CONTROL.—Bed of stream and control consists of cobbles and gravel; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.8 feet at 7.30 a. m. May 23 (discharge, 1,300 second-feet); minimum stage recorded, 1.55 feet September 25 to 30 (discharge, 19 second-feet).

1908–1915: Maximum stage recorded, 7.5 feet June 5, 1909 (discharge, 4,250 second-feet); minimum stage recorded 1.1 feet October 21 and 22, 1911 (discharge 3 second-feet).

WINTER FLOW.—Stage-discharge relation not affected by ice, presumably because of the proximity of the station to Big Payette Lake.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during April, 1915; not affected by ice. Two well-defined rating curves used, October 1 to April 3 and April 9 to September 30. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records excellent.

Discharge measurements of North Fork of Payette River at Lardo, Idaho, during the year ending Sept. 30, 1915.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 13	3.72	568
Sept. 9	1.79	31.6
9	1.79	33.8

Daily discharge, in second-feet, of North Fork of Payette River at Lardo, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	45	153	120	68	68	73	121	1,150	1,150	271	108	62
2	47	158	126	68	68	70	124	1,040	1,070	271	105	66
3	47	166	126	68	68	70	128	893	1,040	271	105	70
4	47	173	126	68	72	70	130	794	999	271	100	64
5	50	178	120	65	72	70	143	670	963	254	100	62
6	50	192	120	65	72	68	165	613	928	254	100	58
7	52	178	120	65	72	68	178	641	893	251	95	53
8	52	173	114	65	72	68	190	762	826	251	92	44
9	52	173	114	65	72	68	203	826	794	240	92	37
10	52	166	110	66	72	68	218	860	731	234	88	41
11	52	166	110	68	68	68	234	928	670	218	84	39
12	52	158	92	68	68	68	251	963	641	209	84	37
13	54	153	88	72	68	68	308	1,040	585	209	80	35
14	54	153	83	72	68	68	369	1,070	585	203	80	34
15	56	148	78	72	72	70	482	1,070	558	189	77	32
16	60	148	78	72	72	70	532	999	532	176	74	30
17	63	142	78	72	72	70	585	963	507	170	74	28
18	65	142	78	72	72	70	670	999	482	156	70	27
19	68	135	75	68	72	73	762	1,040	458	146	70	26
20	72	135	75	68	72	73	860	1,070	435	132	66	24
21	75	130	75	68	72	73	963	1,150	412	124	64	22
22	78	130	75	68	72	73	1,040	1,220	390	118	64	22
23	86	130	72	65	72	77	1,070	1,300	390	118	62	22
24	93	110	72	65	72	77	1,070	1,220	369	112	58	20
25	102	114	72	65	72	77	1,070	1,150	348	124	58	19
26	107	114	68	65	73	84	1,070	1,070	328	118	55	19
27	110	114	68	65	73	92	1,070	963	308	118	53	19
28	120	114	68	65	73	100	1,070	1,070	308	118	53	19
29	126	120	68	65	.....	103	1,150	1,220	290	112	58	19
30	135	120	68	65	.....	114	1,150	1,220	290	112	58	19
31	148	.....	68	65	.....	118	.....	1,150	.....	108	62	.....

NOTE.—Discharge interpolated Dec. 13, 14, Apr. 1, 2, and 4–8, for lack of gage-height record.

Monthly discharge of North Fork of Payette River at Lardo, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	148	45	73.2	0.559	0.644	4,500	A.
November	192	110	146	1.11	1.24	8,690	A.
December	126	68	90.5	.691	.797	5,560	A.
January	72	65	67.3	.514	.593	4,140	A.
February	73	68	71.1	.543	.565	3,950	A.
March	118	68	76.7	.585	.674	4,720	A.
April	1,150	121	579	4.42	4.93	34,500	B.
May	1,300	613	1,000	7.63	8.80	61,500	A.
June	1,150	290	609	4.65	5.19	36,200	A.
July	271	108	183	1.40	1.61	11,300	A.
August	108	53	77.1	.589	.679	4,740	B.
September	70	19	35.6	.272	.304	2,120	B.
The year	1,300	19	252	1.92	26.0	182,000	

NORTH FORK OF PAYETTE RIVER AT VAN WYCK, IDAHO.

LOCATION.—In sec. 26, T. 14 N., R. 3 E., at the river bridge half a mile north of Van Wyck, Boise County, and 1½ miles west of Crawford. Willow Creek, a small stream, enters from the south half a mile below.

DRAINAGE AREA.—586 square miles (measured on topographic and Land Office maps)

RECORDS AVAILABLE.—January 1, 1912, to September 30, 1915. Gage heights January 1 to August 7, 1912, were derived from private records from comparative gage readings; daily discharge not determined prior to June 20, 1912.

GAGE.—Vertical staff spiked to the downstream side of the second pier from right end of bridge; read by L. S. Kimball. Gage used August 8, 1912, to May 4, 1913, was vertical staff at same location and reading 0.6 foot higher than present gage.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed consists of rock overlain by sand and gravel; control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet May 21 and 22 (discharge, 3,900 second-feet); minimum stage recorded, 1.6 feet August 31 and September 10 to 12 (discharge, 139 second-feet).

1912–1915: Maximum stage recorded 9.1 feet June 1 and 2, 1913 (discharge, 8,140 second-feet); minimum stage recorded 1.6 feet August 31 and September 10 to 12, 1915 (discharge, 139 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice; flow estimated from observer's notes, weather records, and by comparison with the records at other stations in the Payette and Boise drainages.

DIVERSIONS.—Practically no diversions made above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 1 to March 24. Two fairly well defined rating curves used, one October 1 to November 30, the other March 25 to September 30. Gage read to half-tenths once daily; gage heights somewhat uncertain during low stages. Daily discharge ascertained by applying daily gage heights to rating tables, except during period for which stage-discharge relation was affected by ice. Records good April to July; fair for October, November, August, and September; poor for winter months.

COOPERATION.—Gage-height record furnished by L. S. Kimball.

Discharge measurements of North Fork of Payette River at Van Wyck, Idaho, during the year ending Sept. 30, 1915.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 14	3.82	1,440
Sept. 10	1.60	139

Daily discharge, in second-feet, of North Fork of Payette River at Van Wyck, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	316	457	.....	775	2,060	2,910	711	295	175
2	298	457	.....	775	2,060	2,780	650	295	194
3	298	457	.....	775	2,060	2,650	592	295	194
4	298	457	.....	841	2,060	2,650	592	295	194
5	298	457	.....	841	1,950	2,400	564	295	175
6	298	436	.....	841	1,840	2,290	536	295	175
7	298	436	.....	909	1,640	2,170	483	274	175
8	298	436	.....	909	1,550	2,060	483	274	175
9	298	457	.....	979	1,550	1,840	433	274	157
10	298	457	.....	979	1,640	1,740	433	274	139
11	298	436	.....	1,050	2,060	1,740	433	274	139
12	298	436	.....	1,050	2,400	1,640	433	274	139
13	298	436	.....	1,050	2,650	1,550	433	253	175
14	281	436	.....	1,130	2,650	1,460	433	253	175
15	281	414	.....	1,130	2,650	1,460	385	253	175
16	281	414	.....	1,130	2,780	1,370	385	253	175
17	264	414	.....	1,210	3,040	1,370	385	253	194
18	264	414	.....	1,290	3,180	1,290	385	253	194
19	264	414	.....	1,290	3,460	1,290	362	253	194
20	264	414	.....	1,370	3,600	1,290	362	233	194
21	264	414	.....	1,550	3,900	1,210	362	233	175
22	298	414	.....	1,640	3,900	1,290	339	233	175
23	298	414	.....	1,740	3,600	1,210	339	233	175
24	334	414	.....	1,840	3,320	1,130	339	194	194
25	373	414	711	1,740	3,180	1,130	339	194	194
26	414	373	711	1,740	3,180	1,050	339	194	194
27	457	373	711	1,740	3,040	979	339	194	194
28	457	373	711	1,740	2,910	909	339	175	175
29	457	373	711	1,840	2,780	841	339	175	175
30	457	373	775	1,950	2,910	775	317	175	157
31	457	.....	775	.....	3,040	.....	317	139	.....

NOTE.—Discharge estimated, because of ice, from weather records and by comparison with records of flow at other stations as follows: Dec. 1–31, 260 second-feet; Jan. 1–31, 285 second-feet; Feb 1–28, 320 second feet; Mar. 1–24, 400 second-feet.

Monthly discharge of North Fork of Payette River at Van Wyck, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 586 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	457	264	324	0.553	.638	19,900	C.
November	457	373	422	.720	.803	25,100	C.
December	.....	.....	260	.444	.512	16,000	D.
January	.....	.....	285	.486	.560	17,500	D.
February	.....	.....	320	.546	.569	17,800	D.
March	775	.....	474	.809	.933	29,100	D.
April	1,950	775	1,260	2.15	2.40	75,000	B.
May	3,900	1,550	2,670	4.56	5.26	164,000	B.
June	2,910	775	1,620	2.76	3.08	96,400	B.
July	711	317	425	.725	.836	26,100	B.
August	295	139	244	.416	.480	15,000	C.
September	194	139	177	.302	.337	10,500	C.
The year	3,900	139	708	1.21	16.4	512,000	

NOTE.—See footnote to table of daily discharge.

LAKE FORK OF PAYETTE RIVER NEAR McCALL, IDAHO.

LOCATION.—In sec. 13, T. 18 N., R. 3 E., at the Waine ranch, one-fourth mile below outlet of Little Payette Lake and 3 miles east of McCall, Boise County. No tributaries between lake and gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 28, 1909, to October 17, 1914, when station was discontinued.

GAGE.—Vertical staff on left bank; installed November 4, 1910, replacing original vertical staff at the same site and datum; read by Arne S. Maki.

DISCHARGE MEASUREMENTS.—Made by wading or from cable about 20? feet below gage.

CHANNEL AND CONTROL.—Bed composed of fine gravel. Control is a rough diversion dam about one-fourth mile below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1–17, 1.35 feet October 4 (discharge, 52 second-feet); minimum stage recorded, 1.0 foot October 13 (discharge, 28 second feet).

1909–1914: Maximum stage recorded 6.1 feet May 28, 1913 (discharge, 1,900 second-feet); minimum stage recorded 0.30 foot September 30, 1911 (discharge, 5 second-feet).

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

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Daily discharge ascertained by applying gage heights to well-defined rating curve. Records good.

Daily discharge, in second-feet, of Lake Fork of Payette River near McCall, Idaho, for the month of October, 1914.

Day.	Oct.	Day.	Oct.	Day.	Oct.
1	38	11	34	21	
2	38	12	38	22	
3	34	13	28	23	
4	52	14	34	24	
5	48	15	34	25	
6	41	16	34	26	
7	44	17	38	27	
8	41	18		28	
9	34	19		29	
10	34	20		30	
				31	

WEISER RIVER NEAR WEISER, IDAHO.

LOCATION.—In sec. 25, T. 11 N., R. 4 W., 2 miles below mouth of Crane Creek, 5 miles above Mann Creek, and 10 miles above Weiser, Washington County, at about the same site as station discontinued in 1904.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 6, 1894, to December 31, 1904; October 7, 1910, to December 31, 1914, when station was discontinued.

GAGE.—Inclined staff on right bank beside the Pacific and Idaho Northern Railroad track; installed December 12, 1911, and used since January 1, 1912; read by J. R. Derig. Records in 1910 and 1911 are referred to an inclined staff on right bank about 1 mile below present site; no known relation between datum of present gage and that of gages used previously.

DISCHARGE MEASUREMENTS.—Made by wading or from cable at site of old gage 1 mile downstream.

CHANNEL AND CONTROL.—Bed composed of rock and coarse gravel. Control practically permanent. One channel at all stages. Banks high, clean, and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1 to December 31, 1914, 5.4 feet November 17 (discharge, 450 second-feet); minimum stage recorded 4.6 feet November 28 (discharge, 61 second-feet).

1894–1914: Maximum stage recorded 9.20 feet May 5, 1896 (discharge, 17,900 second-feet); minimum stage recorded 0.20 foot, August 21, 1898 (discharge, 10 second-feet).

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

DIVERSIONS.—Some small diversions are made from the main river above the station. Large diversions are made from storage reservoirs on Lost and Crane creeks.

REGULATION.—None.

ACCURACY.—Gage read to hundredths daily. Rating curve well defined. Records good.

Daily discharge, in second-feet, of Weiser River near Weiser, Idaho, for the period October to December, 1914.

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec	Day.	Oct.	Nov.	Dec
1	258	206	160	11	179	197	206	21	316	316	120
2	258	197	160	12	152	183	206	22	287	266	120
3	248	202	183	13	140	197	190	23	270	216	120
4	206	206	197	14	140	206	175	24	258	206	120
5	206	206	232	15	128	160	160	25	140	206	120
6	248	206	232	16	120	183	160	26	128	211	120
7	206	206	232	17	120	450	160	27	128	216	104
8	140	206	232	18	206	405	146	28	120	61	87
9	152	206	216	19	248	360	133	29	120	110	87
10	206	206	216	20	316	316	120	30	120	160	87
								31	206	.....	87

NOTE.—Discharge determined from a well-defined rating curve except as follows: Estimated Nov. 21, on account of apparent effect of ice; interpolated, for lack of gage heights, Oct. 11, Nov. 2, 18, 19, 22, 26, 29, Dec. 6, 13, 14, 18, 19, 22, 25, 27, 29, and 31.

Monthly discharge of Weiser River near Weiser, Idaho, for the period October to December, 1914.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	316	120	193	11,900	B.
November	450	61	222	13,200	B.
December	232	87	158	9,720	C.
The period				3' 800	

CRANE CREEK NEAR MIDVALE, IDAHO.

LOCATION.—In sec. 19, T. 12 N., R. 2 W., 300 feet below dam of Crane Creek Irrigation Co., and 12 miles southeast of Midvale, Washington County. No tributaries between dam and station; Last Chance Creek enters a short distance below.

DRAINAGE AREA.—269 square miles (measured on topographic maps).

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

GAGE.—Staff on right bank in three vertical sections and one inclined section; read by Gilbert Thornton, gate keeper at the dam.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable 20 feet above gage.

CHANNEL AND CONTROL.—Bed composed of lava rocks and coarse gravel; very rough. Control practically permanent. Banks very brushy.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.9 feet May 19–29 (discharge, 629 second-feet); gates at dam closed January 1 to April 17, and discharge during this period assumed as zero.

1910–1915: Maximum stage recorded, 8.9 feet December 3, 1910 (discharge, 4,240 second-feet). Zero flow reported at various times when gates at dam were closed.

WINTER FLOW.—Stage-discharge relation not affected by ice; open water rating curve assumed applicable in December. The comparative freedom from ice at this station is probably due to the proximity of the station to the reservoir.

DIVERSIONS.—No large diversions above the gage. Flood waters are impounded in the storage reservoir of the Crane Creek Irrigation Co. just above the gage. The record of flow at the station shows only the amount of water discharged from the reservoir and does not necessarily represent the true flow of Crane Creek.

REGULATION.—Flow completely regulated by gates at dam. When the gates are closed the flow has been considered as zero, but there may be some slight seepage which is thus unaccounted for.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve fairly well defined. Gage read to tenths once daily. Gage height record fair. Daily discharge ascertained by applying daily gage heights to rating table. Records fair.

Discharge measurements of Crane Creek near Midvale, Idaho, during the year ending Sept. 30, 1915.

[Made by A. W. Harrington.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Sept. 2	2.67	53.2
2	2.20	16.9

Daily discharge, in second-feet, of Crane Creek near Midvale, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1	24	37	37	.....	30	30	10?	53	.....
2	24	37	37	.....	30	30	10?	53	45
3	24	37	37	.....	30	30	10?	53	.....
4	37	37	37	.....	30	30	10?	53	.....
5	37	37	37	.....	16	30	10?	53	.....
6	37	37	37	.....	6	30	10?	53	.....
7	37	37	37	.....	6	30	83	53	.....
8	37	37	37	.....	6	30	83	53	.....
9	37	37	37	.....	6	72	83	53	9
10	37	37	37	.....	6	72	83	53	.....
11	37	37	37	.....	6	72	83	53	.....
12	37	37	37	.....	6	72	83	53	.....
13	37	37	37	.....	6	83	83	53	.....
14	37	37	37	.....	6	83	83	53	45
15	37	37	37	.....	6	83	53	53	.....
16	37	37	37	.....	6	83	53	53	6
17	37	37	37	.....	6	83	53	53	6
18	37	37	37	1	89	83	53	53	6
19	37	37	37	2	629	83	53	53	6
20	37	37	37	30	629	83	53	53	6
21	37	37	37	30	629	83	53	53	6
22	37	37	37	30	629	108	53	.....	6
23	37	37	37	30	629	108	53	.....	6
24	37	37	37	30	629	108	53	.....	6
25	37	37	37	30	629	108	37	.....	6
26	37	37	37	30	629	108	37	.....	6
27	37	37	37	30	629	108	37	.....	6
28	37	37	37	30	629	108	37	.....	6
29	37	37	37	30	629	108	37	.....	6
30	37	37	37	30	30	108	37	.....	6
31	37	.....	37	.....	30	.....	37	.....	.....

NOTE.—Gates at dam were closed Jan. 1 to April 17; discharge assumed as zero although there may have been some seepage. Discharge interpolated Oct. 1–3, Sept. 17, 18, 20, 21, and 23–30. Discharge estimated as follows: Aug. 22 to Sept. 1, 53 second-feet; Sept. 3–8, 30 second-feet; Sept. 10–13 and 15, 45 second-feet.

Monthly discharge of Crane Creek near Midvale, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	37	24	35.7	2,200	C.
November	37	37	37.0	2,200	C.
December	37	37	37.0	2,280	C.
January	0	0	0.0	0	
February	0	0	0.0	0	
March	0	0	0.0	0	
April	30	0	11.1	660	D.
May	629	6	235	14,400	B.
June	108	30	74.9	4,460	B.
July	108	37	67.8	4,170	B.
August	53	53	53.0	3,260	C.
September	.....	6	21.6	1,290	D.
The year	629	0	48.3	34,900	

NOTE.—See footnote to table of daily discharge.

NORTH FORK OF BURNT RIVER AT AUDREY, OREG.

LOCATION.—In sec. 31, T. 11 S., R. 37 E., at Audrey post office, Baker County, one-fourth mile below mouth of China Creek, and 9 miles south of Whitney, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15 to September 30, 1915.

GAGE.—Vertical staff nailed to large willow tree on right bank, 200 feet below the post office; read by Charles Davidson.

DISCHARGE MEASUREMENTS.—Made from foot log at gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting only in floods. Banks may be cut during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.70 feet March 29 (discharge, 460 second-feet); minimum stage recorded, 0.02 foot August 21–22 (discharge, 0.3 second-foot).

WINTER FLOW.—Stage-discharge relation affected by ice two or three months.

DIVERSIONS.—An area of 910 acres is irrigated from North Fork above the station, and two ditches take water out about a mile above the station, one diverting around the gage.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 200 second-feet; not defined above. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for low water, for which they are fair.

COOPERATION.—Field data furnished by the State Engineer of Oregon.

Discharge measurements of North Fork of Burnt River at Audrey, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 15	C. G. Paulsen	a 1.02	36.7	June 17	H. K. Donnelly	0.35	8.2
Apr. 19	H. K. Donnelly	1.20	108	July 6	do	.18	3.7
27	do	.70	26.8	Aug. 20	do	.05	.3
May 27	do	.80	30.1				

a Stage-discharge relation affected by ice.

Daily discharge, in second feet of North Fork of Burnt River at Audrey, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	Ju'y.	Aug.	Sept.
1	.....	164	50	35	3.0	2.5	1.2
2	.....	164	66	35	3.0	1.5	1.2
3	.....	208	50	33	3.0	1.5	1.2
4	.....	208	50	33	3.0	1.5	1.2
5	.....	164	50	33	3.0	1.5	.8
6	.....	143	47	25	3.0	1.2	.8
7	.....	112	35	15	3.0	1.2	.8
8	.....	81	35	10	3.5	1.2	.8
9	.....	81	35	10	10	1.2	.8
10	.....	81	35	10	10	1.2	1.5
11	.....	81	50	10	6.5	1.2	1.5
12	.....	81	63	10	3.5	1.2	1.5
13	.....	81	63	10	3.5	1.2	1.5
14	.....	81	100	10	3.5	1.2	3.0
15	40	81	68	10	6.0	1.5	3.0
16	55	85	81	10	6.0	1.5	3.0
17	66	81	70	9	6.5	1.5	3.0
18	81	81	70	9	6.5	1.5	3.0
19	100	81	70	9	6.0	1.5	3.0
20	104	81	63	6.5	3.5	1.5	3.0
21	104	66	50	6.5	3.5	.3	3.0
22	123	66	66	6.5	3.5	.3	3.0
23	139	50	63	7.0	3.5	.8	3.0
24	164	47	50	6.0	3.5	.8	3.0
25	123	47	50	6.5	3.5	.8	3.0
26	100	35	47	7.0	3.5	.8	3.0
27	104	26	47	3.5	3.0	.8	3.0
28	143	25	47	3.0	3.0	.8	3.0
29	460	46	50	3.0	3.5	1.2	3.0
30	230	66	50	3.0	3.5	1.2	3.0
31	197	.....	35	.....	3.0	1.2	.....

NOTE.—Discharge Mar. 15–16 estimated because of ice.

Monthly discharge of North Fork Burnt of River near Audrey, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean		
March 15–31	460	40	137	4,620	B.
April	208	25	89.8	5,340	B.
May	100	35	55.0	3,380	A.
June	35	3.0	12.8	762	A.
July	10	3.0	4.29	264	B.
August	2.5	.3	1.20	74	C.
September	3.0	.8	2.19	130	C.
The period	.....	.....	.....	14,600	

BURNT RIVER NEAR HEREFORD, OREG.

LOCATION.—In sec. 25, T. 12 S., R. 36 E., about one-fourth mile below mouth of canyon which separates valley around Hereford from that around Unity, 3 miles below junction of North and South forks, and 5½ miles west of Hereford, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 16 to September 30, 1915.

GAGE.—Vertical staff on left bank; observer, T. B. Van Cleave.

DISCHARGE MEASUREMENTS.—Made by wading or from planks about one-fourth mile above gage during high water.

CHANNEL AND CONTROL.—Gravel; fairly permanent. Banks subject to overflow below gage and above control in extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 3.25 feet March 29 (discharge, 353 second-feet); minimum stage recorded, —0.05 foot August 24 (discharge, 2.5 second-feet).

WINTER FLOW.—No record for period when stream was frozen.

DIVERSIONS.—A total area of 7,000 acres is irrigated from the forks of Burnt River above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 2 and 125 second-feet. Gage read twice daily. Daily discharge ascertained by applying mean daily gage heights to rating table. Records good for medium stages; fair for high and low water.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Burnt River near Hereford, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Mar. 16	C. G. Paulsen	1.20	76.4	June 23	H. K. Donnelly	.30	8.9
Apr. 12	H. K. Donnelly	1.35	96.7	July 6	do	.12	8.6
27	do	.58	20.1	Aug. 24	do	—.05	2.5
June 5	do	:80	38.9				

Daily discharge, in second-feet, of Burnt River near Hereford, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	181	41	43	6	5	5
2	.....	184	46	43	7	5	5
3	.....	233	43	36	7	5	5
4	.....	226	36	35	5	7	5
5	.....	188	36	31	6	6	5
6	.....	174	30	18	5	.....	5
7	.....	154	30	18	7	.....	5
8	.....	134	28	14	8	.....	6
9	.....	124	28	12	18	.....	7
10	.....	102	30	14	18	.....	6
11	.....	92	40	12	13	.....	6
12	.....	94	51	17	11	.....	7
13	.....	87	64	16	8	.....	7
14	.....	92	95	12	7	.....	8
15	.....	77	82	11	7	.....	7
16	76	71	75	10	7	.....	7
17	86	62	71	9	7	.....	8
18	97	55	68	8	8	.....	8
19	96	56	66	7	7	.....	7
20	104	46	55	6	7	.....	7
21	118	45	55	8	7	.....	7
22	149	41	55	9	7	.....	7
23	167	36	56	7	7	.....	7
24	184	36	65	5	6	.....	6
25	151	30	62	5	5	.....	7
26	123	25	51	6	5	.....	7
27	108	22	45	7	5	.....	7
28	135	18	49	7	5	.....	8
29	300	23	55	7	5	.....	8
30	270	60	40	5	5	.....	7
31	203	.....	36	.....	22	.....	.....

NOTE.—Discharge for Aug. 6–31 estimated 3 second-feet because of inaccurate gage readings.

Monthly discharge of Burnt River near Hereford, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 16–31	300	76	148	4,700	B.
April	233	18	92.3	5,490	B.
May	95	28	51.1	3,140	A.
June	43	5	14.6	869	B.
July	22	5	8.0	492	B.
August	7	.....	3.4	209	C.
September	8	5	6.6	393	B.
The period	.....	.....	.....	15,300	

BURNT RIVER AT BRIDGEPORT, OREG.

LOCATION.—In sec. 25, T. 12 S., R. 41 E., at highway bridge, about 250 yards north of Bridgeport post office, Baker County, above Auburn and Clarks creeks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 11 to September 30, 1915.

GAGE.—Vertical staff on left bank, 30 feet above highway bridge. Charles Wendt, observer.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel; probably shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.45 feet March 31 (discharge, 318 second-feet); minimum stage, 1.18 feet September 18–22, 24, and 25 (discharge, 0.9 second-foot).

WINTER FLOW.—No records for periods during which stream was frozen.

DIVERSIONS.—14,600 acres are irrigated above the canyon, the entrance of which lies about 2 miles below the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 150 second-feet. Gage read to quarter-tenths once daily and twice daily during floods. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for extremely low stages, for which they are fair.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Burnt River at Bridgeport, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 11	C. G. Paulsen	2.49	71.7	June 1	H. K. Donnelly	2.40	57.4
18	do	2.95	111	18	do	1.40	4.1
Apr. 12	H. K. Donnelly	2.60	73.7	July 10	do	1.32	2.5
May 6	do	1.80	16.8	Aug. 21	do	1.20	1.0

Daily discharge, in second-feet, of Burnt River at Bridgeport, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	248	25	117	2.5	2.2	1.0
2	.....	234	22	48	2.5	2.2	1.0
3	.....	220	17	43	2.5	2.5	1.0
4	.....	278	17	42	2.5	2.5	1.0
5	.....	262	17	42	2.5	1.8	1.0
6	.....	234	17	22	2.8	1.8	1.0
7	.....	199	17	17	2.8	1.8	1.0
8	.....	178	16	11	3.2	1.8	1.0
9	.....	140	17	9	3.2	1.8	1.0
10	.....	117	17	9	3.2	1.8	1.0
11	66	106	22	5.6	2.5	1.8	1.0
12	70	66	22	6	2.5	1.8	1.0
13	75	62	85	5	2.5	1.3	1.0
14	80	58	117	6	2.5	1.3	1.0
15	90	58	119	6	2.5	1.3	1.0
16	100	35	122	6	2.5	1.3	1.0
17	100	28	108	4	2.5	1.0	1.0
18	112	25	106	5	2.5	1.0	.9
19	117	22	104	4	2.5	1.0	.9
20	117	22	95	4	2.5	1.0	.9
21	128	9	93	4	2.5	1.0	9
22	138	9	85	4	2.5	1.0	.9
23	152	6	85	4	2.2	1.0	1.0
24	152	6	85	3.7	2.2	1.0	.9
25	171	6	90	4	2.5	1.0	.9
26	178	6	77	4	2.5	1.0	1.0
27	152	6	66	4	2.5	1.0	1.0
28	140	6	66	3.7	1.8	1.0	1.0
29	178	17	58	3.2	1.8	1.0	1.0
30	220	28	54	3.2	2.5	1.0	1.0
31	318	.....	52	.....	2.5	1.0	.....

Monthly discharge of Burnt River at Bridgeport, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 11–31	318	66	136	5,670	B.
April	278	6	89.7	5,340	B.
May	122	16	61.1	3,760	A.
June	117	3.2	15.0	893	B.
July	3.2	1.8	2.52	155	C.
August	2.5	1.0	1.42	87	C.
September	1.0	.9	.98	58	C.
The period	.....	.....	.....	16,000	

MIDDLE FORK OF BURNT RIVER NEAR AUDREY, OREG.

LOCATION.—In sec. 22, T. 12 S., R. 36 E., 4½ miles above mouth, 8 miles southeast of Audrey post office, and 8½ miles northeast of Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 15 to September 30, 1915.

GAGE.—Vertical staff nailed to willow tree on right bank, 600 feet below house of V. H. Campbell, observer.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel and tree roots; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.45 feet March 27 to April 2 (discharge, 4.3 second-feet); minimum stage recorded, 0.60 foot July 28 to September 30 (discharge, 0.4 second-foot).

WINTER FLOW.—No records.

DIVERSIONS.—One ditch diverts water about a mile above the gage and irrigates about 100 acres.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves, each fairly well defined, used March 15–27 and March 28 to September 30, 1915. Daily discharge ascertained by applying gage heights to rating table. Records poor.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Middle Fork of Burnt River near Audrey, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 15	C. G. Paulsen	1.00	0.7	May 5	H. K. Donnelly	1.15	1.5
Apr. 10	H. K. Donnelly	1.32	2.8	July 13	do	.65	.5

Daily discharge, in second-feet, of Middle Fork of Burnt River near Audrey, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	4.3	3.4	1.9	1.1	0.4	0.4
2	.....	4.3	3.4	1.9	1.1	.4	.4
3	.....	3.6	3.4	1.9	1.1	.4	.4
4	.....	3.6	3.4	1.9	1.0	.4	.4
5	.....	3.6	3.4	1.9	1.0	.4	.4
6	.....	3.6	.....	1.9	1.0	.4	.4
7	.....	3.6	.....	1.9	.7	.4	.4
8	.....	2.8	.....	1.6	.7	.4	.4
9	.....	2.8	.....	1.6	.7	.4	.4
10	.....	2.8	.....	1.6	.7	.4	.4
11	.....	2.8	.....	1.6	.7	.4	.4
12	.....	2.8	.....	1.6	.7	.4	.4
13	.....	2.8	.....	1.6	.7	.4	.4
14	.....	2.8	.....	1.6	.7	.4	.4
15	0.7	2.8	.....	1.6	.6	.4	.4
16	.7	2.8	.....	1.6	.6	.4	.4
17	.7	2.8	.....	1.6	.6	.4	.4
18	.7	2.8	.....	1.6	.6	.4	.4
19	.7	2.8	.....	1.6	.6	.4	.4
20	.8	3.1	.....	1.6	.6	.4	.4
21	.8	3.1	2.6	1.6	.6	.4	.4
22	1.0	3.1	2.6	1.6	.6	.4	.4
23	1.0	3.1	2.6	1.6	.6	.4	.4
24	1.0	3.1	2.6	1.6	.6	.4	.4
25	1.1	3.1	2.6	1.6	.6	.4	.4
26	1.1	3.1	2.6	1.6	.6	.4	.4
27	4.3	3.1	2.6	1.6	.6	.4	.4
28	4.3	3.1	2.6	1.6	.4	.4	.4
29	4.3	3.1	2.6	1.6	.4	.4	.4
30	4.3	3.4	2.6	1.6	.4	.4	.4
31	4.3	.....	2.6	.....	.4	.4	.....

NOTE.—Discharge May 6–20 estimated at 3 second-feet beacause of missing gage heights.

Monthly discharge of Middle Fork of Burnt River near Audrey, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
March 15–31	4.3	0.7	1.87	63	C.
April	4.3	2.8	3.15	187	B.
May	3.4	2.6	2.92	180	C.
June	1.9	1.6	1.67	99	C.
July	1.1	.4	.69	42	C.
August	.4	.4	.40	25	C.
September	.4	.4	.40	24	C.
The period				620	

SOUTH FORK OF BURNT RIVER NEAR UNITY, OREG.

LOCATION.—In the NW. ¼ sec. 32, T. 13 S., R. 36 E., 100 feet below the mouth of Elk Creek, and 8½ miles southwest of Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 14 to September 30, 1915.

GAGE.—Vertical staff on right bank; read about every other day in April and weekly thereafter; gage reader, J. L. Hendricks.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel with some rock at control; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.25 feet May 14 (discharge, 28 second-feet); minimum stage recorded, 0.82 foot April 28 (discharge, 12 second-feet), caused by diversion of water in Eldorado ditch.

WINTER FLOW.—Stream does not freeze as most of the low-water flow comes from springs.

DIVERSIONS.—An old mining ditch, the Eldorado, diverts water from most of the tributaries of South Fork above the station. It carried water during the greater part of April over the Beam Creek divide into Willow Creek, where it was used for irrigation. The water was turned out May 1.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 10 and 25 second-feet. Gage read about every other day during April, and weekly thereafter. Daily discharge ascertained by applying daily gage heights to rating table. Records fair.

COOPERATION.—Gage heights furnished by Eastern Oregon Land Co.; measurements by State engineer of Oregon.

Discharge measurements of South Fork of Burnt River near Unity, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 14	C. G. Paulsen	1.03	19.8	June 11	H. K. Donnelly	1.12	21.9
Apr. 9	H. K. Donnelly	1.02	21.0	July 14	do	1.02	18.5
28	do	.82	11.6	Aug. 18	do	1.02	19.0

Daily discharge, in second-feet, of South Fork of Burnt River near Unity, Oreg., for the year ending Sept. 30, 1915.

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

NOTE.—Discharge interpolated Apr. 8, 10–11, 13, 17–18, 20, 24–25, and after May 9, between readings made about once a week. Discharge estimated Apr. 29–30, May 2–7 as in table. Discharge Apr. 1–6 estimated at 22 second-feet.

Monthly discharge of South Fork of Burnt River near Unity, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean		
March	.....	.....	[a] 20.0	1,230	C.
April	25	12	18.4	1,090	C.
May	28	22	24.7	1,520	C.
June	23	20	21.7	1,290	C.
July	20	18	18.8	1,160	C.
August	.....	.....	[a] 19.0	1,170	C.
September	.....	.....	[a] 19.0	1,130	C.
The period	.....	.....	.....	8,590	

[a] Estimated.

SAWMILL CREEK[1] NEAR UNITY, OREG.

LOCATION.—In the NW. ¼ sec. 11, T. 13 S., R. 36 E., 100 yards above intake of Whited reservoir ditch, and 5 miles northwest of Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 29 to June 28, 1915.

GAGE.—Vertical staff on left bank 150 yards above home of Mrs. Chas. Kessler, observer.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Rock and gravel; more or less filled with débris and brush.

DIVERSIONS.—None above station.

COOPERATION.—Records furnished by State engineer of Oregon.

Daily discharge not computed because of insufficient data; gage heights indicate the small and steady flow of the stream.

The following measurement was made by H. K. Donnelly:

April 11, 1915: Gage height, 0.32 foot; discharge, 0.5 second-foot.

[1] Locally known as Pole Creek.

Daily gage height, in feet, of Sawmill Creek near Unity, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1	.....	0.32	0.30	0.35	16	.....	.32	.42	.20
2	.....	.....	.30	.35	17	.....	.32	.42	.15
3	.....	.....	.30	.35	18	.....	.30	.42	.15
4	.....	.....	.35	.35	19	.....	.30	.40	.15
5	.....	.32	.35	.30	20	.....	.30	.40	.15
6	.....	.35	.35	.30	21	.....	.30	.40	.15
7	.....	.38	.35	.25	22	.....	.30	.42	.15
8	.....	.34	.35	.25	23	.....	.30	.41	.12
9	.....	.32	.38	.25	24	.....	.28	.40	.12
10	.....	.32	.39	.25	25	.....	.28	.40	.10
11	.....	.32	.40	.25	26	.....	.25	.38	.10
12	.....	.32	.40	.22	27	.....	.25	.38	.10
13	.....	.32	.42	.22	28	0.28	.25	.35	.10
14	.....	.32	.45	.22	29	.32	.25	.35	.....
15	.....	.32	.45	.20	30	.36	.35	.35	.....
					31	.30	.....	.35	.....

NOTE.—No flow after about June 15.

CAMP CREEK NEAR HEREFORD, OREG.

LOCATION.—In the SW. ¼ sec. 29, T. 12 S., R. 38 E., half a mile above mouth and about 3 miles west of Hereford, on road to Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 17 to April 6, 1915, after which channel was practically dry.

GAGE.—Vertical staff on lower side of wagon bridge, left bank; read daily by Culvin Hough.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel; probably fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded, 1.80 feet April 3, but may have been higher prior to March 17. Channel dry at times.

DIVERSIONS.—Below all diversions; 1,250 acres of land irrigated from Camp Creek and East and West forks; some water also diverted in ordinary years by Eldorado ditch into Willow Creek watershed.

COOPERATION.—Field data furnished by State engineer.

Daily discharge not determined.

Discharge measurements of Camp Creek near Hereford, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 17	C. G. Paulsen	1.05	11.5
Apr. 12	H. K. Donnelly	(a)	.25

a Water on opposite side of channel from gage.

Daily gage height, in feet, of Camp Creek near Hereford, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1		1.00	11			21	1.00	
2		.80	12			22	1.02	
3		1.80	13			23	1.02	
4		1.20	14			24	1.02	
5		1.00	15			25	1.08	
6		.60	16			26	1.08	
7			17	1.05		27	.90	
8			18	1.02		28	.90	
9			19	1.00		29	1.08	
10			20	1.00		30	1.02	
						31	1.00	

POWDER RIVER NEAR NORTH POWDER, OREG.

LOCATION.—In the NE. ¼ sec. 12, T. 6 S., R. 39 E., 3 miles northeast of North Powder, Union County; below all tributaries and return waters from irrigation in the North Powder Valley and above the backwater of the proposed Thief Valley resrevoir.

DRAINAGE AREA.—775 square miles; at lower end of Thief Valley, 826 square miles.

RECORDS AVAILABLE.—May 20, 1913, to September 30, 1915. The records at this station are almost directly comparable with those at the station below Thief Valley, March 9, 1909, to June 30, 1912, as the inflow between the two points constitutes only a negligible percentage of the total.

GAGE.—Vertical staff on left bank just below entrance to short canyon below North Powder Valley. Gage reader, Mrs. H. C. Bidwell.

DISCHARGE MEASUREMENTS.—Made from railway bridge one-fourth mile below gage or by wading.

CHANNEL AND CONTROL.—Rocks with some sand; probably shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.30 feet at 5 p. m. May 18 (discharge, 624 second-feet); minimum stage recorded, 0.32 foot September 1 and 3 (discharge, 1.8 second-feet).

1909–1915: Maximum stage recorded, 10.0 feet at lower station at 6.35 a. m. March 21, 1910 (discharge, 2,920 second-feet). Stream bed dry in August and September, 1910.

WINTER FLOW.—Stage-discharge relation seriously affected by ice generally for about 3 months; flow estimated from discharge measurements, observer's notes, and temperature records.

DIVERSIONS.—Water is diverted from Powder River and its tributaries for irrigating 72,000 acres of land above this station.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice December 1 to February 24. Rating curve well defined between 30 and 600 second-feet. Daily discharge ascertained by applying daily gage heights to rating table. Open-water records good; winter records poor.

Discharge measurements of Powder River near North Powder, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 13	C. G. Paulsen	1.28	51.9	Mar. 26	C. G. Paulsen	2.11	187
Jan. 6	do	[a] 2.40	55.5	Aug. 13	C. E. Stricklin	.38	2.4
Feb. 3	James E. Stewart	[a] 3.20	137				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Powder River near North Powder, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	47	88	.....	118	320	79	409	12	5.8	1.8
2	50	88	.....	126	336	94	449	12	5.1	1.8
3	52	81	.....	144	336	102	470	12	4.6	1.8
4	50	75	.....	135	320	94	409	13	4.2	2.0
5	47	71	.....	126	320	94	371	14	3.9	2.1
6	44	75	.....	144	320	88	354	15	3.6	2.1
7	43	75	.....	135	288	79	272	16	3.6	2.1
8	44	71	.....	126	242	73	187	17	3.6	2.4
9	47	75	.....	126	213	67	118	18	3.6	2.6
10	50	75	.....	118	200	79	81	18	3.3	3.1
11	52	79	.....	118	154	94	76	13	3.0	3.6
12	53	81	.....	126	126	109	73	13	3.0	3.9
13	56	75	.....	126	126	118	67	13	3.0	4.2
14	48	69	.....	135	118	135	61	12	2.8	4.6
15	48	71	.....	154	109	449	46	12	2.6	5.1
16	44	75	.....	176	109	409	44	14	2.6	.....
17	48	75	.....	187	102	491	39	14	2.6	.....
18	50	79	.....	200	79	624	39	14	2.4	.....
19	56	81	.....	176	67	578	37	13	2.1	.....
20	60	81	.....	154	56	534	35	13	2.1	.....
21	67	81	.....	135	56	534	31	9.8	2.1	.....
22	71	81	.....	118	48	491	31	6.6	2.4	.....
23	75	81	.....	126	39	449	28	5.6	2.6	.....
24	79	75	.....	118	31	409	28	4.6	2.6	.....
25	102	75	118	135	25	429	24	3.6	2.6	.....
26	81	69	102	187	31	409	25	4.6	2.8	.....
27	69	75	94	187	35	371	24	5.6	3.0	.....
28	58	81	102	200	39	371	23	6.6	3.0	.....
29	64	81	.....	228	48	354	21	6.6	3.0	.....
30	75	81	.....	256	56	354	21	6.6	2.6	.....
31	94	.....	.....	288	.....	371	.....	6.6	2.1	.....

NOTE.—Gage read every other day, July to September; discharge interpolated. Discharge estimated because of ice as follows: December, 55 second-feet; January, 50 second-feet; Feb. 1–24, 110 second-feet. Stage-discharge relation affected by backwater from beaver dam Sept. 6–30 and discharge estimated as 8 second-feet.

Monthly discharge of Powder River near North Powder, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	102	43	58.8	3,620	B.
November	88	69	77.3	4,600	B.
December	.....	.....	a 55.0	3,380	D.
January	.....	.....	a 50.0	3,070	D.
February	.....	.....	109	6,050	D.
March	288	118	156	9,590	B.
April	336	25	145	8,630	B.
May	624	67	288	17,700	B.
June	470	21	130	7,740	B.
July	18	3.6	11.1	682	C.
August	5.8	2.1	3.11	191	C.
September	.....	1.8	5.44	324	D.
The year	624	1.8	90.6	65,600	

a Estimated.

SALMON RIVER AT SALMON, IDAHO.

LOCATION.—In sec. 6, T. 21 N., R. 22 E., at rear of Shoup's ranch buildings, 300 feet below the island, just above Lemhi River, and one-fourth mile below highway bridge at Salmon, Lemhi County.

DRAINAGE AREA.—3,600 square miles (Forest Service records).

RECORDS AVAILABLE.—April 25, 1912, to September 30, 1915.

GAGE.—Inclined staff on left bank installed October 20, 1913; read by H. H. Power. Prior to October 20, 1913, gage was an inclined staff 30 feet upstream. Both gages referred to same datum but present gage reads about 0.08 foot less.

DISCHARGE MEASUREMENTS.—Made from a cable 700 feet below gage

CHANNEL AND CONTROL.—One channel at all stages; bed consists of rock overlaid with sand and gravel. Control shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.4 feet at 9 a. m. June 2 (discharge, 3,780 second-feet); minimum stage occurred during winter months (discharge not accurately known).

1912–1915: Maximum stage recorded, 8.3 feet June 1, 1913 (discharge, 12,800 second-feet); a discharge of 12,900 second-feet corresponding to a gage height of 8.2 feet occurred June 10, 1912. Minimum stage and discharge, not accurately known, occurred during winter months.

WINTER FLOW.—Stage-discharge relation affected by ice December to January; discharge estimated from weather records and observer's notes.

DIVERSIONS.—A small ditch diverts from left bank between bridge and gage but its total capacity is less than 1 per cent of low-water flow.

REGULATION.—None.

ACCURACY.—State-discharge relation practically permanent during the year; affected by ice December 4 to February 10. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge, except during winter, ascertained by applying daily gage heights to rating table. Open-water records good; winter records poor.

The following discharge measurement was made by Martin and Stewart of the United States Forest Service:

November 27, 1914: Gage height, 2.44 feet; discharge, 1,260 second-feet.

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

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,520	1,520	1,230	.....	1,100	1,140	2,200	3,620	2,330	1,570	1,060
2	1,620	1,520	1,180	.....	1,060	1,140	2,200	3,780	2,460	1,520	1,060
3	1,840	1,520	1,140	.....	1,100	1,180	2,080	3,620	2,590	1,420	1,140
4	1,840	1,520	1,140	.....	1,100	1,180	1,960	3,460	2,660	1,420	1,140
5	1,840	1,520	.....	.....	1,060	1,180	1,840	3,010	2,730	1,420	1,140
6	1,840	1,420	.....	.....	1,100	1,230	1,730	2,940	2,870	1,420	1,100
7	1,620	1,420	.....	.....	1,100	1,230	1,620	2,870	2,870	1,420	1,060
8	1,420	1,420	.....	.....	1,100	1,230	1,620	2,870	3,160	1,420	1,100
9	1,420	1,420	.....	.....	1,100	1,270	1,620	3,010	3,010	1,420	1,100
10	1,420	1,420	.....	.....	1,100	1,320	1,620	3,010	3,160	1,320	1,140
11	1,420	1,420	.....	1,320	1,100	1,420	1,730	3,010	3,020	1,270	1,140
12	1,420	1,320	.....	1,230	1,100	1,420	1,840	3,160	2,870	1,230	1,140
13	1,420	1,320	.....	1,100	1,100	1,520	1,840	3,010	2,590	1,180	1,100
14	1,420	1,320	.....	1,100	1,100	1,620	1,960	2,870	2,590	1,180	1,140
15	1,420	1,320	.....	1,100	1,100	1,730	2,080	2,590	2,330	1,180	1,140
16	1,420	1,320	.....	1,060	1,100	1,730	2,080	2,590	2,330	1,180	1,140
17	1,420	1,230	.....	1,060	1,100	1,840	2,200	2,590	2,080	1,180	1,100
18	1,420	1,230	.....	1,100	1,140	1,840	2,200	2,590	1,900	1,140	1,100
19	1,420	1,230	.....	1,100	1,140	1,840	2,330	2,590	1,730	1,140	1,140
20	1,420	1,230	.....	1,100	1,140	1,960	2,460	2,590	1,730	1,100	1,140
21	1,520	1,230	.....	1,100	1,140	1,960	2,730	2,590	1,620	1,140	1,140
22	1,620	1,230	.....	1,060	1,140	2,080	2,870	2,590	1,620	1,140	1,100
23	1,620	1,180	.....	1,100	1,140	1,960	2,870	2,590	1,620	1,100	1,060
24	1,620	1,180	.....	1,100	1,180	1,960	2,870	2,870	1,620	1,140	1,060
25	1,570	1,180	.....	1,100	1,230	1,960	2,870	2,870	1,520	1,140	1,060
26	1,520	1,270	.....	1,100	1,180	2,080	3,010	3,160	1,520	1,060	1,180
27	1,520	1,270	.....	1,100	1,140	2,080	3,010	2,810	2,590	1,060	1,270
28	1,520	1,270	.....	1,100	1,140	2,080	3,160	2,460	1,520	1,060	1,270
29	1,520	1,270	.....	.....	1,140	2,080	3,160	2,460	1,620	976	1,180
30	1,520	1,270	.....	.....	1,140	2,080	3,310	2,330	1,520	1,060	1,140
31	1,520	.....	.....	.....	1,140	.....	3,460	.....	1,620	1,060	.....

NOTE.—Stage-discharge relation affected by ice Dec. 4 to Feb. 10; discharge estimated from weather records and observer's notes as follows: Dec. 4–31, 950 second-feet; Jan. 1–31, 1,000 second-feet; Feb. 1–10, 900 second-feet.

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

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	1,840	1,420	1,540	94,700	A.
November	1,520	1,180	1,330	79,100	A.
December	.....	.....	979	60,200	D.
January	.....	.....	1,000	61,500	D.
February	.....	.....	1,040	57,800	C.
March	1,230	1,060	1,120	68,900	B.
April	2,080	1,140	1,640	97,600	B.
May	3,460	1,620	2,340	144,000	B.
June	3,780	2,330	2,880	171,000	B.
July	3,160	1,520	2,240	138,000	B.
August	1,570	976	1,230	75,600	B.
September	1,270	1,060	1,130	67,200	B.
The year	3,780	.....	1,540	1,120,000	

NOTE.—See footnote to table of daily discharge.

SALMON RIVER AT WHITEBIRD, IDAHO.

LOCATION.—In sec. 22, T. 28 N., R. 1 E., at Canfield Ferry at Whitebird, Idaho; just below Whitebird Creek and below all important tributaries.

DRAINAGE AREA.—13,600 square miles (measured on General Land Office map, edition of 1909).

RECORDS AVAILABLE.—August 8, 1910, to September 30, 1915.

GAGE.—Inclined staff in two sections; lower section, on right bank, installed August 18, 1910; upper section, on left bank, installed November 3, 1911. Gage read by James Tierney from October 1, 1914, to June 12, 1915, and by William Cantonwine from June 13 to September 30, 1915.

DISCHARGE MEASUREMENTS.—Made from gaging car suspended from ferry cable 75 feet above gage.

CHANNEL AND CONTROL.—One channel at all stages; banks not subject to overflow. Channel straight for a quarter of a mile below gage, but curved slightly immediately above. Control composed of heavy boulders 1,000 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.59 feet at 8 a. m. June 2 (discharge, 33,800 second-feet); minimum stage recorded, 1 foot at 8.30 a. m. December 12 (discharge, 2,800 second-feet).

1910–1915: Maximum stage recorded, 19.7 feet at 7 a. m. May 28, 1913 (discharge, 81,200 second-feet); minimum stage recorded December 12, 1914.

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

DIVERSIONS.—An inconsiderable amount of water is used for irrigation above gaging station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice for a few days in December. Rating curve well defined above 3,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying gage heights to rating table. Records excellent.

No discharge measurements were made during the year.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,630	5,770	4,320	3,760	3,890	3,760	5,170	14,900	30,300	13,100	6,840	3,510
2	4,800	5,980	3,890	3,630	4,030	3,760	5,170	14,500	33,400	12,800	6,840	3,890
3	5,170	5,980	3,760	3,630	4,170	3,760	5,770	14,200	30,300	12,500	6,400	4,470
4	5,370	5,770	4,030	3,630	4,030	3,760	6,400	12,800	27,900	12,500	6,190	4,470
5	5,170	5,570	4,470	3,510	3,890	3,760	6,840	11,800	27,000	12,500	5,980	4,470
6	5,370	5,370	4,470	3,510	3,760	3,760	6,620	11,100	26,100	12,500	5,570	4,170
7	5,370	5,170	4,170	3,510	3,630	3,760	6,620	11,100	25,200	11,800	5,570	4,170
8	5,170	5,170	3,890	3,510	3,630	3,630	6,620	11,100	24,700	14,900	5,370	4,030
9	5,370	4,980	3,630	3,630	3,630	3,630	6,620	11,800	24,300	14,900	5,370	3,890
10	4,980	4,800	3,170	3,760	3,760	3,630	6,400	12,400	23,400	15,600	5,170	4,030
11	5,170	4,800	2,800	3,760	3,760	3,630	6,620	13,800	22,000	14,200	4,980	4,170
12	5,170	4,800	2,800	3,630	3,760	3,760	7,300	14,500	22,500	12,800	4,800	4,470
13	4,980	5,170	2,970	3,630	3,760	3,760	9,100	14,500	22,000	11,400	4,800	4,630
14	5,170	5,170	2,970	3,630	3,630	3,890	10,500	15,200	20,700	10,500	4,800	4,470
15	5,170	5,170	2,970	3,630	3,390	3,890	9,930	15,600	19,900	10,500	4,630	4,470
16	5,170	4,800	2,970	3,760	3,390	4,030	9,930	15,200	19,500	10,500	4,470	4,470
17	5,170	4,320	2,970	3,760	3,510	4,030	10,500	15,600	19,100	10,500	4,320	4,470
18	5,370	4,470	2,970	3,760	3,630	4,030	11,800	17,100	19,100	10,500	4,170	4,320
19	5,800	4,470	2,970	3,510	3,890	4,170	13,500	22,500	19,100	9,930	3,890	4,320
20	6,920	4,170	2,970	3,390	3,890	4,030	14,500	27,500	19,500	9,370	3,630	4,170
21	6,920	4,170	2,970	3,390	3,890	4,030	14,900	27,000	18,300	8,830	3,390	4,030
22	6,400	4,170	2,970	3,390	3,890	4,170	15,600	26,100	16,700	8,300	3,170	4,030
23	6,190	4,170	3,070	3,070	3,890	4,320	14,900	25,200	16,400	7,790	3,070	3,890
24	5,980	4,470	3,170	2,970	3,760	4,800	14,500	24,300	16,000	7,540	3,070	3,890
25	5,770	4,630	3,280	2,880	3,890	5,170	13,100	24,700	16,400	7,300	2,970	3,890
26	5,770	4,470	3,390	2,970	3,890	4,980	12,400	22,900	17,500	6,840	2,970	3,890
27	5,570	4,470	3,630	3,170	3,890	4,800	13,100	21,600	18,300	6,840	2,970	4,170
28	5,570	4,320	3,630	3,390	3,890	4,630	13,800	21,300	16,000	6,840	2,880	4,470
29	5,370	4,470	3,890	3,510	.....	4,800	15,200	28,900	14,500	7,070	2,970	4,630
30	5,370	4,470	3,890	3,630	.....	4,980	15,200	27,500	13,500	6,840	3,170	4,470
31	5,570	.....	3,890	3,760	.....	5,170	.....	26,600	.....	6,840	3,280	.....

NOTE.—Discharge estimated, because of ice, Dec. 19–20, 24.

Monthly discharge of Salmon River at Whitebird, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	6,920	4,630	5,480	337,000	A.
November	5,980	4,170	4,860	289,000	A.
December	4,470	2,800	3,450	212,000	A.
January	3,760	2,880	3,510	216,000	A.
February	4,170	3,390	3,780	210,000	A.
March	5,170	3,630	4,140	255,000	A.
April	15,600	5,170	10,300	613,000	A.
May	28,900	11,100	18,600	1,140,000	A.
June	33,400	13,500	21,300	1,270,000	A.
July	15,600	6,840	10,200	627,000	A.
August	6,840	2,880	4,440	273,000	A.
September	4,630	3,510	4,210	251,000	A.
The year	33,400	2,800	7,860	5,690,000	

GRANDE RONDE RIVER AT HILGARD, OREG.

LOCATION.—In the SW. ¼ sec. 32, T. 2 S., R. 37 E., half a mile east of Hilgard, Union County, at the county highway bridge just below Five Points Creek, about 8 miles above head of Grande Ronde Valley.

DRAINAGE AREA.—660 square miles.

RECORDS AVAILABLE.—November 6, 1903, to March 3, 1910; October 1, 1910, to September 30, 1915, when station was discontinued.

GAGE.—Vertical staff nailed to right abutment of former bridge; used since January 5, 1912. Gage reader, J. W. Scott. Gage on pier of former bridge used November 6, 1903, to March 4, 1910, when bridge and gage were washed away. Gage on left abutment of the same bridge used 1910 and 1911.

DISCHARGE MEASUREMENTS.—Made from downstream side of new steel bridge about 20 feet below gage, or by wading.

CHANNEL AND CONTROL.—Sand and gravel; fairly permanent. The use of the stream for log driving formerly affected the stage-discharge relation, especially for about two months in early summer; no logs have been driven since about 1910.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.05 feet April 13 (discharge, 1,240 second-feet); minimum stage recorded, 0.50 foot August 30–31 (discharge, 15 second-feet).

1903–1915: Maximum stage recorded, 8.0 feet March 17, 1908; maximum discharge, 4,610 second-feet (gage height, 7.5 feet) April 14, 1904. Minimum stage recorded, 2.20 feet June 25, 26, 30, July 1, 1905 (discharge, 3 second-feet), caused by holding back water in logging dams. Minimum stage recorded since 1909, when the splashing ceased, 0.68 foot September 22 and 23, 1913 (discharge, 14.8 second-feet).

WINTER FLOW.—Stage-discharge relation seriously affected by ice about two months (average) each winter; flow estimated from meter measurements, observer's notes, and studies of weather records.

REGULATION.—Practically none at present.

ACCURACY.—Stage-discharge relation practically permanent during the year; affected by ice from December 9 to February 13. Rating curve well defined. Daily discharge (except for winter) ascertained by applying daily gage heights to rating table. Open-water records good; winter records poor.

Discharge measurements of Grande Ronde River at Hilgard, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 7	C. G. Paulsen	[a] 1.15	23.6	Mar. 23	C. G. Paulsen	2.11	444
Feb. 3	James E. Stewart	[a] 1.46	32.7	Aug. 12	C. E. Stricklin	.62	20.9

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Grande Ronde River at Hilgard, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	42	38	.....	76	725	240	645	60	34	18
2	37	42	49	.....	67	725	220	570	52	34	18
3	49	42	46	.....	67	1,240	220	570	52	34	18
4	52	39	44	.....	76	990	240	440	52	28	18
5	47	39	46	.....	76	768	301	390	60	28	18
6	40	39	46	.....	76	645	301	345	60	28	18
7	39	39	39	.....	76	645	345	345	103	28	18
8	39	39	28	.....	70	390	390	301	103	28	19
9	39	39	.....	.....	70	390	390	259	94	28	19
10	39	39	.....	.....	70	368	390	240	94	24	19
11	52	39	.....	.....	84	368	415	259	84	24	19
12	52	39	.....	.....	103	368	645	301	67	20	22
13	52	39	.....	.....	103	390	645	259	64	20	28
14	42	39	.....	103	152	345	810	259	67	20	26
15	39	37	.....	114	220	323	725	220	94	20	24
16	39	28	.....	125	259	323	645	184	94	34	26
17	44	28	.....	125	259	323	725	168	84	28	26
18	44	28	.....	114	301	323	855	152	67	24	26
19	55	28	.....	103	259	323	810	138	52	20	26
20	67	34	.....	94	240	301	725	125	46	20	26
21	58	46	.....	84	301	293	685	125	46	20	24
22	52	42	.....	84	440	280	768	114	39	20	24
23	52	39	.....	84	470	280	725	103	39	19	22
24	52	39	.....	67	390	259	810	114	37	18	22
25	51	42	.....	76	570	228	810	125	34	18	22
26	49	52	.....	76	301	228	810	125	30	18	24
27	46	52	.....	76	280	213	855	103	30	18	24
28	46	52	.....	76	301	202	945	94	34	18	26
29	46	52	.....	.....	810	220	810	84	34	18	26
30	46	42	.....	.....	810	240	725	60	28	15	26
31	46	.....	.....	.....	768	.....	645	.....	28	15	.....

NOTE.—Discharge during ice period estimated as follows: Dec. 9–16, 20 second-feet; Dec. 17–31, 15 second-feet; Jan. 1–7, 20 second-feet; Jan. 8–31, 25 second-feet; Feb. 1–13, 55 second-feet.

Monthly discharge of Grande Ronde River at Hilgard, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	67	28	46.5	2,800	B.
November	52	28	39.9	2,370	B.
December	49	.....	23.3	1,430	C.
January	.....	.....	23.9	1,470	D.
February	125	.....	75.6	4,200	C.
March	810	67	263	16,200	B.
April	1,240	202	424	25,200	B.
May	945	220	601	37,000	B.
June	645	60	241	14,300	B.
July	103	28	59.0	3,630	B.
August	34	15	23.3	1,430	B.
September	28	18	22.4	1,330	B.
The year	1,240	15	154	111,000	

CATHERINE CREEK NEAR UNION, OREG.

LOCATION.—In the SW. ¼ sec. 1, T. 5 S., R. 40 E., 50 yards below a ford, one-fourth mile from Godsey's ranch house, and 8 miles southeast of Union, Union County.

DRAINAGE AREA.—96 square miles.

RECORDS AVAILABLE.—July 20, 1911, to September 30, 1912, and March 20 to September 14, 1915. Also, May 15, 1906, to May 18, 1907, at a station about 1½ miles below.

GAGE.—Vertical staff spiked to clump of alders on left bank; somewhat difficult to read accurately. Gage reader, Mrs. S. T. Godsey.

DISCHARGE MEASUREMENTS.—Made from bridge about 400 feet above gage or by wading.

CHANNEL AND CONTROL.—Gravel; shifting in floods; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.02 feet at 3.50 p. m. May 18 (discharge, 498 second-feet); minimum stage recorded, 0.12 foot September 1–7 (discharge, 24 second-feet).

1906–7, 1911–12, and 1915: Maximum stage recorded, 4.60 feet at old station, May 17, 1907 (discharge estimated from extension of rating curve as 1,120 second-feet); minimum discharge (obtained as result of measurement January 13, 1913), 19.5 second-feet.

WINTER FLOW.—Stage-discharge relation seriously affected by ice for short periods; flow usually estimated.

DIVERSIONS.—Above all ditches except one which irrigates about 18 acres.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during the year. Rating curve fairly well defined between 50 and 500 second-feet; poorly defined below 50 second-feet. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for low-water period, for which they are fair.

COOPERATION.—Field data furnished by the State engineer.

Discharge measurements of Catherine Creek near Union, Oreg., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 20	C. G. Paulsen	0.44	66.6
Apr. 10	C. E. Stricklin	1.00	182
May 18	.....do	1.95	475

Daily discharge, in second-feet, of Catherine Creek near Union, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	135	232	359	104	45	24
2	.....	146	206	314	99	42	24
3	.....	206	182	290	95	42	24
4	.....	232	182	260	95	35	24
5	.....	206	182	260	81	35	24
6	.....	206	194	260	77	35	24
7	.....	182	194	254	86	35	24
8	.....	182	206	246	77	35	27
9	.....	182	206	246	99	32	27
10	.....	182	219	227	77	32	27
11	.....	206	232	206	77	32	27
12	.....	246	232	206	68	32	30
13	.....	290	320	194	63	32	35
14	.....	232	336	182	63	32	32
15	.....	232	336	175	60	32	.....
16	.....	232	336	170	60	32	.....
17	.....	232	403	170	68	32	.....
18	.....	232	486	170	63	32	.....
19	.....	260	483	170	60	32	.....
20	67	290	454	158	57	32	.....
21	77	290	403	146	52	32	.....
22	95	246	379	135	48	30	.....
23	114	246	320	124	48	30	.....
24	114	206	320	124	45	30	.....
25	99	206	305	146	45	30	.....
26	91	194	296	135	45	30	.....
27	77	206	284	114	45	27	.....
28	95	206	386	110	45	27	.....
29	158	275	369	99	57	27	.....
30	135	260	352	104	48	27	.....
31	135	.....	352	.....	45	27	.....

Monthly discharge of Catherine Creek near Union, Oreg., for the year ending Sept. 30, 1915.

[Drainage area, 96 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
March 20-31	158	67	105	1.09	0.49	2,500	A.
April	290	135	222	2.31	2.58	13,200	A.
May	486	182	303	3.16	3.64	18,600	B.
June	359	99	192	2.00	2.23	11,400	A.
July	104	45	66.2	.690	.80	4,070	B.
August	45	27	32.4	.337	.39	1,990	B.
September 1-14	35	24	26.6	.277	.14	739	B.
The period						52,500	

LITTLE CREEK NEAR UNION, OREG.

LOCATION.—In the SE. ¼ sec. 14, T. 4 S., R. 40 E., on the Southerland ranch, 6 miles east of Union, Union County; just below a small tributary from the south.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 11 to September 14, 1915.

GAGE.—Vertical staff on east bank. Gage reader, C. H. Moore.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Firm gravel; probably permanent except in extreme floods. One channel at all stages.

DIVERSIONS.—147 acres irrigated above the station.

COOPERATION.—Data furnished by State Engineer of Oregon.

Daily discharge not computed because of lack of high-water measurements.

Discharge measurements of Little Creek near Union, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 11	0.90	23.9
Apr. 29	1.05	53.6
Sept. 14	.40	1.7

Daily gage height, in feet, of Little Creek near Union, Oreg., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	1.00	1.30	0.75	0.55	0.40	16	0.90	1.30	0.90	0.65	0.45	.....
2	.....	.95	1.25	.70	.55	.40	17	.90	1.70	.90	.65	.45	.....
3	.....	.95	1.20	.70	.55	.40	18	.90	1.95	.85	.65	.45	.....
4	.....	.95	1.20	.65	.55	.40	19	.95	2.10	.80	.65	.45	.....
5	.....	.95	1.15	.65	.55	.40	20	.95	1.90	.80	.65	.40	.....
6	.....	.95	1.15	.65	.55	.40	21	.95	1.65	.80	.65	.40	.....
7	.....	.95	1.10	.70	.55	.40	22	.90	1.60	.80	.60	.40	.....
8	.....	.95	1.10	.70	.50	.40	23	.95	1.40	.80	.60	.40	.....
9	.....	.95	1.05	.70	.50	.40	24	.95	1.35	.80	.60	.40	.....
10	.....	1.10	1.00	.70	.50	.40	25	.95	1.35	.80	.55	.40	.....
11	0.90	1.10	1.00	.65	.50	.40	26	.95	1.30	.80	.55	.40	.....
12	.95	1.10	1.00	.65	.50	.50	27	.95	1.25	.80	.55	.40	.....
13	.95	1.40	1.00	.65	.45	.45	28	.95	1.35	.75	.55	.40	.....
14	.95	1.45	.90	.65	45	.40	29	.95	1.35	.75	.60	.40	.....
15	.95	1.35	.90	.65	.45	.....	30	1.00	1.25	.75	.60	.40	.....
							31	.....	1.20	.....	.60	.40	.....

MILL CREEK NEAR SUMMERVILLE, OREG.

LOCATION.—In the NE. ¼ sec. 35, T. 1 N., R. 38 E., about 2½ miles north of Summerville, Union County.

DRAINAGE AREA.—Indeterminate; practically all the flow of the creek comes from springs.

RECORDS AVAILABLE.—July 11, 1914, to April 3, 1915, when station was discontinued.

GAGE.—Vertical staff on the supports of a flume; read by C. E. Boggs.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel; fairly permanent.

EXTREMES OF STAGE.—Maximum stage recorded during period of record, 0.65 foot October 19, 1914, and February 19, 1915; minimum stage recorded, 0.40 foot December 27, 1914, to January 10, 1915; January 16–29, 31, 1915.

WINTER FLOW.—Discharge apparently slightly reduced during cold weather, but stage-discharge relation unaffected.

DIVERSIONS.—None.

REGULATION.—None.

COOPERATION.—Gage heights furnished by Kleis Electric Co.

Discharge not computed, as measurements do not cover range of stage.

The following measurement was made by James E. Stewart:

February 4, 1915: Gage height, 0.54 foot; discharge, 13.8 second-feet.

Daily gage height, in feet, of Mill Creek, near Summerville, Oreg., for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	0.55	0.55	0.55	0.40	0.45	0.55	0.55
2	.55	.55	.55	.40	.55	.55	.55
3	.55	.55	.55	.40	.45	.55	.60
4	.55	.55	.55	.40	.50	.60	.....
5	.55	.55	.55	.40	.55	.55	.....
6	.55	.55	.55	.40	.55	.55	.....
7	.55	.55	.55	.40	.55	.60	.....
8	.55	.55	.55	.40	.55	.60	.....
9	.55	.55	.55	.40	.55	.55	.....
10	.55	.55	.55	.40	.55	.55	.....
11	.55	.55	.55	.45	.55	.55	.....
12	.55	.55	.55	.50	.55	.55	.....
13	.55	.55	.50	.45	.55	.55	.....
14	.55	.55	.55	.50	.55	.55	.....
15	.55	.55	.50	.45	.55	.55	.....
16	.55	.55	.55	.40	.55	.55	.....
17	.60	.55	.50	.40	.55	.55	.....
18	.60	.55	.55	.40	.60	.55	.....
19	.65	.55	.50	.40	.65	.52	.....
20	.60	.55	.50	.40	.60	.50	.....
21	.60	.55	.50	.40	.60	.50	.....
22	.55	.55	.50	.40	.60	.50	.....
23	.55	.55	.50	.40	.55	.50	.....
24	.55	.55	.50	.40	.55	.50	.....
25	.55	.55	.50	.40	.55	.50	.....
26	.55	.55	.50	.40	.55	.50	.....
27	.55	.55	.40	.40	.55	.50	.....
28	.55	.55	.40	.40	.55	.50	.....
29	.55	.55	.40	.40	.....	.50	.....
30	.55	.55	.40	.45	.....	.55	.....
31	.55	.55	.40	.40	.....	.55	.....

WALLOWA LAKE NEAR JOSEPH, OREG.

LOCATION.—In sec. 5, T. 3 S., R. 45 E., near outlet of Wallowa Lake, about a mile above Joseph, Wallowa County.

RECORDS AVAILABLE.—July 15, 1905, to July 28, 1906; January 13, 1912, to March 31, 1914; May 21 to Sept. 25, 1915.

LAKE AREA.—1,528 acres at low water and 1,548 acres at high water, according to survey made for the State Water Board in 1915.

GAGE.—Vertical staff spiked to shore side of pile supporting boathouse some distance above dam at outlet. Read by J. W. Winston. The gage used in 1905–6 was placed on upstream side of dam at outlet. Its datum was the floor of the sluiceway. No determined relation between the gage used in 1905–6 and present gage.

STORAGE.—Wallowa Lake reservoir is operated for the benefit of four ditches which divert between the lake and Joseph. The reservoir is allowed to remain practically empty during the winter and is filled during the flood run-off in May and June and emptied during August and September. The usual variation in level has been about 6.5 feet.

EXTREMES OF STAGE.—Maximum stage recorded 1911 to 1915, 8.05 feet June 8, 1915; minimum stage recorded, 1.25 feet January 18 and February 1 to May 29, 1913.

Daily gage height, in feet, of Wallowa Lake near Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	Mar.	May.	June.	July.	Aug.	Sept.	Day.	Mar.	May.	June.	July.	Aug.	Sept.
1	.....	.....	8.00	4.90	2.62	1.88	16	.....	.....	7.72	4.00	1.88	1.72
2	.....	.....	8.00	4.48	2.55	1.88	17	.....	.....	7.78	3.92	1.85	1.70
3	.....	.....	7.98	4.35	2.45	1.85	18	.....	.....	7.50	3.95	1.85	1.68
4	.....	.....	7.90	4.20	2.30	1.85	19	.....	.....	7.40	4.00	1.82	1.65
5	.....	.....	7.92	4.00	2.22	1.85	20	.....	.....	7.35	4.02	1.82	1.65
6	.....	.....	8.00	4.00	2.15	1.85	21	.....	7.12	7.10	4.05	1.82	1.65
7	.....	.....	8.02	3.95	2.05	1.85	22	1.50	7.20	6.90	4.05	1.80	1.65
8	.....	.....	8.05	3.95	2.02	1.85	23	.....	7.28	6.65	4.05	1.80	1.62
9	.....	.....	8.00	4.00	2.00	1.85	24	.....	7.35	6.45	4.05	1.82	1.62
10	.....	.....	8.00	4.00	1.90	1.85	25	.....	7.40	6.32	3.90	1.85	1.62
11	.....	.....	7.95	4.05	1.95	1.85	26	.....	7.50	6.20	3.80	1.88	.....
12	.....	.....	7.95	4.10	1.95	1.82	27	.....	7.58	5.85	3.60	1.90	.....
13	.....	.....	7.90	4.05	1.92	1.80	28	.....	7.72	5.58	3.45	1.90	.....
14	.....	.....	7.85	4.00	1.90	1.78	29	.....	7.92	5.10	3.22	1.90	.....
15	.....	.....	7.80	4.00	1.88	1.75	30	.....	8.00	4.85	3.00	1.90	.....
							31	.....	8.00	.....	2.70	1.88	.....

WALLOWA RIVER AT JOSEPH, OREG.

LOCATION.—In sec. 5, T. 3 S., R. 45 E., about 300 feet below the regulating dam at the outlet of Wallowa Lake, and 50 feet above footbridge; half a mile above Joseph, Wallowa County, above the head gates of four irrigating ditches, the first taking out 125 feet below the gage.

DRAINAGE AREA.—52 square miles.

RECORDS AVAILABLE.—November 12, 1903, to August 23, 1907; June 14, 1908, to March 31, 1914; May 20 to September 25, 1915.

GAGE.—Vertical staff bolted to a large boulder on right bank, used since July 12, 1905. Read by J. W. Winston. Original gage, read November 12, 1903, to March 30, 1905, on lake. Temporary gage 100 feet below dam, March 31 to July 11, 1905.

DISCHARGE MEASUREMENTS.—Made by wading at low water; formerly from footbridge.

CHANNEL AND CONTROL.—Boulders; practically permanent; banks are seldom overflowed; current swift and velocities uneven across section.

EXTREMES OF DISCHARGES.—Maximum stage recorded during year, 3.20 feet at 8 a. m. June 23 (discharge, 560 second-feet); minimum stage recorded, 1.88 feet at time of measurement March 22 (discharge, 41.6 second-feet).

1904–1915: Maximum stage recorded, 3.60 feet June 12–13, 1912 (discharge, 850 second-feet). This can not be corrected to natural flow. Minimum stage recorded, 1.8 feet September 27, 30, October 1, 1906, February 17 to March 16, 1907 (discharge from revised curve, 30 second-feet). This is probably the natural flow.

WINTER FLOW.—Discharge relation unaffected by ice on account of proximity to the lake outlet.

REGULATION.—About 10,000 acre-feet of storage has been developed in Wallowa Lake; used since 1905, and monthly discharge corrected for storage since 1912.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined between 40 and 400 second-feet and poorly defined outside these limits. Daily discharge ascertained by applying gage heights to rating table. Monthly mean discharge corrected for storage in Wallowa Lake before computing discharge in second-feet per square mile and run-off in depth in inches. Records good.

The following discharge measurement was made by C. G. Paulsen:

March 22, 1915: Gage height, 1.88 feet; discharge, 41.6 second-feet.

Daily discharge, in second-feet, of Wallowa River at Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	325	465	280	80	16	.....	350	240	135	60
2	.....	350	435	260	80	17	.....	375	240	135	60
3	.....	335	435	240	80	18	.....	405	220	135	60
4	.....	240	435	220	80	19	.....	405	200	129	60
5	.....	240	435	200	80	20	.....	387	172	129	60
6	.....	325	435	182	80	21	105	447	165	120	44
7	.....	375	465	172	76	22	111	465	232	111	44
8	.....	387	405	172	76	23	111	560	220	105	44
9	.....	375	375	165	70	24	129	527	325	76	44
10	.....	302	375	165	70	25	135	450	325	76	44
11	.....	325	350	165	64	26	135	495	302	80	.....
12	.....	325	325	150	64	27	135	435	280	80	.....
13	.....	272	280	141	64	28	150	547	375	80	.....
14	.....	240	280	141	64	29	248	495	325	80	.....
15	.....	289	260	141	60	30	302	405	289	80	.....
						31	325	.....	325	80	.....

NOTE.—Discharge estimated June 25 because of change in gates at Wallowa Lake.

Monthly discharge of Wallowa River at Joseph, Oreg., for period May 21 to Sept. 25, 1915.

[Drainage area, 52 square miles.]

Month.	Discharge (second-feet).			Run-off (total in acre-feet).			Discharge without storage (second-feet).		Run-off (depth in inches on drainage area).	Accuracy.
	Maximum.	Minimum.	Mean.	Observed.	Stored.	Without storage.	Mean.	Per square mile.		
May 21–31	325	111	171	3,730	+1,350	5,080	228	4.38	1.79	B.
June	560	240	382	22,700	—4,820	17,900	301	5.79	6.46	B.
July	465	165	323	19,900	—3,290	16,600	270	5.19	5.98	B
August	280	80	143	8,790	—1,250	7,540	123	2.37	2.73	B.
September 1–25	80	44	643	3,190	— 398	2,790	56.2	1.08	1.00	B.
The period	.....	.....	.....	58,300	—8,410	49,900	.....	.....	.....	

NOTE.—The dam on Wallowa Lake was closed before the stream rose in April, and the water overflowed the dam about May 21; discharge Oct. 1 to May 20 and Sept. 26–30 probably averaged close to 40 second-feet. This assumption would give the total run-off for the year as about 77,000 acre-feet.

SILVER LAKE DITCH NEAR JOSEPH, OREG.

LOCATION.—In the SW. ¼ sec. 32, T. 2 S., R. 45 E., about 500 feet below the ice pond south of Joseph.

RECORDS AVAILABLE.—July 12 to December 31, 1905; May 23 to September 4, 1915.

GAGE.—Vertical staff on east bank of ditch; read daily by R. H. Clark.

DISCHARGE MEASUREMENTS.—Made from collar of flume.

CHANNEL AND CONTROL.—Excavated in clay soil, not likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3 75 feet July 1–2 and 6–9 (discharge, 104 second-feet). Canal dry at times.

ACCURACY.—Records good.

Silver Lake ditch diverts water from Wallowa River in the NW. ¼ sec. 5, T. 3 S., R. 45 E., about 500 feet below dam at outlet of Wallowa Lake, for irrigating 4,165 acres of land lying east and north of Joseph.

Discharge measurements of Silver Lake ditch near Joseph, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 18	3.40	74.9	July 6	3.75	105	Aug. 4	2.88	42.9
22	3.65	94.5	27	3.25	64.1	Sept. 8	2.40	16.1

Daily discharge, in second-feet, of Silver Lake ditch near Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		1.0	104	64	17	16		82	75	44	
2		1.0	104	61	17	17		82	75	43	
3		1.0	90	61	17	18		82	68	43	
4		1.0	90	60		19		78	55	40	
5		1.0	90	58		20		82	58	40	
6		37	104	60		21		90	55	37	
7		40	104	58		22		88	55	37	
8		43	104	58		23		94	55	17	
9		43	104	55		24		94	64	17	
10		61	101	50		25		94	68	17	
11		90	94	49		26		94	61	17	
12		90	90	49		27		94	64	17	
13		90	86	46		28		99	67	17	
14		90	86	46		29		97	64	17	
15		90	61	46		30	1.0	99	67	17	
						31	1.0		67	17	

NOTE.—Daily discharge determined from rating curve well-defined above 10 second-feet; not defined below.

Monthly discharge of Silver Lake ditch near Joseph, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June	99	1	67.6	4,020	A.
July	104	55	78.4	4,820	A.
August	64	17	40.6	2,500	A.
The period				11,300	

FARMERS' DITCH[1] AT JOSEPH, OREG.

LOCATION.—In the SW. ¼ sec. 32, T. 2 S., R. 45 E., at south end of Main Street, Joseph, Wallowa County, about 50 feet above the crossing of the city pipe line.

RECORDS AVAILABLE.—July 11 to December 31, 1905; May 23 to September 4, 1915.

GAGE.—Vertical staff on wagon bridge on north side of ditch; read daily by R. H. Clark.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Clay soil; not likely to change during season.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet July 3, 6, and 7 (discharge, 100 second-feet). Canal dry at times.

ACCURACY.—Records excellent.

COOPERATION.—Field data furnished by State engineer of Oregon.

Farmers' ditch diverts water from right bank of Wallowa River in the NW. ¼ sec. 5, T. 3 S., R. 45 E., a few hundred feet below the Silver Lake ditch, and irrigates a crescent-shaped area of 4,563 acres lying east of Joseph under the Silver Lake ditch.

Discharge measurements of Farmers' ditch at Joseph, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 24	0.75	12.6	July 27	1.60	58.5
June 22	1.90	79.7	Aug. 4	1.35	40.9
July 6	2.10	102			

Daily discharge, in second-feet, of Farmers' ditch at Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	3	42	77	6	16	.....	58	73	22	.....
2	.....	3	90	67	6	17	.....	73	73	22	.....
3	.....	3	100	62	6	18	.....	77	41	22	.....
4	.....	3	90	50	6	19	.....	81	35	22	.....
5	.....	3	90	50	.....	20	.....	81	45	22	.....
6	.....	14	100	44	.....	21	.....	81	52	19	.....
7	.....	22	100	22	.....	22	.....	81	62	19	.....
8	.....	22	90	22	.....	23	16	81	62	3	.....
9	.....	22	90	20	.....	24	14	81	69	3	.....
10	.....	38	90	21	.....	25	13	22	54	3	.....
11	.....	44	90	22	.....	26	13	77	54	3	.....
12	.....	44	90	22	.....	27	43	81	51	3	.....
13	.....	44	62	22	.....	28	90	90	81	3	.....
14	.....	48	62	22	.....	29	9	45	81	4.5	.....
15	.....	51	65	22	.....	30	3	0	79	6	.....
						31	3	.....	81	6	.....

[1] Called Farmers' and Citizens' ditch in U. S. Geol. Survey Water-Supply Paper 178, p. 164.

NOTE.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Farmers' ditch at Joseph, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May 23–31	90	3	22.7	405	A.
June	81	0	45.8	2,730	A.
July	100	35	72.4	4,450	A.
August	77	3	23.5	1,440	A.
September 1–4	6	6	6.0	48	A.
The period				9,070	

BIG BEND DITCH AT JOSEPH, OREG.

LOCATION.—In the SE. ¼ sec. 30, T. 2 S., R. 45 E., at county bridge 100 feet west of the planing mill in Joseph, Wallowa County, about half a mile below the intake.

RECORDS AVAILABLE.—July 12 to December 31, 1905; June 7 to August 21, 1915.

GAGE.—Vertical staff nailed to cribbing on lower side of bridge. Gage reader, W. E. Leffel.

DISCHARGE MEASUREMENTS.—Made in flume above gage.

CHANNEL AND CONTROL.—Gravelly; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.15 feet, June 23, 25–27, 29–30, July 1–2, and 4–7 (discharge, 101 second-feet); canal dry at times.

ACCURACY.—Records good.

COOPERATION.—Field data furnished by State Engineer of Oregon.

Big Bend ditch diverts from the right bank of Wallowa River in the NE. ¼ sec. 31, T. 2 S., R. 45 E., about 1½ miles below dam at Wallowa Lake, and irrigates 3,250 acres of land lying north and east of Joseph.

Discharge measurements of Big Bend ditch at Joseph, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
June 15	0.32	18.3	July 7	1.15	103
22	1.10	94.0	26	.75	54.3

Daily discharge, in second-feet, of Big Bend ditch at Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1	.....	101	40	11	82	40	8	21	94	12	8
2	.....	101	32	12	94	50	12	22	94	12	.....
3	.....	94	24	13	5	40	8	23	101	24	.....
4	.....	101	8	14	40	60	8	24	94	65	.....
5	.....	101	8	15	8	24	70	25	101	65	.....
6	.....	101	8	16	24	32	8	26	101	50	.....
7	70	101	8	17	60	32	8	27	101	45	.....
8	70	94	8	18	94	60	12	28	94	70	.....
9	70	94	8	19	94	32	8	29	101	70	.....
10	82	82	8	20	94	32	8	30	101	50	.....
								31	.....	50	.....

NOTE.—Discharge determined from a well-defined rating curve.

Monthly discharge of Big Bend ditch at Joseph, Oreg., for the year ending Sept. 3[illegible], 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 7–30	101	5	77.9	3,710	B.
July	101	12	60.8	3,740	B.
August 1–21	70	8	14.8	617	B.
The period				8,070	

GRANGER DITCH AT JOSEPH, OREG.

LOCATION.—In the SE. ¼ sec. 30, T. 2 S., R. 45 E., within city limits of Joseph. Wallowa County, at county bridge 75 feet west of Joseph planing mil' and 20 feet east of the station on Big Bend ditch.

RECORDS AVAILABLE.—July 12 to December 31, 1905; June 7 to August 28, 1915.

GAGE.—Vertical staff nailed to cribbing on lower side of bridge. Gage read by W. E. Leffel.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Firm gravel; not likely to shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.70 feet June 25 and 26 (discharge, 257 second-feet). Canal dry at times.

ACCURACY.—Records good.

Granger ditch diverts from the east side of Wallowa River in the NE. ¼ sec. 31, T. 2 S., R. 45 E., and irrigates 3,340 acres of land lying north and east of Joseph.

Discharge measurements of Granger ditch at Joseph, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 16	2.85	34.6	June 19	3.90	143
May 24	3.28	68.4	23	4.50	227

Daily discharge, in second feet, of Granger ditch at Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	June.	July.	Aug.	Day.	June.	July.	Aug.	Day.	June.	July.	Aug.
1	.....	156	71	11	105	52	44	21	117	16	20
2	.....	130	71	12	93	52	37	22	156	61	44
3	.....	117	61	13	105	44	37	23	227	44	44
4	.....	156	52	14	61	37	37	24	212	82	37
5	.....	130	44	15	130	20	31	25	230	105	37
6	.....	156	44	16	93	16	44	26	230	93	44
7	93	156	44	17	143	16	37	27	156	88	37
8	143	93	52	18	130	34	31	28	130	105	37
9	130	93	44	19	130	16	20	29	212	93	.....
10	93	93	44	20	130	12	20	30	184	82	.....
								31	.....	93	.....

NOTE.—Discharge, determined from a rating curve well defined between 25 and 250 second-feet.

Monthly discharge of Granger ditch at Joseph, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
June 7–30	239	61	143	6,810	B.
July	156	12	78.7	4,840	B.
August 1–28	71	20	41.6	2,310	B.
The period				14,000	

HURRICANE CREEK NEAR JOSEPH, OREG.

LOCATION.—In the NW. ¼ sec. 2, T. 3 S., R. 44 E., about 100 feet above the intake of Moonshine ditch, about 5 miles southwest of Joseph, Wallowa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 27 to September 3, 1915.

GAGE.—Vertical staff nailed to stump on south side of creek. Read three times a week by J. R. Kanaga.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Stream bed rocky; largest rocks were removed. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.90 feet April 30 (discharge, 238 second-feet); minimum stage recorded, 1.00 foot August 29 and September 1–2 (discharge, 40 second-feet); creek probably continued to fall.

WINTER FLOW.—No records.

DIVERSIONS.—Station is above all ditches.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Poorly defined rating curve used April 9 to May 29; fairly well defined curve used May 30 to September 3. Daily discharge ascertained by applying daily gage heights to rating tables; computed only for days on which gage was read. Records fair.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Hurricane Creek near Joseph, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
April 27	1.38	72.5	June 26	1.52	155	Aug. 5	1.20	76.0
May 29	1.70	186	July 24	1.30	98.7	Sept. 3	1.00	40.0
June 18	1.68	181						

Daily discharge, in second-feet, of Hurricane Creek near Joseph, Oreg., for the year ending Sept. 30, 1915.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1				97	40	16	93	186	140		
2		212	163			17					
3					40	18		186	140	57	
4		186	163	77		19	78				
5	93			77		20		186		57	
6		163		77		21	186		117		
7	78		212			22				57	
8		163		77		23	212	163	117		
9	55		212			24			97		
10						25			97	57	
11		186	163	77		26	186	145			
12	145					27		186		57	
13		212		77		28	145		97		
14	108		140			29	186			40	
15				77		30	238	163	117		

Monthly discharge of Hurricane Creek, near Joseph, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
May	238	55	139	8,550	C.
June	212	145	180	10,700	C.
July	212	97	141	8,670	C.
August	97	40	68.6	4,220	B.
September 13	40	40	40.0	238	B.
The period				32,100	

NOTE.—Average of discharge for days on which gage was read assumed to be mean discharge for the month.

LOSTINE RIVER NEAR LOSTINE, OREG.

LOCATION.—In the NW. ¼ sec. 34, T. 1 S., R. 43 E., about 4 miles south of Lostine, Wallowa County, about 10 miles above the mouth of the stream, and below all tributaries.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 24, 1912, to March 31, 1914; April 23 to September 25, 1915.

GAGE.—Vertical staff on right bank; read once a day by Oscar Olson.

DISCHARGE MEASUREMENTS.—Made from wagon bridge 500 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel, sand, and boulders; may shift slightly; left bank likely to be overflowed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during part of year for which record was taken, 3.30 feet May 28 and June 8 (discharge 780 second-feet); minimum stage recorded, 0.20 foot September 24–25 (discharge, 30 second-feet).

1912–1914 and 1915: Maximum stage recorded, 6.60 feet May 27, 1913 (discharge, 2,540 second-feet); minimum stage recorded, 0.02 foot February 11–13, 1913 (discharge, 26 second-feet).

WINTER FLOW.—Stage-discharge relation affected by ice during short periods of extremely cold weather.

DIVERSIONS.—Above all diversions except 2 small ditches taking water from Silver Creek, a tributary.

REGULATION.—None.

ACCURACY.—Records somewhat uncertain, as no measurements were made during the year.

COOPERATION.—Field data furnished by State engineer of Oregon.

Daily discharge, in second-feet, of Lostine River near Lostine, Oreg., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	332	740	440	140	52	16	.....	264	470	200	77	52
2	.....	264	590	440	140	64	17	.....	380	500	220	91	52
3	.....	242	470	440	140	52	18	.....	470	500	200	77	52
4	.....	220	440	410	122	52	19	.....	380	560	200	77	40
5	.....	220	590	410	122	52	20	.....	332	440	200	77	40
6	.....	220	740	410	106	52	21	.....	590	440	180	77	40
7	.....	242	740	470	106	52	22	.....	308	500	200	64	40
8	.....	264	780	355	106	52	23	242	332	470	180	64	40
9	.....	308	660	530	106	52	24	220	308	530	180	64	30
10	.....	332	560	410	106	52	25	220	286	470	160	64	30
11	.....	308	440	332	106	52	26	242	286	410	160	64	.....
12	.....	286	380	286	106	52	27	286	286	332	160	64	.....
13	.....	286	355	286	106	52	28	332	780	332	140	64	.....
14	.....	308	332	264	91	52	29	410	625	308	160	64	.....
15	.....	286	332	220	77	52	30	410	560	355	140	52	.....
							31	.....	560	.....	160	64	.....

NOTE.—Discharge determined from rating curve well defined by measurements made in 1912 to 1914 but somewhat uncertain at low water for 1915.

Monthly discharge of Lostine River near Lostine, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 23–30	410	220	295	4,680	C.
May	780	220	350	21,500	C.
June	780	308	492	29,300	C.
July	530	140	276	17,000	C.
August	140	52	89.8	5,520	C.
September 1–25	64	30	48 3	2,400	C.
The period				80,400	

BEAR CREEK NEAR WALLOWA, OREG.

LOCATION.—In the NW. ¼ sec. 3, T. 1 S., R. 42 E., at a private wagon bridge 5 miles southwest of Wallowa, Wallowa County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 13 to September 16, 1915.

GAGE.—Vertical staff on cribbing on lower left side of bridge; read daily by John Huber.

DISCHARGE MEASUREMENTS.—Made from wagon bridge at gage.

CHANNEL AND CONTROL.—Stream bed rocky; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 2.90 feet May 28 (discharge, 755 second-feet); minimum stage observed, 0.60 foot (discharge, 10 second-feet).

WINTER FLOW. —No record.

DIVERSIONS.—Two small ditches, with a combined capacity of about 3 second-feet, divert water above the gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 10 and 500 second-feet. Daily discharge ascertained by applying gage heights to rating table. Records good.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Bear Creek near Wallowa, Oreg., during the year ending Sept. 30, 1915.

[Made by C. E. Stricklin.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr. 13	2.00	241	July 24	0.95	38.2
13	2.00	264	Aug. 23	.62	11.9
May 31	2.40	426			

Daily discharge, in second-feet, of Bear Creek near Wallowa, Oreg., for the year ending Sept. 30, 1915.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	185	480	138	34	10	16	213	281	213	68	19	14
2	.....	185	424	128	32	10	17	185	424	281	62	23	.....
3	.....	172	398	128	30	10	18	281	452	185	62	17	.....
4	.....	185	424	118	32	10	19	372	398	160	46	17	.....
5	.....	160	372	128	30	10	20	245	424	172	46	17	.....
6	.....	160	480	118	25	10	21	324	372	160	68	16	.....
7	.....	160	424	118	23	10	22	213	424	185	55	14	.....
8	.....	185	424	122	25	10	23	185	281	160	44	11	.....
9	.....	213	245	118	23	10	24	160	324	160	44	11	.....
10	.....	229	213	109	23	10	25	185	281	172	34	11	.....
11	.....	245	185	109	23	10	26	160	281	138	30	11	.....
12	.....	213	185	104	21	10	27	213	245	128	34	11	.....
13	245	245	185	100	21	10	28	199	755	118	30	10	.....
14	213	324	213	83	19	11	29	372	605	128	30	11	.....
15	185	245	185	76	19	11	30	372	424	122	34	10	.....
							31	.....	372	.....	44	10	.....

Monthly discharge of Bear Creek near Wallowa, Oreg., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April 13–30	372	160	240	8 570	B.
May	755	160	305	18 800	B.
June	480	118	244	14 500	B.
July	138	30	78.3	4 810	B.
August	34	10	19.3	1,190	B.
September 1–16	14	10	10.4	330	B.
The period	.....	.....	.....	48 200	

CLEARWATER RIVER AT KAMIAH, IDAHO.

LOCATION.—In sec. 1, T. 33 N., R. 3 E., at the toll bridge in the town of Kamiah, 6 miles below the mouth of South Fork of Clearwater River, in Lewis County.

DRAINAGE AREA.—4,850 square miles (measured on General Land Office map, edition of 1909).

RECORDS AVAILABLE.—August 20, 1910, to September 30, 1915.

GAGE.—Since May 30, 1911, chain gage attached to downstream handrail of toll bridge; prior to that date gage was painted on lower steel caisson of first pier from left abutment, the datum being 0.06 foot lower than that of present gage. Gage read by Mrs. J. W. McGuire.

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

CHANNEL AND CONTROL.—Stream bed at gage and control consists of heavy boulders and gravel; probably permanent. One channel at low water, two channels between gage heights about 5 and 8 feet, and one channel above gage height 8 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 9.8 feet May 19 (discharge, 28,200 second-feet); minimum stage recorded, 2.2 feet January 26 (discharge, 1,130 second-feet).

1910–1915: Maximum stage recorded, 16.1 feet May 26, 1913 (discharge, 76,600 second-feet); minimum stage recorded, 2.0 feet December 5–6, 1913 (discharge, 950 second-feet).

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

DIVERSIONS.—Several small ditches divert water for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice during year. Rating curve well defined between 1,000 and 50,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by United States Weather Bureau.

The following discharge measurement was made by C. O. Brown.

May 9, 1915: Gage height, 6.20 feet; discharge, 10,300 second-feet.

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

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,660	5,510	3,630	2,200	2,050	2,350	6,870	15,200	18,500	8,070	4,510	1,430
2	1,780	5,000	2,860	2,050	2,510	2,350	6,590	13,400	20,600	7,760	4,510	1,540
3	2,350	5,510	3,430	2,050	2,510	2,510	8,390	13,000	18,000	7,460	4,060	1,660
4	2,680	7,160	3,630	2,050	2,350	2,200	12,100	10,900	17,500	7,460	3,430	1,780
5	2,860	6,040	3,230	2,200	2,200	2,510	10,900	10,100	17,000	6,870	3,230	1,780
6	4,060	5,000	3,230	1,780	1,910	2,510	9,770	9,410	16,600	6,590	3,230	1,430
7	3,430	4,510	3,040	1,910	2,050	2,350	10,100	9,410	15,200	6,590	3,040	1,430
8	2,860	4,060	2,050	2,050	1,910	2,350	9,770	9,770	14,300	9,060	2,860	1,320
9	2,510	3,840	1,780	2,050	1,910	2,050	8,720	9,770	13,800	8,070	2,680	1,430
10	2,510	6,310	1,660	2,050	2,510	2,200	8,390	10,500	13,000	10,900	2,680	1,780
11	3,040	6,870	1,660	1,910	2,350	2,200	8,390	11,700	12,500	8,390	2,680	1,780
12	3,230	8,390	2,050	1,910	2,200	2,350	9,770	10,100	15,600	7,160	2,200	1,910
13	3,040	6,870	2,200	1,910	2,200	2,510	11,700	9,770	16,100	6,590	2,200	2,200
14	2,860	8,390	1,540	1,910	1,910	2,680	13,800	10,500	15,600	7,160	2,350	2,050
15	3,430	7,160	1,220	2,050	1,910	3,230	12,100	12,100	14,300	6,870	2,510	2,050
16	4,510	6,310	1,220	1,910	1,910	4,280	13,000	10,500	13,400	6,310	2,350	1,910
17	4,750	5,250	1,540	1,780	1,910	4,060	13,800	9,770	13,000	7,160	2,350	1,780
18	5,000	5,510	1,430	1,780	2,350	3,840	15,600	18,500	12,500	8,390	2,050	1,660
19	6,040	4,750	1,430	1,780	2,200	4,060	17,000	28,200	12,100	6,870	2,200	1,430
20	6,310	4,510	1,780	1,780	2,510	3,630	19,000	24,000	13,000	6,590	2,050	1,430
21	6,310	4,510	1,780	1,780	2,510	3,430	19,500	21,700	12,100	5,770	2,050	1,540
22	5,510	4,280	1,780	1,660	2,350	3,840	17,500	21,100	10,500	5,510	1,910	1,430
23	5,250	4,510	2,050	1,320	2,350	4,750	15,200	20,000	10,100	5,250	1,660	1,540
24	4,510	4,510	2,050	1,430	2,350	6,590	14,300	19,000	9,410	4,750	1,540	1,320
25	4,280	4,060	2,200	1,320	2,510	7,460	13,800	18,500	9,060	4,510	1,540	1,430
26	4,060	4,060	2,680	1,130	2,680	6,310	13,000	18,000	12,500	4,280	1,540	1,320
27	4,060	4,060	2,680	1,430	2,510	5,770	13,000	17,000	10,900	4,280	1,430	1,660
28	3,630	3,840	3,040	1,540	2,200	5,770	14,300	18,500	9,770	4,750	1,430	2,350
29	3,430	4,060	2,680	1,780	.....	6,310	15,200	22,800	8,720	4,280	1,430	2,200
30	4,510	4,060	2,860	1,910	.....	6,870	17,000	20,600	8,390	4,510	1,540	1,910
31	5,000	.....	2,350	2,050	.....	7,160	.....	18,500	.....	4,510	1,320	.....

Monthly discharge of Clearwater River at Kamiah, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 4,850 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
October	6,310	1,660	3,850	0.794	0.92	237,000	A.
November	8,390	3,840	5,300	1.09	1.22	315,000	A.
December	3,630	1,220	2,280	.470	.54	140,000	A.
January	2,200	1,130	1,820	.375	.43	112,000	A.
February	2,680	1,910	2,240	.462	.48	124,000	A.
March	7,460	2,050	3,890	.802	.92	239,000	A.
April	19,500	6,590	12,600	2.60	2.90	750,000	A.
May	28,200	9,410	15,200	3.13	3.61	935,000	A.
June	20,600	8,390	13,500	2.78	3.10	803,000	A.
July	10,900	4,280	6,540	1.35	1.56	402,000	A.
August	4,510	1,320	2,410	.497	.57	148,000	A.
September	2,350	1,320	1,680	.346	.39	100,000	A.
The year	28,200	1,130	5,950	1.23	16.64	4,300,000	

SOUTH FORK OF CLEARWATER RIVER NEAR GRANGEVILLE, IDAHO

LOCATION.—In the SE. ¼ NW. ¼ sec. 30, T. 30 N., R. 4 E., below power house of Grangeville Electric Light & Power Co., 6 miles east of Mount Idaho, 10 miles southeast of Grangeville, and 19 miles above mouth of river; in Idaho County.

DRAINAGE AREA.—940 square miles (measured on General Land Office map, edition of 1909).

RECORDS AVAILABLE.—November 14, 1910, to July 31, 1911; October 9 to November 18, 1911; January 4, 1912, to September 30, 1915.

GAGE.—Since May 30, 1912, vertical staff on right bank, in two sections: Lower section anchored to rock point 75 feet below power house; upper section nailed to vertical timbers in tailrace of power plant at datum 0.22 foot higher than lower section, the difference representing fall of river between the two sections at stage 4.0 feet. Gages previously used as follows: November 14, 1910, to November 1, 1911, vertical staff at same site as lower section of present gage but at datum 1.2 feet higher; November 2, 1911, to May 29, 1912, vertical staff in two sections at same site and datum as present lower section. Gage read by John T. Kelly.

DISCHARGE MEASUREMENTS.—Made from cable just above power house or by wading. Two measurements are necessary, one of river above power house and one of intake flume; the sum represents flow past gage.

CHANNEL AND CONTROL.—Stream bed at gage and control composed of large boulders; not likely to shift except at high stages. Channel curved at gage; gradient steep. Left bank subject to overflow during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.75 feet at 5 p. m., May 19 (discharge, 4.200 second-feet); minimum discharge estimated at 114 second-feet December 16–25 (stage-discharge relation affected by ice).

1910–1915: Maximum stage recorded, 9.7 feet May 30, 1912 (discharge, 9,380 second-feet); minimum discharge December 16–25, 1914.

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

DIVERSIONS.—None.

REGULATION.—Operation of power plant causes slight variations in stage.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice December 9 to January 31. Rating curve well defined between 150 and 3,500 second-feet. Gage read to half-tenths twice daily. Daily discharge, except for ice period, ascertained by applying mean daily gage heights to rating table. Records excellent except for December and January, for which they are poor.

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

The following discharge measurement was made by C. O. Brown:
May 8, 1915: Gage height, 3.40 feet; discharge, 798 second-feet.

Daily discharge, in second-feet, of South Fork of Clearwater River near Grangeville, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	213	485	252	252	221	955	1,100	3,590	955	591	195
2	232	485	213	244	213	955	1,100	3,470	955	564	195
3	435	386	294	244	221	1,580	1,100	3,110	890	511	195
4	460	386	252	213	213	1,580	1,100	2,990	890	460	206
5	435	339	252	213	232	1,490	955	2,990	765	435	206
6	564	339	221	206	221	1,240	890	2,770	955	410	206
7	485	339	232	206	213	1,400	825	2,440	1,670	386	195
8	386	294	213	206	213	1,400	825	2,340	1,400	386	177
9	339	294	195	213	213	1,240	825	2,140	1,760	386	177
10	339	294	.....	213	213	1,240	890	1,940	1,580	362	177
11	339	294	.....	206	221	1,240	890	2,240	1,240	339	244
12	435	435	.....	213	232	1,320	890	2,770	1,100	316	316
13	386	591	.....	213	294	1,850	825	2,550	1,020	316	435
14	386	511	.....	221	294	1,760	955	2,340	1,020	316	339
15	410	410	.....	221	435	1,580	1,100	2,340	1,100	294	316
16	386	260	.....	195	485	1,490	955	2,140	1,020	294	294
17	386	362	.....	206	460	1,490	890	1,940	1,400	316	252
18	386	232	.....	213	537	1,490	2,990	1,940	1,160	294	221
19	435	294	.....	206	485	1,580	4,130	1,940	955	273	213
20	591	339	.....	206	435	1,580	3,710	1,940	825	252	206
21	485	316	.....	221	485	1,490	3,470	1,670	765	252	195
22	460	273	.....	213	591	1,320	3,470	1,490	765	252	184
23	435	294	.....	213	705	1,320	3,110	1,400	705	252	184
24	386	339	.....	206	1,020	1,320	2,770	1,400	619	244	184
25	339	294	.....	213	955	1,240	2,770	1,400	591	232	184
26	339	294	.....	221	825	1,170	2,660	1,580	591	232	221
27	339	294	.....	213	765	1,170	2,550	1,320	564	213	386
28	316	316	.....	206	765	1,100	3,710	1,240	647	213	339
29	316	294	.....	.....	955	1,100	3,990	1,100	705	195	244
30	294	273	.....	.....	955	1,100	3,350	1,020	647	195	213
31	485	.....	.....	.....	955	.....	3,110	.....	591	195	.....

NOTE.—Discharge estimated, because of ice, from observer's notes and weather records, as follows: Dec. 10–15, 144 second-feet; Dec. 16–25, 114 second-feet; Dec. 26–31, 132 second-feet; Jan. 1–5, 123 second-feet; Jan. 6–10, 138 second-feet; Jan. 11–20, 167 second-feet; Jan. 21–25, 141 second-feet; Jan. 26–31, 167 second-feet.

Monthly discharge of South Fork of Clearwater River near Grangeville, Idaho, for the year ending Sept. 30, 1915.

[Drainage area, 940 square miles.]

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	591	213	394	24,200	A.
November	591	232	344	20,500	A.
December	294	.....	159	9,780	D.
January	.....	.....	151	9,280	D.
February	252	195	215	11,900	A.
March	1,020	213	485	29,800	A.
April	1,850	955	1,360	80,900	A.
May	4,130	825	2,000	123,000	A.
June	3,590	1,020	2,120	126,000	A.
July	1,760	564	961	59,100	A.
August	591	195	322	19,800	A.
September	435	177	237	14,100	A.
The year	4,130	.....	729	528,000	

TUCANNON RIVER NEAR POMEROY, WASH.

LOCATION.—In sec. 13, T. 11 N., R. 40 E., at highway bridge at the abandoned post office of Marengo, 9 miles southwest of Pomeroy, in Columbia County, 17½ miles north of Dayton, and 14 miles above Petaha Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 31, 1913, to June 30, 1915, when station was discontinued.

GAGE.—Vertical staff in two sections at highway bridge. Lower section on pile 3 feet from left abutment; upper section on left abutment; read by William Brockman.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed of stream composed of gravel. Control formed by riffle 75 feet below gage; shifting at high water. Banks not subject to overflow. Stage of zero flow, determined September 29, 1915, gage height 0.3 foot.

EXTREMES OF DISCHARGE.—Maximum discharge during the period October 1, 1914, to June 30, 1915, estimated at 285 second-feet May 20 and 21, by hydrograph comparison with record of Tucannon River near Starbuck; minimum stage recorded, 1.20 feet at 7.30 a. m. December 24 (discharge, 25 second-feet).

1913–1915: Maximum stage recorded, 2.55 feet at 4.40 p. m. April 15, 1914 (discharge, 370 second-feet); minimum stage recorded December 24, 1914.

WINTER FLOW.—Stage-discharge relation affected by ice for short periods during severe winters.

DIVERSIONS.—Several small diversions for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 19–23 and 28, 1914. Rating curve, well defined below 200 second-feet, used August 31, 1913, to April 15, 1914; rating curve well defined throughout used April 15, 1914, to June 30, 1915. Gage read to half-tenths twice daily from August 31, 1913, to July 25, 1914, and to hundredths twice daily from July 26, 1914, to June 30, 1915. Observer's record doubtful March 17 to April 2 and May 19–21, 1915. Daily discharge ascertained by applying mean daily gage heights to rating tables, except for periods of doubtful gage readings and ice effect. Records good except for periods of estimated discharge. Determinations of discharge August 31, 1913, to September 30, 1914, supersede those published in Water-Supply Paper 393.

Discharge measurements of Tucannon River near Pomeroy, Wash., during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec-ft.*		*Feet.*	*Sec.-ft.*
Nov. 4	1.63	72.8	Feb. 9	1.73	102	Sept. 29	1.49	54.2
Dec. 19	a1.64	44.3	May 20	2.52	310			

aStage-discharge relation affected by ice.

Daily discharge, in second-feet, of Tucannon River near Pomeroy, Wash., for the period Aug. 31, 1913, to June 30, 1915.

Day.	Aug.	Sept.	Day.	Aug.	Sept.	Day.	Aug.	Sept.
1913.			1913.			1913.		
1		70	11		70	21		78
2		70	12		70	22		88
3		70	13		70	23		88
4		82	14		70	24		78
5		75	15		70	25		70
6		70	16		70	26		70
7		70	17		70	27		70
8		78	18		70	28		70
9		70	19		70	29		97
10		70	20		78	30		101
						31	72	

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913-14.												
1	78	101	78	97	98	244	137	165	138	74	56	55
2	70	97	78	97	108	274	137	187	140	72	56	53
3	70	97	78	97	93	259	142	187	160	70	55	55
4	78	97	78	88	114	228	184	202	138	89	56	53
5	78	88	78	88	97	198	228	187	138	87	56	55
6	78	78	78	88	76	198	290	182	135	76	55	56
7	97	78	78	88	114	198	274	174	130	76	55	62
8	108	78	78	88	99	198	259	216	124	83	55	69
9	108	78	78	88	93	213	259	231	124	69	56	69
10	78	78	78	78	97	244	259	231	121	69	55	62
11	78	78	78	78	97	228	244	216	114	66	55	69
12	88	78	78	78	99	198	259	202	108	64	56	69
13	78	78	78	78	101	198	274	216	108	95	55	69
14	82	78	78	78	101	198	306	307	106	91	53	69
15	78	78	78	78	114	228	354	261	104	72	53	87
16	78	78	78	88	110	244	307	261	101	70	55	87
17	78	78	78	78	114	228	261	246	99	69	55	87
18	78	78	78	78	110	228	246	246	91	66	55	89
19	70	78	78	78	116	228	246	216	91	59	56	82
20	70	78	78	88	120	228	276	202	87	59	56	87
21	70	78	78	82	130	213	246	187	87	58	55	72
22	70	78	78	88	169	198	231	202	89	56	53	55
23	78	78	78	97	198	198	216	216	82	56	53	64
24	78	78	78	97	198	195	216	202	82	56	55	62
25	78	78	78	88	228	184	187	187	89	56	48	62
26	97	78	78	88	213	166	187	182	104	55	53	62
27	97	78	78	88	198	156	176	174	93	56	53	69
28	88	78	78	88	213	147	160	158	93	56	55	69
29	88	78	78	88	.....	137	160	148	87	56	55	69
30	97	78	88	88	.....	142	150	135	83	55	55	69
31	108	.....	97	88	.....	142	.....	135	.....	56	55	.....

Daily discharge, in second-feet, of Tucannon River near Pomeroy, Wash., for the period Aug. 31, 1913, to June 30, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1914–15.									
1	67	72	76	72	216	99	.....	160	150
2	72	85	76	72	112	95	.....	155	142
3	72	85	80	72	130	91	246	150	130
4	69	80	76	76	99	95	216	150	119
5	69	80	76	72	102	93	216	150	110
6	69	87	78	72	104	91	216	160	108
7	67	80	80	69	95	91	187	152	102
8	62	76	80	74	95	89	187	148	97
9	56	76	80	76	95	89	187	160	93
10	62	80	76	70	99	87	155	187	99
11	85	80	69	69	102	87	150	182	117
12	85	99	66	69	104	87	174	187	110
13	72	117	64	78	99	89	187	202	102
14	72	112	46	76	91	91	174	216	95
15	72	99	53	80	91	124	171	231	91
16	70	102	56	70	87	145	150	231	87
17	70	91	50	70	87	.....	160	231	89
18	72	85	47	70	91	.....	160	261	83
19	87	80	44	69	95	.....	165	.....	80
20	85	80	.....	69	104	.....	165	.....	83
21	85	82	.....	67	108	.....	171	.....	83
22	72	80	.....	64	108	.....	155	276	72
23	80	80	.....	58	108	.....	150	246	72
24	72	78	27	55	108	.....	148	231	72
25	72	78	35	53	102	.....	145	216	76
26	70	80	39	51	102	.....	135	197	78
27	70	80	53	53	99	.....	135	178	76
28	70	80	68	82	99	.....	135	197	69
29	70	80	83	72	.....	.....	155	176	69
30	70	78	80	72	.....	.....	160	135	66
31	70	.....	72	69	.....	.....	.....	155	.....

NOTE.—Gage not read, discharge interpolated, Feb. 1 and June 14–16, 1914. Stage-discharge relation affected by ice Dec. 19–23 and 28, 1914; discharge Dec. 19 determined from discharge measurement, Dec. 20–23 estimated at 35 second-feet Dec. 28 interpolated. Observer's record doubtful Mar. 17 to Apr. 2 and May 19–21, 1915; discharge estimated by hydrograph comparison with record of flow Tucannon River near Starbuck as follows: Mar. 17–31, 155 second-feet; Apr. 1–2, 185 second-feet; and May 19–21, 280 second-feet.

Monthly discharge of Tucannon River near Pomeroy, Wash., for 1913–1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
September	101	70	74.8	4,450	B.
1913–14.					
October	108	70	82.9	5 100	B.
November	101	78	81.0	4,820	B.
December	97	78	78.9	4,850	B.
January	97	78	86.4	5 310	B.
February	228	76	129	7,160	A.
March	274	137	204	12,500	A.
April	354	137	229	13 600	A.
May	307	135	202	12,400	A.
June	160	82	108	6 430	A.
July	95	55	67.5	4,150	A.
August	56	48	54.6	3 360	B.
September	89	53	67.9	4 040	B.
The year	354	48	116	83 700	
1914–15.					
October	87	56	72.1	4,430	B.
November	117	72	84.7	5 040	B.
December	99	27	60.3	3 710	B.
January	82	51	69.1	4 250	B.
February	216	87	105	5,830	B.
March	.....	87	125	7,690	C.
April	246	135	171	10 200	B.
May	.....	148	199	12,200	B.
June	150	66	94.0	5 590	B.
The period	.....	27	109	58 900	

TUCANNON RIVER NEAR STARBUCK, WASH.

LOCATION.—In sec. 23, T. 12 N., R. 38 E., half a mile below mouth of Petaha Creek, and 6 miles east of Starbuck, Columbia County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1914, to September 30, 1915.

GAGE.—Inclined staff in two sections on left bank, 1,000 feet above observer's house; read by Wesley Martin.

DISCHARGE MEASUREMENTS.—Made by wading or from a bridge 1 mile below gage.

CHANNEL AND CONTROL.—Channel straight for 100 feet above and below gage. Bed composed of solid rock. Banks made up of light soil; wooded; left bank high; right is overflowed at gage height 5.5 feet. Control is a vertical drop of 2 feet over solid rock, 100 feet below gage. Stage of zero flow, determined September 28, 1915, gage height 0.6 ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.2 feet on morning of February 1 (discharge, 970 second-feet); minimum stage, 1.60 feet August 24–31 (discharge, 39 second-feet).

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

DIVERSIONS.—Many small irrigation ditches divert water above gage—probably about 10 per cent of natural flow during July and August. A large part of the diverted water returns to the river above the gage in the form of seepage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; changed by construction of a low wing dam during August, 1915, and affected by ice during December and January. Two rating curves used, each well defined below 600 second-feet; one applicable November 8 to July 31, the other August 16 to September 30. Gage read to hundredths twice daily. Daily discharge ascertained by applying gage heights to rating table; shifting-control method used August 1–15. Records excellent except for December, January, and August, for which they are good.

Discharge measurements of Tucannon River near Starbuck, Wash., during the year ending Sept. 30, 1915.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec. ft.*		*Feet.*	*Sec. ft.*		*Feet.*	*Sec. ft.*
Nov. 9	1.88	85	Feb. 9	2.10	126	May 19	2.78	284
Dec. 18	a 2.51	48	May 2	2.28	158	Sept. 28	1.72	52
Feb. 8	2.11	134						

a Stage-discharge relation affected by ice.

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

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	85	89	341	105	196	162	184	70	52	41
2	.....	89	89	680	102	184	162	142	69	53	41
3	.....	85	89	290	105	378	162	142	65	52	41
4	.....	89	109	208	112	290	162	132	65	51	42
5	.....	86	91	142	112	220	162	132	64	50	41
6	.....	82	99	132	109	208	152	132	68	46	41
7	.....	76	86	132	105	208	152	132	68	46	42
8	85	78	99	123	105	196	152	132	70	46	43
9	86	78	100	123	105	184	162	123	70	46	43
10	78	75	85	114	102	162	173	123	70	46	45
11	95	70	83	123	102	162	184	132	70	45	48
12	109	68	86	114	102	173	196	142	70	45	60
13	109	64	95	114	100	184	233	132	68	44	66
14	123	61	123	112	102	184	233	123	67	43	62
15	102	56	112	107	114	162	233	123	68	42	61
16	99	54	86	102	142	162	233	114	68	41	59
17	102	52	88	102	152	152	246	105	67	41	59
18	102	48	86	114	152	162	260	105	65	41	57
19	91	45	85	123	142	162	275	97	65	41	55
20	89	44	83	123	142	162	290	92	63	40	53
21	92	45	82	123	142	162	290	89	63	40	49
22	89	45	81	123	142	162	290	86	61	40	49
23	89	46	79	123	142	152	280	91	59	46	51
24	89	47	78	114	152	152	246	92	56	39	51
25	89	48	78	114	162	152	233	91	55	39	51
26	89	52	76	112	162	142	208	89	54	39	51
27	85	61	76	109	162	142	208	86	54	39	51
28	85	73	81	107	162	142	208	83	53	39	51
29	89	91	97	.....	173	142	196	78	52	39	51
30	85	86	134	.....	184	173	196	74	52	39	51
31	.....	92	175	.....	208	.....	184	.....	52	39	.....

NOTE.—Discharge estimated, because of ice, Dec. 11–29 and Jan. 11–30.

Monthly discharge of Tucannon River near Starbuck, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
November 8–30	123	78	93.5	4,270	A.
December	92	44	66.8	4,110	B.
January	175	76	93.5	5,750	B.
February	680	102	155	8,610	A.
March	208	100	132	8,120	A.
April	378	142	180	10,700	A.
May	290	152	210	12,900	A.
June	184	74	113	6,720	A.
July	70	52	63.3	3,890	A.
August	53	39	43.4	2,670	B.
September	66	41	50.2	2,990	A.
The period	.....	.....	.....	70,700	

PALOUSE RIVER NEAR POTLATCH, IDAHO.

LOCATION.—A quarter of a mile above Kennedy Ford, three-fourths mile below Deep Creek, and 3½ miles below Potlatch, in Latah County.

DRAINAGE AREA.—Not measured.

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

GAGE.—Stevens water-stage recorder on right bank a quarter of a mile above Kennedy Ford. Floyd Vowell, observer.

DISCHARGE MEASUREMENTS.—Made from bridge three-fourths mile below gage or by wading.

CHANNEL AND CONTROL.—Composed of boulders and solid rock, practically permanent. At extremely high stages water flows around gage on right bank.

EXTREME OF DISCHARGE.—Maximum stage, from water-stage recorder, 10.8 feet at 1 a. m., May 21 (discharge, 2,780 second-feet); minimum stage from recorder, 0.02 at 3 a. m., December 21 (discharge estimated at 1.0 second-foot).

WINTER FLOW.—Stage-discharge relation seriously affected by ice. Flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—Flow affected by regulation of Potlatch Lumber Co.'s reservoir 5 miles above station.

ACCURACY.—Stage-discharge relation permanent, affected by ice December 11 to February 4. Rating curve well defined between 40 and 5 200 second-feet. Daily discharge ascertained by use of discharge integrator. Records excellent except for ice periods and periods of very low discharge.

Discharge measurements of Palouse River near Potlatch, Idaho, during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 19	C. O. Brown	0.65	18.4	Feb. 27	C. O. Brown	1.46	101
21	do	2.15	166	Apr. 14	do	2.63	306
21	do	1.16	51.8	May 22	do	5.35	908
23	do	.53	14.3	23	do	4.97	790
23	do	.38	7.1	24	do	4.38	670
Jan. 28	do[a]	.64	9.9	24	do	3.97	585
29	do[a]	.77	11.7	July 29	do	.29	5.6
29	do[a]	.92	22.9	30	do	.28	5.5
Feb. 24	do	1.58	128	30	do	.27	5.2
26	do	1.67	133	Sept. 8	Parker and Richardson	.20	2.7

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1915.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	17.0	22	13	22	128	765	112	343	12.0	12.8	5.3
2	.....	12.0	26	16	33	150	650	198	233	12.2	10.4	5.0
3	.....	10.5	19.0	18	40	156	678	176	186	15.0	13.0	3.9
4	.....	16.5	18.5	18	35	259	737	187	306	15.0	8.4	4.2
5	.....	18.0	18.5	18	33	220	558	140	168	19.0	9.2	4.2
6	.....	20	19.0	17	48	132	448	116	92	35	10.2	3.9
7	.....	70	18.0	14	68	181	428	107	90	23	8.0	3.6
8	.....	148	18.0	12	82	221	390	96	94	14.9	14.2	3.2
9	.....	14.0	18.5	9	82	166	300	104	80	24	4.9	3.2
10	.....	14.4	18.0	9	144	164	237	92	91	33	7.9	4.2
11	.....	13.6	20	10	148	172	238	132	123	33	8.2	3.2
12	.....	16.0	14	12	90	179	247	118	117	25	9.2	4.6
13	.....	24.0	10	12	62	199	250	102	106	28	10.2	5.0
14	.....	41	14	11	60	234	285	130	88	28	9.1	3.4
15	.....	122	10	10	53	266	255	94	68	19.0	10.8	7.3
16	.....	42	14	9	50	753	219	83	82	14.0	6.0	5.2
17	.....	60	10	13	66	584	220	84	56	6.7	6.7	6.9
18	.....	73	15	17	94	501	223	333	46	7.1	8.8	7.0
19	.....	50	10	10	123	516	188	1,820	44	20	6.9	7.2
20	.....	38	18	14	126	433	164	2,580	47	18.0	6.9	8.5
21	.....	28	8	9	136	368	138	1,670	47	19.0	6.4	4.8
22	.....	14.4	10	9	145	355	100	926	43	18.5	9.7	5.6
23	.....	16.0	9	16	123	371	122	816	40	15.5	6.1	6.2
24	10.0	16.5	9	10	120	422	167	616	40	16.0	6.6	7.9
25	11.5	16.0	10	12	163	405	112	574	38	18.0	6.9	6.0
26	8.8	17.5	11	11	136	336	98	504	37	14.5	6.0	6.6
27	10.0	16.0	8	10	120	297	79	426	38	17.0	5.3	7.1
28	10.1	17.0	7	13	128	368	76	425	24	12.3	6.7	7.1
29	7.6	17.0	8	16	.....	296	80	458	10.9	15.0	7.6	6.3
30	9.5	18.0	10	16	.....	1,010	100	322	13.7	12.8	5.2	6.2
31	11.6	.....	13	17	.....	1,030	.....	320	.....	11.4	4.4	.....

NOTE.—Discharge Oct. 1–23 estimated 8 second-feet by comparison with record at Hooper station. Discharge Dec. 11 to Feb. 4 estimated, because of ice, from observer's notes and weather records.

Monthly discharge of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
October	.....	.....	8.49	522	B.
November	148	10.5	33.2	1,980	B.
December	26	.....	14.0	861	C.
January	.....	.....	12.9	793	D.
February	163	.....	90.4	5,020	B.
March	1,030	128	351	21,600	A.
April	765	76	285	17,000	A.
May	2,580	83	447	27,500	A.
June	343	10.9	93.1	5,540	A.
July	35	6.7	18.4	1,130	B.
August	14.2	4.4	8.15	501	B.
September	8.5	3.2	5.43	323	C.
The period	2,580	3.2	114	87,800	

PALOUSE RIVER NEAR WINONA, WASH.[1]

LOCATION.—In sec. 5, T. 16 N., R. 39 E., 200 feet below Rock Creek, 7 miles southwest of Winona, in Whitman County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 16, 1914, to September 30, 1915.

GAGE.—Inclined and vertical staff on right bank, 200 feet below confluence with Rock Creek; read by Theo. McDougall.

DISCHARGE MEASUREMENTS.—Made from cable 900 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; probably shifting. Right bank high; left bank subject to overflow at high stages. Stage of zero flow, according to measurements made December 16, 1914, and September 18, 1915, 0.0±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.2 feet at 4.20 p. m. February 3 (discharge, 2,800 second-feet); minimum stage recorded, 0.48 foot at 2.30 p. m. September 27 (discharge, 9 second-feet).

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

DIVERSIONS.—Several irrigation ditches divert water above gage. Though small individually, they probably aggregate a large proportion of the extreme low-water flow.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during the year; affected by ice for a few days in December and January. Rating curve well defined below 3,100 second-feet. Gage read to hundredths once daily; corrections to be applied to observed gage heights somewhat uncertain; very little diurnal fluctuation. Daily discharge ascertained by applying daily gage heights to rating table. Records good except for periods in which flow was less than 100 second-feet or gage was not read for five or more days.

Discharge measurements of Palouse River near Winona, Wash., during the year ending Sept. 30, 1915.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec. ft.*			*Feet.*	*Sec. ft.*
Dec. 16	C. O. Brown	0.60	[a]19.2	Feb. 5	C. O. Brown	2.66	777
Feb. 3	do	4.83	[b]2,380	5	do	2.42	629
3	do	5.20	[b]2,850	Mar. 3	do	1.92	374
4	do	3.78	1,600	July 16	do	.92	66.7
4	do	3.30	1,230	Sept. 18	G. L. Parker	.53	[c]12.6

[a] Measured above Rock Creek and discharge of Rock Creek, 4.7 second-feet, measured and added.
[b] Surface velocity observed and coefficient of 0.85 used to reduce to mean velocity.
[c] Measured above Rock Creek and discharge of Rock Creek, 8.3 second-feet, measured and added.

[1] For discharge of Palouse River above Rock Creek, see p. 211.

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

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	24	233	388	1,160	202	482	76	38	13
2	.....	37	1,010	388	870	234	434	70	37	12
3	.....	37	2,530	388	770	234	388	66	31	12
4	.....	47	1,460	434	802	234	268	62	29	11
5	.....	47	737	482	836	234	268	57	27	11
6	.....	44	534	588	706	234	346	52	26	11
7	.....	45	534	457	588	217	268	48	29	11
8	.....	48	1,010	482	534	195	195	48	29	14
9	.....	48	1,230	457	482	192	172	48	29	9
10	.....	44	1,380	405	434	195	172	48	27	9
11	.....	48	1,230	370	346	180	189	66	26	10
12	.....	48	1,010	340	346	195	166	66	26	10
13	.....	55	737	370	346	217	195	59	24	11
14	.....	68	534	352	346	195	195	50	24	11
15	.....	68	434	380	410	180	180	58	25	12
16	18	64	346	535	366	195	166	66	24	12
17	18	60	346	730	346	195	144	62	24	13
18	16	55	507	600	306	195	138	59	21	13
19	16	60	706	457	268	250	125	59	19	14
20	18	60	706	434	268	1,930	112	50	21	14
21	17	55	706	434	234	2,620	112	50	18	14
22	16	52	646	434	234	1,770	112	47	18	13
23	15	48	534	410	234	1,080	105	39	18	13
24	15	45	507	457	192	940	100	39	17	12
25	15	39	482	482	234	836	100	37	17	14
26	25	37	434	346	234	770	100	38	16	9
27	24	42	434	366	166	706	100	39	16	9
28	19	31	410	388	174	588	100	39	14	9
29	15	55	.....	388	166	588	89	39	14	9
30	17	24	.....	346	195	588	82	39	13	12
31	15	37	.....	1,010	.....	534	.....	39	13	.....

NOTE.—Gage not read, discharge interpolated, July 15, 17, 30, Aug. 16, 26, and Sept. 10–17. Gage not read Mar. 10–18; discharge estimated by hydrographic comparison with record of flow of Palouse River at Hooper. Discharge Dec. 23, Jan. 16, 17, 22–25, and 28, estimated, because of ice, from observer's notes and weather records.

Monthly discharge of Palouse River near Winona, Wash., for the year ending Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
December 16–31	.....	.....	17.4	552	C.
January	68	24	47.5	2,920	C.
February	2,530	233	763	42,400	B.
March	1,010	.....	455	28,000	C.
April	1,160	166	420	25,000	B.
May	2,620	180	546	33,600	B.
June	482	82	187	11,100	B.
July	76	37	52.1	3,200	C.
August	38	13	22.9	1,410	C.
September	14	9	11.6	690	D.
The period	.....	.....	.....	149,000	

PALOUSE RIVER AT HOOPER, WASH.

LOCATION.—In sec. 26, T. 15 N., R. 37 E., 1 mile east of Hooper, Whitman County, and 2 miles above Cow Creek.

DRAINAGE AREA.—2,210 square miles.

RECORDS AVAILABLE.—April 1, 1897, to December 31, 1899; April 1, 1900, to April 20, 1907; June 14, 1908, to July 31, 1912; March 7, 1913, to September 30, 1915

GAGE.—Vertical and inclined staff in four sections, on right bank, 300 feet above and across the river from the Oregon-Washington Railroad & Navigation Co.'s water tank. Original gage (Apr. 1 to Aug. 31, 1897), a vertical staff 1 mile above site of present gage; since September 9, 1897, several gages at present site and datum. Gage read by Mrs. L. C. Huffman.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 feet below highway bridge at Hooper.

CHANNEL AND CONTROL.—Gage is in long, riffle-controlled pool. Stream bed composed of solid rock covered with loose boulders; shifts during floods. Left bank high; not subject to overflow; right bank low and covered with brush.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.7 feet at 3 p. m., May 21 (discharge, 2,580 second-feet); probably higher stage and discharge during night of February 3. (See Palouse River near Winona, Wash.) Minimum stage recorded, 0.54 foot September 10–11 (discharge, 6 second-feet).

1897–1915: Maximum stage recorded, 21.0 feet March 2, 1910 (discharge, 27,800 second-feet); minimum stage June 25, 1910 (entire flow diverted; no flow past gage part of day).

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

DIVERSIONS.—Several small irrigation ditches divert water above the gage, the largest being the Palouse Irrigation & Power Co.'s canal, the maximum capacity of which is about 15 second-feet.

ACCURACY.—Stage-discharge relation changed during high water of February, 1914. Rating curve used March 7, 1913, to February 26, 1914, well defined between 150 and 10,000 second-feet; curve used February 27, 1914, to September 30, 1915, well defined between 20 and 10,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating tables. Records good except those for periods of low water.

Discharge measurements of Palouse River near Hooper, Wash., during the year ending Sept. 30, 1915.

[Made by C. O Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 7	0.91	20.2
Feb. 6	3.50	710
May 26	3.82	776

Daily discharge, in second-feet, of Palouse River at Hooper, Wash., from Mar. 7, 1913, to Sept. 30, 1915.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913.							
1	.....	11,800	1,500	510	360	52	29
2	.....	9,900	1,320	414	246	44	29
3	.....	6,500	1,320	396	222	44	29
4	.....	4,880	1,100	414	222	44	29
5	.....	4,520	1,040	414	200	36	28
6	.....	5,650	995	396	200	36	28
7	5,130	4,880	995	362	196	36	28
8	6,500	4,160	995	330	180	32	28
9	6,500	3,810	1,200	330	180	28	28
10	6,200	3,480	1,320	315	171	28	28
11	6,200	3,480	1,500	300	162	28	28
12	5,390	4,400	1,440	300	162	28	28
13	4,400	4,520	1,380	286	162	28	28
14	2,870	4,880	1,380	246	154	28	28
15	2,670	4,880	1,380	246	145	28	28
16	2,490	5,130	1,100	234	145	28	28
17	2,490	4,520	995	222	145	28	28
18	4,880	3,920	1,100	200	137	28	28
19	7,300	3,370	1,100	200	137	28	28
20	6,660	3,170	1,040	211	129	32	26
21	4,880	3,070	1,040	222	107	32	28
22	3,700	2,870	995	234	100	32	28
23	2,770	2,670	995	272	83	32	28
24	2,490	2,160	945	300	70	28	28
25	2,160	1,810	945	272	64	28	32
26	1,810	1,680	765	286	64	28	28
27	1,560	1,500	720	432	77	28	28
28	1,620	2,160	720	414	77	28	28
29	4,160	2,020	634	396	77	28	28
30	10,600	2,020	634	346	70	28	28
31	12,800	.....	591	.....	54	28	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1913–14.												
1	28	70	211	107	677	2,670	677	379	156	52	8	7
2	28	74	211	107	634	2,970	677	379	156	52	8	7
3	28	70	190	114	510	2,240	677	379	156	47	7	7
4	36	70	137	200	432	2,240	765	362	121	38	6	7
5	36	74	114	1,200	330	1,880	765	379	113	38	6	7
6	36	100	137	1,260	330	1,740	995	379	113	38	6	7
7	36	87	145	855	272	1,560	1,440	379	105	33	6	7
8	36	70	129	810	272	1,380	1,740	414	105	33	6	8
9	44	74	129	720	330	1,380	1,880	396	105	31	7	8
10	44	87	107	720	379	1,380	1,740	346	105	36	6	8
11	44	100	100	677	396	1,440	1,560	315	105	33	6	8
12	44	129	100	490	432	1,380	1,260	286	98	31	6	8
13	49	100	107	300	490	1,380	1,100	286	90	33	6	8
14	49	87	100	330	591	1,320	1,040	271	90	36	6	8
15	49	87	100	330	634	1,320	1,040	271	76	38	5	8
16	49	87	100	330	591	1,260	1,100	286	76	38	7	6
17	54	87	100	330	677	1,260	1,150	286	121	29	6	6
18	59	80	87	330	634	1,260	995	286	98	29	6	21
19	70	74	100	346	634	1,260	900	300	83	25	6	21
20	74	74	87	346	634	1,260	765	271	63	25	6	20
21	70	87	80	346	945	1,200	765	258	58	19	7	21
22	64	100	87	346	1,620	1,200	765	219	47	16	8	18
23	64	145	87	1,380	3,070	1,100	677	219	45	16	8	18
24	64	145	87	1,100	2,240	1,100	591	196	42	10	7	18
25	64	145	87	1,260	2,580	855	510	196	38	10	7	19
26	64	145	94	1,040	4,760	765	510	166	38	11	7	19
27	64	154	100	1,380	4,040	765	451	175	47	10	7	19
28	64	145	100	1,100	3,370	765	432	175	47	10	7	19
29	64	145	100	1,380	.....	677	396	156	58	10	7	18
30	64	222	107	765	.....	677	379	156	58	9	7	18
31	64	.....	107	677	.....	677	.....	156	.....	8	7	.....

Daily discharge, in second-feet, of Palouse River at Hooper, Wash., from Mar. 7, 1913, to Sept. 30, 1915—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914-15.												
1	15	36	47	29	634	470	1,260	196	432	76	33	8
2	20	34	50	38	945	432	945	208	379	63	31	8
3	18	32	58	40	1,680	432	855	244	346	63	25	8
4	16	30	47	35	2,400	414	765	330	330	58	24	8
5	14	28	58	42	855	470	855	244	300	58	22	7
6	20	29	52	42	634	510	810	196	286	63	21	7
7	20	29	47	42	550	591	765	219	286	58	21	6
8	21	28	47	43	634	510	634	196	219	52	21	6
9	22	29	47	42	995	362	510	196	219	52	22	6
10	24	90	50	43	1,100	490	451	196	196	42	22	6
11	22	113	42	44	995	396	379	196	175	54	21	6
12	22	90	42	52	995	379	346	186	166	58	19	6
13	25	70	33	58	1,100	346	330	232	166	58	19	7
14	30	63	38	71	1,100	379	346	208	196	52	16	8
15	24	56	33	66	995	362	346	196	166	47	16	8
16	24	52	33	61	432	396	362	196	166	42	16	8
17	24	58	31	61	396	510	346	208	156	44	14	19
18	24	98	33	61	810	765	315	208	138	52	14	19
19	25	90	28	50	765	720	300	219	130	50	16	20
20	33	76	29	58	855	677	286	1,560	130	42	13	19
21	35	76	26	52	810	677	286	2,580	113	38	12	19
22	27	63	29	52	765	634	232	2,320	105	33	12	19
23	38	56	22	52	634	634	232	1,150	98	33	12	19
24	47	63	25	54	634	591	208	1,040	98	29	10	19
25	83	63	24	35	510	550	175	855	113	29	9	19
26	76	70	25	38	432	591	196	677	90	27	8	19
27	58	72	22	33	510	510	196	720	90	27	8	16
28	58	72	29	38	550	432	196	634	90	25	8	16
29	44	70	35	33	.....	396	166	591	83	29	8	14
30	39	58	29	38	.....	432	166	510	76	31	8	12
31	38	.....	34	42	.....	591	.....	510	.....	29	8	.....

Monthly discharge of Palouse River at Hooper, Wash., for the period Mar. 7, 1913, to Sept. 30, 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1913.					
March 7-31	12,800	1,560	4,730	235,000	A.
April	11,800	1,500	4,130	246,000	A.
May	1,500	591	1,070	65,800	A.
June	510	200	317	18,900	A.
July	300	54	143	8,790	B.
August	52	28	31.7	1,950	D.
September	32	26	28.2	1,680	D.
The period	.....	.....	.....	578,000	
1913-14.					
October	74	28	51.7	3,180	C.
November	222	70	104	6,190	C.
December	211	80	114	7,010	B.
January	1,380	107	667	41,000	A.
February	4,760	272	1,160	64,400	A.
March	2,970	677	1,370	84,200	A.
April	1,880	379	925	55,000	A.
May	414	156	281	17,300	A.
June	156	38	87.1	5,180	A.
July	52	8	27.2	1,670	A.
August	8	6	6.61	406	C.
September	21	6	12.5	744	B.
The year	4,760	6	395	286,000	

Monthly discharge of Palouse River at Hooper, Wash., for the period Mar. 7, 1913, to Sept. 30, 1915—Continued.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914–15.					
October	83	14	31.8	1,960	A.
November	113	28	59.8	3,560	A.
December	58	22	36.9	2,270	A.
January	71	29	46.6	2,870	A.
February	2,400	432	847	47,000	A.
March	765	346	505	31,100	A.
April	1,260	166	442	26,300	A.
May	2,580	186	556	34,200	A.
June	432	76	185	11,000	A.
July	76	25	45.6	2,800	A.
August	33	8	16.4	1,010	B.
September	20	6	12.1	720	B.
The year	2,580	6	227	165,000	

ROCK CREEK NEAR EWAN, WASH.[1]

LOCATION.—In sec. 13, T. 19 N., R. 40 E., at outlet of Rock Lake, 1½ miles north of Ewan, in Whitman County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 15, 1903, to September 30, 1905 (published as "Rock Creek near St. John, Wash."); March 30, 1914, to September 30, 1915.

GAGE.—Vertical staff on county bridge 200 feet below outlet of Rock Lake; fastened to downstream caisson of second pier from left bank. Gage used from October 15, 1903, to September 30, 1905, was a vertical rod fastened to fifth pile bent of southeast approch to highway bridge over the creek at outlet of lake; datum of this gage not the same as that of present gage. Gage read by Herbert Babcock.

DISCHARGE MEASUREMENTS.—Made by wading or from county bridge at gage.

CHANNEL AND CONTROL.—Bed of stream composed of solid rock covered with sharp volcanic débris; will not shift. Right bank high; left bank low and subject to overflow at gage height 5.0 feet, so that two channels are formed. Control for stages up to 2.00 feet is rock riffle 100 feet below gage; control for higher stages is an unfinished earth dam half a mile below; low-water control permanent; high-water control unstable. Stage of zero flow, according to measurements made October 29, 1914, 0.35±0.05 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.3 feet at 4 p. m. February 12 (discharge, 393 second-feet); minimum stage recorded, 0.30 foot October 1–17 (discharge practically zero).

1903–1905, 1914–15: Maximum stage recorded, 15.60 feet March 9, 1904 (discharge, 1,980 second-feet); minimum stage recorded, 10.00 feet September 23 to October 25, 1904, 9.76 feet September 24–30, 1905, 0.30 foot September 4–9, 1914, 0.20 foot September 10–30, 1914, and 0.30 foot October 1–17, 1914 (discharge during these periods practically zero).

WINTER FLOW.—Stage-discharge relation not affected by ice. Ice formed in still water, but control remained open.

DIVERSIONS.—None.

REGULATION.—The gates in the low dam at outlet of Rock Lake are seldom regulated.

[1] For discharge of Rock Creek at mouth see p. 211.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve poorly defined below 10 second-feet, fairly well defined between 10 and 60 second-feet, and well defined between 60 and 300 second-feet. Gage read to hundredths once daily; gage-height record not very reliable April 29 to October 31, 1914, and August 22 to September 30, 1915. Daily discharge ascertained by applying daily gage heights to rating table. Records good for discharge above 30 second-feet, fair for discharge between 10 and 30 second-feet, and poor below 10 second-feet.

Discharge measurements of Rock Creek near Ewan, Wash., during 1914–15.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1914.		*Feet.*	*Sec.-ft.*	1915.		*Feet.*	*Sec.-ft.*
June 17	G. L. Parker	1.04	15.8	Feb. 25	C. O. Brown	3.04	188
				28	do	2.77	163
1915.				Mar. 18	do	1.88	75.7
Jan. 30	C. O. Brown	.76	5.0	10	do	1.88	73.7
30	do	.76	4.9	July 31	do	1.21	21.9
30	do	.76	3.9	31	do	1.21	25.0
30	do	.76	4.1	31	do	1.21	22.6
Feb. 25	do	3.05	183	31	do	1.21	23.7

Daily discharge, in second-feet, of Rock Creek near Ewan, Wash., for the years ending Sept. 30, 1914–15.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914.							
1		119	76	29	9	6.0	0.1
2		119	67	29	9	3.2	.1
3		114	76	29	9	3.2	.1
4		119	76	29	9	3.2	.0
5		124	67	29	9	3.2	.0
6		124	67	29	9	3.2	.0
7		124	67	23	9	3.2	.0
8		134	58	23	9	3.2	.0
9		134	58	23	9	3.2	.0
10		134	58	23	9	3.2	.0
11		134	58	23	9	3.2	.0
12		134	50	18	9	3.2	.0
13		134	50	18	9	3.2	.0
14		124	42	18	9	3.2	.0
15		124	42	18	9	3.2	.0
16		119	42	13	9	3.2	.0
17		119	42	13	9	1.5	.0
18		119	42	13	9	1.5	.0
19		114	42	13	6	1.5	.0
20		114	42	13	6	1.5	.0
21		109	35	13	6	1.5	.0
22		104	35	9	6	1.5	.0
23		109	35	9	6	.6	.0
24		90	35	9	6	.6	.0
25		90	29	9	6	.6	.0
26		90	29	9	6	.6	.0
27		85	29	9	6	.6	.0
28		85	29	9	6	.6	.0
29		76	23	9	6	.6	.0
30	119	76	23	9	6	.1	.0
31	119	.....	23	.....	6	.1	.....

Daily discharge, in second-feet, of Rock Creek near Ewan, Wash., for the years ending Sept. 30, 1914–15—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1914–15.												
1	0.0	0.1	1.1	1.8	5	174	39	37	50	36	22	6.0
2	.0	.1	1.1	2.0	9	164	37	37	50	35	22	6.0
3	.0	.1	1.1	2.2	29	154	38	37	50	35	22	6.0
4	.0	.1	1.1	2.5	50	134	39	36	50	36	21	6.0
5	.0	.2	1.1	2.7	50	134	39	36	50	35	21	6.0
6	.0	.2	1.2	2.9	58	134	38	36	50	35	21	6.0
7	.0	.2	1.3	3.0	67	124	38	36	50	35	21	6.0
8	.0	.3	1.4	3.0	67	124	38	35	50	34	20	6.0
9	.0	.3	1.4	3.0	76	124	37	36	48	34	20	6.0
10	.0	.3	1.4	3.2	134	114	37	36	48	34	19	6.0
11	.0	.2	1.5	3.2	260	109	37	35	46	34	19	6.0
12	.0	.2	1.5	3.0	393	104	37	35	46	34	18	6.0
13	.0	.6	1.5	3.0	260	85	37	35	45	33	18	6.0
14	.0	.6	1.5	3.0	245	94	37	36	45	33	17	3.2
15	.0	.6	1.5	3.0	293	90	36	35	44	33	16	3.2
16	.0	.8	1.5	2.9	330	85	36	35	42	32	16	3.2
17	.0	.8	1.5	2.9	293	85	35	35	42	30	15	3.2
18	.1	.9	1.0	3.0	245	76	35	42	41	29	15	3.2
19	.1	.9	1.0	3.0	245	76	36	46	40	29	14	3.2
20	.1	.9	1.0	3.2	260	76	35	48	39	29	13	3.2
21	.1	.9	1.1	3.2	276	85	35	49	39	28	13	3.2
22	.1	.9	1.1	3.2	245	76	35	50	39	27	13	3.2
23	.1	1.0	1.1	3.7	218	76	35	48	38	26	9	3.2
24	.1	1.0	1.2	4.0	206	76	36	50	38	26	9	3.2
25	.1	1.0	1.2	4.0	184	67	36	51	37	25	9	3.2
26	.1	1.0	1.2	4.3	174	58	36	51	36	25	9	3.2
27	.1	1.0	1.3	4.3	164	50	35	50	37	25	9	3.2
28	.1	1.0	1.5	4.6	174	42	35	49	36	25	9	3.2
29	.1	1.1	1.5	4.8	.....	42	36	49	36	24	9	1.5
30	.1	1.1	1.5	4.8	.....	41	36	50	35	24	9	1.5
31	.1	.....	1.8	5.0	.....	39	.....	50	.....	23	9	.....

Monthly discharge of Rock Creek near Ewan, Wash., for the years ending Sept. 30, 1914 and 1915.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
1914.					
March 30–31	119	119	119	472	B.
April	134	76	113	6,720	B.
May	76	23	46.7	2,870	B.
June	29	9	17.3	1,030	C.
July	9	6	7.74	476	D.
August	6	0.1	2.17	133	D.
September	0.1	.0	.01	0.6	D.
The period				11,700	
1914–15.					
October	0.1	0.0	0.05	3.07	D.
November	1.1	.1	.61	36.3	D.
December	1.8	1.0	1.30	79.9	D.
January	5	1.8	3.30	203	D.
February	393	5	179	9,940	B.
March	174	39	93.9	5,770	B.
April	39	35	36.5	2,170	B.
May	51	35	41.6	2,560	B.
June	50	35	43.2	2,570	B.
July	36	23	30.4	1,870	B.
August	23	9	15.5	953	C.
September	6	1.5	4.30	256	D.
The year	393	.0	36.5	26,400	

MISCELLANEOUS MEASUREMENTS.

Miscellaneous measurements in Snake River drainage basin during the year ending Sept. 30, 1915.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Jan. 23	Spring Creek	Blackfoot Reservoir	One-fourth mile above mouth, near Henry, Idaho.		2.6
22	Warm Springs	Little Blackfoot	300 feet above mouth near Henry, Idaho.		.8
22	Winschell ditch	do	100 feet below heading near Henry, Idaho.		.2
22	Wilson Creek	Blackfoot Reservoir	East of Government dam about 10 miles northwest of Henry, Idaho.		1.7
20	Hot Spring Creek	do	About three-fourths mile north of Government dam, Idaho.		4.7
Apr. 29	Upper Fort Hall canal.	Blackfoot River	South boundary of Fort Hall Indian Reservation near Tyhee, Idaho.		108
May 27	do	do	do		88.9
June 11	do	do	do		75.6
July 22	do	do	do		166
Sept. 25	do	do	do		45.1
Aug. 7	Portneuf River	Snake River	Below springs near American Falls, Idaho.		1,420
Nov. 11	Cassia Creek	Raft River	Conant, Idaho	1.95	12.3
May 2	Jakes Creek	Salmon Falls Creek	Below Hubbard ranch, in sec. 33, T. 44 N., R. 63 E. near Contact, Nev.	1.29	2.4
July 25	do	do	do	1.17	.5
26	do	do	do	1.17	.6
24	Shoshone Creek	do	Near mouth, in sec. 17, T. 47 N., R. 65 E., near San Jacinto, Nev.		11.2
8[a]	Big Wood River	Snake River	Below junction with Camas Creek near Stanton, Idaho.	3.56	453
10[a]	do	do	do	3.53	448
13[a]	do	do	do	3.30	357
16[a]	do	do	do	3.09	266
17[a]	do	do	do	2.96	230
19[a]	do	do	do	2.82	185
21[a]	do	do	do	2.72	148
a	do	do	do	2.90	210
a	do	do	do	2.79	179
26[a]	do	do	do	2.70	155
30[a]	do	do	do	2.59	121
Aug. 2[a]	do	do	do	2.64	139
7[a]	do	do	do	2.57	123
10[a]	do	do	do	2.52	118
20[a]	do	do	do	2.55	116
20[a]	do	do	do	2.55	122
20[a]	do	do	do	2.55	126
25[a]	do	do	do	2.54	114
28[a]	do	do	do	2.47	104
Sept. 2[a]	do	do	do	2.47	103
13[a]	do	do	do	2.48	108
June 10[a]	Silver Creek	Little Wood River	Below Kilpatrick dam near Picabo, Idaho.	[b] 1.97	141
16[a]	do	do	do	[b] 2.11	109
10[a]	do	do	Tikura, Idaho	[b] 2.00	93.4
16[a]	do	do	do	[b] 2.25	75.0
Mar. 1	Boise River	Snake River	Arrowrock dam, Idaho		347
1[c]	do	do	do		329
July 16	Rattlesnake Creek	South Fork of Boise River.	Near mouth, near Lenox, Idaho.	.95	18.7
Aug. 27	Malheur River	Snake River	Above mouth of South Fork near Riverside, Oreg.		7.8
Mar. 28	do	do	Former gaging station at Maddock's ranch near Little Valley, Oreg.	1.85	611
Jan. 28	Seepage	East portal of Tunnel No. 1.	Near Namorf, Oreg		.8
Apr. 24	do	do	do		.8

[a] Measurement furnished by Idaho Irrigation Co.
[b] Inverted gage.
[c] Furnished by United States Reclamation Service.

Miscellaneous measurements in Snake River drainage basin during the year ending Sept. 30, 1915—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Mar. 28	Vines ditch	Malheur River	Former gaging station near Little Valley, Oreg.	1.81	9.0
Apr. 1	Willow Creek	do	Ironside, Oreg		8.6
May 7	do	do	do		3.6
Apr. 1	do	do	NW. ¼, sec. 10, T. 14 S., R. 40 E., near Malheur, Oreg.		10.6
May 7	do	do	do		4.7
June 15	Idaho Power Co.'s canal.	Payette River	Horseshoe Bend, Idaho		355
May 21	Petaha Creek	Tucannon River	Pomeroy, Wash		18.5
Feb 4	Palouse River	Snake River	Above Rock Creek, near Winona, Wash.		964
4	do	do	do		1,010
5	do	do	do		548
5	do	do	do		477
Sept. 18	do	do	do		4.3
Feb 4	Rock Creek	Palouse River	Mouth, near Winona, Wash.		[a] 311
4					
5	do	do	do		[a] 390
5	do	do	do		[a] 164
Mar. 3	do	do	do		[a] 151
July 16	do	do	do		195
Sept. 18	do	do	do		33.1
Apr. 17	do	do	do		8.3
	Washington Development Co.'s canal.	do	Opposite station on Palouse River at Hooper, Wash.	2.08	12.0

[a] Discharge obtained by subtracting measured discharge of Palouse River above Rock Creek from computed discharge for gaging station below Rock Creek.

INDEX.

STREAM-GAGING STATIONS

AND

PUBLICATIONS RELATING TO WATER RESOURCES

PART XII.—NORTH PACIFIC SLOPE BASINS

STREAM-GAGING STATIONS AND PUBLICATIONS RELATING TO WATER RESOURCES.

INTRODUCTION.

Investigation of water resources by the United States Geological Survey has consisted in large part of measurements of the volume of flow of streams and studies of the conditions affecting that flow, but it has comprised also investigation of such closely allied subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, monographs, professional papers, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

Part I. North Atlantic slope basins.
II. South Atlantic slope and eastern Gulf of Mexico basins.
III. Ohio River basin.
IV. St. Lawrence River basin.
V. Upper Mississippi River and Hudson Bay basins.
VI. Missouri River basin.
VII. Lower Mississippi River basin.
VIII. Western Gulf of Mexico basins.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three volumes:
A, Pacific slope basins in Washington and upper Columbia River basin.
B, Snake River basin.
C, Lower Columbia River basin and Pacific slope basins in Oregon.

HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application furnish lists giving prices.

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

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.
Albany, N. Y., Room 18, Federal Building.
Atlanta, Ga., Post Office Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Topeka, Kans., 25 Federal Building.
Helena, Mont., Montana National Bank Building.
Denver, Colo., 403 New Post Office Building.
Salt Lake City, Utah, 421 Federal Building.
Boise, Idaho, 615 Idaho Building.
Portland, Oreg., 416 Couch Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Phoenix, Ariz., 417 Fleming Building.
Austin, Tex., Old Post Office Building.
Honolulu, Hawaii, 14 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

STREAM-FLOW REPORTS.

Stream-flow records have been obtained at more than 3,800 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September, 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 2	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	....do	1902.
W 124 to 135	....do	1904.
W 165 to 178	....do	1905.
W 201 to 214	....do	1906.
W 241 to 252	....do	1907–8.
W 261 to 272	....do	1908.
W 281 to 292	....do	1910.
W 301 to 312	....do	1911.
W 321 to 332	....do	1912.
W 351 to 362	....do	1913.
W 381 to 394	....do	1914.
W 401 to 414	....do	1915.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table following gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1915. The data for any particular station will, as a rule, be found in the reports covering the years during which the station was maintained. For example, data for Machias River at Whitneyville, Me., 1903 to 1915, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, and 401, which contain records for the New England streams from 1903 to 1915. Results of miscellaneous measurements are published by drainage basins.

In these papers and in the following lists the stations are arranged in downstream order. The main stem of any river is determined by measuring or estimating its drainage area—that is, the headwater stream having the largest drainage area is considered the continuation of the main stream, and local changes in name and lake surface are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in regular order from source to mouth follow, the streams in each tributary basin being listed before those of the next basin below.

In exception to this rule the records for Mississippi River are given in four parts, as indicated on page III, and the records for large lakes are presented in order of the streams around the rim of the lake.

Numbers of water-supply papers containing results of stream measurements, 1899–1915.

Year.	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												North Pacific slope basins.		
	North Atlantic slope basins (St. John River to York River).	South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).	Ohio River basin.	St. Lawrence River basin.	Hudson Bay and upper Mississippi River basins.	Missouri River basin.	Lower Mississippi River basin.	Western Gulf of Mexico basins.	Colorado River basin.	Great Basin.	Pacific slope basins in California.	Pacific slope basins in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific slope basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[i] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[h] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope drainage basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California, except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

NORTH PACIFIC SLOPE DRAINAGE BASINS.

PRINCIPAL STREAMS.

The largest rivers discharging into the Pacific Ocean in Oregon and Washington are Rogue, Umpqua, and Columbia rivers and streams that reach the ocean through Puget Sound. The principal tributaries of the Columbia are Kootenai, Clark Fork, Spokane, Wenatchee, Yakima, Snake, Walla Walla, Umatilla, John Day, Deschutes, Klickitat, Willamette, and Lewis rivers. Nisqually, Puyallup, White, Snohomish, and Skagit rivers flow into Puget Sound. The streams of this division drain wholly or in part the States of Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations (see pp. XXXI–XXXII).

GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained September 30, 1915. Period after a date indicates discontinuance.

BETWEEN COLUMBIA RIVER AND PUGET SOUND.

Chehalis River at Centralia, Wash., 1910–11.
Quinault River at Quinault Lake, Wash., 1911–
Soleduck River near Quillayute, Wash., 1897–1901.
Kalawa River near Forks, Wash., 1897–1901.

PUGET SOUND DRAINAGE BASINS.

Elwha River at McDonald, Wash., 1897–1901.
Elwha River near Port Angeles, Wash., 1911–12.
Dungeness River at Sequin, Wash., 1897–98.
Dungeness River at Dungeness, Wash., 1898–1901.
Dosewallips River at Brinnon, Wash., 1910–11.
Duckabush River near Duckabush, Wash., 1910–11.
Skokomish River, North Fork (head of Skokomish River), near Hoodsport, Wash., 1910–11.
Nisqually River near Ashford, Wash., 1910–1914.
Nisqually River near La Grande, Wash., 1906–1911.
Puyallup River near Electron, Wash., 1909–
Puyallup River at Alderton, Wash., 1914–
Puyallup River at Puyallup, Wash., 1914–
Carbon River at Fairfax, Wash., 1910–1912.
White River below Forks, near Enumclaw, Wash., 1911–12.

Puyallup River tributaries—Continued.
White River at Buckley, Wash., 1899–1903; 1910–11; 1913–
Greenwater River at mouth, near Enumclaw, Wash., 1911–12.
White River flume at Buckley, Wash., 1913–
Green River at Kanasket, Wash., 1911.
Duwamish River:
Cedar River at Vaughn Bridge, near Cedar Lake, Wash., 1898–99.
Cedar River at Cedar Lake, near North Bend, Wash., 1902–3.
Cedar River near Cedar Falls, Wash., 1914–
Cedar River near Landsburg, Wash., 1914–
Cedar River near Ravensdale, Wash., 1901–1912.
Cedar River at Clifford Bridge, near Ravensdale, Wash., 1895–1899.
Skykomish River, South Fork (head of Snohomish River), near Berlin, Wash., 1910–11.
Skykomish River, South Fork, near Index, Wash., 1902–1905; 1911–12; 1913–
Skykomish River at Sultan, Wash., 1910–11.
Foss River near Skykomish, Wash., 1911.
East Fork of Foss River near Skykomish, Wash., 1911.
Miller Creek near Berlin, Wash., 1911–
West Fork of Miller Creek near Berlin, Wash., 1911.
North Fork of Skykomish River at Index, Wash., 1910–
Snoqualmie River, Middle Fork (head of Snoqualmie River), near North Bend, Wash., 1907–8; 1908– (Records for this station and other stations in Snoqualmie River basin published in Water-Supply Paper 412.)
Snoqualmie River near Snoqualmie, Wash., 1898–99; 1900; 1902–1904. (Revised records published in Water-Supply Paper 412.)
North Fork of Snoqualmie River at cable bridge, near North Bend, Wash., 1913–1915.
North Fork of Snoqualmie River near North Bend, Wash., 1907–
South Fork of Snoqualmie River near Garcia, Wash., 1910–1915.
South Fork of Snoqualmie River at North Bend, Wash., 1907–
Tokul Creek near Snoqualmie, Wash., 1907–1914.
Pilchuck Creek near Granite Falls, Wash., 1911.
Stilaguamish River, South Fork (head of Stilaguamish River), near Silverton, Wash., 1910–
Stilaguamish River, South Fork, near Robe, Wash., 1902–3.
Stilaguamish River, South Fork, at Granite Falls, Wash., 1911; 1913–
Canyon Creek near Granite Falls, Wash., 1911–1913.
Skagit River at Reflector Bar, near Marblemount, Wash., 1913–
Skagit River near Marblemount, Wash., 1908–1914.
Skagit River near Sedro Woolley, Wash., 1908–
Stetattle Creek near Marblemount, Wash., 1913–
Cascade River near Marblemount, Wash., 1909–1913.
Sauk River above Whitechuck River, near Darrington, Wash., 1910–
Sauk River above Clear Creek, near Darrington, Wash., 1910–1913.
Sauk River at Darrington, Wash., 1914–
Sauk River at Suiattle Crossing, near Sauk, Wash., 1910–1912.
Whitechuck River near Darrington, Wash., 1910.
Clear Creek near Darrington, Wash., 1910–11.
Baker Lake (on Baker River) near Concrete, Wash., 1910–1915.
Baker River below Anderson Creek, near Concrete, Wash., 1910–
Baker River at Concrete, Wash., 1910–1915.
Whatcom Lake near Bellingham, Wash., 1913–14.
Whatcom Creek near Bellingham, Wash., 1910–1914.

Nooksack River,[1] North Fork (head of Nooksack River), near Glacier, Wash., 1910–11.
Nooksack River near Deming, Wash., 1910–11.
Middle Fork of Nooksack River at ranger station near Deming, Wash., 1910–11.
Middle Fork of Nooksack River near Deming, Wash., 1910–11.

COLUMBIA RIVER BASIN.

Columbia River at Wenatchee, Wash., 1910.
Columbia River near Julia, Wash., 1905.
Columbia River at Hanford, Wash., 1910.
Columbia River at Pasco, Wash., 1904–1910.
Columbia River at Cascade Locks and The Dalles, Oreg., 1878–
Kootenai River at Libby, Mont., 1910–
Kootenai River at Crossport, Idaho, 1904.
Kootenai River near Bonners Ferry, Idaho, 1904.
Kootenai River near Porthill, Idaho, 1904.
Callahan Creek at Troy, Mont., 1911–
Yaak River near Troy, Mont., 1910–
Moyie River at Snyder, Idaho, 1911–
Clark Fork at Missoula, Mont., 1898–1907.
Clark Fork at St. Regis, Mont., 1910–
Clark Fork near Plains, Mont., 1910–
Pend Oreille Lake at Sandpoint, Idaho, 1914–
Clark Fork at Priest River, Idaho, 1903–1905.
Clark Fork at Newport, Wash., 1904–1910.
Clark Fork at Metaline Falls, Wash., 1908–1910; 1912–
Racetrack Creek near Anaconda, Mont., 1911–12; 1914–
Little Blackfoot River and ditch near Elliston, Mont., 1910–
Rock Creek near Quigley, Mont., 1910–1912.
Big Blackfoot River at Bonner, Mont., 1898–1905.
Rattlesnake Creek at Missoula, Mont., 1898–1900.
Bitterroot River, West Fork (head of Bitterroot River), near Darby, Mont., 1910–
Bitterroot River near Grantsdale, Mont., 1902–1907.
Bitterroot River near Missoula, Mont., 1898–1901; 1903–4.
East Fork of Bitterroot River near Darby, Mont., 1910–
Lolo Creek near Lolo, Mont., 1910–
St. Regis River near St. Regis, Mont., 1910–
Flathead River near Columbia Falls, Mont., 1910–
Flathead River at Demersville, near Kalispell, Mont., 1910–1912.
Flathead River at Damon's ranch, near Kalispell, Mont., 1910–1912.
Flathead River at Keller's ranch, near Holt, Mont., 1910–1912.
Flathead Lake (on Flathead River) near Holt, Mont., 1900.
Flathead Lake at Polson, Mont., 1908–
Flathead River near Polson, Mont., 1907–
Middle Fork Flathead River at Belton, Mont., 1910–
Lake McDonald outlet at Lake McDonald, Mont., 1912–1914.
South Fork of Flathead River near Columbia Falls, Mont., 1910–
Swan River near Big Fork, Mont., 1910–11.
Stillwater River near Kalispell, Mont., 1906–7.
Whitefish River near Kalispell, Mont., 1906.
Little Bitterroot River near Marion, Mont., 1910–
Little Bitterroot River near Hubbart, Mont., 1909–

[1] Revised decision of United States Geographic Board rendered Oct. 3, 1917.

Columbia River tributaries—Continued.
Spokane River tributaries—Continued.
Latah (Hangman) Creek at and near Tekoa, Wash., 1904–5.
North Fork of Latah Creek near Spokane, Wash., 1904–5.
Little Spokane River near Spokane, Wash., 1903–1905; 1911–1913.
Sanpoil River at Keller, Wash., 1911–
Nespelem River at Nespelem, Wash., 1911–
Okanogan River at Okanogan, Wash., 1911–
Similkameen River near Oroville, Wash., 1911–
Sinlahekin Creek near Loomis, Wash., 1903–1905.
Johnson Creek near Riverside, Wash., 1903–1907.
Salmon Creek near Conconully, Wash., 1910–
Salmon Creek near Okanogan, Wash., 1903–1912.
Methow River at Winthrop, Wash., 1912.
Methow River at Pateros, Wash., 1903–
Chewack Creek at Winthrop, Wash., 1912–13.
Twisp River at Twisp, Wash., 1911–1913.
Stehekin River (head of Chelan River) at Stehekin, Wash., 1910–
Chelan Lake at Lakeside, Wash., 1897–1899.
Chelan Lake at Chelan, Wash., 1905; 1910–
Chelan River at Chelan, Wash., 1903–
Railroad Creek at Lucerne, Wash., 1910–1913.
Entiat River at Entiat, Wash., 1910–
Wenatchee River near Leavenworth, Wash., 1910–
Wenatchee River at Dryden (Cashmere), Wash., 1904–
Wenatchee River at Wenatchee, Wash., 1897.
White River near Chiwaukum, Wash., 1911–12; 1914.
Nason Creek near Nason, Wash., 1911.
Chiwawa Creek near Leavenworth, Wash., 1911–12; 1913–14.
Chiwaukum Creek near Chiwaukum, Wash., 1911.
Icicle Creek near Leavenworth, Wash., 1911–14.
Peshastin Creek at Blewett, Wash., 1911–12.
Peshastin Creek near Leavenworth, Wash., 1911–12.
Wenatchee Valley canal at Dryden, Wash. (irrigation seasons only), 1912–
Crab Creek at Wilson Creek, Wash., 1904.
Crab Creek at Adrian, Wash., 1910; 1911; 1912.
Crab Creek near Ephrata, Wash., 1909.
Moses Lake at Neppel (Moses Lake), Wash., 1909–1914.
Crab Creek near Warden, Wash., 1909–1912.
Rockyford Creek near Ephrata, Wash., 1909–1911.
Keechelus Lake (on Yakima River) near Martin, Wash., 1906–
Yakima River near Martin, Wash., 1903–
Yakima River at Easton, Wash , 1904; 1910–1915.
Yakima River at Cle Elum, Wash., 1906–
Yakima River at Umtanum, Wash., 1906–
Yakima River at Selah Gap, near Yakima,[1] Wash., 1897; 1904; 1911; 1912.
Yakima River at Union Gap, Wash., 1894–1909; 1911–1914.
Yakima River near Wapato, Wash., 1908–
Yakima River at Mabton, Wash., 1904–1906; 1911–12.
Yakima River near Prosser, Wash., 1904–1906; 1913–
Yakima River at Kiona, Wash., 1895–1915.

[1] Yakima; city and precinct, Yakima County, Wash.; not North Yakima. Decision of U. S. Geographic Board rendered Jan. 2, 1918.

Columbia River tributaries—Continued.
Yakima River near Richland, Wash., 1906–1911.
Cabin Creek near Easton, Wash., 1909–1911.
Kachess Lake (on Kachess River) near Easton, Wash., 1905–
Kachess River near Easton, Wash., 1903–
Big Creek near Cle Elum, Wash., 1909.
Cle Elum River, North Fork (head of Cle Elum River), at Galena, Wash., 1907; 1911.
Cle Elum Lake near Roslyn, Wash., 1906–
Cle Elum River near Roslyn, Wash., 1903–
Teanaway River below Forks, near Cle Elum, Wash., 1911–12.
Teanaway River near Cle Elum, Wash., 1909–1911; 1912–1914.
Swauk Creek near Cle Elum, Wash., 1909–1912.
Cascade canal near Ellensburg (Thorp), Wash., 1905–6; 1909–1911.
West Kittitas canal near Thorp, Wash., 1904–1906; 1909–1911.
Ellensburg Water Co.'s canal near Ellensburg, Wash., 1904–5; 1909–1911.
Taneum Creek near Thorp, Wash., 1909–1912.
Manastash Creek near Ellensburg, Wash., 1909–1914.
Wilson Creek near Thrall, Wash., 1911.
Selah Moxee canal near Selah, Wash., 1904–5; 1909–1911.
Wenas Creek near Selah, Wash., 1909–1912.
Naches River at Anderson's ranch, near Nile, Wash., 1909–1914.
Naches River at Oak Flat, near Nile, Wash., 1904–
Naches River below Tieton River, near Naches, Wash., 1905; 1909–1912.
Naches River near Yakima,[1] Wash., 1893–1897; 1898–1912.
Bumping Lake (on Bumping River) near Nile, Wash., 1909; 1910–
Bumping River at Bumping Lake, near Nile, Wash., 1906; 1909–
American River near Nile, Wash., 1909; 1910; 1911; 1913; 1914; 1915.
Selah Valley canal near Naches, Wash., 1904–1906; 1909–1913.
Tieton River, North Fork, below Clear Creek, near Naches, Wash., 1914–
Tieton River at McAllister Meadows, near Naches, Wash., 1908–1914.
Tieton River at headworks of Tieton canal, near Naches, Wash., 1906–
Tieton River at Cobb's ranch, near Naches, Wash., 1902–1913.
Tieton canal near Naches, Wash., 1910–
Wapatox canal near Naches, Wash., 1904–5; 1909–11.
Naches Canal Co.'s (Gleed) canal near Naches, Wash., 1904–1906; 1909–1911.
Yakima Valley (Congdon) canal near Naches, Wash., 1904–1906; 1909–1911.
Naches–Cowiche canal near Naches, Wash., 1904–5; 1909–1911.
Yakima [1] power canal near Yakima,[1] Wash., 1904–1906; 1909–10.
Schanno canal near Yakima, Wash., 1904–5; 1909–1911.
Yakima [1] power waste at Yakima, Wash., 1909–1912.
Yakima [1] mill waste at Yakima, Wash., 1909–1912.
Naches Avenue Union canal at Yakima, Wash., 1904–1906; 1909–1911.
Old Union canal near Yakima, Wash., 1904–1906; 1909–1911.
Moxee Co.'s canal near Yakima, Wash., 1904–1906; 1909–1911.
Fowler canal near Yakima, Wash., 1904–1906; 1909–1911.
Ahtanum Creek, North Fork (head of Ahtanum Creek), near Tampico, Wash., 1907–
Ahtanum Creek at The Narrows, near Tampico, Wash., 1908–1913.

[1] Decision of U. S. Geographic Board; formerly called North Yakima.

Columbia River tributaries—Continued.
Yakima River tributaries—Continued.
Ahtanum Creek near Union Gap,[1] Wash., 1904; 1907–1912.
South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., 1915–
South Fork of Ahtanum Creek near Tampico, Wash., 1907–1914.
New Reservation canal near Parker (Union Gap), Wash., 1904–
Old Reservation canal near Parker (Wapato), Wash., 1904–
Sunnyside canal near Wapato, Wash., 1904–
Toppenish Creek near Fort Simcoe, Wash., 1909–
Toppenish Creek near White Swan (Wapato), Wash., 1909–1912.
Toppenish Creek at railway bridge, near Toppenish, Wash., 1894–1896.
Toppenish Creek near Toppenish, Wash., 1908–9.
Toppenish Creek at Alfalfa, Wash., 1909–1912.
Simcoe Creek near Fort Simcoe, Wash., 1909–
Reservation drain at Alfalfa, Wash., 1912–
Satus Creek near Toppenish, Wash., 1908–1913.
Satus Creek below mouth of Dry Creek, near Toppenish, Wash., 1913–
Satus Creek near Alfalfa, Wash., 1905.
Satus Creek near Satus, Wash., 1894–1896.
Kiona canal near Kiona, Wash., 1904–1906; 1908–1911.
Kennewick canal near Richland(Kennewick), Wash., 1904–5; 1910–11.
Lower Yakima canal near Kiona, Wash., 1905; 1910–11.
Snake River at south boundary at Yellowstone National Park, 1913–
Jackson Lake (Snake River) at Moran, Wyo., 1909–10 (fragmentary); 1911–
Snake River [2] near Moran, Wyo., 1903–
Snake River [2] at Grovont, Wyo., 1899.
Snake River [2] near Lyon, Idaho, 1903–1911.
Snake River [2] near Heise, Idaho, 1910–
Snake River at Idaho Falls, Idaho, 1889–1890; 1892–1894.
Snake River near Shelley, Idaho, 1915–
Snake River near Firth, Idaho, 1915.
Snake River near Blackfoot, Idaho, 1910–
Snake River at Neeley, Idaho, 1906–
Snake River at Howells Ferry, near Minidoka, Idaho, 1910–
Snake River at Montgomery Ferry, near Minidoka, Idaho, 1895–1899; 1901–1910
Lake Milner (on Snake River) at Milner, Idaho, 1911–
Snake River at Milner, Idaho, 1909–
Snake River near Twin Falls, Idaho, 1911–
Snake River near Hagerman, Idaho, 1912–
Snake River at King Hill, Idaho, 1909–
Snake River near Murphy, Idaho, 1912; 1913–
Snake River at Weiser, Idaho, 1910–
Snake River at Lewiston, Idaho, 1910.
Snake River near Burbank, Wash., 1907–
Pacific Creek near Moran, Wyo., 1906.
Buffalo River near Elk, Wyo., 1906.
Henrys Fork [3] at Warm River, Idaho, 1910–1915.
Henrys Fork near Ora, Idaho, 1902–1909.
Henrys Fork in canyon above Fall River, Idaho, 1890–91.

[1] Revised decision of U. S. Geographic Board rendered Jan. 2, 1918; formerly called Yakima City.
[2] Decision of United States Geographic Board; formerly called South Fork of Snake River.
[3] Decision of United States Geographic Board; formerly called North Fork of Snake River.

Columbia River tributaries—Continued.
Snake River tributaries—Continued.
North Side Twin Falls canal at Milner, Idaho, 1909–
South Side Twin Falls canal at Milner, Idaho, 1909–
Big Cottonwood Creek near Oakley, Idaho, 1909–
Dry Creek near Artesian City, Idaho, 1912.
Rock Creek near Rock Creek, Idaho, 1909–1913.
McMullen Creek near Rock Creek, Idaho, 1910; 1912.
Salmon Falls Creek above upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below upper Vineyard ditch, near Contact, Nev., 1914.
Salmon Falls Creek below High Line canal, near San Jacinto, Nev., 1914.
Salmon Falls Creek near San Jacinto, Nev., 1909–
Salmon Falls Creek near Twin Falls, Idaho, 1909–10.
Upper Vineyard ditch near Contact, Nev., 1914.
Lower Vineyard ditch near Contact, Nev., 1914.
Jakes Creek above Hubbard ranch, near Contact, Nev., 1914.
Jakes Creek below Hubbard ranch, near Contact, Nev., 1914.
Willow Creek near Contact, Nev., 1914.
Bird's Nest ditch near Contact, Nev., 1914.
Harrell ditch near Contact, Nev., 1914.
High Line ditch near San Jacinto, Nev., 1914.
San Jacinto ditch near San Jacinto, Nev., 1914.
Island ditch near San Jacinto, Nev., 1914.
West Boar's Nest ditch near San Jacinto, Nev., 1914.
Trout Creek near San Jacinto, Nev., 1914.
East Boar's Nest ditch near San Jacinto, Nev., 1914.
Shoshone Creek near San Jacinto, Nev., 1914–15.
North Side ditch near San Jacinto, Nev., 1914.
Cedar Creek near Roseworth, Idaho, 1909–
Devil Creek near Three Creek, Idaho, 1912–1914.
Big Wood River near Gimlet, Idaho, 1904–5.
Big Wood River at Hailey, Idaho, 1889; 1915–
Big Wood Slough at Hailey, Idaho, 1915–
Big Wood River near Bellevue, Idaho, 1911–
Big Wood River below Magic dam, near Richfield, Idaho, 1911–
Big Wood River below North Gooding canal, near Shoshone, Idaho, 1911; 1912–
Big Wood River near Shoshone, Idaho, 1905–6; 1908–1913.
Big Wood River at Toponis, Idaho, 1896–1899.
Big Wood River near Bliss, Idaho, 1899.
Camas Creek near Blaine, Idaho, 1912–
Little Wood River near Carey, Idaho, 1904–5.
Little Wood River near Richfield, Idaho, 1911–
Little Wood River at Toponis [Gooding], Idaho, 1896–1899.
Dry Creek near Blanche, Idaho, 1911–1914.
King Hill Creek near King Hill, Idaho, 1913.
Little Canyon Creek at Glenns Ferry, Idaho, 1909–1913.
Alkali Creek near Glenns Ferry, Idaho, 1909–1913.
Cold Springs Creek near Hammett, Idaho, 1909–1913.
Bennett Creek near Hammett, Idaho, 1909–1913.
Bruneau River near Rowland, Nev., 1913–
Bruneau River near Tindall, Idaho, 1910–1912.
Bruneau River near Hot Spring, Idaho, 1909–1915.

Columbia River tributaries—Continued.
Snake River tributaries—Continued.
Malheur River tributaries—Continued.
Malheur Farmers' canal above Vale, Oreg., 1904–5.
McLaughlin ditch above Vale, Oreg., 1904–5.
"J. H." ditch above Vale, Oreg., 1904–5.
Gellerman & Frohman ditch above Vale, Oreg., 1904–5.
Sand Hollow ditch above Vale, Oreg., 1904–5.
Bully Creek near Westfall, Oreg., 1911; 1912–13.
Bully Creek at Warm Springs, near Vale, Oreg., 1903–4; 1905–1907; 1911–
Bully Creek at Vale, Oreg., 1904–5.
Hope Mill ditch at Vale, Oreg., 1904–5.
Willow Creek near Malheur, Oreg., 1904–6; 1910–11; 1912–
Willow Creek near Brogan, Oreg., 1910–
Willow Creek at Dell, Oreg., 1904–1906.
Cow Creek near Brogan, Oreg., 1912–1914.
Pole Creek near Brogan, Oreg., 1912–13.
Nevada ditch below Vale, Oreg., 1904–5.
Payette River near Horseshoe Bend, Idaho, 1906–
Payette River at Payette, Idaho, 1895–1897.
North Fork of Payette River at Lardo, Idaho, 1908–
North Fork of Payette River at Van Wyck, Idaho, 1912–
Lake Fork of Payette River near McCall, Idaho, 1909–1914.
Shafer Creek near Horseshoe Bend, Idaho, 1911–12.
Harris Creek near Horseshoe Bend, Idaho, 1911–12.
Weiser River near Weiser, Idaho, 1890–91; 1894–1904; 1910–1915.
Weiser River, West Fork, near Fruitvale, Idaho, 1910–1913.
Lost Creek near Tamarack, Idaho, 1910–1914.
Middle Fork of Weiser River at Middle Fork, Idaho, 1910–1913.
Sage Creek near Midvale, Idaho, 1913.
Sommercamp Creek near Midvale, Idaho, 1913.
Miller Creek near Midvale, Idaho, 1913.
Crane Creek near Midvale, Idaho, 1910–
Mann Creek near Weiser, Idaho, 1911–1913.
Monroe Creek (upper station) near Weiser, Idaho, 1911–12.
Monroe Creek (lower station) near Weiser, Idaho, 1911–1913.
Burnt River, North Fork (head of Burnt River), near Audrey, Oreg., 1915–
Burnt River near Hereford, Oreg., 1915–
Burnt River near Bridgeport, Oreg., 1915–
Middle Fork of Burnt River near Audrey, Oreg., 1915.
South Fork of Burnt River near Unity, Oreg., 1915–
Sawmill Creek near Unity, Oreg., 1915.
Camp Creek near Hereford, Oreg., 1915.
Powder River at Salisbury, Oreg., 1903–1914.
Powder River at Baker, Oreg., 1913; 1914.
Powder River near North Powder, Oreg., 1909–1912; 1913–
Baldock Slough at Baker, Oreg., 1913; 1914.
Old Settlers Slough at Baker, Oreg., 1913; 1914.
Pine Creek near Baker, Oreg., 1913; 1914.
Goodrich Creek near Baker, Oreg., 1913.
Mill Creek near Baker, Oreg., 1913; 1914.
Lee-Polly ditch near Baker, Oreg., 1914.
Marble Creek near Baker, Oreg., 1913; 1914.
Salmon Creek near Baker, Oreg., 1913; 1914.

Columbia River tributaries—Continued.
Deschutes River tributaries—Continued.
Metolius River at Rigg's ranch, near Sisters, Oreg., 1908–1912.
Lake Creek near Sisters, Oreg., 1911–1913; 1915–
First Creek, near Sisters, Oreg., 1915–
Jack Creek near Sisters, Oreg., 1915–
Canyon Creek near Sisters, Oreg., 1915–
Whitewater River near Grandview, Oreg., 1911–1913.
Shitike Creek at Warmspring, Oreg., 1911–
Trout Creek near Antelope, Oreg., 1915.
Trout Creek near Gateway, Oreg., 1915.
Hay Creek near Hay Creek, Oreg., 1915.
Warm Springs River near Warmspring, Oreg., 1911–
Mill Creek near Warmspring, Oreg., 1915.
White River near Tygh Valley, Oreg., 1911–
Tygh Creek at Tygh Valley, Oreg., 1911–1913.
Klickitat River above Pearl Creek, near Glenwood, Wash., 1910.
Klickitat River above Big Muddy Creek, Wash., 1905.
Klickitat River below Big Muddy Creek, Wash., 1905; 1907–8.
Klickitat River at Camp Klickitat, Wash., 1907–1908.
Klickitat River near Glenwood, Wash., 1909–
Klickitat River below Glenwood, Wash., 1914.
Klickitat River at Hanson's cable, near Klickitat, Wash., 1908–9.
Klickitat River at Klickitat (Wright), Wash., 1909–1912.
Klickitat River at Wols Ferry, near Lyle, Wash., 1907–1910.
Klickitat River at Lyle, Wash., 1912.
West Fork of Klickitat River near Glenwood, Wash., 1910.
Big Muddy River above mouth of Cougar Creek, near Wright, Wash., 1905; 1908.
Little Klickitat River near Goldendale, Wash., 1910–1912.
Hood River at Dee, Oreg., 1913–
Hood River at Winans, Oreg., 1905–1907; 1910–1912; 1913.
Hood River at Tucker Bridge, Oreg., 1897–1899; 1913–
Hood River at Powerdale, near Hood River, Oreg., 1913–
East Fork of Hood River above intake, near Mount Hood, Oreg., 1915–
East Fork of Hood River near Mount Hood, Oreg., 1913–14.
East Fork irrigation district canal near Mount Hood, Oreg., 1913–
West Fork of Hood River near Dee, Oreg., 1913–
Pacific Light & Power Co. tailrace near Hood River, Oreg., 1914.
White Salmon River at splash dam near Trout Lake, Wash., 1912–
White Salmon River at Husum, Wash., 1909–
White Salmon River at Condit dam, near Underwood, Wash., 1912–13.
Trout Creek at Guler, Wash., 1909–1911.
Little White Salmon River below Lava Creek, near Cook, Wash., 1903–1906.[1]
Little White Salmon River near Cooks, Wash., 1909.
Latourell Creek at Latourell, Oreg., 1912–13.
Sandy River above Salmon River, at Brightwood, Oreg., 1910–1914.
Sandy River below Salmon River, near Brightwood, Oreg., 1907–1911.
Sandy River near Marmot, Oreg., 1911–
Sandy River above Bull Run River, near Bull Run, Oreg., 1910–1912.

[1] Records published in U. S. Geol. Survey Water-Supply Paper 272, pp. 428–429.

Columbia River tributaries—Continued.
Willamette River tributaries—Continued.
Molalla River near Molalla, Oreg., 1905–1909–
Clackamas River near Cazadero, Oreg., 1909–
Clackamas River at Estacada, Oreg., 1908–1911.
Clackamas River near Barton, Oreg. (replaced by Estacada station), 1905–1908.
Clackamas River at Park Place, Oreg., 1911–12.
Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., 1913–
Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., 1909–
Lewis River above Muddy River near Cougar, Wash., 1909.
Lewis River near Cougar, Wash., 1909–1912.
Lewis River near Amboy, Wash., 1911–
Lewis River at Ariel, Wash., 1909.
Muddy River at mouth, near Cougar, Wash., 1909.
Pine Creek at mouth, near Cougar, Wash., 1909.
Swift Creek at mouth, near Cougar, Wash., 1909.
Kalama River near Kalama, Wash., 1911–1913.
Ohanapecosh River near Lewis, Wash., 1907–
Cowlitz River at Lewis, Wash., 1911–
Cowlitz River at Mossy Rock, Wash., 1912–
Cowlitz River at Randle, Wash., 1910–1912.
Cowlitz River at Mayfield, Wash., 1910–11.
Clear Fork near Lewis, Wash., 1907–
Coal Creek near Lewis, Wash., 1911–
Lake Creek at outlet of Packwood Lake, near Lewis, Wash., 1911–
Lake Creek at mouth, near Lewis, Wash., 1907–
Johnson Creek below West Fork, near Lewis, Wash., 1911; 1913–14.
Johnson Creek at mouth, near Lewis, Wash., 1907–1914.
Glacier Creek near Lewis, Wash., 1911.
Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
North Fork of Hagar Creek near Lewis, Wash., 1911–12; 1913–14.
Cispus River near Randle, Wash., 1910–1912.
Toutle River at St. Helen, Wash., 1909.
Toutle River near Castle Rock, Wash., 1909–1912.

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER.

Rogue River near Prospect, Oreg., 1907–1912.
Rogue River below Prospect, Oreg., 1913–
Rogue River near Trail, Oreg., 1910–1913.
Rogue River near Tolo, Oreg., 1905–
Rogue River near Galice, Oreg., 1906.
Mill Creek near Prospect, Oreg., 1910.
Butte Creek, South Fork (head of Butte Creek), at Butte Falls, Oreg., 1910–11; 1915–
Little Butte Creek, South Fork (head of Little Butte Creek), near Lake Creek, Oreg., 1910–1913.
Little Butte Creek near Eagle Point, Oreg., 1907–
Rogue River Valley canal at intake, near Lake Creek, Oreg., 1914; 1915–
Rogue River Valley canal near Brownsboro, Oreg., 1913; 1915.
North Fork of Little Butte Creek, near Lake Creek, Oreg., 1911–1913.

REPORTS ON WATER RESOURCES OF THE NORTH PACIFIC SLOPE DRAINAGE BASINS.

PUBLICATIONS OF UNITED STATES GEOLOGICAL SURVEY.

WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, Washington, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-supply papers are of octavo size.

*4. A reconnaissance in southeastern Washington, by I. C. Russell, 1897. 96 pp., 7 pls. 15c.

Describes an area "bordered on the south by Oregon, on the east by Idaho, on the north by Snake River, and on the west by the Columbia," and "briefly designated as lying south of Snake River"; discusses climate, vegetation, topography and drainage, geologic formations—including the river terraces and soils—irrigation, and the artesian water supply, and gives an outline of the geological history of the region.

*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.

Gives elevations and distances along Columbia, Willamette, Flathead, and Snake rivers.

*53. Geology and water resources of Nez Perce County, Idaho, Part I, by I. C. Russell. 1901. 85 pp., 10 pls. 10c.

*54. Geology and water resources of Nez Perce County, Idaho, Part II, by I. C. Russell. 1901. 55 pp. (87–141).

Nos. 53 and 54 relate to an area "in western Idaho, bordered on the west by portions of Washington and Oregon," drained through Snake River to the Columbia; they describe the topography, geology, and soils of the region, discuss the relation of the surface features—plateaus, canyons, streams, etc.—to the geology and the climate, the source and quantity of the water supply, including springs and artesian wells, and refer briefly to the occurrence of building stones, lignite, gold, silver, and copper. They include also a short bibliography of artesian waters and two appendixes—one giving list of elevations, and the other notes concerning Portland cement.

55. Geology and water resources of a portion of Yakima County, Wash., by G. O. Smith. 1901. 68 pp., 7 pls. 10c.

Describes topography, climate, soil, agriculture, geology, and surface and ground waters of an area comprising about 50 square miles in the vicinity of North Yakima; discusses in some detail the artesian basins and wells.

*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 5c.

*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.

Nos. 57 and 61 contain information as to depth, diameter, yield, and head of water in borings more than 400 feet deep; under head "Remarks" gives information concerning temperature, quality of water, purposes of boring, etc. The lists are arranged by States, and the States are arranged alphabetically. A second, revised, edition was published in 1905 as Water-Supply Paper 149 (q. v.). 5c.

*78. Preliminary report on artesian basins in southwestern Idaho and southeastern Oregon, by I. C. Russell. 1903. 53 pp., 2 pls. 5c.

Discusses briefly the rocks and geologic structure of a part of the Snake River Plains in Canyon and Owyhee counties, Idaho, and Malheur and Harney counties, Oreg.; describes briefly the conditions on which artesian flow depends, and in some detail the springs and drilled wells in the Lewis, Otis, Harney, and Whitehorse artesian basins; also describes artesian wells in alluvial deposits and discusses the size of drill holes, casings, etc., the preservation of well records, and the importance of laws to control the use of artesian waters; gives list of publications bearing on artesian waters.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer, 1904. 361 pp. 25c. [Inquiries concerning this report should be addressed to the Reclamation Service.] Contains:

Investigations in Idaho, by D. W. Ross. Describes the irrigable lands in the area drained by Snake River.

Investigations in Oregon, by J. T. Whistler. Mentions the Umatilla, Malheur, and Harney projects.

Work in Washington, by T. A. Noble. Describes the plains of Columbia River.

96. Destructive floods in the United States in 1903, by E. C. Murphy. 1904. 81 pp., 13 pls. 15c.

Gives an account of a flood (commonly spoken of as the "Heppner disaster") on Willow Creek, a tributary of Columbia River, in Morrow County, Oreg.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. [Superseded by No. 152, q. v.]

Cites statutory restrictions of water pollution in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

111. Preliminary report on the underground waters of Washington, by Henry Landes. 1905. 85 pp., 1 pl. 10c.

Describes, by counties, the municipal water supplies, deep wells, and springs in the State, giving also for each county a brief account of the climate, rainfall, topography, drainage, and geology.

118. Geology and water resources of a portion of east-central Washington, by F. C. Calkins. 1905. 96 pp., 4 pls. 5c.

Describes briefly the topography, geology, climate, vegetation, grazing, and agriculture on the Columbia Plains and in Kittitas Valley; discusses the streams, springs, and shallow and deep wells.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.

Cites legislative acts relating to ground waters in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

149. Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton. 1905. 175 pp. 10c.

Gives, by States (and within the States by counties), location, depth, diameter, yield, height of water, and other available information, concerning wells 400 feet or more in depth; includes all wells listed in Water-Supply Papers 57 and 61; mentions also principal publications relating to deep borings.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Cites statutory restrictions of water pollution in Idaho, Nevada, Oregon, Utah, Washington, and Wyoming.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

Gives estimates (p. 85) of flood discharge and frequency for Boise River at Boise and Weiser River at Weiser, Idaho.

*231. Geology and water resources of the Harney Basin region, Oregon, by G. A. Waring. 1909. 93 pp., 5 pls. 25c.

The greater part of the area covered by this report is in the Great Basin, but a small tract in the northeastern corner is drained by a number of small streams that are tributary to Malheur River.

253. Water powers of the Cascade Range, Part I, Southern Washington, by J. C. Stevens. 1910. 94 pp., 21 pls. 40c.

Discusses conditions governing hydraulic development, water laws of Washington and variations in streams; describes the drainage basins of Klickitat, White Salmon, Little White Salmon, Lewis, and Toutle rivers; gives results of observations at gaging stations, and estimates of average minimum discharge and of the available horsepower at the power sites.

274. Some stream waters of the western United States, with chapters on sediment carried by the Rio Grande and the industrial application of water analyses, by Herman Stabler. 1911. 188 pp. 15c.

Describes collection of samples, plan of analytical work, and methods of analyses; discusses soap-consuming power of waters, water softening, boiler waters, and water for irrigation; gives results of analyses of waters of Boise, Malheur, Payette, and Palouse rivers, and Salmon Creek

313. Water powers of the Cascade Range, Part II, Cowlitz, Nisqually, Puyallup, White, Green, and Cedar drainage basins, by F. F. Henshaw and G. L. Parker. 1913. 170 pp., 16 pls. 55c.

Describes the geologic features and history of the drainage basins, topography and drainage, soils and vegetation, and precipitation; gives stream-flow records and discusses water powers storage, and power sites; discusses also natural resources and harbors of the Pacific coast, central electric stations, and power utilization, and gives commercial and residential rates. See also 253.

316. Geology and water resources of a portion of south-central Washington, by G. A. Waring. 1913. 46 pp., 1 pl. 5c.

Describes settlements, climate and vegetation, agriculture, grazing, geographic provinces, relation of surface features and structure, and geology; discusses shallow and artesian waters and irrigation enterprises in Sunnyside and Reservation valleys, Horse Heaven Plateau, and the Columbia River Plains, and irrigation along lower Yakima River; gives tabulated data concerning wells and springs.

339. Quality of the surface waters of Washington, by Walton Van Winkle. 1914. 105 pp., 2 pls. 15c.

Discusses briefly the natural and economic features of the State, the constituents and uses of the natural waters, purification of water, methods of analysis, and industrial and geochemical interpretation of the results of analysis; describes the general features of the principal drainage basins and gives the results of an investigation of the character of the river waters; treats briefly of the average chemical composition of river water, the economic value of the rivers, denudation, and the influence of natural features on the character of the waters.

344. Deschutes River, Oregon, and its utilization, by F. F. Henshaw, John H. Lewis, and E. J. McCaustland. 1914. 200 pp., 28 pls. 50c.

A report, prepared in cooperation with the State of Oregon, containing the results of measurements of stream flow, a discussion of the economic distribution of the water, and chapters on the quality of the water, the availability of the water supply, the developed water powers, undeveloped power sites, water rights and appropriations, the relation of the Federal Government to the development of water power, and Government permits for power and reservoir sites.

346. Profile surveys in the basin of Clark Fork of Columbia River, Montana-Idaho-Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 6 pp., 3 pls. (22 sheets). 50c.

347. Profile surveys in Snake River basin, Idaho, prepared under the direction of R. B. Marshall, chief geographer. 1914. 12 pp., 3 pls. (37 sheets). 55c.

348. Profile surveys in Hood and Sandy River basins, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 2 pls. (6 sheets). 30c.

349. Profile surveys in Willamette River, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1914. 8 pp., 3 pls. (16 sheets). 30c.

363. Quality of the surface waters of Oregon, by W. Van Winkle. 1914. 137 pp., 2 pls. 20c.

Describes the topography, drainage, rocks and soils, climate, population, and industries of the State, the constituents of natural waters, water for domestic and industrial uses, and purification of water, methods of analysis, and interpretation of results of analysis; describes the general features of the river basins and the character of the river waters; discusses the conditions influencing the quality of the surface waters, average chemical composition, geochemical character, denudation, industrial value, and value for irrigation.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of Soap and Omak lakes, Wash., and of mine waters from Butte, Mont.

366. Profile surveys of Snoqualmie, Sultan, and Skykomish rivers, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 3 pls. (12 sheets). 20c.

368. Profile surveys in Wenatchee River basin, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 1 pl. (8 sheets). 20c.

369. Water powers of the Cascade Range, Part III, Yakima River basin, by G. L. Parker and F. B. Storey, 1916. 169 pp., 20 pls 45c.

Describes the geography of the basins, the geologic history, physiography and river history, climate, settlement, and development, population, and transportation; gives stream-flow records and discusses natural conditions affecting stream flow, storage reservoirs, developed and undeveloped power sites; treats also of the industrial development of the region, discussing irrigation by gravity systems and by pumping, the production of coal and other minerals, and manufacturing; presents a scheme of development and utilization of stored water. The report was prepared under the direction of the Washington State Board of Geological Survey, and is based on data consisting of "stream-flow records, river plans and profiles, reservoir surveys, and field reconnaissances of the rivers and their various tributaries," obtained by the United States Geological Survey and the United States Reclamation Service, supplemented by a large amount of information furnished by private parties.

370. Surface water supply of Oregon, 1878–1910, by F. F. Henshaw and H. J. Dean. 1915. 829 pp., 1 pl. 45c.

Describes briefly the natural features of Oregon and in greater detail the general features of the river basins; consists principally of records of stream flow that have been carefully studied and recomputed when necessary to insure their best possible interpretation.

376. Profile surveys in Chelan and Methow River basins, Washington, prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 5 pls. 15c.

377. Profile surveys in Spokane River basin, Washington, and John Day River basin, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 10 pls. 15c.

378. Profile surveys in 1914 on Middle Fork of Willamette River and White River, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 8 pp., 6 pls. 15c.

379. Profile surveys in 1914 in Umpqua River basin, Oregon, prepared under the direction of R. B. Marshall, chief geographer. 1915. 7 pp., 13 pls. 20c.

*400. Contributions to the hydrology of the United States, 1916, Nathan C. Grover, chief hydraulic engineer, 1917. 108 pp., 7 pls. 15c. Contains:

(b) Artesian water for irrigation in Little Bitterroot Valley, Mont., by O. E. Meinzer.

419. Profile surveys in 1915 in Skagit River basin, Washington, prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 12 pls. 15c.

420. Profile surveys along Henrys Fork, Idaho, and Logan River and Blacksmith Fork, Utah. prepared under the direction of W. H. Herron, acting chief geographer. 1916. 8 pp., 10 pls. 10c.

425. Contributions to the hydrology of the United States, 1917, N. C. Grover, chief hydraulic engineer, 1918. Contains:

(e) Ground water in Quincy Valley, Wash., by A. T. Schwennesen and O. E. Meinzer.

BULLETINS.

An asterisk (*) indicates that the Geological Survey's stock of the paper is exhausted. Many of the papers so marked may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Bulletins are of octavo size.

*199. Geology and water resources of the Snake River Plains of Idaho, by I. C. Russell. 1902. 192 pp., 25 pls. 25c.

Describes the topography, geology, climate, vegetation, fauna, and soils of an area extending entirely across the southern part of Idaho; discusses streams, springs, water powers, irrigation and agriculture, industries, and routes of transportation and highways; treats of the origin of surface and subsurface waters, the requisite conditions for artesian wells and the quantity of water available.

252. Preliminary report on the geology and water resources of central Oregon, by I. C. Russell. 1905. 138 pp., 24 pls. 15c.

Describes a portion of the extreme northern part of the Great Basin and a part of the drainage area of Deschutes River and its principal tributary, Crooked River; gives an account of the topography, drainage, rainfall and temperature, winds, and forests; describes the volcanic sedimentary rock formations, and discusses by counties the geology and topography, the surface and ground waters; treats of artesian conditions in the Deschutes basin and makes suggestions concerning artesian-well records.

*264. Record of deep-well drilling for 1904, by M. L. Fuller, E. F. Lines and A. C. Veatch. 1905. 106 pp. 10c.

*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Bulletins 264 and 298 give an account of progress in the collection of well records and samples, and contain tabulated records of wells in Idaho, Montana, Nevada, Oregon, Washington, and Wyoming. No. 298 gives detailed records of wells in Flathead County, Mont., and Benton, Jefferson, and Walla Walla counties, Wash. The wells of which detailed sections are given were selected because they afford valuable stratigraphic information.

ANNUAL REPORTS.

Each of the papers contained in the annual reports was also issued in separate form.

Annual reports are distributed free by the Geological Survey as long as its stock lasts. An asterisk (*) indicates that this stock has been exhausted. Many of the papers so marked, however, may be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C.

*Tenth Annual Report of the Director of the United States Geological Survey, 1888–89, J. W. Powell, Director. 1890. 2 parts. *Pt. II. Irrigation, viii, 123 pp. 35c.

Makes a preliminary report on the organization and prosecution of the survey of the arid lands for purposes of irrigation; includes an account of the methods of topographic and hydraulic work, the segregation work on reservoir sites and irrigable lands, field and office methods, and brief descriptions of the topography of some of the river basins.

Eleventh Annual Report of the United States Geological Survey, 1889–90, J. W. Powell, Director. 1891. 2 parts. Pt. II. Irrigation, xiv, 395 pp. 30 pls. and maps. $1.25. Contains:

*Hydrography, pp. 1–110. Discusses scope of work, methods of stream measurement, rainfall and evaporation, and describes the more important streams.

*Engineering, pp. 111–200. Defines the scope of the work and gives an account of the survey in the Sun River basin and in the Arkansas, Rio Grande, California, Lahontan, Utah, and Snake River divisions.

*Topography, pp. 291–343. Comprises reports of the topographic surveys in California, Nevada, Colorado, Idaho, Montana, and New Mexico, and a report on reservoir sites.

*Irrigation literature, pp. 345–388. Gives a list of books and pamphlets on irrigation and allied subjects, mainly contained in the library of the United States Geological Survey.

Twelfth Annual Report of the Director of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Hydrography of the arid regions, by F. H. Newell, pp. 213–361, Pls. 58–106. Discusses the available water supply of the arid regions, the duty of water, flood waters, relation of rainfall to river flow; classifies the drainage basins; and describes the rivers of the Missouri, Arkansas, Rio Grande, Colorado, Sacramento, and San Joaquin basins, and the principal streams of the Great Basin in Nevada and Utah and the Snake River basin.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III. Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*Engineering results of irrigation survey, by H. M. Wilson, pp. 351–427, Pls. 147–182. Describes structures on the Pocatello canal, Idaho.

Sixteenth Annual Report of the United States Geological Survey, 1894–95, Charles D. Walcott, Director. 1896. (Pts. II, III, and IV, 1895.) 4 parts. *Pt. II. Papers of an economic character, xix, 598 pp., 43 pls. $1.25. Contains:

The public lands and their water supply, by F. H. Newell, pp. 457–533, Pls. 35–39. Describes general character of the public lands, the lands disposed of (railroad, grant, and swamp lands, and private miscellaneous entries), lands reserved (Indian, forest, and military reservations), the vacant lands, and the rate of disposal of vacant lands; discusses the streams, wells, and reservoirs as sources of water supply; gives details for each State.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Pts. II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xvii, 400 pp., 110 pls. $1.25. 16 maps in separate case, 75c. Contains:

*Priest River Forest Reserve, by J. B. Leiberg, pp. 217–252, Pls. 48–61.
*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 253–282, Pls. 62–73.
*Washington Forest Reserve, by H. B. Ayres, pp. 283–313, Pls. 76–100.
*Eastern part of Washington Forest Reserve, by M. W. Gorman, pp. 315–350, Pl. 101.
*Forest conditions of northern Idaho, by J. B. Leiberg, pp. 373–386, Pls. 109–110.
These reports describe the topography and the streams of the forest reserves.

Twentieth Annual Report of the United States Geological Survey, 1898–99, Charles D. Walcott, Director. 1899. (Pts. II, III, IV, V, and VII, 1900.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, xix, 498 pp., 159 pls., 8 maps in separate case. $2.80. Contains:

*The Flathead Forest Reserve, by H. B. Ayres, pp. 245–316, Pls. 77–113.
*Bitterroot Forest Reserve, by J. B. Leiberg, pp. 317–409, Pls. 115–142. Contains brief descriptions of the streams and lakes in the reserves.

Twenty-first Annual Report of the United States Geological Survey, 1899–1900, Charles D. Walcott, Director. 1900. (Pts. III, IV, VI, VI continued, and VII, 1901.) 7 parts in 8 vols. and separate case for maps with Pt. V. *Pt. V, Forest reserves, 711 pp., 143 pls., 39 maps in separate case. $3 85. Contains:

*Mount Rainier Forest Reserve, Washington, by F. G. Plummer, pp. 81–143, Pls. 33–50.
*Olympic Forest Reserve, Washington, from field notes by Arthur Dodwell and T. F. Rixon, pp. 145–208, Pls. 51–70.
*Cascade Range Forest Reserve, Oregon, from T. 28 S. to T. 37 S., inclusive, together with the Ashland Forest Reserve and adjacent forest regions from T. 28 S. to T. 41 S., inclusive, and from R. 2 W. to R. 14 E., Willamette meridian, inclusive, by J. B. Leiberg, pp. 209–498, Pls. 71–84. Contains descriptions of many of the streams flowing through the forest reserves.

GEOLOGIC FOLIOS.

Under the plan adopted for the preparation of a geologic map of the United States the entire area is divided into small quadrangles, bounded by certain meridians and parallels, and these quadrangles, which number several thousand, are separately surveyed and mapped.[1] The unit of survey is also the unit of publication, and the maps and description of each quadrangle are issued in the form of a folio. When all the folios are completed they will constitute the Geologic Atlas of the United States.

A folio is designated by the name of the principal town or of a prominent natural feature within the quadrangle. Each folio includes maps showing the topography, geology, underground structure, and mineral deposits of the area mapped and several pages of descriptive text. The text explains the maps and describes the topographic and geologic features of the country and its mineral products. The topographic map shows roads, railroads, waterways, and, by contour lines, the shapes of the hills and valleys and the height above sea level of all points in the quadrangle. The areal-geology map shows the distribution of the various rocks at the surface. The structural-geology map shows the relations of the rocks to one another underground. The economic-geology map indicates the location of mineral deposits that are commercially valuable. The artesian-water map shows the depth to underground-water horizons. Economic-geology and artesian-water maps are included in folios if the conditions in the areas mapped warrant their publication. The folios are of special interest to students of geography and geology and are valuable as guides in the development and utilization of mineral resources.

The folios numbered from 1 to 163, inclusive, are published in only one form (18 by 22 inches), called the library edition. Some of the folios that bear numbers higher than 163 are published also in an octavo edition (6 by 9 inches). Owing to a fire in the Geological Survey Building May 18, 1913, the stock of geologic folios was more or less damaged by fire and water, but the folios are usable and are sold at the uniform price of 5 cents each, with no reduction for wholesale orders. This rate applies to folios in stock from 1 to 184, inclusive (except reprints), also the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sells for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell at higher prices. The octavo edition of folio 185 and higher numbers sells for 50 cents a copy except folio 193, which sells for 75 cents a copy. If 34 folios selling at 25 cents each (or their equivalent in higher-priced folios) are ordered at one time a discount of 40 per cent is allowed; $5.10 is the minimum amount accepted at this rate.

All the folios contain descriptions of the drainage of the quadrangles. The folios in the following list contain also brief discussions of the underground waters in connection with the economic resources of the areas and more or less information concerning the utilization of the water resources.

An asterisk (*) indicates that the stock of the folio is exhausted.

*45. Boise, Idaho.

Describes geography and geology, cold springs and cold artesian waters, and hot springs and hot artesian waters.

103. Nampa, Idaho-Oregon. 5c.

Describes the relief, drainage, climate, and vegetation of the area; discusses the geologic history and geologic formations, and, under "Economic geology," the surface waters available for irrigation, the springs and shallow wells, and the artesian wells; indicates areas of possible artesian flow.

[1] Index maps showing areas in the North Pacific slope basins covered by topographic maps and by geologic folios will be mailed on receipt of request addressed to the Director, U. S. Geological Survey, Washington, D. C.

104. Silver City, Idaho. 5c.

Describes the relief, drainage, climate, vegetation, and culture of the Silver City quadrangle; discusses the geologic history and the geologic formations, and, under "Economic geology," the surface waters available for irrigation or water-power development, warm springs, and artesian wells; notes possible chances for artesian waters; gives records of wells near Enterprise and Guffey; see also Water-Supply Paper 78.

*139. Snoqualmie, Washington.

Describes the relief and drainage of an area including portions of Kittitas Yakima, Pierce, and King counties; the statigraphic, structural, and historical geology, and, under "Economic geology," includes a brief paragraph on the utilization of the water supply.

MISCELLANEOUS REPORTS.

Other Federal bureaus and State and other organizations have from time to time published reports relating to the water resources of various sections of the country. Notable among those pertaining to the northern Pacific coast drainage basins are the reports of the commissioner of conservation of the State of Montana; the State land commission; the State engineer of Idaho; the Bureau of Industry, Agriculture, and Irrigation of Nevada; the State engineers of Nevada, Oregon, Utah, and Washington; the annual reports of the United States Reclamation Service; and the reports of the Chief of Engineers, U. S. Army. The following reports deserve special mention:

The Oregon system of water titles, by John H. Lewis: Oregon State Engineer Bull. 2, 1912.

State and National water laws, with a detailed statement of the Oregon system of water titles, by John H. Lewis, with a discussion by Clarence T. Johnston and L. J. Le Conte: Am. Soc. Civil Eng. Trans., vol. 76, pp. 637–758, 1913.

Report of the commission on conservation [State of Montana] on bills relating to public lands, water rights, and the protection and preservation of the forests: Helena, 1911; also report of the governor of the State of Montana on the same subject.

How to appropriate the public waters of the State of Nevada, compiled by W. M. Kearney, State engineer, 1911.

Requirements and regulations, including suggestions and instructions in relation to the appropriation, use, and measurement of water in the State of Nevada: State engineer of Nevada, 1912.

Irrigation pumping in Nevada, etc., by Charles Norcross: Nevada Bur. of Industry, Agr., and Irr. Bull. 8, 1913.

The water resources of Washington: Potable and mineral water, by H. G. Byers; artesian water, by C. A. Ruddy; water power, by R. E. Heine: Washington Geol. Survey Ann. Rept. for 1901, vol. 1, pt. 5, 1902.

Preliminary report on the Quincy Valley irrigation project, by Henry Landes and others: Washington Geol. Survey Bull. 14, 1912.

Biennial Report of the State Commissioner of Arid Lands [Washington], 1895–96 and 1897–98.

The irrigated lands of the State of Washington, by George M. Allen, deputy commissioner: State Bureau of Statistics and Immigration, 1910.

Irrigation laws of the State of Wyoming, prepared for publication in the office of the State engineer, 1909.

GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

WATER-SUPPLY PAPERS.

*1. Pumping water for irrigation, by H. M. Wilson. 1896. 56 pp., 9 pls.

Describes pumps and motive powers, windmills, water wheels, and various kinds of engines; also storage reservoirs to retain pumped water until needed for irrigation.

*3. Sewage irrigation, by G. W. Rafter. 1897. 100 pp., 4 pls. (See Water-Supply Paper 22.) 10c.

Discusses methods of sewage disposal by intermittent filtration and by irrigation; describes utilization of sewage in Germany, England, and France, and sewage purification in the United States.

*8. Windmills for irrigation, by E. C. Murphy. 1897. 49 pp., 8 pls. 10c.

Gives results of experimental tests of windmills during the summer of 1896 in the vicinity of Garden, Kans.; describes instruments and methods and draws conclusions.

*14. New tests of certain pumps and water lifts used in irrigation, by O. P. Hood, 1898. 91 pp., 1 pl.

Discusses efficiency of pumps and water lifts of various types.

*20. Experiments with windmills, by T. O. Perry. 1899. 97 pp., 12 pls. 15c.

Includes tables and descriptions of wind wheels, compares wheels of several types, and discusses results.

*22. Sewage irrigation, Part II, by G. W. Rafter. 1899. 100 pp., 7 pls. 15c.

Gives résumé of Water-Supply Paper 3; discusses pollution of certain streams, experiments on purification of factory wastes in Massachusetts, value of commercial fertilizers, and describes American sewage-disposal plants by States; contains bibliography of publications relating to sewage utilization and disposal.

*41. The windmill, its efficiency and economic use, Part I, by E. C. Murphy. 1901. 72 pp., 14 pls. 5c.

*42. The windmill, its efficiency and economic use, Part II, by E. C. Murphy. 1901. 75 pp. (73–147), 2 pls., (15–16). 10c.

Nos. 41 and 42 give details of results of experimental tests with windmills of various types

*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.

*56. Methods of stream measurement. 1901. 51 pp., 12 pls. 15c.

Describes the methods used by the Survey in 1901–2. See also Nos. 64, 94, and 95.

*64. Accuracy of stream measurements, by E. C. Murphy. 1902. 99 pp., 4 pls. (See No. 95.) 10c.

Describes methods of measuring velocity of water and of measuring and computing stream flow and compares results obtained with the different instruments and methods; describes also experiments and results at the Cornell University hydraulic laboratory. A second, enlarged, edition published as Water-Supply Paper 95.

*67. The motions of underground waters, by C. S. Slichter. 1902. 106 pp., 8 pls. 15c.

Discusses origin, depth, and amount of ground waters; permeability of rocks and porosity of soils; causes, rates, and laws of motions of ground water; surface and deep zones of flow, and recovery of waters by open wells and artesian and deep wells; treats of the shape and position of the water table; gives simple methods of measuring yield of flowing well; describes artesian wells at Savannah, Ga.

72. Sewage pollution in the metropolitan area near New York City and its effect on inland water resources, by M. O. Leighton. 1902. 75 pp., 8 pls. 10c.

Defines "normal" and "polluted" waters and discusses the damage resulting from pollution.

*80. The relation of rainfall to run-off, by G. W. Rafter. 1903. 104 pp. 10c.

Treats of measurements of rainfall and laws and measurements of stream flow; gives rainfall, run-off, and evaporation formulas; discusses effects of forests on rainfall and run-off.

87. Irrigation in India (second edition), by H. M. Wilson. 1903. 238 pp., 27 pls. 25c.

First edition was published in Part II of the Twelfth Annual Report.

93. Proceedings of first conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this paper should be addressed to the U. S. Reclamation Service.]

Contains, in addition to an account of the organization of the hydrographic [water-resources] branch of the United States Geological Survey and the reports of the conference, the following papers of more or less general interest:

Limits of an irrigation project, by D. W. Ross.
Relation of Federal and State laws to irrigation, by Morris Bien.
Electrical transmission of power for pumping, by H. A. Storrs.
Correct design and stability of high masonry dams, by Geo. Y. Wisner.
Irrigation surveys and the use of the plane table, by J. B. Lippincott.
The use of alkaline waters for irrigation, by Thomas H. Means.

*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.

Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.

*95. Accuracy of stream measurements (second, enlarged edition), by E. C. Murphy. 1904. 169 pp., 6 pls.

Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.

*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)

Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.

110. Contributions to the hydrology of eastern United States, 1904; M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.

Contains the following reports of general interest. The scope of each paper is indicated by its title.

Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.

The California or "stovepipe" method of well construction, by Charles S. Slichter.

Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.

Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.

Experiments relating to problems of well contamination at Quitman, Ga., by S. W. McCallie.

113. The disposal of strawboard and oil-well wastes, by R. L. Sackett and Isaiah Bowman. 1905. 52 pp., 4 pls. 5c.

The first paper discusses the pollution of streams by sewage and by trade wastes, describes the manufacture of strawboard, and gives results of various experiments in disposing of the waste. The second paper describes briefly the topography, drainage, and geology of the region about Marion, Ind., the contamination of rock wells and of streams by waste oil and brine.

*114. Underground waters of eastern United States; M. L. Fuller, geologist in charge. 1905. 285 pp., 18 pls. 25c.

Contains report on "Occurrence of underground waters," by M. L. Fuller, discussing sources amount, and temperature of waters, permeability and storage capacity of rocks, water-bearing formations, recovery of water by springs, wells, and pumps, essential conditions of artesian flows, and general conditions affecting ground waters in eastern United States.

119. Index to the hydrographic progress reports of the United States Geological Survey, 1888 to 1903, by J. C. Hoyt and B. D. Wood. 1905. 253 pp. 15c.

120. Bibliographic review and index of papers relating to underground waters published by the United States Geological Survey, 1879–1904, by M. L. Fuller. 1905. 128 pp. 10c.

*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c

Defines and classifies underground waters, gives common-law rules relating to their use, and cites State legislative acts affecting them.

140. Field measurements of the rate of movement of underground waters by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.

Discusses the capacity of sand to transmit water, describes measurements of underflow in Rio Hondo, San Gabriel, and Mohave River valleys, Cal., and on Long Island, N. Y., gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.

143. Experiments on steel-concrete pipes on a working scale, by J. H. Quinton. 1905. 61 pp., 4 pls. 5c.

Scope indicated by title.

145. Contributions to the hydrology of eastern United States, 1905; M. L. Fuller, geologist in charge. 1905. 220 pp., 6 pls. 10c.

Contains brief reports of general interest as follows:

Drainage of ponds into drilled wells, by Robert E. Horton.. Discusses efficiency, cost, and capacity of drainage wells, and gives statistics of such wells in southern Michigan.

Construction of so-called fountain and geyser springs, by Myron L. Fuller.

A convenient gage for determining low artesian heads, by Myron L. Fuller.

146. Proceedings of second conference of engineers of the Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1905. 267 pp. 15 c. [Inquiries concerning this report should be addressed to the U. S. Reclamation Service.]

Contains brief account of the organization of the hydrographic [water-resources] branch and the Reclamation Service, reports of conferences and committees, circulars of instruction, and many brief reports on subjects closely related to reclamation, and a bibliography of technical papers by members of the service. Of the papers read at the conference those listed below (scope indicated by title) are of more or less general interest:

Proposed State code of water laws, by Morris Bien.

Power engineering applied to irrigation problems, by O. H. Ensign.

Estimates on tunneling in irrigation projects, by A. L. Fellows.

Collection of stream-gaging data, by N. C. Grover.

Diamond-drill methods, by G. A. Hammond.

Mean-velocity and area curves, by F. W. Hanna.

Importance of general hydrographic data concerning basins of streams gaged by R. E. Horton

Effect of aquatic vegetation on stream flow, by R. E. Horton.

Sanitary regulations governing construction camps, by M. O. Leighton.

Necessity of draining irrigated land, by Thos. H. Means.

Alkali soils, by Thos. H. Means.

Cost of stream-gaging work, by E. C. Murphy.
Equipment of a cable gaging station, by E. C. Murphy.
Silting of reservoirs, by W. M. Reed.
Farm-unit classification, by D. W. Ross.
Cost of power for pumping irrigating water, by H. A. Storrs.
Records of flow at current-meter gaging stations during the frozen season, by F. H. Tillinghast.

147. Destructive floods in the United States in 1904, by E. C. Murphy and others. 1905. 206 pp., 18 pls. 15c.

Contains a brief account of "A method of computing cross-section area of waterways," including formulas for maximum discharge and area of cross section.

*150. Weir experiments, coefficients, and formulas, by R. E. Horton. 1906. 189 pp., 38 pls. (See Water-Supply Paper 200.) 15c.

Scope indicated by title.

151. Field assay of water, by M. O. Leighton. 1905. 77 pp., 4 pls.

Discusses methods, instruments, and reagents used in determining turbidity, color, iron, chlorides, and hardness in connection with the studies of the quality of water in various parts of the United States.

152. A review of the laws forbidding pollution of inland waters in the United States (second edition), by E. B. Goodell. 1905. 149 pp. 10c.

Scope indicated by title.

*155. Fluctuations of the water level in wells, with special reference to Long Island, N. Y., by A. C. Veatch. 1906. 83 pp., 9 pls. 25c.

Includes general discussion of fluctuation changes due to rainfall and evaporation, barometric changes, temperature changes, changes in rivers, changes in lake level, tidal changes, effects of settlement, irrigation, dams, underground-water developments, and to indeterminate causes.

*160. Underground-water papers, 1906; M. L. Fuller, geologist in charge. 1906. 104 pp., 1 pl.

Gives account of work in 1905; lists publications relating to ground waters and contains the following brief reports of general interest:
Significance of the term "artesian," by Myron L. Fuller.
Representation of wells and springs on maps, by Myron L. Fuller.
Total amount of free water in the earth's crust, by Myron L. Fuller.
Use of fluorescein in the study of underground waters, by R. B. Dole.
Problems of water contamination, by Isaiah Bowman.
Instances of improvement of water in wells, by Myron L. Fuller.

*162. Destructive floods in the United States in 1905, with a discussion of flood discharge and frequency and an index to flood literature, by E. C. Murphy and others. 1906. 105 pp., 4 pls. 15c.

*163. Bibliographic review and index of underground-water literature published in the United States in 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson. 1906. 130 pp. 15c.

Scope indicated by title.

*179. Prevention of stream pollution by distillery refuse, based on investigations at Lynchburg, Ohio, by Herman Stabler. 1906. 34 pp., 1 pl. 10c.

Describes grain distillation; treatment of slop; sources, character, and effects of effluents on streams; discusses filtration, precipitation, fermentation, and evaporation methods of disposal of wastes without pollution.

*180. Turbine water-wheel tests and power tables, by R. E. Horton. 1906. 134 pp., 2 pls. 20c.

Scope indicated by title.

*185. Investigations on the purification of Boston sewage, by C.-E. A. Winslow and E. B. Phelps. 1906. 163 pp. 25c.

Discusses composition, disposal, purification, and treatment of sewages and tendencies in sewage-disposal practice in England, Germany, and the United States; describes character of crude sewage at Boston, removal of suspended matter, treatment in septic tanks, and purification in intermittent sand filtration and coarse material; gives bibliography.

*186. Stream pollution by acid-iron wastes, a report based on investigations made at Shelby, Ohio, by Herman Stabler. 1906. 36 pp., 1 pl.

Gives history of pollution by acid-iron wastes at Shelby, Ohio, and resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.

*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.

Scope indicated by title.

*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.

Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amount and character of water used, raw material and finished product, and mechanical filtration.

*194. Pollution of Illinois and Mississippi rivers by Chicago sewage (a digest of the testimony taken in the case of the State of Missouri *v.* the State of Illinois and the Sanitary District of Chicago), by M. O. Leighton. 1907. 369 pp., 2 pls.

Scope indicated by amplification of title.

*200. Weir experiments, coefficients, and formulas (revision of paper No. 150), by R. E. Horton. 1907. 195 pp., 38 pls. 35c.

Scope indicated by title.

*226. The pollution of streams by sulphite-pulp waste, a study of possible remedies, by E. B. Phelps. 1909. 37 pp., 1 pl. 10c.

Describes manufacture of sulphite pulp, the waste liquors, and the experimental work leading to suggestions as to methods of preventing stream pollution.

*229. The disinfection of sewage and sewage filter effluents, with a chapter on the putrescibility and stability of sewage effluents, by E. B. Phelps. 1909. 91 pp., 1 pl. 15c.

Scope indicated by title.

*234. Papers on the conservation of water resources. 1909. 96 pp., 2 pls. 15c.

Contains the following papers, whose scope is indicated by their titles: Distribution of rainfall by Henry Gannett; Floods, by M. O. Leighton; Developed water powers, compiled under the direction of W. M. Steuart, with discussion by M. O. Leighton; Undeveloped water powers, by M. O. Leighton; Irrigation, by F. H. Newell; Underground waters, by W. C. Mendenhall; Denudation, by R. B. Dole and Herman Stabler; Control of catchment areas, by H. N. Parker.

*235. The purification of some textile and other factory wastes, by Herman Stabler and G. H. Pratt. 1909. 76 pp. 10c.

Discusses waste waters from wool scouring, bleaching and dyeing cotton yarn, bleaching cotton piece goods, and manufacture of oleomargarine, fertilizer, and glue.

236. The quality of surface waters in the United States, Part I, Analyses of waters east of the one hundredth meridian, by R. B. Dole. 1909. 123 pp. 10c.

Describes collection of samples, methods of examination, preparation of solutions, accuracy of estimates, and expression of analytical results.

238. The public utility of water powers and their governmental regulation, by René Tavernier and M. O. Leighton. 1910. 161 pp. 15c.

Discusses hydraulic power and irrigation, French, Italian, and Swiss legislation relative to the development of water powers, and laws proposed in the French Parliament; reviews work of bureau of hydraulics and agricultural improvements of the French department of agriculture, and gives résumé of Federal and State water-power legislation in the United States

*255. Underground waters for farm use, by M. L. Fuller. 1910. 58 pp., 17 pls. 15c.

Discusses rocks as sources of water supply and the relative safety of supplies from different materials; springs and their protection; open or dug and deep wells, their location, yield, relative cost, protection, and safety; advantages and disadvantages of cisterns and combination wells and cisterns.

*257. Well-drilling methods, by Isaiah Bowman. 1911. 139 pp., 4 pls. 15c.

Discusses amount, distribution, and disposal of rainfall; water-bearing rocks; amount of ground water; artesian conditions; oil and gas bearing formations; gives history of well drilling in Asia, Europe, and the United States; describes in detail the various methods and the machinery used; discusses loss of tools and geologic difficulties, contamination of well waters and methods of prevention, tests of capacity and measurement of depth, and costs of sinking wells.

*258. Underground-water papers, 1910, by M. L. Fuller, F. G. Clapp, G. C. Matson, Samuel Sanford, and H. C. Wolff. 1911. 123 pp., 2 pls. 15c.

Contains the following papers (scope indicated by titles) of general interest:
Drainage by wells, by M. L. Fuller.
Freezing of wells and related phenomena, by M. L. Fuller.
Pollution of underground waters in limestone, by G. C. Matson.
Protection of shallow wells in sandy deposits, by M. L. Fuller.
Magnetic wells, by M. L. Fuller.

*315. The purification of public water supplies, by G. A. Johnson. 1913. 84 pp., 8 pls. 10c.

Discusses ground, lake, and river waters as public supplies, development of waterworks systems in the United States, water consumption, and typhoid fever; describes methods of filtration and sterilization of water and municipal water softening.

334. The Ohio Valley flood of March-April, 1913 (including comparisons with some earlier floods), by A. H. Horton and H. J. Jackson. 1913. 96 pp., 22 pls. 20c.

Although relating specifically to floods in the Ohio Valley, this report discusses also the causes of floods and the prevention of damage by floods.

337. The effects of ice on stream flow, by William Glenn Hoyt. 1913. 77 pp., 7 pls. 15c.

Discusses methods of measuring the winter flow of streams.

*345. Contributions to the hydrology of the United States, 1914; N. C. Grover, chief hydraulic engineer. 1915. 225 pp., 17 pls. 30c. Contains:

(e) A method of determining the daily discharge of rivers of variable slope, by M. R. Hall, W. E. Hall, and C. H. Pierce, pp. 53–65.

364. Water analyses from the laboratory of the United States Geological Survey, tabulated by F. W. Clarke, chief chemist. 1914. 40 pp. 5c.

Contains analyses of waters from rivers, lakes, wells, and springs in various parts of the United States, including analyses of the geyser water of Yellowstone National Park, hot springs in Montana, brines from Death Valley, water from the Gulf of Mexico, and mine waters from Tennessee, Michigan, Missouri and Oklahoma, Montana, Colorado and Utah, Nevada and Arizona, and California.

371. Equipment for current-meter gaging stations, by G. J. Lyon. 1915. 64 pp., 37 pls. 20c.

Describes methods of installing automatic and other gages and of constructing gage wells shelters, and structures for making discharge measurements and artificial controls.

*375. Contributions to the hydrology of the United States, 1915; N. C. Grover, chief hydraulic engineer. 1916. 181 pp., 9 pls. 15c. Contains:

(c) The relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77–84.

(e) A method of correcting river discharge for a changing stage, by B. E. Jones pp. 117–130.

(f) Conditions requiring the use of automatic gages in obtaining records of stream flow, by C. H. Pierce, pp. 131–139.

Three papers presented at the conference of engineers of the water-resources branch in December, 1914.

*400. Contributions to the hydrology of the United States, 1916; N. C. Grover, chief hydraulic engineer. 108 pp., 7 pls. Contains:

(a) The people's interest in water-power resources, by G. O. Smith, pp. 1–8.

(c) The measurement of silt-laden streams, by R. C. Pierce, pp. 39–51.

(d) Accuracy of stream-flow data, by N. C. Grover and J. C. Hoyt, pp. 53–59.

416. The divining rod, a history of water witching, with a bibliography, by Arthur J. Ellis. 1917. 59 pp. 10c.

A brief paper published "merely to furnish a reply to the numerous inquiries that are continually being received from all parts of the country" as to the efficacy of the divining rod for locating underground water.

425. Contributions to the hydrology of the United States, 1917, N. C. Grover, chief hydraulic engineer. 1918. Contains:

*(c) Hydraulic conversion tables and convenient equivalents, pp. 71–94. 1917.

ANNUAL REPORTS.

*Fifth Annual Report of the United States Geological Survey, 1883–84, J. W. Powell, Director. 1885. xxxvi, 469 pp., 58 pls. $2.25. Contains:

*The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin, pp. 125–173, pl. 21. Scope indicated by title.

Twelfth Annual Report of the United States Geological Survey, 1890–91, J. W. Powell, Director. 1891. 2 parts. Pt. II, Irrigation, xviii, 576 pp., 93 pls. $2. Contains:

*Irrigation in India, by H. M. Wilson, pp. 363–561, pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111 to 146. Discusses the economical aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of eastern United States, by W J McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, 'therma' springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897–98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7 vols. and separate case for maps with Pt. V. *Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. $2.65. Contains:

*Principles and conditions of the movements of ground water, by F. H. King, pp. 59–294, pls. 6 to 16. Discusses the amount of waters stored in sandstone, in soil, and in other rocks, and the depth to which ground water penetrates; gravitational, thermal, and capillary movements of ground waters, and the configuration of the ground-water surface; gives the results of experimental investigations on the flow of air and water through a rigid, porous medium, and through sand, sandstones, and silts; discusses results obtained by other investigators, and summarizes results of observations; discusses also rate of flow of water through sand and rock, the growth of rivers, rate of filtration through soil, interference of wells, etc.

*Theoretical investigation of the motion of ground waters, by C. S. Slichter, pp. 295–384, pl. 17. Scope indicated by title.

PROFESSIONAL PAPERS.

*72. Denudation and erosion in the southern Appalachian region and the Monongahela basin, by L. C. Glenn. 1911. 137 pp., 21 pls. 35c.

Describes the topography, geology, drainage, forests, climate, and population, and transportation facilities of the region, the relation of agriculture, lumbering, mining, and power development to erosion and denudation, and the nature, effects, and remedies of erosion; gives details of conditions in Holston, Nolichucky, French Broad, Little Tennessee, and Hiwassee River basins, along Tennessee River proper, and in the basins of the Coosa-Alabama system, Chattahoochee, Savannah, Saluda, Broad, Catawba, Yadkin, New, and Monongahela rivers.

86. The transportation of débris by running water, by G. K. Gilbert, based on experiments made with the assistance of E. C. Murphy. 1914. 263 pp., 3 pls. 70c.

The results of an investigation which was carried on in a specially equipped laboratory at Berkeley, Cal., and was undertaken for the purpose of learning "the laws which control the movement of bed load and especially to determine how the quantity of load is related to the stream slope and discharge and to the degree of comminution of the débris."

105. Hydraulic-mining débris in the Sierra Nevada, by G. K. Gilbert. 154 pp., 34 pls. 1917. 50c.

Presents the results of an investigation undertaken by the United States Geological Survey in response to a memorial from the California Miners' Association asking that a particular study be made of portions of the Sacramento and San Joaquin valleys affected by detritus from torrential streams. The report deals largely with geologic and physiographic aspects of the subject, traces the physical effects, past and future, of the hydraulic mining of earlier decades the similar effects which certain other industries induce through stimulation of the erosion of the soil, and the influence of the restriction of the area of inundation by the construction of levees. Suggests cooperation by several interests for the control of the streams now carrying heavy loads of débris.

BULLETINS.

*32. Lists and analyses of the mineral springs of the United States (a preliminary study), by A. C. Peale. 1886. 235 pp.

Defines mineral waters, lists the springs by States, and gives tables of analyses so far as available.

*319. Summary of the controlling factors of artesian flows, by Myron L. Fuller. 1908. 44 pp., 7 pls. 10c.

Describes underground reservoirs, the sources of ground waters, the confining agents, the primary and modifying factors of artesian circulation, the essential and modifying factors of artesian flow, and typical artesian systems.

*479. The geochemical interpretation of water analyses, by Chase Palmer. 1911. 31 pp. 5c.

Discusses the expression of chemical analyses, the chemical character of water and the properties of natural waters; gives a classification of waters based on property values and reacting values, and discusses the character of the waters of certain rivers as interpreted directly from the results of analyses; discusses also the relation of water properties to geologic formations, silica in river water, and the character of the water of the Mississippi and the Great Lakes and St. Lawrence River as indicated by chemical analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.