DEPARTMENT OF THE INTERIOR
FRANKLIN K. LANE, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

WATER-SUPPLY PAPER 443

SURFACE WATER SUPPLY OF THE UNITED STATES

1916

PART XII. NORTH PACIFIC DRAINAGE BASINS

B. SNAKE RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
G. C. BALDWIN, G. L. PARKER, and F. F. HENSHAW, District Engineers

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

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AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records of measurements of flow made on streams in the United States during the year ending September 30, 1916.

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, 1895–1917.

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 1917, 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 14.

Measurements of stream flow have been made at about 4,100 points in the United States, and also at many points in Alaska and the Hawaiian Islands. In July, 1916, 1,290 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements were made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made

available in the water-supply papers from time to time. 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 (p. 9).

"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 in inches.

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

The following terms not in common use are here defined:

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

"Control," a term used to designate the section or sections of the stream channel below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same 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 falls when the discharge is reduced to zero.

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 one day by the number of days.

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

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

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

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

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

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

1 second-foot equals 40 California miner's inches (law of March 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 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 meters.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 34,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Second-feet} \times \text{fall in feet}}{11}$ = 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, 1915, and ending September 30, 1916. 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 means of discharge are determined.

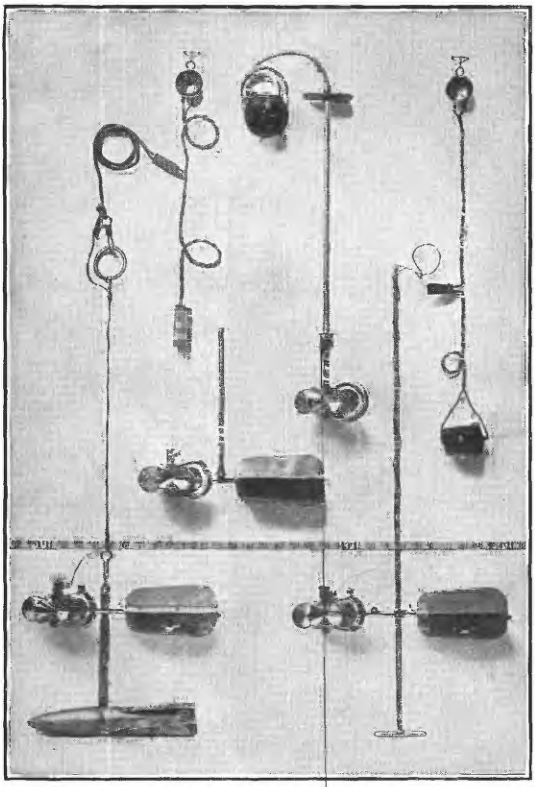
The data presented for each gaging station in the area covered by this report comprise a description of the station, a table giving records of discharge measurements, a table showing the daily discharge of the stream, and a table of monthly and yearly discharge and run-off.

If the base data are insufficient to determine the daily discharge tables giving daily gage height and records of discharge measurements are published.

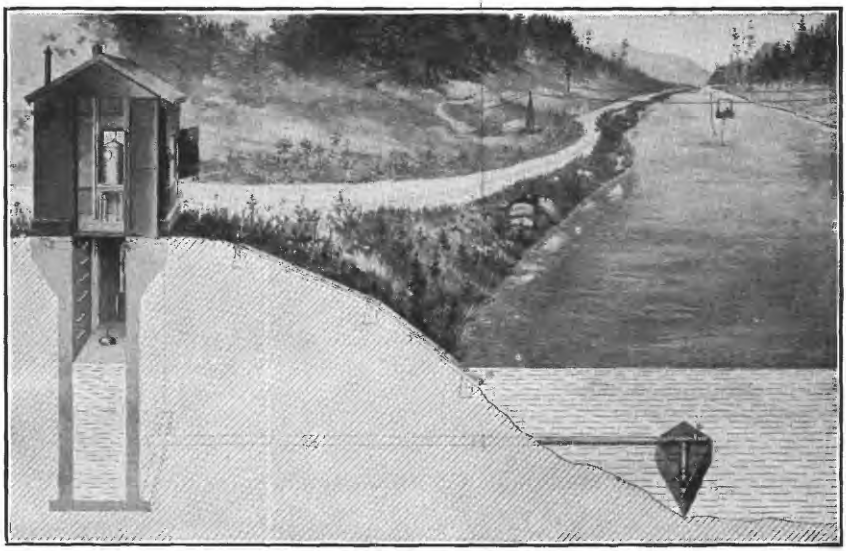
The description of the station gives, in addition to statements regarding location and equipment, information in regard to any conditions that may affect the permanence of the stage-discharge relation, covering such subjects as the occurrence of ice, the use of the stream for log driving, shifting of 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.

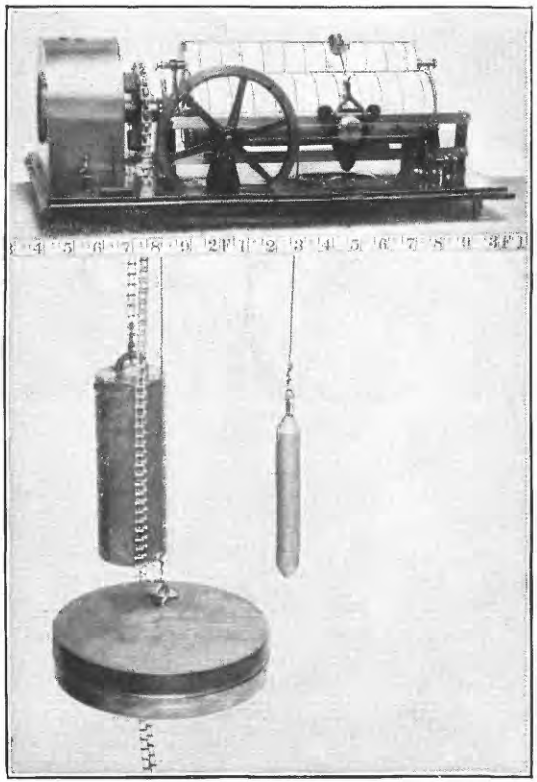
In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently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



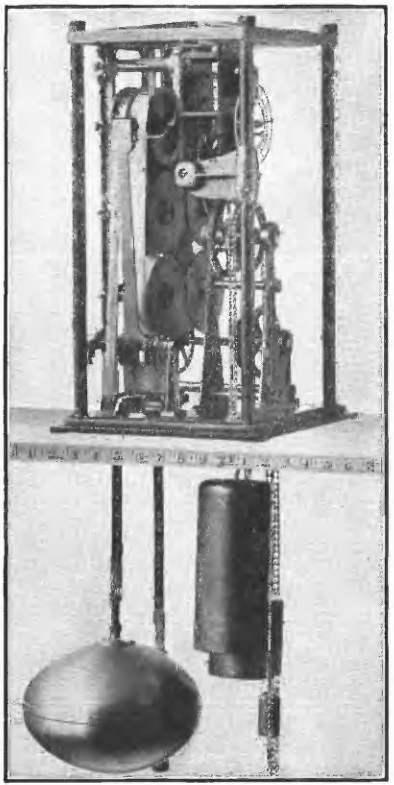
A. PRICE CURRENT METERS.



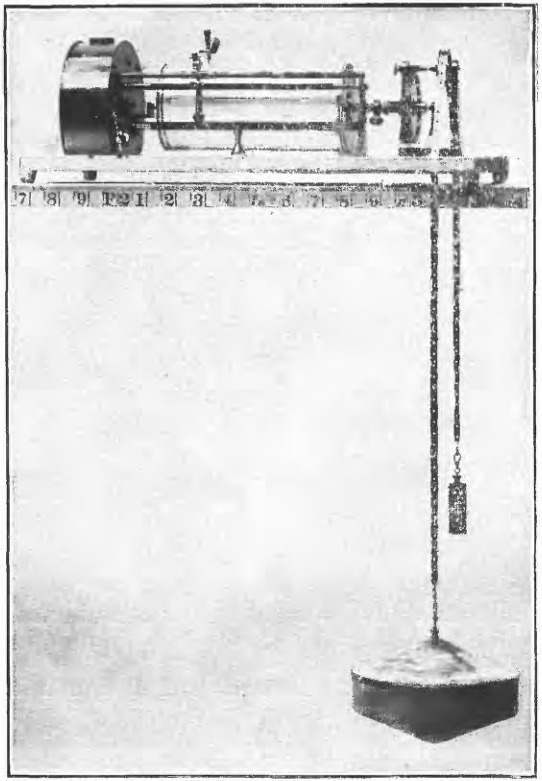
B. TYPICAL GAGING STATION.



A. STEVENS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

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 per 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 RECORDS.

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

A paragraph in the description of the station gives information regarding (1) permanence of the stage-discharge relation, (2) precision with which the discharge rating curve is defined, (3) refinement of gage readings, (4) frequency of gage readings, and (5) methods of applying daily gage height to the rating table to obtain the daily discharge.[1]

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

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

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

[1] For a more detailed discussion of the accuracy of stream-flow data see Grover, N. C., and Hoyt, J. C., Accuracy of stream-flow data: U. S. Geol. Survey Water-Supply Paper 400, pp. 53–59, 1916.

COOPERATION.

During the year ending September 30, 1916, work in the Snake River basin was carried on in cooperation with the States of 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.

Special acknowledgements are due 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., West End Twin Falls Irrigation Co., Idaho Power Co., Twin Falls-Oakley Land & Water Co., Twin Falls-Salmon River Land & Water Co., Twin Falls North Side Land & Water Co., Idaho Irrigation Co., Burbank Co., Willow River Land & Irrigation Co., Crane Creek Irrigation, Land & Power Co., Maney Bros. Construction Co., Utah Construction Co., State Engineer of Idaho, I. B. Perrine, L. S. Kimball, S. A. Mullenix, J. G. Richardson, and P. W. McCarthy.

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. Purton, L. W. Jordan, J. J. Sanford, W. E. Dickinson, C. W. Bennett, and Miss Ruby Christensen.

For stations in Idaho, (except in 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, who was assisted by H. J. Dean, A. W. Harrington, 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, and C. G. Paulsen.

The manuscript was assembled and reviewed by H. J. Dean and W. E. Dickinson.

GAGING-STATION RECORDS.

SNAKE RIVER.

SNAKE RIVER AT SOUTH BOUNDARY OF YELLOWSTONE NATIONAL PARK.

LOCATION.—About a quarter of a mile below junction of Lewis and Snake rivers, half a mile north of 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, 1916.

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

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

CHANNEL AND CONTROL.—Bed composed of coarse gravel; clean except for occasional lodgment of drift. Control probably permanent at ordinary stages. One channel at gage but divided by an island into two channels at control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.8 feet at 7 a. m. July 2 (discharge, 4,790 second-feet); minimum stage recorded, 1.4 feet October 26–31 (discharge, 160 second-feet).

1913–1916: Maximum stage recorded, 6.3 feet June 2, 1914 (discharge, 5,690 second-feet); minimum stage recorded, 1.4 feet October 26–31, 1915 (discharge, 160 second-feet).

ICE.—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. Rating curve well defined between 250 and 5,000 second-feet by measurements made in 1916 and 1917. Gage read to half-tenths twice daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

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

Discharge measurements of Snake River at south boundary of Yellowstone National Park during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
July 30	Baldwin and Hoyt	3.45	1,360
Sept. 20	C. G. Paulsen	2.10	433

Daily discharge, in second-feet, of Snake River at south boundary of Yellowstone National Park for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	July.	Aug.
1	439	178	233	535	439	351	439	.....	1,200
2	439	196	233	535	439	351	439	4,790	1,110
3	439	196	271	510	439	351	439	4,430	1,110
4	394	196	271	486	439	351	439	4,430	1,110
5	394	196	271	486	439	351	486	4,430	1,280
6	351	196	271	439	439	351	486	4,430	1,280
7	351	233	271	439	439	394	439	4,430	1,200
8	310	233	310	486	394	394	439	4,430	1,110
9	310	233	310	486	394	394	462	4,080	1,110
10	310	233	310	439	394	394	486	4,080	1,030
11	310	233	310	439	394	439	462	3,740	956
12	310	233	351	394	394	439	416	3,740	956
13	271	271	351	394	394	439	439	3,400	887
14	271	271	351	394	394	439	416	3,070	821
15	233	271	351	351	351	486	462	2,600	821
16	233	271	394	351	351	486	462	2,600	758
17	233	233	394	310	351	486	439	2,450	698
18	233	233	394	310	351	486	416	2,310	698
19	196	233	439	351	351	486	462	2,180	641
20	196	233	439	351	351	486	462	2,180	641
21	196	233	439	330	351	439	486	1,930	587
22	196	252	439	351	351	439	439	1,810	561
23	196	271	439	351	351	439	462	1,810	535
24	196	271	439	394	351	439	510	1,810	510
25	196	271	486	394	394	439	486	1,480	486
26	160	271	486	416	394	486	510	1,480	486
27	160	271	486	439	394	486	510	1,380	.....
28	160	271	486	439	394	486	510	1,480	.....
29	160	233	486	462	351	439	561	1,480	.....
30	160	233	535	486	.....	439	.....	1,280	.....
31	160	.....	535	486	.....	439	.....	1,280	.....

NOTE.—Observer absent Apr. 30 to July 1 and Aug. 27 to Sept. 30, no record obtained.

Monthly discharge of Snake River at south boundary of Yellowstone National Park for the year ending Sept. 30, 1916.

[Drainage area, 490 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	439	160	263	0.537	0.62	16,200
November	271	178	238	.486	.54	14,200
December	535	233	380	.776	.89	23,400
January	535	310	420	.857	.99	25,800
February	439	351	389	.794	.86	22,400
March	486	351	430	.878	1.01	26,400
April 1–29	561	416	464	.947	1.02	26,700
July 2–31	4,790	1,280	2,830	5.78	6.45	168,000
August 1–26	1,280	486	869	1.77	1.71	44,800

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, 1916. Records for years 1909 and 1910 fragmentary.

GAGE.—Inclined staff on right shore just below 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	33.30	34.06	35.54	36.95	38.82	40.38	41.47	43.24	47.44	61.81	64.24	49.25
2	33.37	34.11	35.58	37.02	38.89	40.42	41.48	43.25	47.65	62.57	63.84	48.86
3	33.40	34.16	35.61	37.08	38.96	40.45	41.49	43.26	47.85	63.05	63.54	48.38
4	33.38	34.24	35.65	37.15	39.03	40.49	41.50	43.27	48.22	63.28	63.31	47.89
5	33.38	.....	35.68	37.21	39.10	40.55	41.51	43.28	48.59	63.53	63.08	47.38
6	33.34	34.34	35.72	37.28	39.19	40.61	41.52	43.45	48.95	63.81	62.84	46.90
7	33.31	34.34	35.75	37.35	39.27	40.67	41.53	43.62	49.32	64.08	62.56	46.43
8	33.31	34.35	35.79	37.41	39.36	40.73	41.54	43.79	49.89	64.33	62.26	45.98
9	33.34	.....	35.82	37.48	39.45	40.79	41.55	43.85	50.47	64.63	61.84	45.61
10	33.36	34.45	35.86	37.54	39.54	40.85	41.56	43.91	51.05	64.82	61.28	45.21
11	33.38	.....	35.89	37.61	39.62	40.91	41.64	43.97	51.66	64.85	60.73	44.86
12	33.34	.....	35.93	37.67	39.71	40.95	41.72	44.03	52.27	64.81	60.16	44.57
13	33.40	34.60	35.96	37.74	39.75	40.99	41.80	44.09	52.88	64.85	59.77	44.33
14	33.40	34.64	36.00	37.81	39.78	41.03	41.88	44.15	53.53	64.91	59.37	44.14
15	33.44	34.68	36.05	37.87	39.82	41.07	41.95	44.21	54.25	64.93	58.78	44.03
16	33.48	34.74	36.09	37.93	39.86	41.11	42.01	44.21	55.03	64.92	58.20	44.00
17	33.50	34.80	36.14	37.98	39.90	41.15	42.07	44.37	55.90	64.94	57.50	44.03
18	33.54	34.85	36.18	38.04	39.93	41.19	42.13	44.53	56.90	65.02	56.78	44.03
19	33.57	34.90	36.24	38.09	39.97	41.23	42.19	44.69	57.44	65.09	56.12	44.04
20	33.62	34.97	36.30	38.15	40.01	41.27	42.25	44.85	58.01	65.13	55.42	44.06
21	33.68	35.02	36.36	38.21	40.04	41.31	42.31	45.07	58.45	65.12	54.70	44.08
22	33.72	35.08	36.42	38.26	40.08	41.35	42.37	45.29	58.45	65.11	53.96	44.08
23	33.79	35.13	36.48	38.31	40.11	41.39	42.48	45.52	58.42	65.11	53.53	44.08
24	.....	35.19	36.54	38.37	40.15	41.43	42.59	45.74	58.31	65.09	53.01	44.08
25	33.82	35.24	36.60	38.42	40.19	41.47	42.70	45.96	58.34	65.06	52.45	44.09
26	33.85	35.29	36.66	38.48	40.22	41.47	42.81	46.18	58.79	65.12	51.95	44.09
27	33.89	35.35	36.73	38.53	40.26	41.47	42.93	46.39	59 34	65.12	51.50	44.08
28	33.91	35.40	36.80	38.58	40.30	41.47	43.03	46.60	60.01	65.16	51.09	44.07
29	33.96	35.46	36.84	38.60	40.34	41.47	43.13	46.81	60.69	65 16	50.64	44.06
30	34.00	35.51	36.88	38.70	.....	41.47	43.23	47.02	61.34	64.96	50.18	44.05
31	34.02	.....	36.91	38.75	.....	41.47	.....	47.23	.....	64.69	49.76	.....

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

SNAKE RIVER NEAR MORAN, WYO.

LOCATION.—In sec. 17, T. 45 N., R. 114 W., 1½ miles below Moran post office, Lincoln County, and United States Reclamation Service dam at outlet of Jackson Lake. No large tributaries between dam and station.

DRAINAGE AREA.—820 square miles.

RECORDS AVAILABLE.—September 21, 1903, to September 30, 1916.

GAGE.—Inclined staff on left bank. Datum lowered 1.0 foot July 26, 1915. Gage read by employees of United States Reclamation Servicce.

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

CHANNEL AND CONTROL.—Bed of gravel and boulders. Control practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.60 feet morning of August 17 (discharge, 9,350 second-feet); minimum stage recorded, 0.53 foot November 23 and 24 (discharge, 30 second-feet).

1903–1916: Maximum stage recorded, 8.8 feet (old datum) July 6, 1910 (discharge, 12,100 second-feet); practically no flow during a few days in 1907 and 1909 as a result of closing of gates in Jackson Lake dam.

ICE.—Stage-discharge relation affected by ice from December to February:

DIVERSIONS.—None 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 increased from 400,000 to 790,000 acre-feet during the year.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 8,000 second-feet. Gage read to hundredths twice daily during summer and once daily during the rest of year. Daily discharge ascertained by applying gage height 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.

Discharge measurements of Snake River near Moran, Wyo., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
July 19	Banks and Markham	4.04	2,250	July 30	G. C. Baldwin	6.29	5,600
24	do	4.32	2,560	Sept. 10	do	5.92	4,860
29	G. C. Baldwin	4.10	2,130				

NOTE.—Banks and Markham were employees of United States Reclamation Service.

Daily discharge, in second-feet, of Snake River near Moran, Wyo., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	610	35	.....	46	381	1,800	500	840	7,420	6,060
2	610	34	.....	46	50	1,800	400	1,280	6,060	6,060
3	528	34	.....	46	50	1,800	340	3,090	4,920	5,900
4	528	34	.....	46	50	1,800	353	3,090	4,920	6,060
5	500	33	.....	46	50	2,160	367	3,090	5,080	6,060
6	425	33	.....	46	50	2,540	381	3,090	4,920	6,060
7	400	33	.....	46	50	2,540	395	3,240	5,080	6,060
8	425	33	.....	46	50	2,540	400	3,240	6,060	5,400
9	425	33	.....	46	50	2,540	425	3,240	7,080	5,080
10	301	34	.....	46	50	2,540	450	4,440	7,420	4,760
11	305	34	.....	46	52	2,540	450	5,900	8,120	4,290
12	160	33	.....	45	54	2,540	425	5,240	7,950	3,980
13	98	33	.....	45	57	2,540	425	3,980	3,830	3,090
14	96	33	.....	45	59	2,680	425	3,830	7,780	2,680
15	96	33	.....	45	61	2,680	425	3,830	8,120	1,380
16	96	33	.....	45	64	1,480	425	3,830	8,120	582
17	96	33	.....	45	66	735	425	3,240	9,350	381
18	52	33	.....	45	68	735	1,280	2,810	9,180	381
19	50	33	.....	45	69	770	4,140	2,410	9,180	381
20	47	32	46	45	69	770	4,140	2,280	9,000	381
21	46	32	46	179	70	770	5,900	2,680	9,000	381
22	46	31	46	309	70	770	7,780	2,680	8,120	381
23	45	30	46	475	71	555	6,740	2,540	7,250	500
24	44	30	46	582	71	450	6,740	2,410	7,080	555
25	43	31	46	805	73	475	2,810	2,160	7,080	555
26	43	32	46	805	73	475	875	2,030	6,570	555
27	42	32	46	770	73	475	555	2,030	5,900	555
28	41	33	46	770	500	500	362	2,160	6,060	555
29	41	33	46	735	1,380	500	322	3,090	6,060	555
30	41	34	.....	702	1,800	500	367	5,400	5,900	555
31	35	.....	.....	702	.....	500	.....	6,230	6,060	.....

NOTE.—Stage-discharge relation affected by ice Dec. 1 to Feb. 19. Gates in dam at Jackson Lake remained closed but the leakage through gates increased somewhat owing to increasing head on gates. Mean discharge estimated as follows: Dec. 1–31, 35 sec.-ft.; Jan. 1–31, 40 sec-ft.; Feb. 1–19, 43 sec.-ft.

Monthly discharge of Snake River near Moran, Wyo., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	610	35	204	12,500
November	35	30	32.8	1,950
December			35.0	2,150
January			40.0	2,460
February			44.0	2,530
March	805	45	250	15,400
April	1,800	50	188	11,200
May	2,680	450	1,470	90,400
June	7,780	322	1,630	97,000
July	6,230	840	3,210	197,000
August	9,350	3,830	6,920	425,000
September	6,060	381	2,670	159,000
The year	9,350	30	1,410	1,020,000

SNAKE RIVER AT ALPINE, IDAHO.

LOCATION.—In T. 3 S., R. 46 E., 300 yards below ranch house, 1 mile below highway bridge at Alpine, Bonneville County, and the Idaho-Wyoming State line. Salt River enters just above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 20 to September 30, 1916.

GAGE.—Vertical staff in two sections on right bank; read by Mrs. W. W. Kizer and Mrs. Hattie Miller.

DISCHARGE MEASUREMENTS.—Made from highway bridge or by wading. Measurements of the flow of Snake River and of Salt River are combined to obtain the flow below mouth of Salt River.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. One channel at all stages. Control shifting but believed to have been permanent during period covered by record.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 8.86 feet at 7.30 p. m. June 20 (discharge, 26,100 second-feet); minimum stage recorded 3.50 feet at 9 a. m. September 23 (discharge, 3,300 second-feet).

ICE.—No information.

DIVERSIONS.—None above station.

REGULATION.—Flow controlled by storage at Jackson Lake reservoir, which was completed to a capacity of about 790,000 acre-feet in 1916.

ACCURACY.—Stage-discharge relation permanent during period covered by record. Rating curve fairly well defined between 2,500 and 27,000 second-feet. Gage read once daily to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of Snake River at Alpine, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
June 20	G. C. Baldwin	8.84	[a] 25,700
July 17	L. W. Roush	6.69	14,300
Sept. 5	G. C. Baldwin	5.71	9,360

[a] Surface velocities obtained and coefficient of 0.83 used to reduce to mean velocity.

NOTE.—Measurements were made of Snake River above mouth of Salt River and of Salt River and results added to give flow below mouth of Salt River.

Daily discharge, in second-feet, of Snake River at Alpine, Idaho, for the year ending Sept. 30, 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		16,700	13,600	9,860	16		15,600	13,600	4,480
2		17,200	14,600	9,860	17		14,100	14,100	3,660
3		17,800	11,600	9,860	18		12,600	15,100	3,480
4		18,900	10,700	9,450	19		12,600	14,600	3,480
5		16,700	11,600	9,450	20	25,800	10,700	14,600	3,480
6		16,700	11,600	9,450	21	23,400	10,700	14,600	3,480
7		16,700	10,700	9,450	22	19,400	10,300	13,600	3,480
8		17,800	11,600	9,450	23	18,900	9,450	12,100	3,300
9		17,800	13,100	8,290	24	18,900	9,050	11,600	3,480
10		17,800	13,100	8,290	25	18,300	9,050	11,600	3,480
11		18,300	13,600	7,930	26	14,100	9,050	11,200	3,480
12		18,900	13,600	7,240	27	15,100	9,450	9,860	3,480
13		16,200	13,600	6,910	28	16,700	9,860	9,860	3,480
14		15,600	6,600	6,010	29	17,800	9,860	9,860	3,480
15		14,600	13,600	5,200	30	17,800	11,600	9,860	3,480
					31		12,100	9,860	

Monthly discharge of Snake River at Alpine, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 20-30	25,800	14,100	18,700	408,000
July	18,900	9,050	14,000	861,000
August	15,100	6,600	12,200	750,000
September	9,860	3,300	6,000	357,000
The period				2,380,000

SNAKE RIVER NEAR HEISE, IDAHO.

LOCATION.—In sec. 5, T. 3 N., R. 41 E., 600 feet above the Anderson dam, in Bonneville County, 3 miles above Heise, and 25 miles below the site of 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, 1916.

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 cobblestones. 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 to dam and damage to crest caused by ice and high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from water-stage recorder, 8.78 feet at 8.30 a. m. June 20 (discharge, 28,100 second-feet); minimum stage recorded, 1.35 feet November 29 and 30 (discharge, 2,500 second-feet); actual minimum probably occurred during winter or spring.

1910–1916: Maximum stage recorded, 10.35 feet June 16 and 17, 1911 (discharge, 36,000 second-feet); minimum stage, 1.1 feet at 10 a. m. March 10, 1915 (discharge, 2,180 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—No large diversions above station. A small ditch of about 20 second-feet capacity takes out just above station.

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

ACCURACY.—Stage-discharge relation permanent during periods covered by records; affected by ice and changed slightly during winter. Rating curves well defined between 2,200 and 27,000 second-feet. Operation of water-stage recorder satisfactory except November 14 to March 19, and June 30 to July 13. Staff gage read to hundredths once daily November 28 to December 11, and July 2-13. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Snake River near Heise, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 20	A. W. Harrington	2.33	4,160	Aug. 24	L. W. Roush	5.05	11,900
May 30	L. W. Roush	4.81	12,000	Sept. 25	S. E. Vance, jr.[a]	2.40	4,220
July 19	do	5.50	14,000				

[a] State hydrographer.

Daily discharge, in second-feet, of Snake River near Heise, Idaho, for the year ending Sept. 30, 1916.

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,340	2,800	.....	.....	4,680	13,700	13,300	19,400	14,100	10,700
2	4,220	2,800	.....	.....	4,910	13,700	12,500	19,000	14,900	10,300
3	4,220	2,800	.....	.....	4,680	13,700	12,200	19,400	14,100	10,300
4	4,120	2,800	2,570	.....	4,560	14,900	12,900	21,100	12,500	10,300
5	4,010	2,800	2,570	.....	4,790	17,700	15,700	18,600	11,800	10,300
6	3,900	2,800	2,570	.....	4,790	19,600	17,300	18,600	12,500	10,300
7	3,800	2,800	2,570	.....	4,680	21,500	16,100	18,600	12,200	10,300
8	3,700	2,800	2,570	.....	4,910	20,700	16,100	18,600	12,200	9,990
9	3,700	2,800	2,570	.....	5,760	20,200	17,700	19,000	12,900	9,640
10	3,600	2,880	2,570	.....	6,610	19,400	19,800	18,600	14,100	9,300
11	3,600	2,800	2,570	.....	7,470	18,100	19,800	18,100	14,100	8,970
12	3,500	2,720	.....	.....	8,320	16,500	19,400	19,400	14,500	8,640
13	3,500	2,720	.....	.....	7,680	15,700	19,400	16,900	14,100	8,000
14	3,410	.....	.....	.....	7,680	12,500	19,800	16,900	10,700	7,370
15	3,320	.....	.....	.....	8,320	13,700	20,700	16,500	13,300	6,770
16	3,220	.....	.....	.....	8,640	12,900	17,700	16,100	14,100	5,920
17	3,220	.....	.....	.....	8,320	11,800	23,300	15,700	14,500	5,030
18	3,220	.....	.....	.....	8,970	11,100	24,600	14,900	15,300	4,560
19	3,140	.....	.....	.....	8,970	11,100	25,500	14,100	15,300	4,440
20	3,140	.....	.....	3,900	8,000	12,500	27,800	12,900	14,900	4,340
21	3,080	.....	.....	4,790	7,370	13,700	26,900	11,800	14,900	4,220
22	3,020	.....	.....	4,790	7,060	13,700	25,500	11,800	14,500	4,220
23	2,960	.....	.....	5,030	7,680	12,900	23,300	11,800	13,700	4,220
24	2,960	.....	.....	5,150	8,970	11,800	21,500	11,400	12,500	4,220
25	2,960	.....	.....	4,790	10,700	11,400	21,100	11,100	12,200	4,220
26	2,960	.....	.....	4,680	12,500	11,100	18,600	10,700	12,200	4,220
27	2,880	.....	.....	4,680	14,500	11,100	17,700	10,700	11,400	4,220
28	2,880	2,570	.....	4,910	16,500	11,400	19,400	10,700	10,700	4,220
29	2,880	2,570	.....	5,030	16,100	11,400	20,200	11,100	10,700	4,220
30	2,880	2,570	.....	4,790	14,900	11,400	19,800	11,400	10,700	4,220
31	2,880	.....	.....	4,560	.....	12,500	.....	13,300	10,700	.....

NOTE.—Discharge interpolated Oct. 21, 22, Apr. 9–11, May 6, June 30, July 1 and 6. Mean discharge estimated Nov. 14–27, 2,640 second-feet and Dec. 1–3 at 2,570 second-feet.

Monthly discharge of Snake River near Heise, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,340	2,880	3,390	208,000
November	2,880	.....	2,700	161,000
December 1–11	.....	2,570	2,570	56,100
March 20–31	5,150	3,900	4,760	113,000
April	16,500	4,560	8,300	494,000
May	21,500	11,100	14,300	879,000
June	27,800	12,200	19,500	1,160,000
July	21,100	10,700	15,400	947,000
August	15,300	10,700	13,100	806,000
September	10,700	4,220	6,920	412,000

SNAKE RIVER NEAR SHELLEY, IDAHO.

LOCATION.—In sec. 17, T. 1 N., R. 37 E., about a quarter of a 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, 1916.

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

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 gage and control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 12.3 feet June 21 and 22 (discharge, 26,500 second-feet); minimum stage, 5.72 feet at 6 p. m. November 27 (discharge, 3,000 second-feet); actual minimum probably occurred during winter.

1915–16: Maximum stage, from water-stage recorder, June 21 and 22, 1916; minimum stage, 4.88 feet at 4 a. m. September 2, 1915 (discharge, 1,800 second-feet).

ICE.—Stage-discharge relation probably seriously affected by ice; observations discontinued during the winter.

DIVERSIONS.—Practically the entire natural summer flow of the river above the station is appropriated by numerous diversions in the Idaho Falls district.

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

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except during May and June, when inlet pipe was clogged. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records good.

Discharge measurements of Snake River near Shelley, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 9	G. C. Baldwin	6.25	3,880	July 22	L. W. Roush	7.56	8,770
Mar. 16	A. W. Harrington	6.26	3,910	Aug. 22	do	8.18	10,100
May 27	L. W. Roush	8.60	12,300	Sept. 17	G. C. Baldwin	6.88	5,700
June 13	G. C. Baldwin	10.20	17,800				

NOTE.—All gage heights refer to outside staff gage.

Daily discharge, in second-feet, of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,120	3,620	.....	5,880	.....	12,600	15,400	8,140	6,820
2	4,390	3,620	.....	5,880	.....	12,600	14,600	8,480	6,820
3	4,390	3,580	.....	6,040	.....	12,300	14,600	8,660	6,980
4	4,390	3,580	.....	5,880	.....	12,800	16,200	7,300	7,140
5	4,530	3,580	.....	6,040	.....	13,300	17,400	6,340	7,300
6	4,390	3,550	.....	6,190	.....	13,800	15,400	6,340	7,470
7	4,390	3,530	.....	6,190	.....	14,300	14,600	6,820	7,640
8	4,260	3,550	.....	6,040	.....	14,800	14,200	6,500	7,640
9	4,260	3,550	.....	6,190	.....	15,300	14,200	6,820	7,640
10	4,120	3,530	.....	6,660	.....	15,800	14,600	7,970	7,300
11	4,260	3,530	.....	7,470	.....	16,500	14,200	8,660	7,300
12	4,260	3,530	.....	8,830	.....	17,100	15,000	8,830	7,640
13	4,120	3,480	.....	9,180	.....	17,800	15,400	9,350	7,640
14	4,080	3,620	.....	9,000	.....	17,400	14,200	9,180	6,980
15	4,040	.....	.....	8,830	.....	17,800	13,000	6,500	6,660
16	4,000	.....	3,930	9,350	.....	18,600	12,600	8,310	6,190
17	4,000	.....	3,930	9,700	.....	19,400	12,300	8,830	5,580
18	4,000	.....	4,180	9,350	.....	21,900	11,500	9,180	4,990
19	3,940	.....	4,440	10,100	.....	23,100	10,800	10,100	4,580
20	3,870	3,750	4,790	10,100	.....	24,400	10,400	10,100	4,310
21	3,870	3,750	5,140	9,350	.....	26,500	8,660	10,100	4,180
22	3,750	3,620	6,040	9,000	.....	26,500	7,970	10,100	3,930
23	3,680	3,620	6,340	8,830	.....	25,200	7,640	9,700	3,690
24	3,620	3,620	6,500	9,000	.....	22,300	7,140	9,000	3,460
25	3,660	3,510	6,660	10,100	.....	20,200	6,660	8,310	3,460
26	3,710	3,510	6,190	12,600	11,500	19,400	6,340	7,970	3,350
27	3,750	3,280	5,880	15,400	11,500	15,000	6,190	7,800	3,240
28	3,680	.....	5,730	17,400	11,500	13,800	6,190	7,140	3,350
29	3,620	.....	6,190	19,000	11,500	14,200	6,500	6,820	3,690
30	3,620	.....	6,190	19,400	11,200	15,800	6,980	6,320	3,690
31	3,620	.....	5,880	.....	11,200	.....	7,300	6,820	.....

NOTE.—Discharge Oct. 1 to Nov. 27 determined from a well-defined rating curve referred to hook gage in well; Mar. 16 to Sept. 30, from a well-defined curve referred to staff gage outside of well. Discharge interpolated, on account of lack of gage heights, Oct. 14, 15, 19, 23, 25, 26, 28, Mar. 20, and June 4–9 and 11–12. Mean discharge estimated as follows: Nov. 15–19, 3,680 second-feet; Nov. 28–30, 3,300 second-feet; May 1–25, 16,000 second-feet.

Monthly discharge of Snake River near Shelley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,530	3,620	4,010	347,000
November	.....	.....	3,560	212,000
March 16-31	6,660	3,930	5,500	175,000
April	19,400	5,880	9,430	561,000
May	.....	11,200	15,200	935,000
June	26,500	12,300	17,700	1,050,000
July	17,400	6,190	11,600	713,000
August	10,100	6,340	8,160	502,000
September	7,640	3,240	5,690	339,000

SNAKE RIVER AT PORTERVILLE BRIDGE, NEAR BLACKFOOT, IDAHO.

LOCATION.—About on line between secs. 23 and 26, T. 2 S., R. 35 E., at Porterville highway bridge, about 3 miles north of Blackfoot, Bingham County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 12 to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff on downstream side of bridge at right abutment; read by W. D. Chapman.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Bed composed of irregular lava outcrop, coarse gravel, and boulders. Control is diagonal dam of loose rock used to divert water into Danskin canal about a third of a mile downstream; probably permanent during period of record.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8 feet at 4.30 p. m. June 21 (discharge, determined from extension of rating curve, 22,600 second-feet); minimum stage recorded, 2.84 feet at 5 p. m. September 29 (measured discharge, 2,410 second-feet).

ICE.—No information.

DIVERSIONS.—Numerous both above and below gage. Danskin canal, diverting water about a third of a mile below, has an estimated capacity of about 200 second-feet.

REGULATION.—Flow of river partly regulated at outlet of Jackson Lake dam, in Wyoming, and also by the regulation of numerous canal head gates in Idaho Falls district above.

ACCURACY.—Stage-discharge relation practically permanent during period of records. Rating curve fairly well defined between 2,000 and 16,000 second-feet. Gage read once daily to quarter-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Snake River at Porterville Bridge, near Blackfoot, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 12	G. C. Baldwin	6.54	16,200	Sept. 15	G. C. Baldwin	3.84	5,510
July 24	L. W. Roush	3.84	5,650	29	L. W. Roush	2.84	2,410
Aug. 26	do	4.16	6,900				

Daily discharge, in second-feet, of Snake River at Porterville Bridge, near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		13,600	6,920	5,460	16	16,600	11,600	6,550	5,110
2		12,800	6,920	5,460	17	17,400	11,600	7,670	4,760
3		14,000	7,300	5,460	18	18,700	10,400	8,820	4,090
4		14,400	6,180	6,180	19	20,000	9,980	9,590	.....
5		15,700	4,080	6,180	20	20,900	9,200	9,200	.....
6		14,400	4,760	6,550	21	22,600	7,670	9,200	.....
7		13,200	4,760	6,550	22	21,800	6,920	8,430	.....
8		12,800	4,760	6,550	23	21,800	6,550	8,430	.....
9		12,400	4,090	6,550	24	20,000	6,180	8,050	.....
10		12,400	5,820	6,550	25	17,400	5,460	6,920	.....
11		12,800	6,920	6,180	26	15,700	4,760	6,550	.....
12	16,600	13,200	6,920	6,550	27	13,200	4,420	6,550	.....
13	16,100	12,800	7,670	6,180	28	12,000	4,760	6,180	.....
14	15,300	12,400	7,670	5,820	29	12,800	4,760	5,460	.....
15	15,700	12,000	6,180	5,460	30	14,000	5,460	5,460	.....
					31		6,180	5,460	.....

NOTE.—Water surface below gage Sept. 19-30; mean discharge, estimated from records at other stations, 3,000 second-feet.

Monthly discharge of Snake River at Porterville Bridge, near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 12-30	22,600	12,000	17,300	652,000
July	15,700	4,420	10,200	627,000
August	9,590	4,090	6,760	416,000
September	6,550	.....	4,720	281,000
The period	.....	.....	.....	1,980,000

SNAKE RIVER NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 31, T. 3 S., R. 34 E., about a quarter of a 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 the one at Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 6, 1910, to September 30, 1916.

GAGE.—Friez water-stage recorder on right bank; installed July 6, 1913, at same site 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 June 25, 1911, and 0.03 foot October 1, 1912, when new staff gage was installed. Observer, James A. Clough.

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

CHANNEL AND CONTROL.—Bed composed of very coarse gravel. Two channels at low and medium stages. Control shifts slightly during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.36 feet June 22 (discharge, 24,700 second-feet); minimum stage recorded, 2.73 feet at 3.50 p. m. December 31 (discharge, 960 second-feet).

1910–1916: 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).

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

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

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

ACCURACY.—Stage-discharge relation changed slightly in June. Two rating curves used, well defined between 400 and 20,000 second-feet, one applicable October 1 to June 20, the other June 21 to September 30. Operation of water-stage recorder satisfactory except as noted in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records good.

Discharge measurements of Snake River near Blackfoot, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 14	A. W. Harrington	4.78	3,720
May 28	L. W. Roush	7.50	11,300
July 27	....do	5.30	4,940

Daily discharge, in second-feet, of Snake River near Blackfoot, Idaho, for the year ending Sept, 30, 1916.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,980	.....	1,430	1,720	2,920	5,980	19,200	11,180	13,600	6,460	5,580
2	4,080	.....	1,480	1,660	2,920	5,980	17,800	13,000	12,700	6,730	5,460
3	4,180	.....	1,410	1,660	2,840	6,100	16,900	12,600	13,100	7,150	5,580
4	4,180	.....	1,740	1,840	3,000	6,100	16,900	11,800	14,800	6,200	5,950
5	4,180	.....	1,900	2,030	3,250	5,980	17,400	11,800	16,200	4,780	5,950
6	4,180	.....	2,760	2,160	3,160	6,230	19,700	13,400	14,800	4,460	6,200
7	4,180	.....	2,920	2,380	3,420	6,360	21,600	14,700	13,600	4,680	6,330
8	4,080	4,180	2,840	2,680	3,520	6,230	23,500	13,800	12,700	4,680	6,330
9	3,980	4,080	2,680	2,920	3,340	6,230	23,500	13,000	12,700	4,260	6,330
10	.....	3,600	2,680	3,080	3,520	6,490	23,000	13,800	12,700	4,890	6,460
11	.....	3,600	2,680	3,340	3,700	7,180	22,600	15,600	13,100	6,080	6,330
12	.....	3,340	2,520	3,340	3,880	8,530	21,100	16,400	13,100	6,200	6,460
13	.....	3,080	2,680	3,250	3,980	9,880	18,700	16,400	13,600	6,870	6,600
14	.....	3,340	2,520	3,250	3,790	9,880	16,900	15,600	13,100	7,010	6,330
15	.....	3,250	2,300	3,080	3,790	9,520	15,100	15,600	11,900	5,700	5,820
16	.....	2,920	2,100	3,000	3,790	9,520	13,400	16,000	11,100	4,890	5,460
17	.....	2,520	2,030	3,000	3,790	10,200	11,400	17,400	11,100	6,870	5,000
18	.....	1,900	2,160	3,080	3,790	10,200	9,880	19,200	10,800	7,150	4,260
19	.....	1,270	2,100	3,160	3,980	10,600	8,530	21,100	10,000	7,880	3,770
20	.....	1,320	1,840	3,160	4,380	11,000	7,910	21,600	9,320	8,660	3,320
21	.....	1,780	1,750	3,160	4,590	10,200	9,180	24,100	8,030	8,660	3,060
22	.....	2,240	2,100	3,160	5,480	9,880	11,000	24,700	6,600	8,340	2,820
23	.....	3,340	2,520	3,340	6,360	9,520	12,600	23,700	6,200	8,340	2,510
24	.....	3,420	2,600	3,250	6,360	9,180	12,200	22,300	5,820	7,730	2,360
25	.....	3,520	2,600	3,250	6,620	10,200	11,400	19,900	5,360	6,870	2,290
26	.....	3,080	2,600	3,340	6,490	11,800	11,400	18,000	4,890	6,460	2,360
27	.....	2,450	2,450	3,420	6,100	14,200	11,400	14,800	4,890	6,330	2,290
28	.....	2,520	2,520	3,160	5,850	16,400	11,400	12,300	4,780	6,080	2,290
29	.....	1,840	2,240	3,080	6,100	18,700	11,000	12,300	5,120	5,460	2,440
30	.....	1,430	1,960	.....	6,360	20,200	10,600	13,600	5,700	5,340	2,580
31	.....	1,020	1,620	.....	6,230	.....	11,000	.....	5,950	5,460	.....

NOTE.—No record Oct. 10 to Dec. 7.

Monthly discharge of Snake River near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-9	4,180	3,980	4,110	73,400
December 8-31	4,180	1,020	2,710	129,000
January	2,920	1,410	2,250	138,000
February	3,420	1,660	2,860	165,000
March	6,620	2,840	4,430	272,000
April	20,200	5,980	9,620	572,000
May	23,500	7,910	15,100	928,000
June	24,700	11,800	16,300	970,000
July	16,200	4,780	10,200	627,000
August	8,660	4,260	6,340	390,000
September	6,600	2,290	4,620	275,000

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 station near Blackfoot and that at Neeley. Raft River enters about 18 miles below Neeley.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 17, 1906, to September 30, 1916.

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

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of river at measuring section rough, especially near right bank. Banks high and clean. One channel at all stages. Control is of lava rock, probably partly overlain with coarse gravel; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder 9.88 feet June 23 (discharge, 26,800 second-feet); minimum stage, 4.5 feet December 26; minimum discharge of about 3,300 second-feet probably occurred about January 1.

1906–1916: 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).

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

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

REGULATION.—Summer flow augmented by stored water from Jackson Lake for use on the Minidoka project and Twin Falls tracts.

ACCURACY.—Stage-discharge relation not permanent. Two well-defined rating curves used, one applicable October 1 to January 27, the other February 10 to September 30. Operation of water-stage recorder satisfactory except for short periods mentioned in footnote to daily discharge table. Discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage-height graph. Records fair for December, good for rest of year.

Discharge measurements of Snake River at Neeley, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 24	G. C. Baldwin	5.29	6,100	July 23	G. C. Baldwin	6.13	8,710
June 3	L. W. Roush	7.72	15,400	28	L. W. Roush	5.74	7,410
3	do	7.73	15,700	28	do	5.72	7,470
24	do	9.75	26,200	Aug. 30	do	5.89	8,160

Daily discharge, in second-feet, of Snake River at Neeley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,380	5,920	6,220	.....	.....	5,760	9,280	22,400	14,000	15,800	8,550	7,850
2	6,380	5,920	6,220	.....	.....	5,760	9,090	21,300	14,900	15,800	9,090	7,850
3	6,380	5,920	6,220	.....	.....	5,610	9,090	20,300	15,300	15,300	9,460	7,680
4	6,380	5,920	6,220	.....	.....	5,610	9,090	19,800	15,300	15,800	9,460	8,020
5	6,380	5,770	6,220	.....	.....	6,060	9,090	19,800	14,400	17,800	8,370	8,200
6	6,380	5,770	6,690	.....	.....	6,220	9,090	20,800	14,400	18,200	7,010	8,370
7	6,380	5,920	7,170	.....	.....	6,220	9,090	22,900	15,800	16,800	6,850	8,550
8	6,380	5,920	7,840	.....	.....	6,370	9,090	24,000	16,800	15,800	7,010	8,550
9	6,380	5,920	7,840	.....	.....	6,370	8,910	26,200	15,800	15,300	6,850	8,730
10	6,380	5,920	.....	5,050	5,760	6,370	9,090	26,200	15,300	14,900	6,850	8,730
11	6,380	6,070	.....	5,050	7,010	6,690	9,460	26,200	16,800	15,300	7,680	8,730
12	6,380	6,070	.....	4,780	7,010	6,850	10,200	25,100	17,800	15,300	8,550	8,730
13	6,530	6,070	.....	.....	6,060	7,340	11,800	23,500	18,800	15,800	8,730	8,910
14	6,380	5,920	.....	.....	6,060	7,180	12,700	20,800	18,200	15,800	9,280	8,910
15	6,380	5,620	.....	.....	6,060	7,010	12,700	18,800	17,800	14,900	9,280	8,550
16	6,220	6,220	.....	.....	5,760	7,010	12,200	17,300	17,800	14,300	7,510	8,200
17	6,120	6,260	.....	.....	5,760	6,850	12,700	15,800	18,200	13,700	8,200	7,850
18	6,020	6,300	.....	.....	5,760	6,850	13,100	14,000	19,800	13,000	9,280	7,340
19	5,920	6,340	.....	.....	5,760	6,850	13,100	12,200	21,900	12,400	9,650	6,690
20	5,920	6,380	.....	.....	5,760	7,180	13,500	11,000	22,900	11,800	10,600	6,220
21	5,920	6,380	.....	.....	5,760	7,510	13,500	11,000	24,000	11,400	11,000	5,760
22	6,070	6,380	.....	.....	5,760	8,020	12,700	12,700	26,200	9,840	11,000	5,610
23	6,070	6,380	5,050	.....	5,760	9,090	12,200	14,400	26,800	8,910	10,600	5,320
24	6,070	6,530	4,000	.....	6,060	9,650	12,200	14,900	26,200	8,550	10,600	5,030
25	5,920	6,430	4,000	.....	5,910	9,650	12,200	14,900	24,000	8,020	9,840	5,030
26	5,920	6,320	3,760	5,050	5,910	10,000	13,100	14,400	21,900	7,680	8,910	4,890
27	5,920	6,220	4,250	4,780	6,220	9,650	15,300	14,400	19,800	7,340	8,550	4,890
28	6,070	6,220	.....	.....	5,910	9,280	17,300	14,400	16,300	7,510	8,550	4,760
29	6,070	6,220	.....	.....	5,910	9,280	19,800	14,400	14,900	7,510	8,200	4,890
30	6,070	6,220	.....	.....	.....	9,460	21,900	14,000	14,900	7,850	7,850	5,030
31	5,920	.....	.....	.....	.....	9,650	.....	13,500	.....	8,370	7,850	.....

NOTE.—Discharge interpolated, because of lack of gage heights, Oct. 10, 17, 18, Nov. 17–19, 25, 26, Nov. 29 to Dec. 3 and July 16–19. Mean discharge estimated, on account of ice, from observer's notes, weather records, and record obtained at Blackfoot station, as follows: Dec. 10–18, 5,910 second-feet; Dec. 19–22, 3,940 second-feet; Dec. 28–31, 4,240 second-feet; Jan. 1–9, 4,350 second-feet; Jan. 13–25, 4,570 second-feet; Jan. 28–31, 4,260 second-feet; Feb. 1–9, 4,570 second-feet.

Monthly discharge of Snake River at Neeley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	6,530	5,920	6,200	381,000
November	6,530	5,620	6,120	364,000
December	.....	.....	5,410	333,000
January	.....	.....	4,530	279,000
February	7,010	.....	5,550	319,000
March	10,000	5,610	7,460	459,000
April	21,900	8,910	12,100	720,000
May	26,200	11,000	18,100	1,110,000
June	26,800	14,000	18,600	1,110,000
July	18,200	7,340	12,800	787,000
August	11,000	6,850	8,750	538,000
September	8,910	4,760	7,130	424,000
The year	26,800	.....	9,400	6,820,000

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 6 miles above the Montgomery's ferry station, which was discontinued December 31, 1910. Raft River enters between the station at Neeley and that near Minidoka.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21, 1910, to September 30, 1916.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.47 feet at 11.20 a. m. May 11 (discharge, 24,200 second-feet); minimum stage recorded, 5.40 feet September 29 (discharge, 3,280 second-feet).

1910–1916: 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).

ICE.—Some shore ice is formed in vicinity of gage; stage-discharge relation slightly affected at times.

DIVERSIONS.—The North Side and South Side Minidoka canals divert water between the Neeley and Minidoka stations. (See pp. 72–74.) The nearest diversions below the station are the Twin Falls North Side and South Side canals at Milner (See pp. 79–83).

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

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory except for short periods during the winter. Records good.

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

Discharge measurements of Snake River near Minidoka, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 30	G. C. Baldwin	6.22	5,030	May 28	G. C. Baldwin	9.05	13,800
Dec. 7	do	7.80	9,240	June 26	L. W. Roush	10.70	20,900
Mar. 24	A. W. Harrington	7.84	9,330	July 22	G. C. Baldwin	7.10	7,320
Apr. 24	L. W. Roush	8.38	11,800	Sept. 13	L. W. Roush	6.35	5,320

Daily discharge, in second-feet, of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6,870	5,340	5,220	5,960	.....	6,340	9,360	20,000	12,200	12,600	6,210	5,460
2	7,000	5,340	4,980	5,460	.....	6,340	8,730	19,600	13,000	13,000	6.210	5,460
3	6,600	5,340	4,980	5,460	.....	6,340	9,040	18,300	13,800	13,400	5.960	5,460
4	6,470	5,340	5,100	5,220	.....	6,340	9,040	17,500	13,400	13,800	5,830	5,460
5	5,580	5,580	5,340	5,100	.....	6,210	9,360	17,100	12,600	14,200	6,210	5,340
6	3,880	5,460	5,830	5,100	4,760	6,470	9,680	17,100	13,000	15,000	5,960	5,460
7	4,100	5,340	7,280	5,340	5,340	5,960	9,040	20,500	13,400	15,000	5,960	6,740
8	4,420	5,700	5,460	5.700	5,830	6,210	8,730	21,800	14,200	13,800	6,210	8,140
9	5,580	5,600	6,470	6,080	5,960	5,700	8,430	21,300	14,200	12,200	5,960	9,360
10	5,220	5,510	6,870	5,830	6,470	5,830	8,730	23,100	13,400	11,100	5,700	7,560
11	5,700	5,410	6,210	5,760	7,280	5,960	9,040	23,900	13,800	9,360	5,700	5,220
12	5,580	5,320	6 470	5,760	7,560	6,210	10,700	22,200	14,600	10,000	5,700	5,220
13	5,580	5,220	5,960	5.700	6,870	6,600	11,800	20,500	15.800	10,700	5,700	5,830
14	5,460	5,520	5,700	5,700	6,600	6,740	12,600	19,200	15,000	11,800	5,960	7,560
15	5,460	5,830	5,960	5,580	6,340	7,000	13,000	18,300	14,200	12,600	5,960	7,560
16	5,460	5,960	6.080	6,080	6,210	6,870	13,800	16,200	13,800	11,800	5,830	7,560
17	5,340	6,010	5,700	.....	5,960	6,870	13,400	14,600	15,000	10,700	5,830	6,600
18	5,340	6,060	5,580	.....	5,960	6,870	13,000	13.000	15,800	9,360	5,700	5.580
19	5,100	6,110	5,100	.....	5,960	6,740	11,400	11,800	17,500	10,400	5,580	4,980
20	5,100	6,160	4,420	.....	5,960	7,000	12,200	10,400	19,200	9,680	5,700	4,530
21	5,220	6,210	4,310	.....	6,080	7.280	12,600	9,360	20,500	7,840	5,960	4,100
22	5,100	6,210	4,530	.....	6,080	7,560	12,600	9,680	22.200	7,280	6,870	4,100
21	4,870	6,080	4,870	5,100	6,080	8,730	11,800	11,400	23,500	6,870	8,140	4,100
24	5,340	6,080	5,830	.....	6,080	9,360	11,100	12,600	23,500	4,870	8,430	3,780
25	.....	6,140	5,960	.....	6,080	9,680	10,700	13,800	22,600	5,460	7,560	3,680
26	.....	6,210	5,960	.....	6.080	9,680	11,100	15,000	20,900	6,470	7.560	3,780
27	.....	6.280	5.960	.....	6,210	9,680	11,800	15,400	19,200	6,210	7,280	3,580
28	.....	6,340	5,960	.....	6,340	9,360	13,800	14,600	17,100	5,830	6,340	3,380
29	.....	5,700	5,960	.....	6,340	9,360	16,200	13,400	14,200	5,830	5,580	3,280
30	5,100	5,460	5,960	.....	.....	9,360	17,900	13,000	12,200	5,700	5,340	3,480
31	5,100	.....	5,960	.....	.....	9,360	.....	12,600	.....	6,210	5,340	.....

NOTE.—Stage-discharge relation believed to have been affected by ice Jan. 11, 12, 17–22, and Jan. 24 to Feb. 5. Discharge interpolated because of lack of gage-height record, Nov. 9–12, 14, 17–20, 25–27, 30, Dec. 1, and 26–31. Mean discharge estimated as follows: Oct. 25–29, 5,220 second-feet; Jan. 11 and 12, 5,760 second-feet; Jan. 17–22, 5,590 second-feet; Jan. 24–31, 5,000 second-feet; and Feb. 1–5, 4,900 second-feet.

Monthly discharge of Snake River near Minidoka, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	7,000	3,880	5,380	331,000
November	6,340	5,220	5,760	343,000
December	7,280	4,310	5,680	349,000
January	.....	.....	5,430	334.000
February	7,560	.....	5,960	343,000
March	9,680	5.700	7,360	453,000
April	17,900	8,430	11,400	678,000
May	23,900	9.360	16,400	1,010,000
June	23,500	12,200	16,100	958,000
July	15,000	5,700	9.970	613,000
August	8,430	5.340	6,200	381,000
September	9,360	3,280	5,410	322.000
The year	23,900	3,280	8,420	6,120,000

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, 1916.

GAGE.—Staff gage at dam. A Lietz and a Friez water stage recorder have also been used for short periods. All gages have 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.85	8.50	8.30	7.55	8.60	7.65	7.00	9.96	10.10	10.30	10.16	10.14
2	9.30	9.20	8.25	7.33	8.45	7.50	6.70	9.80	10.08	10.38	10.30	10.12
3	9.60	8.80	7.85	8.00	8.35	7.30	6.70	9.92	10.22	10.18	10.34	10.11
4	9.85	8.60	7.90	8.57	8.35	7.05	7.00	9.94	10.10	10.30	10 30	10.18
5	8.20	8.40	8.65	8.58	8.35	7.45	7.60	9.98	10.00	10.34	10.23	10.17
6	8.00	8.35	8.80	8.70	8.45	6.50	8.40	10.04	10.00	10.42	10.40	10.14
7	8.30	8.20	8.20	8.70	8.75	7.40	8.60	10.00	10.10	10.38	10.40	10.19
8	8.50	8.30	8.80	8.87	8.70	7.50	8.64	10.10	10.18	10.30	10.40	10.22
9	8.80	8.25	8.70	8.80	8.65	7.50	8.70	9.94	10.05	10.24	10.40	10.05
10	9.05	8.00	8.85	8.90	8.40	7.35	8.74	9.96	9.95	10.24	10.45	9.96
11	9.10	8.10	8.65	8.75	8.70	7.30	8.68	10.10	10.10	10.42	10.34	9.82
12	8.80	8.30	8.45	8.70	8.10	7.30	8.70	9.98	10.10	10.12	10.28	10.05
13	8.50	8.25	8.45	8.80	7.85	7.15	9.32	10.00	10.22	10.44	.....	10.08
14	7.90	8.45	8.45	8.80	8.15	7.40	9.65	9.98	10.24	10.34	.....	10.15
15	8.40	8.40	8.30	8.90	8.10	7.30	9.60	9.96	10.12	10.33	10.45	10.06
16	8.45	8.25	8.50	8.70	7.90	7.15	9.76	10.12	10.16	10.33	10.40	9.93
17	8.40	8.40	8.40	8.70	7.75	7.00	9.72	10.00	10.38	10.20	9.70	6.61
18	8.50	8.60	8.50	8.50	7.75	6.85	9.72	10.00	10.30	10.20	10.30	9.67
19	8.45	8.30	8.40	8.60	7.85	6.80	9.55	10.00	10.40	10.40	10.28	9.34
20	8.45	.....	8.10	8.80	7.90	6.80	10.00	10.00	10.40	10.38	10.40	9.68
21	8.50	8.90	8.00	8.70	7.90	6.60	9.96	10.00	10.27	10.26	10.27	9.78
22	8.45	8.55	8.00	8.55	7.90	6.50	9.90	9.95	10.40	10.26	10.34	9.68
23	8.50	8.56	7.76	8.40	7.80	6.70	9.90	10.24	10.34	10.40	10.39	9.40
24	8.45	8.15	8.00	8.50	7.80	7.00	9.88	10.04	10.26	10.30	10.30	9.38
25	8.50	8.60	8.37	8.80	7.80	7.15	9.90	10.12	10.26	9.50	10.13	9.10
26	8.65	8.80	8.35	8.80	7.90	7.00	9.90	10.18	10.20	9.60	10.34	8.70
27	8.60	8.90	8.30	8.60	7.90	7.15	10.05	10.08	10.20	10.00	10.30	9.00
28	8.50	8.60	8.40	8.50	8.15	6.90	9.96	10.20	10.20	10.10	10.39	9.60
29	8.60	8.25	8.20	8.30	7.70	7.00	10.04	10.02	10.10	9.94	10.12	9.38
30	8.60	8.45	8.00	.....	.....	7.40	10.12	10.00	10.20	10.00	10.14	9.20
31	8.20	.....	7.75	8.50	.....	7.35	.....	10.20	.....	9.94	10.16	.....

SNAKE RIVER AT MILNER, IDAHO.

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

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1916.

GAGE.—Staff gage in three sections on left bank; installed October 20, 1909; high and low sections vertical, middle section inclined; read by F. W. Deming October 1 to middle of August and thereafter by C. E. Tappan. An auxiliary low-water gage is on right bank about 100 yards below the main gage, to which it bears no definite relation; datum of auxiliary gage lowered 1.00 foot July 30 and 1.00 foot September 7, 1916. Gage used prior to October 20, 1909, was a vertical staff on the right bank at about the same datum as the present gage.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 15.7 feet at 8 a. m., May 11 (discharge, 19,000 second-feet); minimum stage recorded, 1.16 feet (auxiliary gage) August 12 (discharge, 15 second-feet).

1909–1916: Maximum stage recorded, 20.1 feet June 12, 1909 (discharge, 44,400 second-feet); minimum stage recorded, −1.08 feet (old datum on auxiliary gage) August 17–18, 1915 (discharge, 9 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice; open-water rating curve assumed applicable. Observations discontinued during part of winter because gages are inaccessible to observer.

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 during the irrigation season is regulated at the Milner dam.

ACCURACY.—Stage-discharge relation practically permanent during the year. Rating curve fairly well defined. Gage read to hundredths twice daily while water is being released from storage, and once daily during rest of year. Daily discharge ascertained by applying mean daily gage height to rating table. Records only fair because of infrequency of gage readings and sudden changes in flow.

COOPERATION.—Gage-height record furnished by the Twin Falls Canal Co., and some discharge measurements were made by an assistant of the State Engineer.

Discharge measurements of Snake River at Milner, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 18	L. W. Roush	13.14	9,570	Aug. 12	C. E. Tappan	c 1.17	14.0
June 29	do	13.29	9,430	19	L. W. Roush	10.61	3,010
July 27	Finkelnburg [a] and McConnel. [b]	c 2.38	63.1	22	C. E. Tappan	c 2.20	43.8
Aug. 10	C. E. Tappan [b]	c 1.58	25.2	Sept. 11	L. W. Roush	c 1.61	26.1

[a] Employee of North Side Twin Falls Canal Co.
[b] Assistant to State engineer.
[c] Gage height referred to low water gage as regraduated Sept. 7, 1916.

Daily discharge, in second-feet, of Snake River at Milner, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,960	5,130	5,130	.....	5,910	10,800	15,400	7,680	7,060	100	17
2	1,300	5,640	5,130	.....	5,640	10,000	17,000	7,680	8,000	80	16
3	4,230	5,640	5,130	.....	5,380	10,000	13,800	8,000	8,330	94	17
4	8,330	5,910	.....	.....	5,130	8,000	13,000	9,340	8,660	58	18
5	7,060	6,190	.....	.....	5,130	6,190	13,000	8,330	9,530	23	16
6	4,440	6,190	.....	.....	4,890	8,000	12,200	6,760	10,400	55	16
7	4,890	5,910	4,440	.....	5,380	7,370	12,200	8,000	10,000	87	15
8	5,130	6,190	5,640	6,760	5,640	7,370	16,200	9,340	9,690	27	438
9	5,640	6,190	5,380	7,060	6,190	7,370	16,600	8,330	7,680	23	3,320
10	7,060	5,640	7,060	8,000	5,910	7,370	16,600	8,000	4,890	26	3,150
11	7,060	5,910	6,190	8,660	5,910	6,780	19,000	8,330	2,990	21	1,130
12	7,060	5,910	5,910	8,000	5,910	6,190	18,600	9,340	4,660	15	16
13	5,640	5,910	5,640	6,760	5,380	8,330	15,800	10,400	4,660	16	76
14	5,640	6,190	4,660	6,190	6,190	9,000	15,000	11,500	5,910	17	1,650
15	5,640	6,190	4,660	5,640	6,760	8,660	15,000	9,000	6,760	18	2,540
16	5,640	5,640	4,890	5,640	6,470	9,690	14,600	7,370	7,370	23	2,540
17	5,640	.....	4,890	5,640	6,760	9,340	11,900	8,000	5,910	2,230	2,990
18	8,660	.....	4,890	5,640	6,470	9,340	9,000	9,000	4,440	3,150	2,990
19	5,640	.....	4,890	5,640	6,470	8,660	7,060	11,100	3,840	2,640	926
20	5,640	.....	4,660	5,640	7,370	11,500	5,130	13,000	5,130	36	18
21	5,640	.....	4,660	5,640	7,060	11,100	4,660	14,600	2,840	1,250	20
22	5,640	6,190	4,660	5,130	7,370	10,400	4,230	15,400	1,440	1,010	19
23	5,640	6,190	4,440	5,130	7,370	10,400	5,130	17,800	1,310	2,320	21
24	5,640	.....	4,660	5,130	8,000	9,340	6,760	18,600	940	3,320	21
25	5,640	.....	4,890	5,380	8,660	9,340	8,000	17,800	648	2,100	20
26	5,640	.....	4,280	5,640	9,000	8,000	8,660	17,000	356	562	18
27	5,640	5,910	3,660	5,640	8,660	9,000	11,500	15,400	64	404	18
28	5,640	.....	5,380	6,760	8,660	9,340	11,500	12,600	62	340	24
29	5,640	.....	5,380	5,640	9,340	11,500	9,340	8,000	60	129	18
30	5,640	.....	5,130	.....	10,800	13,800	8,000	6,760	58	24	21
31	5,380	.....	4,000	.....	9,340	.....	8,000	.....	56	20	.....

NOTE.—Discharge interpolated or estimated, because of lack of gage heights Dec. 26, 31, Apr. 11, July 3, 5, 25, 26, 28, 29, 30, and Aug. 1. Mean discharge estimated from records at other stations as follows: Nov. 17–21, 5,900 second-feet; Nov. 24–26, 5,400 second-feet; Nov. 28-30, 5,900 second-feet; Dec. 4–6, 4,000 second-feet. No record Jan. 1 to Feb. 7.

Monthly discharge of Snake River at Milner, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	8,660	1,300	5,620	346,000
November	.....	5,130	5,870	349,000
December	7,060	3,660	4,910	302,000
February 8–29	8,660	5,130	6,150	268,000
March	10,800	4,890	6,880	423,000
April	13,800	6,190	9,070	540,000
May	19,000	4,230	11,700	719,000
June	18,600	6,760	10,700	637,000
July	10,400	56	4,640	285,000
August	3,320	15	652	40,100
September	3,320	15	737	43,900

89941°—19—WSP 443——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 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, 1916.

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 the bridge.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.25 feet at 6.30 p. m. May 11 (discharge, 20,200 second-feet); minimum stage recorded, 2.32 feet morning and evening of August 12 (discharge, 595 second-feet).

1911–1916: 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 27–30 July 1–4, 9–16, 18–20, 28–29, and 31, August 1–3, 6–7, 1915 (discharge, 468 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice. Open-channel rating curve assumed applicable to winter flow.

DIVERSIONS.—No water is diverted from the river between this station and that at Milner, except by small ranch ditches.

REGULATION.—Flow past the station is regulated directly by the diversions of the North Side 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 twice daily to quarter-tenths. Daily discharge ascertained by applying daily gage height 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, 1916.

[Made by L. W. Roush.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 2	7.30	10,100
Sept. 6	2.41	637

Daily discharge, in second-feet, of Snake River near Twin Falls, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	3,000	5,280	5,040	4,370	4,590	6,270	10,800	15,700	7,880	7,060	625	655
2	7,320	6,020	5,520	3,740	4,370	5,760	10,200	17,500	7,880	7,600	655	655
3	7,060	7,060	5,520	2,670	4,370	6,020	10,200	14,400	8,160	8,720	655	655
4	9,300	6,530	4,590	3,360	4,160	5,760	8,440	13,400	9,300	8,720	655	655
5	7,880	6,530	4,160	3,740	4,160	5,520	6,790	13,000	8,440	8,720	655	655
6	6,020	6,270	4,160	3,940	4,370	5,520	7,600	12,700	7,600	9,900	655	655
7	4,370	6,020	4,590	3,940	5,280	6,020	7,880	14,000	8,160	10,500	625	655
8	4,590	6,270	7,060	4,160	8,440	5,760	7,880	16,800	9,020	10,200	720	1,290
9	4,590	6,270	5,760	4,820	8,720	6,530	7,880	17,500	9,600	8,160	688	4,160
10	6,020	6,020	5,760	5,280	9,300	6,270	7,600	17,500	8,720	6,790	625	5,040
11	6,020	6,020	6,530	5,040	10,500	6,270	7,320	19,700	8,440	6,270	625	3,540
12	7,880	5,020	6,270	4,590	10,500	6,270	6,790	19,700	9,020	3,540	595	1,340
13	7,320	6,270	6,020	4,820	8,160	6,020	8,440	16,400	10,200	4,820	625	870
14	6,530	6,270	5,040	4,590	7,600	6,270	9,300	15,100	11,100	5,760	625	1,140
15	6,020	6,530	5,040	5,040	7,600	7,320	9,020	15,400	9,020	7,060	625	3,540
16	6,020	6,270	5,280	4,820	7,060	7,060	9,600	13,700	7,320	7,600	625	3,740
17	6,020	6,270	5,280	5,520	6,270	6,790	9,600	11,400	9,600	6,020	655	4,160
18	6,270	6,790	5,280	5,280	6,020	6,530	9,300	9,300	9,900	4,590	4,160	3,360
19	6,020	7,320	5,040	3,740	6,020	6,530	9,020	7,600	11,800	4,370	3,360	2,670
20	6,020	5,760	4,590	4,160	6,020	7,060	11,400	6,270	13,000	5,520	1,690	1,340
21	6,020	5,280	4,370	4,590	6,020	7,060	11,100	5,280	15,100	4,160	912	790
22	6,270	6,530	4,370	4,370	6,020	7,320	10,800	4,160	15,700	2,520	1,460	688
23	6,270	6,530	4,370	4,160	5,760	7,320	10,800	6,020	18,200	1,690	1,140	688
24	5,760	6,020	4,370	4,160	6,020	8,160	9,600	7,060	18,900	1,690	3,740	655
25	6,270	5,760	5,040	5,040	6,020	9,020	8,720	8,160	18,200	1,140	3,740	655
26	6,270	6,020	4,820	5,040	6,020	9,600	7,320	9,300	16,800	870	2,670	688
27	6,270	6,020	5,760	5,040	6,270	9,900	7,880	11,800	15,100	688	3,000	688
28	6,270	7,060	5,520	4,820	6,530	9,300	9,300	11,400	13,000	625	2,080	655
29	6,270	6,530	5,040	4,590	6,530	9,900	11,800	9,300	10,500	625	2,080	655
30	6,270	5,280	4,590	4,370	.....	10,500	14,700	8,440	7,320	625	1,240	688
31	5,760	.....	4,590	4,590	.....	10,200	.....	8,160	.....	655	755	.....

Monthly discharge of Snake River near Twin Falls, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9,300	3,000	6,190	381,000
November	7,320	5,280	6,230	371,000
December	7,060	4,160	5,140	316,000
January	5,520	2,670	4,460	274,000
February	10,500	4,160	6,510	374,000
March	10,500	5,520	7,220	444,000
April	14,700	6,790	9,240	550,000
May	19,700	4,160	12,100	744,000
June	18,900	7,320	11,100	660,000
July	10,500	625	5,070	312,000
August	4,160	595	1,390	85,500
September	5,040	655	1,590	94,600
The year	19,700	595	6,350	4,610,000

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 4 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, 1916.

GAGE.—Vertical staff on left bank about 50 feet below the ferry; installed August 15, 1915, at same site and datum as former inclined gage; read by Clarice Owsley. An auxiliary inclined staff is also maintained at 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.

EXTREMES OF DISCHARGE.—Maximum and minimum stages during year could not be determined because of unreliable gage-height record.

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).

ICE.—Stage discharge relation not affected by ice; open water rating curve applicable throughout winter.

DIVERSIONS.—No noteworthy diversions between this station and that at Milner. Practically entire flow of 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 the Twin Falls canals at Milner.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined, but gage-height record too unreliable to warrant publication of determinations of daily discharge. Monthly discharge as published is believed to be fairly accurate.

Discharge measurements of Snake River near Hagerman, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 3	G. C. Baldwin	4.88	13,500	July 20	G. C. Baldwin	4.21	8,620
July 8	L. W. Roush	4.92	14,300	Sept. 5	L. W. Roush	3.41	5,170
8	do	4.91	14,100				

Monthly discharge of Snake River near Hagerman, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12,700	4,800	10,500	646,000
November	11,400	10,300	10,600	631,000
December	10,300	8,620	9,060	557,000
January	9,710	8,620	8,670	533,000
February	.....	.....	11,600	667,000
March	13,300	9,710	11,300	695,000
April 1–15	14,600	.....	12,700	378,000
July 16–31	.....	5,000	7,020	223,000
August	.....	5,000	5,620	346,000
September 1–8	5,210	5,000	5,080	80,600

NOTE.—Gage height record Apr. 16 to July 15 and Sept. 9–30 too unreliable to warrant determination of discharge. Monthly discharge for rest of year determined from gage-height record, discharge measurements and records at other stations.

SNAKE RIVER AT KING HILL, IDAHO.

LOCATION.—In sec. 7, T. 5 S., R. 11 E., 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, 1916.

GAGE.—Inclined staff on right bank; installed August 17, 1910; read by P. W. McCarthy. 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 at datum about 2.2 feet higher. Temporary staff gage three-fourths mile above present site used March 7 to August 16, 1910.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.1 feet May 12 and 13 and June 24 (discharge, 24,800 second-feet); minimum stage recorded, 5.49 feet July 29 to August 6 and August 13–17 (discharge, 6,310 second-feet).

1909–1916: Maximum stage recorded, 13.1 feet June 12, 13, 1909 (discharge, 41,900 second-feet); minimum stage recorded, 4.5 feet July 7–9 and August 15, 16, 1910 (discharge, 4,760 second-feet.)

ICE.—Stage-discharge relation unaffected by ice; open-channel rating curve applicable throughout winter.

DIVERSIONS.—No noteworthy diversions for irrigation are made between this station and that at Milner.

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 year. Two well-defined rating curves used, one applicable October 4 to July 8, the other July 27 to September 30. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying gage height to rating table; shifting-control method used July 9–26. Records good.

Discharge measurements of Snake River at King Hill, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 7	G. C. Baldwin	6.98	10,500	Aug. 22	G. C. Baldwin	5.66	6,580
Nov. 3	do	7.72	12,600	Sept. 15	L. W. Roush	6.34	8,420
July 7	L. W. Roush	8.73	16,000				

Daily discharge, in second-feet, of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	12,800	11,000	10,500	10,200	11,900	17,500	20,900	14,400	12,200	6,310	6,970
2	.....	12,800	11,600	10,200	10,200	11,900	17,200	20,900	14,100	13,100	6,310	6,520
3	.....	12,500	11,600	9,100	10,200	11,600	17,200	21,300	14,100	13,100	6,310	6,520
4	13,400	12,500	11,300	9,370	9,910	11,600	16,800	20,900	14,100	14,100	6,310	6,520
5	14,100	12,800	11,300	9,370	9,910	11,600	16,100	20,900	14,100	14,400	6,310	6,520
6	11,300	13,400	11,000	9,640	10,500	11,600	14,400	19,800	13,400	14,700	6,310	6,520
7	10,700	13,400	10,700	9,910	13,400	11,300	14,100	20,600	13,100	15,800	6,520	6,740
8	10,500	13,100	10,700	9,640	18,700	11,900	14,100	22,500	13,800	16,800	6,520	6,970
9	10,500	12,800	11,300	9,910	19,800	13,400	14,100	24,400	13,800	15,000	6,520	7,670
10	11,000	12,800	11,900	9,910	20,200	15,800	14,100	24,400	14,400	13,100	6,520	8,690
11	11,600	13,400	12,500	10,200	19,400	15,100	14,100	24,400	14,400	11,800	6,520	10,000
12	12,200	14,100	12,500	10,500	18,700	15,100	14,400	24,800	14,700	11,200	6,520	10,000
13	11,900	11,900	12,500	10,500	16,500	15,800	14,700	24,800	15,100	9,000	6,310	8,950
14	11,900	12,200	12,500	10,500	13,100	12,500	15,100	23,700	15,100	10,900	6,310	8,170
15	11,600	12,500	12,800	10,500	12,800	13,100	15,800	21,300	15,400	11,700	6,310	8,170
16	11,600	11,600	11,600	10,500	12,800	14,700	15,100	20,600	14,400	12,600	6,310	8,950
17	11,900	11,600	11,000	10,500	12,200	14,700	14,700	18,300	13,100	12,600	6,310	8,690
18	11,600	11,600	10,700	10,500	12,200	14,700	14,100	16,500	14,100	11,400	6,520	8,690
19	11,900	11,900	10,700	10,500	11,900	15,800	14,400	14,100	15,800	9,670	9,210	8,690
20	11,900	11,600	10,500	10,500	12,200	16,100	15,400	13,100	17,500	10,200	7,670	8,430
21	11,900	11,600	11,000	10,500	12,200	16,800	15,800	11,900	19,800	9,350	7,200	7,670
22	11,600	11,900	10,700	9,910	12,500	16,800	16,800	11,300	20,600	8,790	6,520	7,430
23	11,600	12,200	10,700	10,200	12,500	12,800	16,800	11,600	22,900	8,000	6,520	7,430
24	11,600	11,900	10,700	10,700	12,200	15,400	16,800	11,600	24,800	7,270	6,970	7,200
25	11,600	11,900	10,700	11,600	12,200	14,700	16,100	15,100	24,100	7,010	10,000	7,200
26	11,600	11,900	10,700	11,300	12,200	15,400	15,400	16,800	22,500	6,760	9,210	6,970
27	11,900	11,600	10,700	11,000	12,200	15,800	15,400	17,500	21,300	6,520	8,430	6,970
28	11,900	11,600	10,700	10,500	12,200	16,100	15,400	16,800	19,400	6,520	8,430	6,970
29	12,200	11,600	10,500	10,200	12,200	16,500	15,800	14,100	17,200	6,310	7,920	6,740
30	12,200	11,600	10,500	10,200	.....	16,500	18,700	12,500	13,400	6,310	7,920	6,740
31	12,500	.....	10,200	10,200	.....	16,800	.....	14,400	.....	6,310	7,430	.....

NOTE.—Mean discharge Oct. 1-3 estimated 9,400 second-feet because of lack of gage-height record.

Monthly discharge of Snake River at King Hill, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	14,100	.....	11,600	713,000
November	14,100	11,600	12,300	732,000
December	12,800	10,200	11,200	689,000
January	11,600	9,100	10,300	633,000
February	20,200	9,910	13,300	765,000
March	16,800	11,300	14,300	879,000
April	18,700	14,100	15,500	922,000
May	24,800	11,300	18,400	1,130,000
June	24,800	13,100	16,500	982,000
July	16,800	6,310	10,700	658,000
August	10,000	6,310	7,050	433,000
September	10,000	6,520	7,660	456,000
The year	24,800	6,310	12,400	8,990,000

SNAKE RIVER NEAR MURPHY, IDAHO.

LOCATION.—In the NW. ¼ sec. 18, T. 2 S., R. 1 E., three-quarters of a mile below the Swan Falls power plant, 1¼ miles below the company ferry, and 12 miles east of Murphy, Owyhee County. The gage is in Ada County 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, 1916.

GAGE.—Friez water-stage recorder on right bank one-fourth mile below house of S. H. Cantwell; installed September 7, 1914; observer, S. N. Glass. Temporary vertical staff gage 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. Friez water-stage recorder, temporarily installed, used December 13, 1913, to June 27, 1914. All gages at practically same site and set to same datum. Records obtained prior to August 21, 1913, fragmentary.

DISCHARGE MEASUREMENTS.—Made from ferry boat 1¼ miles above gage.

CHANNEL AND CONTROL.—Stream bed of lava rock with deposits of sand, silt, and gravel where not scoured out by current. Control practically permanent. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.55 feet at 8 p. m. May 12 (discharge, 29,400 second-feet); minimum stage about —2.00 feet at 5 p. m. August 6 (discharge, about 5,080 second-feet).

1912–1916: 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.

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

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

RELATION.—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 permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Discharge determined by applying to rating table the mean daily gage height obtained by inspecting recorder graph. Records good.

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

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

October 11, 1915: Gage height, 3.05 feet; discharge, 10,800 second-feet.

Daily discharge, in second-feet, of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,090	11,800	11,400	9,860	10,200	12,600	17,300	21,600	15,800	14,300	6,290	7,320
2	6,140	11,200	10,200	.....	10,600	12,400	17,900	23,500	15,500	13,300	6,210	6,890
3	10,700	11,400	10,600	.....	11,800	12,000	18,100	24,200	15,000	13,800	6,290	6,470
4	12,900	12,000	10,800	.....	9,600	12,000	18,100	23,200	15,300	14,500	6,380	6,570
5	13,600	12,200	.....	.....	9,860	11,800	17,300	21,600	16,000	14,500	6,380	6,570
6	14,000	12,200	.....	.....	10,000	12,200	15,300	20,400	16,000	14,800	6,730	6,570
7	12,900	12,000	.....	.....	13,500	12,000	14,800	20,700	15,300	15,300	6,050	6,670
8	11,000	11,800	.....	9,690	19,800	12,000	15,300	20,700	14,800	16,000	6,290	6,570
9	10,200	11,800	.....	10,000	22,900	12,600	15,500	24,500	15,500	16,000	6,380	6,780
10	10,000	11,600	.....	10,600	23,800	15,000	15,500	25,200	16,300	15,000	6,290	7,340
11	10,600	11,800	.....	11,000	24,200	16,300	15,800	24,500	15,800	13,600	6,470	10,200
12	11,600	11,600	.....	11,200	23,500	16,800	16,300	26,600	15,300	12,200	6,290	10,800
13	12,200	11,800	.....	10,400	20,400	17,600	16,000	27,000	15,500	11,000	6,470	9,520
14	13,100	12,200	.....	10,400	16,800	17,300	15,800	24,800	16,000	10,200	6,380	8,000
15	12,400	11,800	.....	10,600	14,500	14,800	16,800	21,900	17,100	10,800	6,380	7,360
16	11,400	12,000	.....	10,600	14,500	15,300	17,100	22,200	16,300	11,800	6,380	7,870
17	11,000	12,000	.....	10,800	14,300	15,800	17,100	21,000	15,000	12,900	6,290	9,860
18	11,200	12,000	11,200	10,400	13,300	16,000	17,300	19,200	14,800	12,600	6,470	10,000
19	11,400	12,400	11,000	10,000	12,900	16,300	17,100	16,500	16,800	11,400	6,290	10,200
20	11,200	12,600	10,600	9,860	12,600	16,500	16,800	15,000	17,300	10,200	8,580	9,690
21	11,400	13,100	10,400	9,520	12,900	17,900	17,100	14,300	18,700	10,200	8,720	8,870
22	10,600	11,200	10,400	10,000	12,900	18,400	17,900	.....	21,000	10,800	7,480	8,000
23	12,400	11,200	10,400	10,400	12,900	17,100	17,300	.....	22,200	9,190	6,890	7,360
24	11,600	12,000	10,400	10,600	12,900	16,300	17,300	.....	21,600	8,000	7,120	7,240
25	12,000	12,000	10,400	11,000	12,900	15,800	17,600	.....	.....	7,360	7,040	7,240
26	11,800	11,600	10,600	12,400	12,900	16,000	17,100	.....	.....	7,240	9,350	7,240
27	11,400	10,800	10,800	12,200	12,600	17,100	16,300	17,100	.....	7,000	9,350	7,240
28	12,200	10,400	10,800	11,400	12,600	17,300	15,800	18,100	.....	6,670	8,900	7,240
29	12,000	10,600	11,200	11,000	12,600	17,600	17,100	19,000	.....	6,570	8,450	7,120
30	12,000	11,500	11,200	10,600	.....	17,100	18,700	18,100	.....	6,680	8,000	7,120
31	11,600	.....	10,400	10,200	.....	17,600	.....	16,500	.....	6,210	7,740	.....

NOTE.—No gage-height record received for the following periods and mean discharge estimated from records at other stations as follows: Dec. 5–17, 12,000 second-feet; Jan. 2–7, 9,750 second-feet; May 22–26, 14,000 second-feet; June 25–30, 18,000 second-feet. Discharge for the following days is the mean of 12 two-hour periods, Oct. 1–3, Nov. 12, 30, Feb. 3, 4, 7, 29, Mar. 1, July 30, Aug. 6, 15, 20, 25, and Sept. 10.

Monthly discharge of Snake River near Murphy, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	14,000	6,140	11,400	701,000
November	13,100	10,400	11,800	702,000
December	.....	10,200	11,300	695,000
January	12,400	.....	10,400	640,000
February	24,200	9,600	14,600	840,000
March	18,400	11,800	15,300	941,000
April	18,700	14,800	16,800	1,000,000
May	27,000	.....	19,900	1,220,000
June	.....	.....	16,900	1,010,000
July	16,000	6,210	11,300	695,000
August	9,350	6,210	7,040	433,000
September	10,800	6,470	7,860	468,000
The year	27,000	6,140	12,900	9,340,000

SNAKE RIVER AT WEISER, IDAHO.

LOCATION.—In sec. 31, T. 11 N., R. 5 W., about a 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 and Boise, Payette, and Weiser Rivers on the right.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 8, 1910, to September 30, 1916. Fragmentary gage-height records 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. One channel at all stages. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet at 9 a. m. March 22 (discharge 58,400 second-feet); minimum stage recorded, 2 feet October 4 and August 8 (discharge, 7,140 second-feet).

1910–1916: Maximum stage recorded, 14.5 feet (U. S. Geol. Survey 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).

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

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

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Gage read once a day to tenths. Daily discharge determined by applying daily gage height 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, 1916.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Feb. 18	5.50	23,600
Aug. 25	2.34	8,110

NOTE.—All gage heights refer to United States Weather Bureau gage.

Daily discharge, in second-feet, of Snake River at Weiser, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	7,470	12,400	13,700	12,400	14,100	21,800	38,200	43,300	30,600	39,700	9,240	8,870
2	7,810	12,800	14,100	12,400	14,600	21,800	38,900	45,500	29,300	36,800	8,870	8,510
3	8,160	12,400	14,100	12,400	14,600	20,100	36,800	48,500	29,300	38,200	8,870	8,160
4	7,140	12,000	14,100	12,000	15,500	19,000	44,000	50,000	29,300	38,200	8,510	7,810
5	9,240	12,800	14,600	12,000	14,600	20,100	43,300	50,800	31,300	36,100	8,160	7,470
6	12,800	13,300	14,600	12,000	15,000	22,400	42,600	50,800	34,700	34,700	8,160	7,470
7	13,700	13,300	14,100	12,000	32,600	22,400	38,900	50,800	36,100	32,600	8,870	7,810
8	13,300	12,800	13,700	12,000	47,000	20,100	38,900	53,000	36,800	32,600	7,140	7,810
9	12,400	12,800	13,700	12,000	40,400	21,200	39,700	51,500	38,200	34,000	7,810	7,470
10	11,200	12,800	13,300	12,000	44,000	26,100	39,700	53,000	38,900	35,400	7,810	7,470
11	10,400	12,800	15,500	12,400	55,400	31,300	42,600	52,300	41,800	33,300	7,810	8,160
12	10,800	12,800	14,100	12,400	50,800	36,800	47,000	48,500	41,800	29,300	7,810	9,990
13	11,600	12,800	14,100	12,400	39,700	41,100	47,000	48,500	40,400	26,100	7,810	12,400
14	12,000	12,800	15,000	12,800	32,600	44,000	45,500	47,000	40,400	24,200	7,810	11,200
15	12,400	12,800	15,000	12,800	28,000	44,000	44,000	44,800	41,100	21,200	8,160	9,990
16	13,300	12,800	14,600	12,800	24,200	38,200	45,500	40,400	43,300	20,700	7,810	8,870
17	12,800	13,700	14,600	12,800	23,000	38,200	46,200	38,900	44,000	20,700	7,470	9,240
18	12,000	13,700	14,100	12,800	23,000	41,800	44,000	38,200	44,000	21,200	7,810	10,800
19	12,400	13,700	13,700	12,800	23,000	46,200	44,800	38,900	51,500	23,600	8,510	11,200
20	12,400	13,700	13,300	12,800	21,800	51,500	41,800	36,800	56,900	19,000	8,510	11,200
21	12,800	14,600	12,800	12,800	21,200	55,400	38,900	35,400	56,900	17,000	8,870	10,800
22	12,400	14,600	13,700	11,600	21,800	58,400	38,900	34,700	50,000	15,000	10,400	10,400
23	12,800	13,300	14,100	12,400	21,800	53,000	41,100	34,000	50,000	15,500	9,610	9,610
24	12,800	13,300	14,600	20,100	22,400	50,000	41,100	32,600	48,500	15,000	8,160	8,870
25	12,400	14,100	14,100	29,300	23,000	45,500	41,100	32,000	47,000	14,100	8,510	8,870
26	13,300	14,100	13,700	26,100	23,000	42,600	44,000	32,000	50,800	12,800	8,870	8,510
27	12,800	13,300	12,800	19,600	22,400	38,200	46,200	32,600	50,800	11,200	9,610	8,510
28	12,400	13,300	12,800	18,000	22,400	35,400	47,000	32,600	45,500	10,800	10,400	8,510
29	12,800	13,300	13,300	15,500	21,800	37,500	45,500	32,600	44,000	10,400	9,610	8,510
30	12,800	13,300	13,700	15,000	.....	38,900	44,000	33,300	42,600	9,990	9,610	8,870
31	12,400	.....	12,800	14,100	.....	38,200	.....	32,600	.....	9,610	9,610	.....

Monthly discharge of Snake River at Weiser, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	13,700	7,140	11,700	719,000
November	14,600	12,000	13,200	786,000
December	15,500	12,800	13,900	855,000
January	29,300	11,600	14,300	879,000
February	55,400	14,100	26,700	1,540,000
March	58,400	19,000	36,200	2,230,000
April	47,000	36,800	42,600	2,530,000
May	53,000	32,000	41,800	2,570,000
June	56,900	29,300	42,200	2,510,000
July	39,700	9,610	23,800	1,460,000
August	10,400	7,140	8,590	528,000
September	12,400	7,470	9,110	542,000
The year	58,400	7,140	23,600	17,100,000

SNAKE RIVER AT RIPARIA, WASH.

LOCATION.—In sec. 31, T. 13 N., R. 38 W., at Oregon-Washington Railroad & Navigation Co.'s bridge at Riparia, in Whitman County.

DRAINAGE AREA.—102,000 square miles (authority, United States Weather Bureau).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1916. Gage-height record April 16, 1904, to June 30, 1907, and after February 1, 1908, obtained and published by United States Weather Bureau.

GAGE.—Vertical staff in three sections, the highest section being on first bridge pier from right bank and the lower sections on upper draw guard of railroad bridge.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Texas Rapids, about half a mile below gage, forms control. The United States Army Engineer Corps is removing rock obstructions from the control, but this work apparently does not affect the permanence of the stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 16.8 feet June 20 (discharge, 230,000 second-feet); minimum stage recorded, 1.4 feet October 1 (discharge, 15,200 second-feet).

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

DIVERSIONS.—A large amount of water is diverted for irrigation.

REGULATION.—Flow is regulated to some extent by storage for irrigation in Jackson Lake (capacity, 790,000 acre-feet), and by other smaller reservoirs in the basin; also by diversions for irrigation.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good above 25,000 second-feet; fair below.

COOPERATION.—Gage-height record furnished by United States Army Engineer Corps and United States Weather Bureau.

Discharge measurements of Snake River at Riparia, Wash., during the year ending Sept. 30, 1916.

[Made by C. G. Paulsen.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 30	13.30	164,000
July 17	7.95	81,800
Aug. 15	2.90	26,400

NOTE.—Two discharge measurements of Snake River at Burbank are referred to this station after deducting the flow of the tributaries between the stations and allowing a time interval of 24 hours between stations (the stage being practically constant), as follows: Sept. 22, 1915: Gage height, 1.2 feet; discharge, 14,400 second-feet. Sept. 23, 1915: Gage height, 1.3 feet; discharge, 14,500 second-feet.

Daily discharge, in second-feet, of Snake River at Riparia, Wash., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	15,200	22,400	23,200	20,200	26,400	47,600	84,900	127,000	111,000	157,000	35,100	21,000
2	15,800	21,000	22,400	20,200	26,400	45,600	87,800	111,000	111,000	144,000	34,200	21,000
3	15,200	21,600	22,400	20,200	26,400	45,600	90,800	127,000	108,000	155,000	33,300	20,200
4	15,800	21,600	23,200	20,200	26,400	44,600	93,800	136,000	111,000	155,000	31,500	20,200
5	18,900	21,600	24,800	20,200	26,400	44,600	101,000	153,000	126,000	144,000	29,800	20,200
6	15,800	21,000	26,400	22,400	26,400	40,700	96,800	171,000	138,000	138,000	28,900	21,600
7	22,400	21,600	26,400	22,400	26,400	39,800	95,300	180,000	136,000	136,000	28,000	19,600
8	22,400	23,200	28,000	22,400	26,400	39,800	92,300	185,000	139,000	134,000	28,900	19,600
9	23,200	22,400	28,900	24,800	28,000	47,600	92,300	171,000	146,000	136,000	28,900	18,900
10	23,200	22,400	29,800	24,800	38,800	71,100	96,800	162,000	157,000	134,000	27,200	20,200
11	21,600	22,400	28,900	24,800	47,600	86,300	99,800	148,000	160,000	131,000	27,200	23,200
12	21,600	21,600	28,900	24,800	57,400	96,800	117,000	136,000	153,000	120,000	26,400	22,400
13	21,000	21,600	28,900	24,800	52,900	104,000	122,000	127,900	151,000	109,000	26,400	21,600
14	19,600	21,600	28,900	24,800	48,600	101,000	122,000	120,000	149,000	101,000	25,600	23,200
15	21,000	21,600	26,400	24,800	46,600	101,000	122,000	114,000	153,000	87,800	25,600	24,800
16	22,400	21,600	26,400	24,800	44,600	101,000	122,000	108,000	171,000	56,200	24,800	24,000
17	24,000	22,400	26,400	24,800	57,400	95,300	124,000	103,000	187,000	79,300	24,800	21,600
18	23,200	24,000	26,400	24,800	52,900	86,300	124,000	103,000	203,000	71,100	24,800	20,200
19	21,600	24,000	24,000	24,800	48,600	83,500	124,000	111,000	216,000	75,100	28,000	19,600
20	21,000	24,000	23,200	20,200	48,600	104,000	111,000	126,000	230,000	72,400	25,600	20,200
21	21,900	28,000	23,200	22,400	50,700	134,000	108,000	126,000	216,000	64,600	25,600	21,600
22	21,900	27,200	22,400	22,400	50,700	144,000	103,000	127,000	193,000	61,000	25,600	21,600
23	21,000	28,000	29,800	26,400	52,900	139,000	95,300	120,000	171,000	56,200	24,800	21,000
24	21,000	28,000	38,800	26,400	49,600	127,000	92,300	117,000	151,000	51,800	24,000	20,600
25	21,000	28,000	34,200	26,400	49,600	120,000	92,300	111,000	144,000	50,700	24,000	20,300
26	21,600	28,000	30,600	26,400	49,600	103,000	106,000	108,000	144,000	49,600	22,400	20,000
27	21,600	26,400	30,600	26,400	49,600	103,000	127,000	108,000	151,000	46,600	21,000	19,600
28	22,400	26,400	30,600	26,400	49,600	101,000	148,000	108,000	157,000	44,600	20,200	19,600
29	21,600	26,400	30,600	26,400	50,700	99,800	148,000	111,000	173,000	42,600	20,200	21,000
30	21,600	26,400	24,000	26,400	.....	90,800	139,000	109,000	167,000	39,800	23,200	20,200
31	22,400	.....	21,000	26,400	.....	84,900	.....	109,000	.....	37,800	22,400	.....

NOTE.—Discharge interpolated Sept. 24-26.

Monthly discharge of Snake River at Riparia, Wash., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	24,000	15,200	20,700	1,270,000
November	28,000	21,000	23,900	1,420,000
December	38,800	21,000	27,100	1,670,000
January	26,400	20,200	24,000	1,480,000
February	57,400	26,400	42,600	2,450,000
March	144,000	39,800	86,200	5,300,000
April	148,000	84,900	109,000	6,490,000
May	185,000	103,000	128,000	7,870,000
June	230,000	108,000	157,000	9,340,000
July	157,000	37,800	92,900	5,710,000
August	35,100	20,200	26,400	1,620,000
September	24,800	18,900	21,000	1,250,000
The year	230,000	15,200	63,300	45,900,000

SNAKE RIVER NEAR BURBANK, WASH.

LOCATION.—In sec. 28, T. 9 N., R. 31 E., at head of Fivemile Rapids, 4 miles above Burbank, in Walla Walla County.

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

RECORDS AVAILABLE.—September 1, 1909, to September 30, 1916; fragmentary records October 2, 1907, to August 31, 1909.

GAGE.—Inclined staff 1,500 feet above intake of Burbank Power & Water Co.'s canal; datum, 300 feet above sea level; gage read by Lewis Dunlap, E. B. Madden, and James Hogan. Auxiliary vertical staff at lower end of power canal used for short periods prior to 1916.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 49.65 feet June 20 (discharge, 249,000 second-feet); minimum stage recorded, 35.95 feet January 21 (discharge, 20,000 second-feet).

1909–1916: Maximum stage recorded, 51.8 feet May 29, 1913 (discharge, 298,000 second-feet); minimum stage recorded, 34.6 feet September 4, 1914 (discharge, 13,000 second-feet).

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

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

REGULATION.—Jackson Lake reservoir (capacity, 790,000 acre-feet) is the largest in operation.

ACCURACY.—Stage-discharge relation changed during high water June 20. Rating curve used before change well defined below 225,000 second-feet; that used after change poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records too fragmentary to permit computation of monthly discharge. Records excellent prior to June 20 and fair thereafter.

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

Discharge measurements of Snake River near Burbank, Wash., during the year ending Sept. 30, 1916.

[Made by C. G. Paulsen.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
May 11–12	45.01	148,000
Aug. 8	36.93	30,800

Daily discharge, in second-feet, of Snake River near Burbank, Wash., for the year ending Sept. 30, 1916.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	22,500	.....	.....	.....	45,600	87,300	.....	99,400	170,000	.....
2	21,900	22,500	.....	.....	44,300	87,300	.....	103,000	160,000	.....
3	21,200	23,200	.....	.....	41,800	94,100	.....	103,000	156,000	.....
4	21,200	23,900	21,200	.....	40,600	94,100	.....	103,000	168,000	29,800
5	22,500	.....	.....	.....	.....	101,000	.....	124,000	158,000	.....
6	22,500	24,600	.....	.....	38,300	101,000	175,000	138,000	146,000	.....
7	.....	26,900	.....	.....	40,600	95,800	184,000	136,000	140,000	.....
8	22,500	27,700	22,500	.....	41,800	94,100	.....	138,000	140,000	29,800
9	23,900	27,700	.....	34,000	45,600	92,400	188,000	145,000	140,000	.....
10	22,500	27,700	23,900	130,000	63,600	92,400	161,000	157,000	140,000	.....
11	22,500	.....	.....	130,000	87,300	94,100	153,000	161,000	132,000	.....
12	22,500	.....	.....	122,000	103,000	114,000	143,000	157,000	126,000	.....
13	23,200	.....	.....	.....	110,000	121,000	.....	153,000	123,000	.....
14	.....	.....	.....	.....	117,000	121,000	.....	149,000	108,000	.....
15	22,500	.....	.....	68,100	105,000	115,000	.....	157,000	101,000	.....
16	22,500	.....	.....	.....	101,000	115,000	.....	173,000	89,500	.....
17	21,200	.....	.....	62,200	94,100	115,000	.....	194,000	79,900	.....
18	23,200	26,900	.....	56,500	.....	115,000	.....	212,000	79,900	.....
19	23,900	.....	.....	53,700	.....	115,000	.....	234,000	79,900	.....
20	24,600	.....	20,600	.....	.....	112,000	.....	248,000	76,700	.....
21	.....	21,900	20,000	51,000	.....	103,000	.....	238,000	70,500	.....
22	28,500	.....	29,400	48,200	.....	.....	.....	211,000	64,500	.....
23	26,900	23,900	.....	51,000	159,000	.....	122,000	193,000	60,100	.....
24	26,900	.....	.....	51,000	.....	84,000	115,000	164,000	54,500	.....
25	26,900	.....	.....	48,200	121,000	.....	112,000	150,000	51,800	.....
26	27,700	.....	31,100	49,600	.....	.....	101,000	160,000	50,500	.....
27	26,900	31,100	.....	.....	115,000	124,000	101,000	170,000	46,600	.....
28	.....	28,500	45,600	51,000	112,000	145,000	101,000	182,000	42,900	.....
29	25,400	.....	.....	48,200	101,000	153,000	99,400	182,000	38,300	.....
30	23,900	25,400	.....	.....	94,100	.....	97,600	182,000	.....	.....
31	.....	23,900	.....	.....	89,000	.....	99,400	.....	.....	.....

NOTE.—No gage-height record for days for which discharge is not given.

TRIBUTARY BASINS.

HENRYS FORK NEAR REXBURG, IDAHO.

LOCATION.—In sec. 30, T. 6 N., R. 39 E., just below a highway bridge about a mile below the mouth of the south channel of Teton River, 7 miles below mouth of 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, 1916.

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 gage used prior to January 1, 1912, 0.67 foot higher than that of present gage. Observers, Hansen and Sorensen.

DISCHARGE MEASUREMENTS.—Made from cable a quarter of a mile below gage, from highway bridge above, or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.25 feet at 7 p. m. May 8 (discharge, 6,490 second-feet); minimum stage, 2.69 feet at 8 a. m. August 5 (discharge, 671 second-feet).

1909–1916: Maximum stage recorded, 8.7 feet (equivalent to 9.37 feet present datum) June 6 and 7, 1909 (discharge, 7,680 second-feet); minimum stage, 1.90 feet at 6 p. m. August 10, 1915 (discharge, 481 second-feet).

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

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

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

ACCURACY.—Stage-discharge relation not permanent. Standard rating curve well defined; several parallel curves used. Operation of water-stage recorder satisfactory. Mean daily gage height obtained by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table or by shifting-control method. Records good.

Discharge measurements of Henrys Fork near Rexburg, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar 18	A. W. Harrington	4.41	2,080	Aug. 5	G. C. Baldwin	2.71	680
May 31	L. W. Roush	5.69	3,090	25	L. W. Roush	3.19	1,120
June 18	G. C. Baldwin	7.72	4,780	Sept. 14	G. C. Baldwin	4.19	1,870
July 21	L. W. Roush	4.94	2,350				

Daily discharge, in second-feet, of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,710	.....	2,140	4,890	3,320	3,860	1,070	1,230
2	1,680	.....	2,140	4,510	3,320	3,770	951	1,270
3	1,640	.....	2,210	4,420	2,960	3,950	835	1,300
4	.....	.....	2,210	4,610	2,620	4,510	729	1,300
5	.....	.....	2,380	5,180	2,710	4,510	675	1,340
6	.....	.....	2,380	5,860	3,140	4,040	706	1,410
7	.....	.....	2,290	6,050	3,400	3,950	738	1,490
8	.....	.....	2,210	6,440	3,320	4,040	850	1,520
9	.....	.....	2,290	6,240	3,400	3,950	1,050	1,560
10	.....	.....	2,460	6,150	3,580	4,230	1,120	1,640
11	.....	.....	2,620	5,760	3,770	4,420	1,190	1,760
12	.....	.....	2,880	5,180	3,860	4,230	1,170	1,870
13	.....	.....	3,050	4,320	3,950	3,860	1,190	1,910
14	.....	.....	2,710	3,680	3,770	3,580	1,140	1,880
15	.....	.....	2,540	3,230	3,860	3,490	1,100	1,920
16	.....	.....	2,620	2,880	4,140	3,230	1,050	1,880
17	.....	.....	2,540	2,540	4,510	3,140	1,060	1,840
18	.....	2,060	2,540	2,380	4,800	3,050	1,020	1,810
19	.....	2,140	2,620	2,380	4,990	2,880	1,060	1,730
20	.....	2,380	2,790	2,540	5,180	2,620	1,100	1,730
21	.....	2,710	2,710	2,960	5,370	2,290	1,140	1,730
22	.....	2,880	2,710	3,230	5,660	2,040	1,130	1,730
23	.....	2,880	2,460	3,230	5,660	1,800	1,130	1,730
24	.....	2,960	2,540	2,960	5,280	1,600	1,130	1,660
25	.....	2,620	2,960	2,960	4,510	1,490	1,130	1,630
26	.....	2,460	3,580	3,140	3,770	1,370	1,130	1,660
27	.....	2,290	4,310	3,320	3,490	1,420	1,130	1,730
28	.....	2,290	5,030	3,230	3,400	1,580	1,130	1,840
29	.....	2,380	5,760	3,050	3,580	1,560	1,130	1,840
30	.....	2,290	5,560	2,960	3,860	1,550	1,160	1,770
31	.....	2,140	.....	3,140	.....	1,270	1,230	.....

Monthly discharge of Henrys Fork near Rexburg, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 18–31	2,960	2,060	2,460	68,300
April	5,760	2,140	2,910	173,000
May	6,440	2,380	3,980	245,000
June	5,660	2,620	3,970	236,000
July	4,510	1,270	3,010	185,000
August	1,230	675	1,040	64,000
September	1,920	1,230	1,660	98,800
The period				1,070,000

GRAYS LAKE OUTLET NEAR HERMAN, IDAHO.

LOCATION.—In sec. 15, T. 3 S, R. 42 E, about 3 miles below bridge at outlet of lake and 3½ miles west of Herman, Bonneville County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 5 to September 30, 1916.

GAGE.—Vertical staff on right bank; read by W. C. Handy.

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

CHANNEL AND CONTROL.—Bed composed of gravel. Banks covered with willows. Control practically permanent during 1916. Left bank is overflowed at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year believed to have occurred April 28 at about gage height 5.2 feet (discharge, about 1,100 second-feet); minimum stage recorded, 0.72 foot April 7–10 (discharge, 1.1 second-foot).

ICE.—At times flow from lake is practically shut off by ice but springs probably keep channel free from ice near gage.

DIVERSIONS.—None between lake and station. Diversions for irrigation are made above the lake but quantity of water diverted is not known.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read to quarter-tenths once daily to June 30 and once every other day thereafter. Daily discharge determined by applying daily gage height to rating table; interpolated for days on which gage was not read. Records good.

Discharge measurements of Grays Lake outlet near Herman, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 5	G. C. Baldwin	0.73	1.2	June 9	L. W. Roush	2.43	144
6	do	.74	1.3	11	do	2.45	146
May 6	L. W. Roush	4.31	564	18	do	2.06	97.6
7	do	4.21	488	Aug. 12	do	1.07	14.1
9	do	3.50	278	13	do	1.06	14.1

Daily discharge, in second-feet, of Grays Lake outlet near Herman, Idaho, for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	.....	209	71	29	4.0	16	98	291	115	42	.....	2.8
2	.....	.....	196	70	28	3.7	17	132	281	104	41	.....	2.8
3	.....	.....	192	68	26	3.7	18	176	275	98	40	.....	2.8
4	.....	.....	184	66	24	3.7	19	136	271	95	39	.....	2.8
5	1.2	572	174	64	23	3.7	20	264	254	104	38	.....	2.8
6	1.2	549	164	60	23	3.7	21	300	248	108	36	.....	2.8
7	1.1	494	162	57	22	3.7	22	336	225	104	34	.....	2.8
8	1.1	468	160	56	21	3.7	23	488	232	98	33	.....	2.8
9	1.1	322	142	55	20	3.7	24	753	248	95	32	.....	2.8
10	1.1	418	148	50	18	3.7	25	.....	251	95	33	.....	2.8
11	34	381	144	48	16	3.7	26	.....	258	93	34	.....	2.8
12	26	358	138	46	14	3.7	27	.....	261	88	33	.....	2.8
13	30	318	132	44	14	3.2	28	.....	248	83	32	.....	2.8
14	36	309	126	42	.....	2.8	29	.....	235	78	31	.....	2.8
15	55	304	124	50	.....	2.8	30	.....	225	73	30	.....	2.8
							31	.....	218	.....	29	.....	.....

NOTE.—No gage height record obtained Apr. 25 to May 4 and Aug. 14 to Sept. 1; gage read every other day July 1 to Aug. 13 and Sept. 2–30. Discharge interpolated for days of no gage height except as mean discharge was estimated as follows: Apr. 25–28, 970 second-feet; Apr. 29 and 30, 987 second-feet; May 1–4, 760 second-feet; Aug. 14–31, 7.0 second-feet.

Monthly discharge of Grays Lake outlet near Herman, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 5–30	.....	1.1	336	17,300
May	.....	218	373	22,900
June	209	73	128	7,620
July	71	29	45.3	2,790
August	29	.....	13.0	799
September	4.0	2.8	3.18	189
The period	.....	.....	.....	51,600

IDAHO (GOVERNMENT) CANAL NEAR SHELLEY, IDAHO.

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

RECORDS AVAILABLE.—June 20, 1912, to September 30, 1916. No water diverted during 1913 because of break in the canal.

GAGE.—Inclined staff on the right bank set in the concrete of the rating section; read by J. A. Vaughn. Bristol water-stage recorder has been operated at times, but records were not satisfactory; inclined staff always used as standard reference gage.

DISCHARGE MEASUREMENTS.—Made by wading or from a suspension foot-bridge at the gage.

CHANNEL AND CONTROL.—Trapezoidal concrete rating section. Growth of weeds and brush causes changes in the stage-discharge relation, but bottom of rating section evidently furnishes a permanent point of zero flow at about 0.0 foot gage height.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.47 feet at 10.30 a. m. June 29 (discharge, 224 second-feet); minimum flow probably zero when head gates are closed, but has not been definitely determined, as no records are obtained when gates are closed.

1912–1916: Maximum stage recorded, 3.7 feet July 29, 1912 (discharge, 308 second-feet); minimum as stated above.

DIVERSIONS.—None.

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

ICE.—Canal not operated during winter months.

ACCURACY.—Stage-discharge relation affected by growth of vegetation; change fairly well determined by discharge measurements. Gage read once daily to hundredths. Daily discharge determined by applying daily gage height to rating table or by shifting-control method. Records fair.

Idaho 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. 27, T. 2 S., R. 36 E. The canal also receives water from Sand Creek about 10 miles below station.

Discharge measurements of Idaho (Government) canal near Shelley, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
June 23	S. E. Vance, jr.[a]	2.17	195	July 31	L. W. Roush	2.39	196
July 10	L. W. Roush	2.39	209	Aug. 15	S. E. Vance, jr	1.95	130
10	do	1.68	132	22	do	2.11	137
15	S. E. Vance, jr	2.32	203	23	L. W. Roush	2.11	134
21	do	2.32	194	Sept. 15	G. C. Baldwin	2.04	116
23	do	2.20	183				

[a] Employee of Idaho State Engineer.

Daily discharge, in second-feet, of Idaho (Government) canal near Shelley, Idaho, for the year ending Sept. 30, 1916.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1	0	216	198	71	16	199	198	153	117
2	19	214	198	0	17	200	197	150	112
3	42	211	179	0	18	201	198	151	105
4	42	214	175	0	19	206	191	150	117
5	42	216	168	0	20	202	194	146	112
6	120	209	180	0	21	199	191	142	122
7	83	203	179	0	22	200	189	138	124
8	78	201	176	0	23	198	187	134	120
9	78	212	175	0	24	197	196	132	117
10	88	194	185	0	25	186	194	126	117
11	109	188	184	60	26	190	191	120	117
12	153	196	179	128	27	179	189	124	115
13	175	191	175	127	28	203	187	138	120
14	199	189	155	114	29	224	194	136	120
15	199	199	141	117	30	222	194	133	122
					31		195	127	

NOTE.—Head gates of canal closed Oct. 1 to June 1 and Sept. 2 to 10.

Monthly discharge of Idaho (Government) canal near Shelley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June	224	.....	148	8,810
July	216	187	198	12,200
August	198	120	156	9,590
September	128	.....	79.1	4,710
The period	.....	.....	.....	35,300

BLACKFOOT RIVER ABOVE RESERVOIR, NEAR HENRY, IDAHO.

LOCATION.—About in sec. 9, T. 7 S., R. 42 E., at Cully's ranch, 1½ miles above flow line of the Blackfoot-Marsh reservoir, 7 miles south of Henry, Bannock County, and 13 miles north of Soda Springs.

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

RECORDS AVAILABLE.—March 25, 1914, to September 30, 1916.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.04 feet at 8 a. m., April 29 (discharge, 1,040 second-feet); minimum stage recorded, 1.46 feet September 28, 30 (discharge, 61 second-feet). Minimum discharge may have occurred during winter when stage-discharge relation was affected by ice.

1914–1916: Maximum stage recorded, 6.45 feet at 3.15 p. m., April 24, 1914 (discharge, 1,450 second-feet); minimum stage recorded, 1.40 feet at 9.30 a. m., September 1, 1915 (discharge, 55 second-feet). Minimum discharge probably occurred during winter.

ICE.—Stage-discharge relation seriously affected by ice during winter.

DIVERSIONS.—Only a few small ranch diversions are made above the station.

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

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve fairly well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good for open-water period, but poor for November and December; no record January 1 to March 21.

Discharge measurements of Blackfoot River above reservoir, near Henry, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 14	G. C. Baldwin	[a] 1.72	75.9	June 6	L. W. Roush	2.80	311
Apr. 14	....do	3.41	492	23	....do	2.69	274
May 2	L. W. Roush	3.87	642	Aug. 7	....do	1.78	99.2
16	....do	3.09	397				

[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, 1916.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	68	.....	138	886	307	155	101	76
2	82	67	.....	138	652	307	146	101	82
3	82	67	.....	138	652	293	138	101	82
4	82	66	.....	138	619	293	138	101	76
5	76	66	.....	138	586	307	130	94	76
6	82	68	.....	138	619	307	130	101	76
7	76	67	.....	138	619	293	130	101	74
8	76	68	.....	146	619	293	122	101	72
9	75	68	.....	146	586	279	115	101	70
10	76	.....	.....	322	554	266	108	94	67
11	76	.....	.....	427	522	252	101	94	67
12	75	.....	.....	427	490	252	101	88	66
13	76	.....	.....	458	458	240	101	88	65
14	76	.....	.....	490	427	227	101	88	67
15	76	.....	.....	554	396	216	101	88	66
16	76	.....	.....	586	396	216	115	94	65
17	76	70	.....	586	396	204	122	88	64
18	75	76	.....	619	351	204	130	88	65
19	74	76	.....	652	351	194	130	82	63
20	73	82	.....	586	427	183	130	82	64
21	72	82	.....	522	427	240	122	82	64
22	70	88	227	458	427	279	115	82	65
23	70	88	227	490	458	279	108	76	63
24	72	88	227	554	427	252	101	82	63
25	73	82	240	652	427	227	101	76	64
26	73	.....	240	784	427	204	101	76	63
27	72	.....	183	852	427	183	101	75	62
28	70	.....	130	1,020	396	164	101	76	61
29	70	.....	130	1,020	366	164	101	74	62
30	70	.....	138	988	336	164	101	76	61
31	69	.....	138	.....	322	.....	101	76	.....

NOTE.—No record obtained Jan. 1 to Mar. 21. Stage-discharge relation affected by ice Nov. 10–16 and Nov. 26 to Dec. 31. Mean discharge estimated from observer's notes, discharge measurement Dec. 14, weather records, and records of flow at other stations, as follows: Nov. 10–16, 68 second-feet; Nov. 26–30, 76 second-feet; Dec. 1–13, 77 second-feet; Dec. 14, 76 second-feet; Dec. 15–31, 69 second-feet.

Monthly discharge of Blackfoot River, above reservoir, near Henry, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 360 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	82	69	74.9	0.208	0.24	4,610
November	.....	.....	73.1	.203	.23	4,350
December	.....	.....	72.6	.202	.23	4,460
March 22–31	240	130	188	.522	.19	3,730
April	1,020	138	477	1.32	1.47	28,400
May	886	322	485	1.35	1.56	29,800
June	307	164	243	.675	.75	14,500
July	155	101	116	.322	.37	7,130
August	101	74	88.0	.244	.28	5,410
September	82	61	67.7	.188	.21	4,030

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, 1916.

GAGE.—Vertical staff near spillway at right end of dam; read twice daily to hundredths by J. D. Curtis, October 1, 1915, to May 31, 1916, and by B. B. Reynolds thereafter. Zero of gage, 6,100 feet above sea level.

EXTREMES OF STAGE.—Maximum stage recorded during year, 56.83 feet May 29 and June 8; minimum stage 42.28 feet November 12 and 13.

1912–1916.—Maximum stage recorded 68.60 feet June 27–30, 1912; minimum stage 42.28 feet November 12 and 13, 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	48.66	44.58	46.00	47.98	49.84	50.18	50.30	54.24	56.68	55.75	52.60	49.42
2	48.58	44.28	46.00	48.08	49.87	50.18	50.35	54.30	56.80	55.68	52.48	49.32
3	48.50	43.75	46.00	48.16	49.89	50.18	50.37	54.58	56.81	55.55	52.38	49.15
4	48.42	43.51	46.00	48.24	49.91	50.18	50.42	54.76	56.81	55.48	52.28	49.02
5	48.34	43.24	46.08	48.28	49.92	50.19	50.47	55.01	56.79	55.42	52.25	48.92
6	48.26	43.00	46.15	48.32	49.92	50.20	50.54	55.24	56.79	55.36	52.18	48.82
7	48.18	42.82	46.19	48.36	49.93	50.20	50.60	55.42	56.82	55.28	52.08	48.72
8	48.10	42.65	46.26	48.44	49.94	50.20	50.70	55.58	56.83	55.18	51.95	48.62
9	48.00	42.58	46.32	48.52	49.96	50.20	50.78	55.76	56.81	55.05	51.78	48.52
10	47.88	42.48	46.40	48.60	49.99	50.21	50.87	55.94	56.79	54.97	51.72	48.36
11	47.72	42.36	46.50	48.66	50.02	50.21	50.98	56.02	56.79	54.88	51.66	48.24
12	47.62	42.28	46.61	48.74	50.04	50.22	51.12	56.15	56.79	54.79	51.55	48.05
13	47.54	42.32	46.73	48.82	50.06	50.22	51.22	56.21	56.79	54.72	51.42	47.85
14	47.49	42.45	46.85	48.90	50.08	50.22	51.30	56.26	56.71	54.62	51.25	47.65
15	47.50	42.60	46.96	48.98	50.10	50.22	51.39	56.36	56.74	54.48	51.05	47.40
16	47.46	42.76	47.12	49.05	50.10	50.22	51.54	56.46	56.68	54.42	50.90	47.24
17	47.37	42.94	47.19	49.12	50.10	50.24	51.69	56.52	56.61	54.35	50.75	47.10
18	47.26	43.30	47.21	49.18	50.11	50.24	51.85	56.60	56.57	54.10	50.55	46.95
19	47.18	43.64	47.26	49.26	50.12	50.25	52.05	56.61	56.50	54.00	50.42	46.75
20	47.14	43.88	47.32	49.35	50.13	50.26	52.22	56.59	56.42	53.92	50.36	46.55
21	46.95	44.18	47.36	49.42	50.14	50.26	52.40	56.58	56.25	53.82	50.31	46.38
22	46.77	44.54	47.42	49.48	50.14	50.26	52.56	56.58	56.20	53.72	50.29	46.28
23	46.72	44.80	47.48	49.54	50.15	50.26	52.74	56.59	56.22	53.62	50.24	46.18
24	46.57	45.01	47.50	49.62	50.16	50.26	52.90	56.65	56.20	53.48	50.19	45.92
25	46.43	45.32	47.54	49.68	50.16	50.26	53.15	56.74	56.12	53.38	50.12	45.65
26	46.24	45.58	47.56	49.74	50.16	50.28	53.36	56.76	56.08	53.35	50.02	45.35
27	46.05	45.76	47.58	49.76	50.18	50.28	53.55	56.72	55.95	53.28	49.92	45.05
28	45.78	45.88	47.66	49.79	50.18	50.29	53.73	56.76	55.85	53.15	49.82	44.75
29	45.52	45.92	47.74	49.80	50.18	50.29	53.90	56.82	55.85	52.98	49.72	44.40
30	45.22	45.95	47.82	49.82	.....	50.30	54.08	56.78	55.78	52.88	49.64	44.05
31	44.92	.....	47.90	49.82	.....	50.30	.....	56.74	.....	52.78	49.52	.....

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 the 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, 1916.

GAGE.—Friez water-stage recorder installed September 18, 1912, 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. Datum of original gage was lowered 0.11 foot between July 15, 1908, and May 25, 1912, and datum of present gage is same as that of original gage on the later date. Curtis and Reynolds made daily staff-gage readings and obtained the Friez record.

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

CHANNEL AND CONTROL.—Bed consists of lava rock and boulders and gravel. One channel at all stages. Control fairly permanent. Growth of moss at times affects stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.30 feet at 9 a. m. July 15 (discharge, 957 second-feet); minimum stage recorded, 0.80 foot at 2.30 p. m. May 12 (discharge, 7.3 second-feet).

1908–1916: Maximum stage recorded, 4.15 feet May 14, 1909 (discharge, 1,640 second-feet); minimum stage recorded, 0.70 foot at 1.30 p. m. January 21, 1915 (measured discharge, 3.3 second-feet).

ICE.—Stage-discharge relation not affected by ice, presumably because of the proximity of the station to the reservoir, where the temperature of the stored water is above the freezing point.

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

REGULATION.—Flow past station consists entirely of stored water from reservoir and is controlled by gates at dam.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants. Well-defined rating curves applicable October 1 to December 27, December 28 to May 13, and May 25 to September 30. Operation of Friez recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph; shifting-control method used May 14–24. Records good.

Discharge measurements of Blackfoot River near Henry, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	A. W. Harrington	2.47	487	May 13	L. W. Roush	1.93	265
Dec. 12	G. C. Baldwin	1.12	37.3	13	do	2.33	440
May 12	L. W. Roush	1.23	58.2	June 14	do	2.16	342
12	do	.80	7.3	15	do	2.77	656
12	do	1.63	165				

Daily discharge, in second-feet, of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	482	365	68	35	44	44	49	56	343	667	678	645
2	482	326	68	35	44	44	50	58	343	667	678	639
3	477	280	68	35	44	44	52	56	343	673	678	634
4	472	257	68	35	44	44	52	56	343	667	678	634
5	477	242	68	35	44	44	52	58	343	667	684	639
6	468	227	68	37	44	44	52	62	343	667	684	634
7	469	213	68	38	44	44	52	62	343	667	684	634
8	471	213	68	38	44	45	52	60	343	667	684	623
9	472	210	48	38	44	45	54	58	343	662	684	601
10	383	199	37	38	44	45	56	58	343	662	684	596
11	322	193	37	38	44	45	56	58	343	667	684	579
12	322	183	37	38	44	45	60	74	343	667	684	569
13	322	117	39	38	44	45	60	169	343	667	678	558
14	317	50	40	38	44	45	60	100	347	667	684	558
15	313	50	40	38	44	45	62	100	492	840	684	553
16	313	50	40	38	44	45	62	100	650	928	684	532
17	313	54	40	38	44	45	62	156	650	898	678	512
18	313	57	40	35	44	45	62	220	650	898	678	502
19	378	59	42	35	44	47	62	462	656	898	667	487
20	548	59	42	35	44	49	62	678	656	869	667	477
21	548	59	42	38	44	45	58	617	656	782	662	467
22	543	57	40	38	44	45	58	617	662	707	662	458
23	528	55	39	38	44	45	58	617	662	724	662	448
24	507	57	37	40	44	45	58	448	662	735	656	434
25	497	59	37	40	44	45	58	343	667	735	656	415
26	472	59	37	40	44	49	58	343	667	735	645	396
27	453	63	36	42	44	49	58	343	673	730	650	383
28	434	64	35	42	44	49	58	343	673	724	656	374
29	420	64	35	44	44	49	58	343	667	707	656	360
30	396	68	35	44	.....	49	58	343	673	695	656	343
31	378	.....	35	44	.....	49	.....	343	.....	690	645	.....

NOTE.—No gage-height record Oct. 7 and 8; discharge interpolated.

Monthly discharge of Blackfoot River near Henry, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	548	313	429	26,400
November	365	50	134	7,970
December	68	35	46.3	2,850
January	44	35	38.2	2,350
February	44	44	44.0	2,530
March	49	44	45.7	2,810
April	62	49	57.0	3,390
May	678	56	239	14,700
June	673	343	507	30,200
July	928	662	730	44,900
August	684	645	671	41,300
September	645	343	523	31,100
The year	928	35	290	210,000

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, and 18 miles northeast of Blackfoot. Below all important tributaries.

DRAINAGE AREA.—Not measured.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 5.36 feet at 9 p. m. July 17 (discharge, 926 second-feet); minimum stage not definitely known as it occurred during the winter.

1909–1916: 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).

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSIONS.—No noteworthy diversions are made 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 permanent except as affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Blackfoot River near Shelley, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 10	G. C. Baldwin	a3.43	76.7	May 25	L. W. Roush	4.70	581
Mar. 15	A. W. Harrington	3.51	104	Aug. 2	do	5.08	789

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	531	416	.....	.....	111	212	328	517	719	786	653
2	536	385	.....	.....	113	227	320	512	719	786	643
3	531	367	.....	.....	116	224	311	512	719	786	643
4	527	345	.....	.....	118	239	307	508	719	786	638
5	527	328	.....	.....	132	250	311	508	714	786	633
6	522	311	.....	.....	99	224	307	503	708	786	633
7	522	290	.....	.....	91	216	295	498	708	760	623
8	522	282	.....	.....	101	231	282	498	693	760	623
9	527	286	.....	.....	129	262	274	494	683	760	613
10	527	270	77	.....	123	328	266	489	678	760	608
11	517	258	.....	.....	115	452	262	489	678	760	608
12	398	250	.....	.....	132	448	254	484	673	760	608
13	398	.....	.....	.....	132	389	354	484	668	734	604
14	398	.....	91	101	109	367	311	480	668	734	599
15	394	.....	87	99	118	398	295	494	724	734	594
16	394	.....	.....	99	121	394	290	760	920	734	594
17	394	.....	.....	99	132	358	295	760	920	724	584
18	389	.....	.....	101	135	389	394	760	920	708	579
19	389	.....	.....	99	141	372	452	760	920	708	570
20	498	121	.....	87	170	324	760	760	920	703	560
21	541	121	.....	87	187	315	812	760	893	703	550
22	570	123	.....	84	170	332	812	760	786	698	536
23	584	123	.....	96	201	354	812	760	786	693	550
24	570	126	89	89	167	376	760	760	786	688	550
25	560	99	91	87	157	407	584	760	786	683	531
26	546	123	.....	101	165	412	574	734	786	683	512
27	531	.....	.....	103	173	416	579	734	786	678	494
28	508	.....	.....	106	181	420	546	724	786	673	480
29	489	.....	.....	108	188	380	527	724	786	673	466
30	466	.....	.....	.....	196	354	522	724	786	668	448
31	438	.....	.....	.....	204	.....	517	.....	786	658	.....

NOTE.—No gage-height record Nov. 13–19, Dec. 30–31, Jan. 16–22, Jan. 30 to Feb. 10, Feb. 27 to Mar. 3 and Mar. 26–31. Stage-discharge relation affected by ice Nov. 27 to Jan. 9, 11–13, 23, Jan. 26 to Feb. 13. Discharge interpolated Feb. 27 to Mar. 3 and Mar. 26–31. Mean discharge estimated from discharge measurement, observer's notes, weather records, and record obtained at station near Henry, as follows: Nov. 13–19, 140 second-feet; Nov. 27–30, 115 second-feet; Dec. 1–9, 123 second-feet; Dec. 10, 91 second-feet; Dec. 11–31, 82 second-feet; Jan. 1–9, 78 second-feet; Jan. 11–13, 77 second-feet; Jan. 16–23 and 26–31, 80 second-feet; Feb. 1–13, 98 second-feet.

Monthly discharge of Blackfoot River near Shelley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	584	389	492	30,300
November	416	.....	202	12,000
December	.....	.....	94.2	5,790
January	.....	.....	80.3	4,940
February	.....	.....	97.2	5,590
March	204	91	143	8,790
April	452	212	336	20,000
May	812	254	442	27,200
June	760	480	624	37,100
July	920	668	769	47,300
August	786	658	728	44,800
September	653	448	578	34,400
The year	920	.....	383	278,000

BLACKFOOT RIVER NEAR BLACKFOOT, IDAHO.

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

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 27, 1913, to September 30, 1916. 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 by wading or from cable near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded, 8.48 feet at 8.15 a. m. July 19 (discharge, 626 second-feet); minimum stage, 5.65 feet at 10.35 a. m. July 15 (discharge, 174 second-feet).

1913–1916: Maximum stage recorded, 8.7 feet September 21–22, 1914 (discharge, 673 second-feet); water below gage at 7.20 p. m. June 17, 1915 (discharge estimated at 40 second-feet).

ICE.—No records obtained during winter.

DIVERSIONS.—Principal diversions above gage are the Fort Hall canals near Blackfoot, but several smaller diversions are made near 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 height to rating table. Records good.

Discharge measurements of Blackfoot River near Blackfoot, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 29	L. W. Roush	7.33	437
Aug. 4	....do	6.90	380
Sept. 16	G. C. Baldwin	8.22	556

Daily discharge, in second-feet, of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	214	575	458	11	256	256	442	21	541	378	426
2	228	541	490	12	286	242	490	22	541	394	378
3	228	426	442	13	214	242	541	23	507	378	362
4	271	362	442	14	200	242	558	24	458	378	378
5	301	286	458	15	174	256	575	25	378	362	378
6	301	301	442	16	286	228	575	26	442	316	394
7	256	316	394	17	592	271	541	27	524	331	410
8	214	301	378	18	592	301	410	28	524	362	426
9	228	286	378	19	626	301	458	29	575	378	426
10	256	271	426	20	575	346	442	30	592	394	394
								31	575	426	

Monthly discharge of Blackfoot River near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	626	174	386	23,700
August	575	228	337	20,700
September	575	362	444	26,400
The period				70,800

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, 1916.

GAGE.—Vertical staff fastened to log across the stream just below Skinner's barn; read by Miss E. Skinner and Mrs. W. W. Chester.

DISCHARGE MEASUREMENTS.—Made by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.30 feet at 6 p. m. April 24 (discharge, 115 second-feet); minimum stage, 1.15 feet January 7–15 (discharge, 11 second-feet).

1914–1916: 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 1–2, and July 4 at 6 p. m. to July 7, 1914 (minimum discharge, determined by shifting control method, 7 second-feet July 5, 6, and 7).

ICE.—Stage-discharge relation not affected by ice because of warm springs.

DIVERSIONS.—A ditch used for watering stock diverts about 300 feet above the station and a small ditch diverts between station and reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by growth of aquatic plants but changes well covered by discharge measurements until June 22. Fairly well defined standard rating curve and shifting-control method used. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table October 1 to June 22; estimated June 23 to September 30. Records fair to June 22, but poor after that date.

Discharge measurements of Little Blackfoot River at Henry, Idaho, during the year ending Sept. 30, 1916.

Date.	made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Oct. 2	A. W. Harrington	1.31	15.8	May 14	L. W. Roush	1.53	28.5
Dec. 13	G. C. Baldwin	1.19	12.7	June 8	.....do	1.70	23.8
Apr. 7	.....do	1.40	24.6	June 22	.....do	1.96	19.4
May 4	L. W. Roush	1.52	29.1	Aug. 8	.....do	1.95	16.0

Daily discharge, in second-feet, of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	16	14	15	13	13	13	13	30	22
2	16	14	14	13	13	13	13	30	22
3	17	14	14	13	13	13	16	30	21
4	16	14	13	13	13	13	21	29	22
5	18	14	13	13	13	13	22	28	23
6	18	14	13	13	13	13	20	28	23
7	19	15	13	11	13	13	22	28	23
8	17	15	13	11	13	13	28	28	24
9	16	15	13	11	13	13	35	28	23
10	16	16	13	11	13	13	44	28	21
11	16	16	13	11	13	13	51	28	19
12	16	16	13	11	13	13	46	28	19
13	16	16	13	11	13	13	26	28	18
14	16	15	13	11	13	13	46	28	18
15	16	15	13	11	13	13	69	27	18
16	16	15	13	13	13	13	78	26	18
17	16	15	13	13	13	13	84	25	17
18	16	15	13	13	13	13	94	23	16
19	16	16	13	13	13	13	67	27	16
20	16	16	13	13	13	13	51	37	18
21	16	16	13	13	13	13	37	34	19
22	16	16	13	13	13	13	57	30	19
23	16	16	13	13	13	13	84	28	.....
24	16	16	13	13	13	13	108	25	.....
25	16	16	13	13	13	13	95	27	.....
26	16	16	13	13	13	13	77	30	.....
27	15	16	13	13	13	13	60	29	.....
28	14	16	13	13	13	13	37	27	.....
29	14	15	13	13	13	13	37	25	.....
30	14	15	13	13	.....	13	35	24	.....
31	14	.....	13	13	.....	13	.....	22	.....

NOTE.—Mean discharge estimated as follows: June 23–30, 18 second-feet; July 1–31, 17 second-feet; Aug. 1–8, 16 second feet; Aug. 9–31, 15 second-feet; Sept. 1–30, 15 second-feet.

Monthly discharge of Little Blackfoot River at Henry, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	19	14	16.0	984
November	16	14	15.3	910
December	15	13	13.1	806
January	13	11	12.4	762
February	13	13	13.0	748
March	13	13	13.0	799
April	108	13	49.1	2,920
May	37	22	27.9	1,720
June	24	.....	19.4	1,150
July	.....	.....	17.0	1,050
August	.....	.....	15.3	941
September	.....	.....	15.0	893
The year	108	11	18.8	13,700

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 of a 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, 1916.

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

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 the gage, but this dam was torn out August 17–19, 1915, and stage-discharge relation completely 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, 3.92 feet at 3.40 p. m. April 15 (discharge, 207 second-feet); minimum stage recorded, about 1.06 feet at 6 p. m. July 17 (discharge, about 0.4 second-foot).

1914–1916: Maximum stage recorded, 4.39 feet April 17, 1914 (discharge, 281 second-feet); minimum stage recorded July 17, 1916, at 6 p. m.

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—None above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two fairly well defined rating curves used, one applicable October 1 to November 7, the other April 11 to July 5. Operation of water-stage recorder unsatisfactory at times. Daily discharge ascertained by applying to rating table daily gage height obtained by inspecting recorder graph. Records fair.

Discharge measurements of Meadow Creek near Henry, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 2	A. W. Harrington	1.98	18.2	May 15	L. W. Roush	2.95	68.0
Dec. 13	G. C. Baldwin	[a]1.91	8.2	June 7	do	2.46	35.0
Apr. 15	do	3.78	178	22	do	2.02	15.1
May 3	L. W. Roush	3.45	121	Aug. 9	do	1.82	12.6

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	20	11	.....	121	54	9.5	9.5	11
2	18	11	.....	121	51	8.6	8.9	11
3	18	11	.....	121	48	7.6	8.6	11
4	17	11	.....	115	45	6.9	8.3	11
5	16	11	.....	107	41	2.3	9.8	10
6	15	11	.....	103	38	.....	13	10
7	14	11	.....	99	36	.....	13	10
8	14	.....	.....	94	34	.....	13	9.8
9	13	.....	.....	90	32	.....	13	9.8
10	13	.....	.....	86	30	.....	13	10
11	13	.....	141	82	28	.....	12	10
12	13	.....	138	78	27	.....	12	10
13	13	.....	125	75	26	.....	12	11
14	13	.....	114	71	22	.....	12	11
15	13	.....	182	67	21	.....	13	11
16	12	.....	176	65	20	.....	13	11
17	12	.....	170	62	18	.....	14	12
18	12	.....	172	59	17	.....	15	12
19	12	.....	178	58	15	13	15	12
20	12	.....	159	57	11	14	14	12
21	12	.....	140	56	11	13	14	12
22	12	.....	121	55	15	12	14	12
23	12	.....	121	55	18	11	14	13
24	12	.....	121	55	20	9.5	14	13
25	11	.....	120	55	20	8.9	13	14
26	11	.....	120	58	18	8.9	13	14
27	11	.....	120	62	16	8.9	12	14
28	11	.....	120	65	14	8.9	12	14
29	11	.....	120	66	12	8.6	12	14
30	11	.....	121	63	11	8.9	12	14
31	11	.....	.....	58	.....	9.5	11	.....

NOTE.—No record Nov. 8 to Apr. 6. Discharge interpolated on account of lack of gage-height record Oct. 7, 8, 16–24, Oct. 29 to Nov. 5, Apr. 20, 21, Apr. 27 to May 2, May 6–10, 12, and 13. Mean discharge estimated as follows: Apr. 7–10, 67 second-feet; July 6–18, 0.5 second-feet.

Monthly discharge of Meadow Creek near Henry, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	11	13.2	812
November 1–7	11	11	11.0	153
April 7–30	182	.....	127	6,050
May	121	55	76.7	4,720
June	54	11	25.6	1,520
July	14	.....	5.70	350
August	15	8.3	12.4	762
September	14	9.8	11.7	696

IDAHO (GOVERNMENT) CANAL NEAR FIRTH, IDAHO.

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

RECORDS AVAILABLE.—March 29, 1914, to September 30, 1916.

GAGE.—Friez water-stage recorder on left bank. Vaughn and Kaiser, observers.

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

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

EXTREMES OF DISCHARGE.—Maximum recorded during the year, 5.30 feet at 3.35 p. m., June 21 (discharge, 428 second-feet); minimum discharge is practically zero.

1914–1916: Maximum stage recorded June 21, 1916; minimum discharge practically zero in 1916, but can not be exactly determined as water was below inlet pipe to float well.

ICE.—Stage-discharge relation seriously affected by ice. Data inadequate for determination of winter discharge.

DIVERSIONS.—None.

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

ACCURACY.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined between 10 and 330 second-feet. Operation of water-stage recorder unsatisfactory at times. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except as noted in footnote to table of daily discharge. Records good for period April to September, fair for rest of year.

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 just above this station.

Discharge measurements of Idaho (Government) canal near Firth, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Dec. 9	G. C. Baldwin	1.86	40.2	May 24	L. W. Roush	2.90	139
Mar. 15	A. W. Harrington	1.26	6.7	25	do	3.12	154
15	do	1.32	6.6	Aug. 1	do	4.47	317
April 18	G. C. Baldwin	3.39	179				

Daily discharge, in second-feet, of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	70	.....	.....	94	222	183	213	321	256
2	49	.....	.....	103	230	189	207	250	183
3	34	.....	.....	64	237	183	269	171	[illegible]
4	36	.....	.....	41	219	160	256	144	160
5	35	.....	.....	47	195	149	308	166	160
6	34	13	.....	56	201	104	282	201	160
7	32	18	.....	52	195	160	195	213	160
8	32	29	.....	48	201	207	231	183	149
9	30	53	.....	52	201	295	269	219	123
10	28	57	.....	63	196	360	347	207	160
11	31	47	.....	77	192	308	269	207	171
12	32	64	.....	104	188	334	269	183	231
13	28	50	.....	144	183	386	269	183	256
14	22	.....	.....	160	171	360	195	171	243
15	19	.....	.....	149	177	295	183	154	243
16	20	.....	.....	160	123	308	308	207	231
17	21	.....	.....	171	31	256	314	195	195
18	20	.....	.....	177	16	334	321	195	183
19	20	.....	.....	183	15	347	347	243	171
20	20	26	.....	183	33	360	360	256	149
21	19	24	.....	183	101	428	360	231	149
22	17	23	.....	183	129	373	347	195	128
23	18	26	.....	.....	144	360	295	195	149
24	.....	15	109	.....	131	334	282	171	160
25	.....	10	91	.....	149	308	269	128	207
26	.....	.....	84	.....	166	231	386	160	183
27	.....	.....	84	.....	166	149	321	160	183
28	.....	.....	84	.....	183	171	334	207	183
29	.....	.....	95	207	207	183	347	231	207
30	11	.....	87	214	195	219	321	195	160
31	.....	.....	84	.....	189	.....	347	231	.....

NOTE.—Stage-discharge relation affected by ice Nov. 26 to March 23. No gage-height record Oct. 24–29, Oct. 31 to Nov. 5, Nov. 14–19, Apr. 20, 21, 23–28, Apr. 30 to May 2 and May 10–12. Mean discharge estimated as follows: Oct. 24–29, 15 second-feet; Oct. 31 to Nov. 5, 12 second-feet; Nov. 14–19, 38 second-feet; Nov. 26–30, 10 second-feet; Dec. 1–3, 12 second-feet; Dec. 4–7, 25 second-feet; Dec. 8, 28 second-feet; Dec. 9, 26 second-feet; Dec. 10–18, 10 second-feet; Mar. 15–20, 7 second-feet; Mar. 21–23, 60 second-feet; Apr. 23–28, 195 second-feet; Water-stage recorder not working, staff gage read once a day Oct. 30, Nov. 6, 20, 21, Apr. 22, 29, May 13, June 6–30, July 3–8, 10–12, 15, 22–31, Aug. 18 to Sept. 30.

Monthly discharge of Idaho (Government) canal near Firth, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	70	.....	25.2	1,550
November	.....	.....	26.4	1,570
December 1–18	.....	.....	15.6	557
March 15–31	.....	.....	55.3	1,860
April	.....	41	136	8,090
May	237	15	161	9,900
June	428	104	268	15,900
July	386	183	291	17,900
August	321	128	199	12,200
September	256	123	182	10,800

FORT HALL UPPER CANAL NEAR BLACKFOOT, IDAHO.

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

RECORDS AVAILABLE.—May 8, 1912, to September 30, 1916.

GAGE.—Vertical staff in stilling well on right bank and sloping gage painted on right side 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 site. Gage read by ditch rider and gate tender.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge at gage.
CHANNEL AND CONTROL.—Concrete trapezoidal rating section.
EXTREMES OF DISCHARGE.—Maximum stage recorded 1912–1916, 4.60 feet at 5.30 a. m. July 16, 1916 (discharge, 372 second-feet); minimum flow occurs during winter months when a small quantity of water is run for stock.
ICE.—Observations discontinued during winter.
DIVERSIONS.—None above station or 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 twice daily to half tenths. Daily discharge determined by applying mean daily gage height to rating table. Records good

Fort Hall upper canal diverts water from 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 18	G. C. Baldwin	0.70	7.6	May 23	L. W. Roush	2.74	166
May 22	L. W. Roush	2.83	168	July 25	do	4.45	354

Daily discharge, in second-feet, of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	96	.....	136	136	300	360	190
2	96	.....	136	136	300	360	190
3	96	.....	168	136	300	360	190
4	96	.....	212	168	300	360	190
5	68	.....	212	168	300	360	223
6	68	.....	212	168	300	360	223
7	68	.....	234	168	300	360	223
8	68	.....	234	190	324	360	223
9	68	.....	234	234	324	360	223
10	68	.....	234	256	324	360	223
11	68	.....	234	267	324	360	223
12	68	.....	234	267	324	342	223
13	68	.....	223	256	336	324	233
14	68	.....	234	278	336	267	223
15	68	.....	212	300	348	267	223
16	26	.....	190	300	146	267	223
17	.....	.....	136	300	7.6	267	223
18	.....	.....	126	300	7.6	223	223
19	.....	.....	126	300	136	223	223
20	.....	.....	136	300	300	233	223
21	.....	.....	157	300	336	223	223
22	.....	.....	168	300	336	223	223
23	.....	46	168	300	348	223	223
24	.....	54	168	300	360	223	223
25	.....	75	168	300	360	234	223
26	.....	86	136	300	360	245	212
27	.....	86	136	300	360	245	190
28	.....	86	136	300	360	245	190
29	.....	116	136	300	360	245	190
30	.....	136	136	300	360	245	168
31	.....	.....	136	.....	360	190	.....

NOTE.—No record obtained Oct. 17 to Apr. 2, only small amount of water run for stock. Mean discharge estimated from gate tender's notes and measurement of Apr. 18, as follows: Apr. 3, 3.8 second-feet; Apr. 4–21, 7.6 second-feet; Apr. 22, 12 second-feet.

Monthly discharge of Fort Hall upper canal near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–16	96	.....	72.4	2,300
April 3–30	136	.....	29.9	1,660
May	234	126	178	10,900
June	300	136	254	15,100
July	360	7.6	298	18,300
August	360	190	287	17,600
September	223	168	213	12,700

FORT HALL LOWER CANAL NEAR BLACKFOOT, IDAHO.

LOCATION.—In sec. 15, T. 3 S., R. 35 E., Bingham County, 200 feet below the 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, 1916.

GAGE.—Inclined staff on right bank near center of concrete rating station; read by ditch rider for the United States Indian Service. Bristol water-stage recorder at same site, but referred to 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 sand and silt have been deposited. Principal control is a wooden check across the canal about a third of a mile below gage. Variations in 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.—Maximum stage recorded 1912–1916, 2.8 feet July 5–7 and 10–14, 1916 (discharge, 167 second-feet); canal reported dry on many dates.

ICE.—No records obtained during winter. 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 also diverts between the gage and the check that acts as the main control.

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

ACCURACY.—Stage-discharge relation not permanent; affected by variation in quantity of water diverted immediately below gage and by growth of aquatic vegetation. Two fairly well defined rating curves used, one applicable May 23 to July 15, the other July 18 to September 30. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records May 23 to September 30 fair; other records poor.

Fort Hall lower canal diverts water 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 23	L. W. Roush	1.95	80.0	Aug. 3	L. W. Roush	2.54	129
23	.....do	1.51	39.4	3	.....do	1.95	73.0
23	.....do	1.73	60.9	3	.....do	2.26	106
23	.....do	2.24	106	Sept. 16	G. C. Baldwin	1.82	59.8
July 26	.....do	2.68	148				

Daily discharge, in second-feet, of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1	32	.....	124	145	136	86	16	24	.....	104	26	126	59
2	32	.....	129	145	126	96	17	24	.....	124	24	126	59
3	32	.....	129	145	121	96	18	24	.....	124	116	131	59
4	32	.....	124	156	131	96	19	24	.....	134	126	136	59
5	32	.....	124	167	147	96	20	24	.....	145	136	126	59
6	32	.....	114	167	147	96	21	24	.....	145	147	126	59
7	32	.....	114	167	136	86	22	24	.....	156	158	116	54
8	32	.....	114	145	136	77	23	24	75	156	158	106	50
9	32	.....	114	156	126	77	24	.....	75	156	158	101	50
10	32	.....	104	167	126	77	25	.....	80	150	136	86	50
11	32	.....	94	167	126	77	26	.....	75	156	147	77	50
12	28	.....	114	167	126	77	27	.....	66	145	147	77	50
13	24	.....	114	167	126	77	28	.....	84	134	136	77	50
14	24	.....	104	167	126	77	29	.....	104	134	126	77	50
15	24	.....	94	145	126	68	30	.....	104	134	126	77	50
							31	.....	114	.....	126	77	.....

NOTE.—No record obtained Oct. 24 to Apr. 26; head gates closed most of the time. Mean discharge estimated as follows: Apr. 27–30, 1 second-foot; May 1–22, 10.6 second-feet.

Monthly discharge of Fort Hall lower canal near Blackfoot, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1–23	32	24	28.0	1,280
April 27–30	.....	.....	1.00	8
May	114	.....	35.9	2,210
June	156	94	127	7,560
July	167	24	141	8,670
August	147	77	116	7,130
September	96	50	68.9	4,100

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, 1916.

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, 4.52 feet June 18, 19 (discharge, 567 second-feet); minimum stage recorded, 1.49 feet at 6 a. m. September 23 (discharge, 17 second-feet). Minimum discharge probably occurred during winter.

1913–1916: Maximum stage recorded, 4.4 feet May 28, 1913 (discharge, 581 second-feet); minimum stage recorded, 1.06 feet August 4, 6, 7, and 9, 1915 (discharge, 3 second-feet). Stages exceeding 4.4 feet may have occurred during winter months, but stage-discharge relation was seriously affected by ice.

ICE.—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.—Gage read twice daily to hundredths. Open-water record for 1916 based on rating curve indicated by one measurement and drawn parallel to curves used previously. Daily discharge determined by applying mean daily gage height to rating table. Records fair.

The following discharge measurement was made by G. C. Baldwin:
August 7, 1916: Gage height, 1.83 feet; discharge, 37.7 second-feet.

Daily discharge, in second-feet, of Antelope Creek near Darlington, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	30	29	.....	50	181	220	210	55	24
2	30	25	.....	50	200	230	230	42	24
3	30	25	.....	50	200	220	240	42	22
4	30	25	.....	50	240	251	172	42	22
5	29	29	.....	60	297	262	164	34	22
6	27	29	.....	60	297	309	155	34	22
7	30	30	.....	60	358	321	131	35	22
8	33	25	.....	65	286	334	190	60	22
9	33	25	.....	74	274	384	200	40	22
10	33	23	.....	109	251	423	155	50	24
11	30	.....	.....	147	240	371	139	47	27
12	35	.....	.....	147	200	309	131	34	23
13	35	.....	.....	116	200	297	123	34	22
14	33	.....	.....	116	172	309	116	33	22
15	30	.....	.....	155	164	346	116	33	22
16	30	.....	.....	139	164	410	190	34	22
17	29	.....	.....	131	164	477	147	34	22
18	27	.....	.....	147	147	561	102	34	22
19	27	.....	.....	131	155	561	102	33	22
20	27	.....	.....	116	181	533	91	27	19
21	27	.....	.....	131	181	505	80	27	19
22	27	.....	.....	131	181	262	80	27	19
23	27	.....	.....	139	164	240	80	27	17
24	29	.....	50	155	190	210	74	27	19
25	29	.....	42	172	200	200	69	27	22
26	25	.....	46	190	172	262	80	27	22
27	25	.....	55	230	181	297	74	27	22
28	24	.....	65	251	172	321	69	27	22
29	24	.....	50	210	190	309	60	27	22
30	25	.....	46	200	220	230	60	26	22
31	25	.....	46	.....	220	.....	60	24	.....

NOTE.—No record obtained Nov. 17 to Mar. 23. Stage-discharge relation affected by ice Nov. 11–16, mean discharge estimated 23 second-feet.

Monthly discharge of Antelope Creek near Darlington, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	35	24	28.9	1,780
November 1–16	30	.....	25.2	800
March 24–31	65	42	50.0	793
April	251	50	126	7,500
May	358	147	208	12,800
June	561	200	332	19,800
July	240	60	125	7,690
August	60	24	34.5	2,120
September	27	17	21.8	1,300

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, 1916. 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, 5.4 feet at 1 p. m., March 24 (discharge, 817 second-feet); minimum stage recorded, 2.35 feet at 1 p. m. August 4 and 3 p. m. August 5 (discharge, 90 second-feet); actual minimum may have occurred during certain gaps in gage height record.

1911–1916: Maximum stage recorded, 6.4 feet May 23 and 24, 1912 (discharge, 1,240 second-feet); minimum stage recorded, 2. 0 feet July 4, 1915 (discharge, 52 second feet).

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).

ICE.—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 changed slightly during winter. Two well-defined rating curves used, one applicable October 1 to January 29, the other February 12 to September 30. Gage read once daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Portneuf River at Pocatello, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 14	G. C. Baldwin	4.78	585
21	A. W. Harrington	5.13	733
Aug. 5	L. W. Roush	2.35	90.1

Daily discharge, in second-feet, of Portneuf River at Pocatello, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	175	201	238	.....	.....	278	547	547	365	108	102	96
2	175	201	247	.....	.....	275	547	547	347	108	96	96
3	166	201	247	.....	.....	271	547	547	340	105	93	96
4	166	210	247	.....	.....	268	547	547	340	102	90	96
5	166	210	247	.....	.....	278	518	532	319	108	90	96
6	166	210	247	.....	.....	386	518	518	298	108	99	96
7	175	210	247	.....	.....	386	547	518	274	112	108	96
8	175	210	247	.....	.....	386	489	489	249	115	185	99
9	175	210	247	.....	.....	386	518	489	212	159	230	102
10	175	219	247	.....	.....	386	547	462	216	203	240	102
11	175	219	247	.....	.....	435	547	435	221	212	.....	102
12	175	219	247	.....	298	489	641	410	203	167	.....	105
13	175	228	247	.....	298	489	641	386	185	122	.....	108
14	175	228	247	.....	298	609	609	340	168	115	.....	108
15	175	228	247	.....	288	609	609	298	160	108	.....	108
16	183	228	247	.....	278	577	577	278	151	.....	.....	108
17	192	228	.....	183	278	547	577	259	144	.....	.....	108
18	192	228	.....	.....	278	577	547	250	136	.....	.....	108
19	201	238	.....	.....	278	609	547	240	129	.....	.....	108
20	210	238	.....	.....	278	675	547	240	148	.....	.....	115
21	210	247	247	.....	278	709	518	235	168	.....	108	122
22	219	247	247	.....	278	744	489	230	168	.....	104	126
23	219	247	266	.....	278	817	489	254	160	.....	100	129
24	219	247	266	.....	288	817	489	278	151	.....	96	129
25	219	247	247	.....	298	780	489	356	148	.....	96	132
26	210	247	238	.....	298	577	489	435	144	185	96	136
27	210	247	228	.....	298	609	518	422	130	185	96	141
28	210	247	.....	.....	291	609	518	410	115	180	96	146
29	210	238	.....	183	285	609	547	410	115	176	96	151
30	210	238	.....	.....	.....	609	547	386	112	151	96	162
31	201	.....	.....	.....	.....	577	.....	362	.....	108	96	.....

NOTE.—Observer absent July 16–25 and Aug. 11–20; mean discharge estimated at 120 second-feet. Stage-discharge relation affected by ice Dec. 17–20, Dec. 28 to Jan. 16, Jan. 18–28, Jan, 30 to Feb. 11; mean discharge estimated from observer's notes and weather records, as follows: Dec. 17–20, 222 second-feet; Dec. 28–31, 190 second-feet; Jan. 1–16, 220 second-feet; Jan. 18–22, 219 second-feet; Jan. 30 and 31, 198 second-feet; Feb.1–11, 274 second-feet.

Monthly discharge of Portneuf River at Pocatello, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	219	166	190	11,700
November	247	201	227	13,500
December	266	.....	236	14,500
January	.....	.....	216	13,300
February	.....	.....	282	16,200
March	817	268	528	32,500
April	641	489	542	32,300
May	547	230	391	24,000
June	355	112	200	11,900
July	.....	.....	133	8,180
August	.....	.....	117	7,190
September	162	96	114	6,780
The year	817	.....	265	192,000

NORTH SIDE MINIDOKA CANAL NEAR MINIDOKA, IDAHO.

LOCATION.—In sec. 1, T. 9 S., R. 35 E., 650 feet below Minidoka dam, 6 miles south of Minidoka, Minidoka County.

RECORDS AVAILABLE.—May 1, 1909, to September 30, 1916.

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

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

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

ICE.—No records kept during winter.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.31 feet, June 21 (discharge, 1,490 second-feet); no flow May 8 and also at times during period of no record.

1909–1916: 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 below 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 1	M. Aylor	5.64	646	July 5	Schlapkohl	7.92	1,150
13	do	5.30	578	14	do	8.72	1,350
30	G. C. Baldwin	5.30	561	24	do	9.31	1,538
Apr. 20	Schlapkohl	5.65	659	27	Schlapkohl and Redeker	9.33	1,502
23	L. W. Roush	5.64	638				
26	Schlapkohl	7.40	1,056	27	do	9.33	1,485
May 1	do	8.83	1,387	Aug. 8	Schlapkohl	9.21	1,450
10	do	4.25	404	14	Schlapkohl and Aylor	8.82	1,320
15	do	8.69	1,323	23	M. Aylor	8.24	1,186
29	do	6.32	812	31	do	8.72	1,286
June 8	do	9.08	1,448	Sept. 8	do	8.20	1,171
14	M. Aylor	9.27	1,429	14	L. W. Roush	7.45	985
19	do	9.30	1,448	15	M. Aylor	7.42	964
27	L. W. Roush	8.79	1,360	23	Schlapkohl	7.33	936

NOTE.—All measurements except those by Baldwin and Roush 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, 1916.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	641	.....	1,343	910	1,283	1,364	1,319
2	627	.....	1,424	958	1,246	1,362	1,294
3	618	350	1,465	1,008	1,202	1,373	1,297
4	612	137	1,465	1,089	1,147	1,473	1,292
5	607	49	1,465	1,214	1,125	1,467	1,265
6	616	118	1,459	1,275	1,128	1,451	1,251
7	630	353	705	1,334	1,123	1,462	1,230
8	643	521	.....	1,410	1,139	1,459	1,200
9	596	563	96	1,462	1,169	1,448	1,194
10	576	461	304	1,473	1,199	1,413	1,164
11	580	74	514	1,467	1,204	1,386	1,034
12	580	35	734	1,429	1,235	1,378	974
13	578	107	914	1,459	1,300	1,365	976
14	578	270	1,089	1,476	1,329	1,365	994
15	578	421	1,273	1,476	1,351	1,332	1,001
16	578	459	1,386	1,484	1,413	1,233	1,017
17	576	459	1,443	1,490	1,443	1,209	1,010
18	578	555	1,454	1,487	1,453	1,222	999
19	574	618	1,445	1,487	1,453	1,220	994
20	578	641	1,421	1,476	1,462	1,222	987
21	576	643	1,359	1,490	1,478	1,140	990
22	576	641	1,292	1,476	1,478	1,130	994
23	574	641	1,164	1,408	1,478	1,179	987
24	576	692	983	1,340	1,484	1,230	990
25	578	800	816	1,332	1,462	1,265	985
26	578	956	768	1,337	1,453	1,297	961
27	576	1,060	730	1,337	1,484	1,319	919
28	578	1,187	709	1,329	1,445	1,359	839
29	580	1,248	751	1,354	1,421	1,375	794
30	578	1,257	796	1,356	1,394	1,383	800
31	578	.....	866	.....	1,367	1,346	.....

NOTE.—No record received Nov. 1 to April 2.

Monthly discharge of North Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	643	574	590	36,300
April 3–30	1,257	35	547	30,400
May	1,465	0	1,020	62,700
June	1,490	910	1,350	80,300
July	1,484	1,123	1,330	81,800
August	1,473	1,130	1,330	81,800
September	1,319	794	1,060	63,100

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, 1916.

GAGE.—Friez water-stage recorder on right bonk. 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.

ICE.—No records obtained during winter.

EXTREMES OF DISCHARGE.—1909–1916: Maximum stage recorded, 5.50 feet July 24, 1916 (discharge, 1,012 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. Rating curve well defined by a large number of measurements. Records 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 4	M. Aylor	3.24	392	June 26	H. L. Crawford	4.78	817
13	do	2.83	320	July 6	do	4.94	854
30	G. C. Baldwin	2.83	319	14	do	5.18	905
Apr. 23	L. W. Roush	2.06	242	22	do	5.43	991
25	H. L. Crawford	2.06	241	Aug. 1	do	5.32	941
May 1	Schlapkohl	3.35	450	7	do	5.24	944
8	H. L. Crawford	4.82	831	15	do	5.12	878
16	do	4.46	750	23	do	4.37	676
27	do	3.48	498	30	do	4.73	741
June 1	do	2.99	368	Sept. 7	do	4.82	745
6	do	4.12	652	14	L. W. Roush	4.36	658
13	do	5.16	919	15	H. L. Crawford	4.07	573
19	do	5.38	970	22	do	4.18	605
26	L. W. Roush	4.78	832	30	do	3.48	466

NOTE.—All measurements except those made by Baldwin and Roush 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, 1916.

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	418	.....	460	396	829	968	759
2	412	.....	491	398	840	962	772
3	396	.....	533	400	840	971	769
4	390	.....	623	429	840	976	764
5	388	.....	708	489	842	973	769
6	396	.....	790	630	845	962	772
7	410	.....	819	702	821	954	762
8	408	.....	824	756	819	957	754
9	400	.....	845	850	824	952	767
10	379	.....	860	884	832	944	767
11	325	.....	827	922	853	941	754
12	322	.....	821	927	873	938	725
13	320	.....	832	925	879	919	662
14	322	.....	837	949	911	914	645
15	318	93	827	952	930	876	606
16	318	158	767	965	925	871	570
17	318	160	720	957	925	840	584
18	318	162	743	962	949	777	601
19	318	165	736	973	946	756	601
20	316	172	650	949	984	698	603
21	316	228	623	944	995	705	603
22	316	245	618	890	1,001	698	603
23	318	241	547	873	998	678	608
24	320	242	526	873	1,012	708	608
25	316	242	517	847	1,006	728	610
26	320	321	513	821	998	730	618
27	320	392	497	814	1,003	751	574
28	320	431	469	837	998	767	544
29	323	456	400	837	1,006	782	502
30	323	456	400	824	1,006	759	464
31	323	.....	396	.....	990	741	.....

NOTE.—No record obtained Nov. 1 to Apr. 14.

Monthly discharge of South Side Minidoka canal near Minidoka, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	418	316	345	21,200
April 15-30	456	93	260	8,250
May	860	396	652	40,100
June	973	396	799	47,500
July	1,012	819	920	56,600
August	976	678	845	52,000
September	772	464	658	39,200

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, 1916 when station was discontinued.

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; apparently permanent. 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 recorded during year, 3.54 feet at noon April 30 to 6 a. m May 1 (discharge, 245 second-feet); minimum stage recorded, 1.61 feet at 5 to 7 a. m. August 28 (discharge, 7.3 second-feet).

1911–1916: Maximum stage recorded, 4.4 feet May 22, 1912 (discharge, 493 second-feet); minimum stage recorded, 1.19 feet at 9 a. m., August 13, 1915 (discharge, 1.1 second-feet).

ICE.—Stage-discharge relation greatly affected by ice; observations discontinued during winter.

DIVERSION.—A number of small canals and ditches divert water above station chiefly for irrigation of lands belonging to the Utah Construction Co.

REGULATIONS.—None except such as might be caused by changes of head gates of ditches and canals.

ACCURACY.—Stage-discharge relation changed slightly during winter. Two well-defined rating curves used, one applicable October 1 to December 20, the other March 9 to September 30. Gage-height record unsatisfactory at times owing to breaks in record. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 11	C. A. McClelland [a]	1.99	22.7	June 16	W. N. McConnell [b]	2.58	71.4
29	do	1.89	16.8	23	L. H. Perrine [a]	2.44	58.8
Dec. 6	do	2.11	31.6	30	C. A. McClelland [a]	2.26	41.2
20	do	1.96	20.6	July 18	W. N. McConnell [b]	2.20	37.5
Mar. 16	do	2.75	95.7	Aug. 15	do	1.68	9.5
Apr. 21	L. W. Roush	3.28	189	20	L. W. Roush	1.68	9.2
June 9	C. A. McClelland [a]	2.70	88.1				

[a] Employee of Twin Falls-Oakley Land and Water Co.
[b] Employee of Idaho State Engineer.

Daily discharge, in second-feet, of Goose Creek above Trapper Creek, near Oakley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	13	.....	.....	.....	113	241	138	41	21	11
2	12	.....	.....	.....	121	234	133	39	20	9.2
3	11	.....	.....	.....	128	225	.....	42	18	8.4
4	11	.....	.....	.....	128	218	.....	43	16	7.8
5	12	.....	.....	.....	126	218	.....	38	15	8.1
6	13	.....	31	.....	124	227	.....	36	14	8.4
7	13	.....	30	.....	124	236	.....	35	13	9.0
8	13	.....	30	.....	124	241	.....	33	13	8.7
9	13	.....	30	62	122	238	88	31	12	8.4
10	13	.....	29	82	129	238	82	29	11	8.4
11	13	22	23	105	141	236	79	26	11	9.5
12	13	21	23	121	162	229	79	24	9.8	11
13	13	21	23	136	179	216	79	22	9.2	11
14	14	21	22	113	187	204	76	20	9.0	11
15	15	21	22	97	181	193	73	24	9.0	12
16	15	21	22	92	175	185	73	28	9.5	11
17	18	22	22	100	177	175	67	33	9.8	12
18	16	24	22	102	183	167	64	37	9.5	12
19	16	27	22	102	189	167	62	34	8.7	11
20	17	28	21	111	191	177	62	31	9.2	11
21	17	28	.....	131	189	179	61	27	9.2	11
22	17	28	.....	126	179	177	60	24	9.2	12
23	16	28	.....	136	167	175	59	22	9.0	12
24	16	28	.....	145	158	173	57	20	8.7	13
25	17	28	.....	131	158	171	55	20	9.2	14
26	18	25	.....	134	167	169	53	31	8.7	15
27	17	22	.....	128	189	.....	51	45	8.1	16
28	17	20	.....	124	208	.....	49	29	7.8	17
29	17	17	.....	121	225	.....	46	27	8.1	16
30	17	28	.....	119	243	.....	43	24	9.2	16
31	16	.....	.....	116	.....	.....	.....	22	14	.....

NOTE.—Discharge interpolated, because of missing gage heights Oct. 22, 23, Nov. 26–28, Dec. 12, 14–19 June 1, 21, 22, July 8–13 and 15–17. Discharge estimated, on account of ice Nov. 13–16. Mean discharge estimated as follows, because lack of gage heights: Nov. 1–10, 20 second-feet; Dec. 1–5, 30 second-feet; Dec. 21–31, 17 second-feet; May 27–31, 154 second-feet; June 3–8, 110 second-feet. No record obtained Jan. 1 to Mar. 8.

Monthly discharge of Goose Creek above Trapper Creek, near Oakley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	18	11	14.8	910
November	28	.....	22.7	1,350
December	.....	.....	22.9	1,410
March 9–31	145	62	115	5,250
April	243	113	163	9,700
May	241	.....	196	12,100
June	138	43	78.3	4,660
July	45	20	30.2	1,860
August	21	7.8	11.3	695
September	17	7.8	11.4	678

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, 1916, when station was discontinued.

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 recorded during year, 2.82 feet May 7 (discharge, 52 second-feet); minimum stage recorded, 1.99 feet at 9 a. m. September 2 (discharge, 9.4 second-feet).

1911-1916: Maximum stage recorded, 3.17 feet at 10 p. m. February 28, 1914 (discharge, 70 second-feet); minimum discharge probably occurs during winter.

ICE.—Stage-discharge relation seriously affected by ice. Observations discontinued during winter.

DIVERSIONS.—None of consequence above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent but changes are fairly well defined by discharge measurements. Several rating curves and shifting-control method used. Operation of water-stage recorder unsatisfactory; a number of breaks in the record. Daily discharge ascertained by applying to rating table daily gage height obtained by inspecting recorder graph. Records fair.

COOPERATION.—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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Nov. 12	C. A. McClelland [a]	2.02	10.3	July 19	W. N. McConnel [b]	2.14	15.0
30	do	2.03	11.1	19	do	2.14	16.0
Mar. 10	do	2.24	18.8	Aug 1	L. H. Perrine [a]	2.05	11.3
Apr. 20	L. W. Roush	2.56	31.6	15	W. N. McConnel [b]	2.03	10.3
June 27	L. H. Perrine [a]	2.30	24.2	20	L. W. Roush	2.03	10.7

[a] Employes of Twin Falls-Oakley Land and Water Co.
[b] Employee of Idaho State engineer.

Daily discharge, in second-feet, of Trapper Creek near Oakley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	.....	11	.....	22	42	38	21	11	9.9
2	11	.....	11	.....	24	43	38	21	11	9.7
3	11	.....	11	.....	22	43	38	24	11	9.7
4	11	.....	11	.....	23	45	37	21	11	9.9
5	11	.....	11	.....	23	49	38	21	11	10
6	11	.....	11	.....	23	50	38	20	11	10
7	11	.....	11	.....	23	52	38	19	11	10
8	11	.....	11	.....	24	50	38	19	11	9.9
9	11	.....	11	.....	26	50	38	17	11	10
10	11	.....	11	21	28	48	38	17	11	11
11	11	.....	11	22	34	46	38	17	10	11
12	11	11	11	23	33	45	38	17	10	11
13	11	11	11	24	30	43	37	17	9.9	11
14	11	11	11	20	30	42	36	16	10	10
15	11	11	11	19	32	40	34	18	10	10
16	11	11	11	18	32	40	33	20	10	10
17	11	11	11	20	32	39	32	16	10	10
18	11	11	.....	23	32	38	30	16	10	10
19	11	11	.....	25	32	42	31	16	11	10
20	.....	11	.....	29	32	41	30	15	11	9.9
21	.....	11	.....	30	.....	40	30	14	11	9.9
22	.....	12	.....	26	.....	40	29	14	11	9.9
23	.....	12	.....	32	.....	40	29	14	10	10
24	.....	12	.....	26	.....	40	28	13	9.9	11
25	.....	12	.....	24	.....	41	26	13	9.9	10
26	.....	12	.....	24	.....	40	25	14	9.9	11
27	.....	12	.....	24	.....	39	24	13	9.9	10
28	.....	12	.....	25	44	38	23	12	9.7	11
29	.....	11	.....	24	44	37	23	13	9.9	11
30	.....	11	.....	22	43	36	22	12	10	11
31	.....	.....	.....	21	.....	37	.....	12	10	.....

NOTE.—Discharge interpolated, because of lack of gage heights, Oct. 7-11, Nov. 14-19, 28, 29, Dec. 16, Apr. 16-19, May 6, June 13-16, 20-23, Aug. 16 and 17. Mean discharge estimated, for lack of gage heights, as follows: Oct. 20 to Nov. 11, 11 second-feet; Apr. 21-27, 34 second-feet. No record Dec. 18 to Mar. 9.

Monthly discharge of Trapper Creek near Oakley, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October			11.0	676
November			11.2	666
December 1-17	11	11	11.0	371
March 10-31	32	18	23.7	1,030
April		22	30.9	1,840
May	52	36	42.5	2,610
June	38	22	32.6	1,940
July	24	12	16.5	1,010
August	11	9.7	10.4	640
September	11	9.7	10.3	613

BIRCH CREEK NEAR OAKLEY, IDAHO.

LOCATION.—In sec. 24, T. 14 S., R. 23 E., 600 feet below headgates of Birch Creek feeder canal, three-fourths mile below Martindale's house, and 5 miles southeast of Oakley, Cassia County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 21, 1914, to March 23, 1916, when station was discontinued. January 1, 1912, to May 31, 1913, for station above feeder canal.

GAGE.—Friez water-stage recorder on left bank about 50 feet from road and 600 feet below head gates of feeder canal. At the 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 channel just below gage and make a control that shifts at times. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—1912–1916: Maximum stage recorded, 4.5 feet April 8, 1912 (discharge, 55 second-feet); data for periods of minimum flow do not furnish complete information but a gage reading of 0.12 foot on present gage (discharge practically zero) was recorded at 9 p. m. August 26, 1914.

ICE.—Observations discontinued during winter.

DIVERSIONS.—The Birch Creek feeder canal takes out about 600 feet above the gage and discharges into the Goose Creek reservoir of the Twin Falls-Oakley Land & Water Co.

REGULATION.—Flow can be entirely or partly regulated at head gates of the feeder canal.

ACCURACY.—Stage-discharge relation permanent October to March. Rating curve fairly well defined. Gage-height record incomplete. Daily discharge ascertained by applying to rating tables mean daily gage height obtained by inspecting recorder graph. Records poor.

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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 13	C. A. McCelland [a]	0.51	1.9	Mar. 14	C. A. McClelland	1.00	9.8
27	do	.62	3.0	Apri. 20	L. W. Roush	1.20	16.9
Mar. 10	do	.80	6.2	20	do	1.02	9.9
13	do	1.08	14.2	Aug. 21	do	.59	1.9

[a] Employee of twin Falls-Oakley Land and Water Co.

Daily discharge, in second-feet, of Birch Creek near Oakley, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Day.	Oct.	Nov.	Dec.	Mar.
1	1.9	.....	3.5	.....	16	.....	3.8	3.4	13
2	1.9	.....	3.5	.....	17	.....	3.1	3.5	18
3	1.9	.....	3.5	.....	18	.....	3.2	3.4	18
4	1.9	.....	3.6	.....	19	.....	3.4	3.4	18
5	2.0	.....	3.6	.....	20	.....	3.4	3.5	16
6	2.0	.....	3.6	.....	21	.....	3.3	3.5	14
7	1.9	.....	3.8	.....	22	.....	3.2	4.1	16
8	.....	.....	3.8	.....	23	.....	3.1	4.4	8.7
9	.....	.....	3.6	.....	24	.....	3.1	3.5	.....
10	.....	.....	3.8	7.4	25	.....	2.7	3.6	.....
11	.....	.....	3.5	8.4	26	.....	3.2	3.5	.....
12	.....	.....	3.6	12	27	.....	2.9	.....	.....
13	.....	1.9	3.4	15	28	.....	3.1	.....	.....
14	.....	2.5	3.6	11	29	.....	3.3	.....	.....
15	.....	3.1	3.6	10	30	.....	3.5	.....	.....
					31	.....	.....	.....	.....

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, 1916.

GAGE.—Vertical staff attached to downstream side of bridge near left bank; read by F. W. Deming October 1, 1915, to March 31, 1916; after April 1, 1916, Stevens 8-day water-stage recorder at slightly different site and datum. Datum of gage unchanged from establishment of station until March 31, 1916. A slide gage installed on bridge in 1911 and set to read same as staff gage was discontinued in 1913. A Lietz water-stage recorder, which was installed in 1912 in a shelter over the staff gage, never operated entirely satisfactorily and was abandoned in 1913.

DISCHARGE MEASUREMENTS.—Made from cable 150 feet below gage.

CHANNEL AND CONTROL.—Channel is a permanent concrete-lined section. Moss growth is heavy during summer and stage-discharge relation is greatly affected. Control apparently indeterminate.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.59 feet at 11.50 p. m. September 9; maximum discharge, 2,880 second-feet, occured June 20 and 22 (gage height, 7.28 feet); canal reported dry October 3 to November 6, February 8–14, and March 29 to April 3.

1909–1916: Maximum discharge recorded June 20, 22, 1916; canal reported dry during various periods.

ICE.—Stage-discharge relation not affected by ice; open-channel rating curves used throughout the year.

DIVERSIONS.—None between gage and head gates and none for some distance below. Surplus water may be discharged into river through waste gates about 200 feet below head of canal.

REGULATION.—Flow regulated by head and waste gates.

ACCURACY.—Stage-discharge relation not permanent, changes being due to growth of aquatic plants. A number of well-defined standard parallel rating curves used. Staff gage read to tenths once daily October 1 to March 31; operation of water-stage recorder used thereafter satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or by shifting-control method. Records for periods in which discharge measurements were made daily are excellent; those for other periods fair.

COOPERATION.—Some discharge measurements furnished by State engineer of Idaho; gage-height record and some measurements furnished by Twin Falls North Side Land & Water Co.

The North Side Twin Falls canal diverts water from the north side of Snake River at the Milner dam and furnishes water for stock and irrigation for about 240,000 acres in Minidoka, Lincoln, and Gooding counties. The distribution system comprises about 100 miles of main canal and 625 miles of laterals.

Discharge measurements of North Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.		Discharge.	Date.	Made by—	Gage height.		Discharge.
		Staff gage.	Hook gage.				Staff gage.	Hook gage.	
		Feet.	*Feet.*	*Sec.-ft.*			*Feet.*	*Feet.*	*Sec.-ft.*
Mar. 22	A. W. Harrington.	3.52	.....	735	Aug. 19	L. W. Roush.....	7.89	7.28	2,480
Apr. 7	R. L. Wallace.....	5.70	5.02	1,630	20	E. A. Finkelnburg.	8.05	7.38	2,580
16	.....do.....	7.00	6.22	2,260	20	C. E. Tappan.....	8.05	7.38	2,600
18	L. W. Roush.....	6.90	6.15	2,280	21	.....do.....	8.03	7.35	2,570
30	R. L. Wallace.....	7.15	6.36	2,360	22	.....do.....	8.06	7.36	2,620
May 14	.....do.....	7.70	6.82	2,710	23	.....do.....	8.14	7.44	2,570
18	W. N. McConnel...	7.70	6.91	2,480	24	.....do.....	8.10	7.44	2,550
28	E. A. Finkelnburg.	7.72	6.95	2,700	25	.....do.....	7.92	7.24	2,440
June 6	.....do.....	7.71	6.95	2,780	26	.....do.....	8.08	7.44	2,500
19	W. N. McConnel...	7.93	7.23	2,800	28	E. A. Finkelnburg.	8.15	7.54	2,530
23	E. A. Finkelnburg.	7.95	7.22	2,830	29	C. E. Tappan.....	7.89	7.26	2,310
28	E. S. Fuller.....	7.85	7.05	2,790	30	.....do.....	7.95	7.36	2,400
29	L. W. Roush.....	7.68	7.00	2,690	31	W. N. McConnel...	7.96	7.38	2,420
July 4	E. A. Finkelnburg.	7.90	7.18	2,820	31	C. E. Tappan.....	7.96	7.38	2,400
10	.....do.....	7.85	7.13	2,750	Sept. 1	.....do.....	7.98	7.39	2,370
22	.....do.....	7.87	7.19	2,690	3	.....do.....	7.91	7.32	2,360
27	W. N. McConnel...	7.60	6.97	2,530	4	.....do.....	7.99	7.39	2,390
30	Crandall and Finkelnburg.....	7.65	6.98	2,590	5	E. A. Finkelnburg.	7.98	7.40	2,440
					5	C. E. Tappan.....	8.00	7.42	2,340
Aug. 1	Lynn Crandall.....	7.75	7.07	2,620	7	.....do.....	7.98	7.40	2,370
3	E. A. Finkelnburg.	7.90	7.18	2,740	8	.....do.....	7.92	7.31	2,390
6	.....do.....	8.07	7.36	2,760	11	L. W. Roush.....	7.54	7.02	2,320
9	C. E. Tappan.....	8.05	7.35	2,570	12	E. A. Finkelnburg.	7.86	7.27	2,360
10	.....do.....	8.10	7.39	2,740	12	C. E. Tappan.....	7.85	7.26	2,310
11	.....do.....	8.05	7.31	2,640	13	.....do.....	7.93	7.34	2,360
12	.....do.....	7.95	7.28	2,510	16	.....do.....	7.74	7.17	2,260
13	E. A. Finkelnburg.	7.85	7.22	2,600	18	.....do.....	7.65	7.08	2,210
14	C. E. Tappan.....	7.95	7.30	2,460	19	.....do.....	7.12	6.56	2,000
15	.....do.....	8.05	.....	2,550	20	.....do.....	7.55	6.99	2,170
16	.....do.....	8.10	.....	2,580	20	E. A. Finkelnburg.	7.55	6.99	2,250
17	.....do.....	8.13	.....	2,600	28	.....do.....	7.38	6.78	2,230
18	.....do.....	8.00	.....	2,550					

NOTE.—Wallace, Finkelnburg, Fuller, and Crandall were employees of the Twin Falls North Side Land and Water Co.; McConnel and Tappan of the Idaho State engineer.

Daily discharge, in second-feet, of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	248	.....	847	885	885	773	.....	2,260	2,660	2,740	2,650	2,360
2	225	.....	847	847	885	847	.....	2,370	2,720	2,820	2,730	2,360
3	.....	.....	847	847	847	810	.....	2,540	2,720	2,740	2,730	2,140
4	.....	.....	737	885	847	847	818	2,540	2,660	2,820	2,680	2,440
5	.....	.....	847	885	847	847	1,400	2,600	2,540	2,820	2,630	2,430
6	.....	.....	847	885	885	810	1,620	2,540	2,660	2,820	2,740	2,370
7	.....	60	885	923	885	923	1,650	2,600	2,720	2,820	2,660	2,430
8	.....	60	847	923	.....	923	1,670	2,720	2,720	2,820	2,740	2,370
9	.....	60	847	923	.....	923	1,670	2,540	2,540	2,740	2,740	2,370
10	.....	60	847	923	.....	923	1,770	2,660	2,540	2,740	2,740	2,320
11	.....	60	847	885	.....	923	1,770	2,660	2,760	2,730	2,660	2,260
12	.....	60	810	885	.....	923	1,910	2,600	2,750	2,800	2,660	2,370
13	.....	60	847	923	.....	885	2,070	2,600	2,810	2,790	2,590	2,320
14	.....	60	847	923	.....	961	2,150	2,600	2,730	2,790	2,510	2,370
15	.....	60	847	885	296	923	2,150	2,660	2,710	2,780	2,590	2,320
16	.....	60	847	923	702	923	2,260	2,660	2,780	2,690	2,590	2,260
17	.....	67	847	847	702	923	2,200	2,600	2,760	2,690	2,660	2,150
18	.....	67	847	847	702	847	2,260	2,660	2,830	2,680	2,590	2,150
19	.....	302	847	847	702	847	1,800	2,600	2,820	2,830	2,590	2,060
20	.....	538	847	885	702	847	1,470	2,540	2,820	2,740	2,590	2,240
21	.....	568	847	885	702	773	1,470	2,600	2,740	2,660	2,590	2,260
22	.....	847	847	847	702	773	1,470	2,600	2,820	2,730	2,590	2,220
23	.....	810	810	847	667	1,330	1,450	2,720	2,820	2,730	2,590	2,120
24	.....	822	847	847	667	1,240	1,450	2,720	2,740	2,570	2,510	2,080
25	.....	834	847	885	667	1,280	1,450	2,720	2,740	2,200	2,440	1,930
26	.....	847	847	923	667	1,160	2,200	2,720	2,740	2,420	2,510	1,830
27	.....	847	847	923	702	1,120	2,320	2,660	2,740	2,570	2,490	2,060
28	.....	847	847	885	702	1,080	2,260	2,720	2,740	2,570	2,530	2,240
29	.....	847	856	923	667	.....	2,320	2,660	2,660	2,500	2,360	2,130
30	.....	847	866	885	.....	.....	2,320	2,660	2,660	2,570	2,360	2,030
31	.....	.....	875	885	.....	.....	.....	2,720	.....	2,500	2,440	.....

NOTE.—Canal reported dry Oct. 3 to Nov. 6, Feb. 8–14, and Mar. 29 to Apr. 3. No gage height record received Nov. 19, 24, 25, Dec. 26, and 29–31; discharge interpolated.

Monthly discharge of North Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	248	0	15.3	941
November	847	0	323	19,200
December	885	737	844	51,900
January	923	847	887	54,500
February	885	0	553	31,800
March	1,330	0	851	52,300
April	2,320	0	1,640	97,600
May	2,720	2,260	2,610	160,000
June	2,830	2,540	2,720	162,000
July	2,830	2,200	2,690	165,000
August	2,740	2,360	2,600	160,000
September	2,440	1,830	2,230	133,000
The year	2,830	0	1,500	1,090,000

SOUTH SIDE TWIN FALLS CANAL AT MILNER, IDAHO.

LOCATION.—In sec. 29, T. 10 S., R. 21 E., at wagon bridge about one-eighth of a mile below the head gates at Milner, in Twin Falls County,

RECORDS AVAILABLE.—May 10, 1909, to September 30, 1916.

GAGE.—Vertical staff in two sections, read by F. W. Deming and C. E. Tappan. 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.

DISCHARGE MEASUREMENTS.—Made from the bridge.

CHANNEL AND CONTROL.—Channel at gage is blasted out of rock; practically permanent. Occasionally slight changes in control are due to washing in and deposition of silt.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.50 feet on numerous days during the summer (discharge, 3,670 second-feet); minimum stage recorded, 1.80 feet, February 7 and March 20 (discharge, 94 second-feet).

1909-1916: Maximum stage recorded in summer of 1916; minimum stage recorded, 0.8 foot April 7, 1913 (discharge, 11 second-feet).

ICE.—Stage-discharge relation seldom affected by ice; open channel rating curve used throughout the 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 has been known to form to a sufficient extent farther down the canal to affect the stage-discharge relation.

DIVERSIONS.—None above gage and none of consequence for several miles below.

REGULATION.—Flow regulated by head gates.

ACCURACY.—Stage-discharge relation considered permanent throughout year but may have been changed slightly by effect of ice during winter. Rating curve well defined. Gage read to tenths once daily except from August 15 to September 20, when it was read twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for winter period for which they are somewhat uncertain owing to the unknown effect of ice.

COOPERATION.—Gage-height record and part of the discharge measurements furnished by the Twin Falls Canal Co. and by the State engineer of Idaho.

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 irrigation of about 200,000 acres in the vicinity of Twin Falls. The distribution system comprises about 110 miles of main canal and 590 miles of laterals.

Discharge measurements of South Side Twin Falls canal at Milner, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 23	A. W. Harrington.....	5.15	914	Aug. 14	C. E. Tappan [b].....	10.34	3,620
Apr. 17	L. W. Roush.....	6.59	1,610	18	L. W. Roush.....	6.52	1,420
June 28	.....do.....	10.26	3,460	Sept. 12	.....do.....	9.76	3,210
Aug. 3	E. A. Finkelnburg [a]...	10.43	3,630				

[a] Employee of Twin Falls North Side Land and Water Co.
[b] Employee of Idaho State engineer.

Daily discharge, in second-feet, of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,930	1,200	532	776	744	532	477	2,890	3,190	3,490	3,670	3,430
2	1,830	712	532	776	744	532	590	3,070	3,250	3,490	3,670	3,370
3	1,010	712	532	978	744	532	590	3,250	3,250	3,490	3,670	3,310
4	1,010	712	744	943	744	532	650	3,250	3,310	3,490	3,670	3,490
5	1,010	712	744	943	744	532	712	3,250	3,310	3,490	3,670	3,490
6	1,010	712	744	909	178	532	620	3,250	3,310	3,490	3,610	3,430
7	1,010	712	744	909	94	620	620	3,250	3,370	3,610	3,610	3,490
8	1,010	712	744	943	125	620	561	3,250	3,370	3,610	3,550	3,490
9	1,010	744	744	943	125	620	532	3,250	3,370	3,610	3,550	3,490
10	1,010	744	943	943	237	620	532	3,250	3,370	3,610	3,550	3,430
11	1,010	744	943	909	237	561	532	2,650	3,370	3,670	3,550	3,370
12	1,010	744	943	909	160	744	712	3,250	3,430	3,670	3,550	3,130
13	1,010	744	943	909	776	909	909	3,310	3,430	3,610	3,550	3,130
14	1,010	744	943	1,120	1,050	909	909	3,370	3,490	3,610	3,550	3,130
15	1,010	744	943	1,120	1,090	909	1,480	2,030	3,490	3,610	3,610	3,010
16	1,280	650	943	1,120	909	744	1,520	1,610	3,490	3,610	3,610	3,070
17	1,280	650	943	1,120	809	744	1,520	2,190	3,490	3,610	1,800	2,470
18	1,280	650	650	909	809	744	1,520	3,310	3,490	3,610	800	2,300
19	842	650	681	909	809	909	1,520	3,310	3,490	3,610	712	2,710
20	842	650	681	909	744	94	1,520	3,310	3,490	3,610	2,530	2,590
21	842	650	681	909	744	1,480	1,520	3,310	3,490	3,610	2,590	2,650
22	842	650	681	909	809	1,480	1,520	3,370	3,490	3,670	3,550	2,650
23	842	650	398	909	809	1,240	1,740	3,370	3,490	3,670	3,550	2,650
24	842	650	398	744	712	1,090	1,740	3,370	3,490	3,670	3,430	2,650
25	842	650	681	744	712	1,090	1,740	3,310	3,490	3,370	3,490	2,650
26	842	590	504	744	712	1,090	1,740	3,190	3,490	3,490	3,550	2,140
27	842	590	650	744	532	1,090	2,650	3,190	3,490	3,670	3,550	1,830
28	842	590	681	744	532	1,090	2,650	3,190	3,490	3,670	3,610	1,830
29	842	532	842	909	532	477	2,770	3,190	3,490	3,610	3,490	2,080
30	1,230	532	842	909	.....	477	2,770	3,190	3,490	3,670	3,370	2,080
31	1,610	.....	809	776	.....	504	.....	3,190	.....	3,610	3,370	.....

Monthly discharge of South Side Twin Falls canal at Milner, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,930	842	1,060	65,200
November	1,200	532	691	41,100
December	943	398	735	45,200
January	1,120	744	904	55,600
February	1,090	94	620	35,700
March	1,480	94	776	47,700
April	2,770	477	1,300	77,400
May	3,370	1,610	3,100	191,000
June	3,490	3,190	3,420	204,000
July	3,670	3,370	3,590	221,000
August	3,670	712	3,260	200,000
September	3,490	1,830	2,880	171,000
The year	3,670	94	1,870	1,350,000

SALMON FALLS CREEK NEAR SAN JACINTO, NEV.

LOCATION.—In sec. 23, T. 47 N., R. 64 E., in the canyon about 200 yards below the county highway bridge, and about 5 miles north of San Jacinto, Elko County. Shoshone Creek enters about 250 yards above the station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 17, 1909, to September 30, 1916.

GAGE.—Barrett and Lawrence water-stage recorder on right bank; installed November 20, 1911. Gage used prior to June 30, 1910, was a vertical staff on the right bank a short distance upstream and at a different datum. July 1, 1910, to November 19, 1911, record obtained from Friez recorder at present site and datum.

DISCHARGE MEASUREMENTS.—Made by wading or from a cable about 20 feet below the gage.

CHANNEL AND CONTROL.—Stream bed is of gravel. Control shifts slightly. Left bank subject to overflow at high stages, when the creek may flow in two channels.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 5.23 feet April 14 and May 2 (discharge, 626 second-feet); minimum stage recorded, 2.21 feet August 18 and 19 (discharge, 16 second-feet).

1909–1916: 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).

ICE.—Stage-discharge relation not seriously affected by ice; open channel rating curve 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 20 miles below the station; capacity of the Salmon Falls reservoir, about 180,000 acre-feet.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Gage-height record furnished 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, 1916.

[Made by L. W. Roush.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
April 10	4.44	416
13	5.15	597
Sept. 2	2.29	19.4

Daily discharge, in second-feet, of Salmon Falls Creek near San Jacinto, Nev., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	23	49	41	48	75	377	617	279	127	33	21
2	16	23	52	45	53	71	377	603	291	136	32	20
3	.....	22	52	51	54	75	403	561	296	144	31	19
4	.....	22	52	60	58	76	406	533	296	135	30	19
5	.....	22	52	56	60	76	411	505	294	122	28	19
6	.....	21	51	51	69	79	424	505	291	119	27	19
7	.....	22	51	52	89	79	424	505	294	105	26	20
8	.....	22	52	54	76	79	414	533	314	99	23	20
9	.....	22	54	57	76	80	411	547	310	89	21	20
10	.....	22	57	57	76	90	411	561	305	87	20	20
11	.....	24	56	55	76	99	438	561	301	79	20	20
12	.....	28	49	50	71	115	505	561	316	75	18	20
13	.....	32	57	50	69	133	575	547	314	74	18	20
14	.....	27	56	49	69	144	617	505	298	74	18	20
15	.....	40	56	50	66	148	603	464	294	74	18	20
16	.....	42	43	50	65	159	547	438	291	74	17	20
17	.....	39	50	49	64	204	547	406	291	74	16	21
18	.....	43	38	49	64	241	547	385	291	76	16	22
19	.....	43	41	49	64	262	561	375	291	75	16	22
20	.....	44	52	49	64	289	575	372	291	66	18	22
21	.....	48	55	50	64	324	561	356	291	62	19	24
22	.....	47	61	51	65	375	533	344	291	57	20	25
23	.....	46	62	51	65	451	505	334	291	55	19	26
24	.....	47	54	55	65	492	478	336	260	54	18	27
25	.....	44	52	60	64	424	464	346	229	52	17	27
26	.....	52	43	62	64	416	478	359	198	69	17	28
27	.....	37	43	60	64	424	505	364	168	56	17	27
28	.....	34	54	58	64	411	547	346	138	49	18	27
29	.....	48	45	51	71	438	575	321	127	37	21	27
30	21	51	43	42	.....	451	603	298	127	35	24	27
31	22	.....	41	43	.....	403	.....	286	.....	33	21	.....

NOTE.—No gage-height record Oct. 3–29, June 9, 10 and 24–27; mean discharge Oct. 3–29 estimated at 18 second-feet; discharge interpolated June 9, 10, and 24–27.

Monthly discharge of Salmon Falls Creek near San Jacinto, Nev., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	.....	.....	18.1	1,110
November	52	21	34.6	2,060
December	62	38	50.7	3,120
January	62	41	51.8	3,190
February	89	48	66.1	3,800
March	492	71	232	14,300
April	617	377	494	29,400
May	617	286	444	27,300
June	316	127	269	16,000
July	144	33	79.5	4,890
August	33	16	21.2	1,300
September	28	19	22.3	1,330
The year	617	.....	148	108,000

CEDAR CREEK NEAR ROSEWORTH, IDAHO.

LOCATION.—In sec. 12, T. 14 S., R. 13 E., about 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 the gage.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 30, 1909, to December 16, 1914; February 23 to July 1, 1916, when station was discontinued.

GAGE.—Vertical staff on right bank, in two sections; high-water section, reading from 4.6 to 7.5 feet, installed May 3, 1912. Gage read by L. E. Moon until March 22 and by Frank Messinger thereafter.

DISCHARGE MEASUREMENTS.—Made by wading or from plank footbridge near gage.

CHANNEL AND CONTROL.—Bed consists of sand and gravel; shifting. Stage-discharge relation often greatly affected by growth of aquatic plants during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 3.1 feet April 27, 28 (discharge, 54 second-feet); minimum stage recorded during period, 1.8 feet March 2 (discharge, 17 second-feet).

1909-1916: Maximum stage recorded, 5.2 feet March 5, 1913 (discharge, 167 second-feet); water above gage March 1, 1910 (discharge estimated at 200 second-feet); minimum stage recorded, 1.85 feet August 27, 1910, and August 23, 25, 1911 (discharge, 8 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice; open-water rating curves assumed applicable except for short periods.

DIVERSIONS.—Several small ranch diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two well-defined rating curves used, one applicable February 23 to March 3 and March 21 to June 30, the other March 4-19. Gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

Discharge measurements of Cedar Creek near Roseworth, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 1	G. N. Carter	1.82	17.3	May 17	G. N. Carter	2.28	29.7
9	do	2.22	23.8	18	do	2.21	27.5
10	do	2.66	35.9	31	do	2.42	33.0
18	do	2.80	39.9	June 2	do	2.42	32.8
Apr. 1	do	2.40	32.6	8	do	2.24	26.2
4	L. W. Roush	2.37	29.9	15	do	2.06	23.7
13	G. N. Carter	2.93	47.8	22	do	2.37	31.1
21	do	2.77	43.2	29	do	1.89	18.6
27	do	3.07	53.6				

Daily discharge, in second-feet, of Cedar Creek near Roseworth, Idaho, for the year ending Sept. 30, 1916.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	18	32	44	34	16	.....	38	42	32	22
2	.....	17	32	40	32	17	.....	38	42	28	22
3	.....	18	30	40	30	18	.....	40	42	27	21
4	.....	19	30	39	32	19	.....	40	47	32	21
5	.....	19	32	39	30	20	.....	52	47	32	22
6	.....	21	30	40	30	21	.....	65	44	30	27
7	.....	21	30	42	28	22	.....	58	42	32	30
8	.....	19	30	47	27	23	22	54	40	33	27
9	.....	24	32	47	28	24	24	49	44	38	24
10	.....	37	33	47	27	25	26	44	47	50	22
11	.....	40	45	45	26	26	25	40	50	44	22
12	.....	50	47	42	27	27	26	38	54	38	21
13	.....	57	49	39	27	28	38	36	54	34	20
14	.....	50	45	38	26	29	21	34	50	28	19
15	.....	43	44	36	22	30	.....	34	49	30	18
						31	.....	32	.....	33	.....

NOTE.—Discharge interpolated Mar. 23-25.

Monthly discharge of Cedar Creek near Roseworth, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 23-29	38	21	26.0	361
March	65	17	36.9	2,270
April	54	30	41.2	2,450
May	50	27	37.6	2,310
June	34	18	25.5	1,520
The period	.....	.....	.....	8,910

DEVIL CREEK NEAR THREE CREEK, IDAHO.

LOCATION.—In sec. 15, T. 15 S., R. 12 E., at Reynolds ranch, where road from Buhl to Three Creek crosses Devil Creek (upper or second crossing), about 9 miles northeast of Three Creek, Owyhee County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 10, 1912, to August 8, 1914; February 24 to June 30, 1916.

GAGE.—Vertical staff about 50 feet below the bridge; read by Neva A. Reynolds.

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

CHANNEL AND CONTROL.—Bed composed of mud. Banks covered with brush; subject to overflow. Control shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.2 feet at 7.30 p. m. March 13 (discharge, 16 second-feet); minimum stage recorded, 1.8 feet June 26–29 (discharge, 0.9 second-foot); minimum discharge, 0.8 second-foot, occurred June 30.

1912–1916: Maximum discharge recorded, 29.4 second-feet April 2, 1913; minimum discharge recorded, 0.6 second-foot August 29, 1913.

DIVERSIONS.—None of importance above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; changes well defined by frequent discharge measurements. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records good.

Discharge measurements of Devil Creek near Three Creek, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Mar. 9	G. N. Carter	2.38	2.7	May 17	G. N. Carter	2.14	3.1
10	do	3.09	12.5	18	do	2.17	3.3
Apr. 2	do	2.48	5.0	31	do	2.08	2.3
8	L. W. Roush	2.41	4.6	June 2	do	2.07	2.2
12	G. N. Carter	2.47	5.6	8	do	2.06	2.1
14	do	2.43	5.1	15	do	1.97	1.5
21	do	2.40	4.5	22	do	1.91	1.5
27	do	2.31	4.0				

Daily discharge, in second-feet, of Devil Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June
1	.....	2.1	5.3	4.0	2.0	16	.....	14	4.6	2.7	1.8
2	.....	1.4	5.1	4.1	2.1	17	.....	13	4.6	3.1	1.8
3	.....	1.4	5.3	3.3	2.0	18	.....	12	3.6	3.2	1.8
4	.....	1.4	5.3	2.7	2.0	19	.....	11	5.8	3.2	1.3
5	.....	2.1	5.4	2.8	1.7	20	.....	13	5.2	3.2	1.3
6	.....	1.4	5.6	2.8	1.7	21	.....	13	4.4	3.1	1.3
7	.....	.9	5.6	2.8	2.0	22	.....	12	4.2	3.1	1.7
8	.....	1.3	4.7	2.9	2.1	23	.....	11	4.2	3.5	2.0
9	.....	5.1	4.6	2.5	2.0	24	.....	2.1	10	3.1	5.7	1.4
10	.....	11	4.6	1.8	2.0	25	.....	2.1	10	2.1	7.5	1.4
11	.....	11	4.6	1.8	2.4	26	.....	2.1	7.1	3.8	6.8	.9
12	.....	11	4.7	1.8	1.7	27	.....	2.1	6.0	4.0	3.9	.9
13	.....	15	4.6	3.1	2.4	28	.....	2.1	6.0	3.9	3.4	.9
14	.....	13	5.3	3.1	2.4	29	.....	2.1	5.6	4.0	3.3	.9
15	.....	14	4.6	3.1	1.3	30	.....	.....	5.0	4.0	1.8	.8
						31	.....	.....	5.1	.....	2.2	.....

Monthly discharge of Devil Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 24–29	2.1	2.1	2.1	25.0
March	15	.9	7.93	488
April	5.8	2.1	4.56	271
May	7.5	1.8	3.30	203
June	2.4	.8	1.67	99.4
The period	.....	.....	.....	1,090

BIG WOOD RIVER AT HAILEY, IDAHO.

LOCATION.—In sec. 9, T. 2 N., R. 18 E., at steel highway bridge about a quarter of a mile southwest of Hailey, Blaine County.

DRAINAGE AREA.—640 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 11, 1915, to September 30, 1916.

GAGE.—Inverted stadia board spiked to pile near left abutment of bridge.

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 that crosses the river; high-water control subject to shift.

EXTREMES OF DISCHARGE.—1915–16: Maximum stage recorded, 1.60 feet afternoon of June 19, 1916 (discharge, 3,120 second-feet); minimum stage recorded, 5.09 feet December 28, 1915 (discharge, 3.5 second-feet).

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

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 is diverted from the main stream in this manner and is returned to the river below the station. A record of the flow of Big Wood Slough is being obtained (see p.99) 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 the flow of the river passing the gage, but as observations on the river and on Big Wood Slough are practically simultaneous each day the effect of such regulation is probably eliminated.

ACCURACY.—Stage-discharge relation changed somewhat June 18. Two well-defined rating curves used, one applicable before and the other after that date. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record and most of the discharge measurements furnished by the Idaho Irrigation Co.

Tables of combined discharge of Big Wood River and Big Wood Slough are published herewith.

Discharge measurements of Big Wood River at Hailey, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	G. C. Baldwin	4.87	22.9	July 8	L. Crosby[a]	2.53	1,790
May 3	L. Crosby[a]	2.74	1,430	12	McBride[a]	2.81	1,400
16	do	3.19	955	20	do	3.37	833
24	G. C. Baldwin	3.00	1,090	26	L. Crosby[a]	3.59	662
June 3	L. Crosby[a]	2.98	1,140	29	do	3.73	582
8	do	2.49	1,730	Aug. 2	do	3.88	463
15	do	2.30	1,990	8	do	4.01	388
16	do	2.06	2,250	9	G. C. Baldwin	4.03	388
22	do	2.64	1,620	11	L. Crosby[a]	4.09	334
29	do	2.34	2,040	18	do	4.19	279
30	McBride[a]	2.66	1,540	Sept. –	do	4.27	240
July 7	L. Crosby[a]	2.58	1,690				

[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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	19	21	5	43	128	167	176	1,160	1,110	1,670	520	242
2	19	19	4	38	167	167	188	1,270	1,110	2,010	488	236
3	19	19	5	38	167	167	193	1,270	1,110	1,540	424	247
4	21	19	7	128	167	167	247	1,630	1,270	1,480	424	242
5	23	19	8	124	163	184	238	2,090	1,560	1,480	424	231
6	32	23	9	124	151	163	276	2,090	1,560	1,670	393	231
7	32	21	10	144	155	163	296	2,380	1,560	1,670	393	226
8	30	23	8	144	151	167	338	1,960	1,690	1,740	387	216
9	30	21	9	167	151	184	388	1,820	1,820	1,800	375	216
10	28	23	6	167	151	201	478	1,560	2,090	1,670	369	226
11	21	17	6	167	151	53	646	1,380	1,960	1,480	358	221
12	21	19	11	148	151	58	646	1,270	1,690	1,420	334	226
13	21	19	10	210	144	247	610	1,160	1,690	1,300	328	226
14	21	19	8	28	140	78	646	1,110	1,820	1,250	323	224
15	21	19	6	30	144	69	758	970	2,090	1,190	312	221
16	21	19	6	233	144	72	758	925	2,380	1,140	306	218
17	21	19	6	148	148	93	720	925	2,380	1,250	278	216
18	30	15	6	159	148	110	720	925	2,750	1,040	300	216
19	28	15	7	144	148	155	646	1,060	3,120	948	323	216
20	23	14	6	148	155	193	610	1,110	2,520	860	323	216
21	23	12	6	148	151	193	646	1,160	1,940	778	317	216
22	21	9	4	148	159	171	798	1,160	1,670	737	289	216
23	21	8	4	146	167	171	798	1,110	1,480	698	278	216
24	21	10	6	144	163	151	970	1,110	1,420	698	268	216
25	17	10	4	159	159	136	1,160	1,060	1,540	660	262	216
26	21	8	5	159	159	132	1,330	1,060	1,670	660	257	202
27	21	12	6	154	171	148	1,560	1,060	1,800	624	257	197
28	21	17	4	148	167	148	1,560	970	2,220	588	252	188
29	21	5	4	148	167	148	1,390	1,020	2,080	554	242	178
30	21	5	167	188	.....	151	1,220	1,060	1,600	520	352	178
31	25	.....	17	128	.....	167	.....	1,110	.....	520	346	.....

NOTE.—Discharge interpolated Nov. 20, Jan. 23, 27, Apr. 29, June 18, Aug. 13, and Sept. 14–16.

Monthly discharge of Big Wood River at Hailey, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	32	17	23.0	1,410
November	23	5	16.0	952
December	167	4	11.9	732
January	233	28	136	8,360
February	171	128	155	8,920
March	247	53	148	9,100
April	1,560	176	700	41,700
May	2,380	925	1,290	79,300
June	3,120	1,110	1,820	108,000
July	2,010	520	1,150	70,700
August	520	242	339	20,800
September	247	178	218	13,000
The year	3,120	4	500	363,000

Daily combined discharge, in second-feet, of Big Wood River and Big Wood Slough at Hailey, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	175	177	133	155	130	170	332	1,170	1,120	1,700	534	252
2	184	175	141	166	170	170	353	1,280	1,120	2,040	498	246
3	165	165	161	184	170	170	358	1,290	1,120	1,570	434	257
4	177	165	172	134	170	170	412	1,640	1,280	1,500	434	252
5	179	165	173	136	165	185	403	2,110	1,580	1,500	436	241
6	188	179	174	136	153	165	441	2,110	1,590	1,700	407	241
7	188	177	175	151	158	166	461	2,400	1,590	1,700	408	239
8	186	169	173	151	153	170	512	1,990	1,730	1,770	401	229
9	186	177	183	177	153	186	525	1,840	1,860	1,830	388	229
10	174	169	152	177	154	210	662	1,580	2,150	1,700	382	240
11	167	163	171	173	153	218	830	1,400	2,010	1,510	372	235
12	177	165	157	151	154	223	820	1,290	1,730	1,450	348	240
13	177	147	156	216	146	254	775	1,180	1,730	1,320	342	240
14	167	156	164	34	143	224	811	1,120	1,860	1,280	336	238
15	167	165	143	37	146	225	923	984	2,160	1,210	323	235
16	167	184	125	236	147	237	923	938	2,470	1,160	317	232
17	167	165	152	151	150	258	885	934	2,490	1,270	288	230
18	176	171	106	162	150	275	885	933	2,880	1,070	311	230
19	174	180	119	147	150	311	811	1,080	3,270	970	339	230
20	169	179	152	150	158	349	775	1,120	2,670	871	333	230
21	169	177	162	151	154	358	811	1,180	2,070	838	325	230
22	167	174	169	150	162	336	825	1,180	1,780	793	297	230
23	167	173	169	149	170	327	860	1,120	1,570	746	287	230
24	167	175	132	147	165	316	1,000	1,120	1,510	746	275	230
25	163	156	150	162	162	292	1,190	1,070	1,640	703	269	230
26	167	164	133	162	161	288	1,360	1,070	1,780	700	264	216
27	177	149	116	157	173	304	1,580	1,070	1,930	652	264	211
28	177	109	141	150	170	304	1,580	978	2,360	615	259	202
29	177	133	141	150	170	304	1,400	1,030	2,220	575	249	192
30	186	142	245	191	.....	307	1,230	1,070	1,710	540	362	192
31	162	.....	154	130	.....	323	.....	1,120	.....	538	356	.....

Monthly combined discharge of Big Wood River and Big Wood Slough at Hailey, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	186	162	174	10,700
November	184	109	165	9,820
December	245	106	155	9,530
January	236	34	152	9,350
February	173	143	157	9,030
March	358	165	252	15,500
April	1,580	332	824	49,000
May	2,400	933	1,300	79,900
June	3,270	1,120	1,900	113,000
July	2,040	538	1,180	72,600
August	534	249	350	21,500
September	257	192	231	13,700
The year	3,270	34	570	413,600

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 topographic and Land Office maps).

RECORDS AVAILABLE.—July 6, 1911, to September 30, 1916.

GAGE.—Lallie water-stage recorder on right bank; replaced by Gurley recorder May 3, 1916; outside vertical staff gage at same section is read daily by Idaho Irrigation Co.

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 water-stage recorder, 4.77 feet at 6 p. m. June 19 (discharge, 2,240 second-feet); minimum stage recorded, 0.57 foot February 22 and 23 (discharge, 46 second-feet).

1911–1916: Maximum stage recorded 9.2 feet, May 18, 1911 (discharge, 5,070 second-feet); minimum stage recorded February 22 and 23, 1916.

ICE.—Stage-discharge relation not seriously affected by ice. Open-water rating curve applicable to winter flow.

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, but rating curves are well defined by numerous measurements. Operation of water-stage recorder not satisfactory at times; staff gage read to hundredths once daily. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Gage-height record furnished and most of the discharge measurements made by Idaho Irrigation Co.

Discharge measurements of Big Wood River near Bellevue, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	G. C. Baldwin	0.87	80.9	July 19	McBride	2.67	712
May 4	L. Crosby	3.90	1,530	26	L. Crosby	2.06	357
26	G. C. Baldwin	2.84	773	27	do	2.02	326
26	L. Crosby	2.83	778	Aug. 2	do	1.56	182
June 3	do	2.67	671	3	do	1.57	185
10	do	3.65	1,380	8	do	1.45	154
16	do	4.00	1,660	15	do	1.41	143
23	McBride	3.31	1,220	24	G. C. Baldwin	1.35	126
July 8	L. Crosby	3.57	1,270	Sept. 6	L. Crosby	1.30	119

NOTE.—Crosby and McBride were employees of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood River near Bellevue, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	91	85	95	60	62	65	297	1,100	690	1,250	194	109
2	92	82	97	60	60	65	339	1,140	666	1,370	177	103
3	91	81	99	62	54	67	381	1,290	660	1,400	172	101
4	92	81	100	62	52	70	403	1,480	696	1,210	169	105
5	95	81	100	62	51	71	429	1,680	847	1,140	166	109
6	96	82	100	64	51	74	447	1,710	994	1,140	161	115
7	96	82	101	64	50	78	470	1,790	1,030	1,180	156	119
8	95	82	101	64	50	96	499	1,710	1,100	1,250	158	122
9	95	82	101	64	50	99	528	1,600	1,250	1,330	158	126
10	95	84	102	64	50	101	599	1,440	1,330	1,290	158	133
11	92	82	104	65	50	107	729	1,290	1,370	1,140	156	133
12	89	82	101	67	50	109	811	1,100	1,250	1,070	150	131
13	86	.....	101	66	50	110	770	994	1,180	1,030	145	131
14	88	.....	104	65	50	109	776	861	1,180	958	140	128
15	88	.....	95	62	51	122	835	774	1,250	854	138	131
16	89	.....	87	62	50	126	859	703	1,520	820	138	133
17	89	.....	78	65	50	137	884	641	1,750	854	133	128
18	86	.....	76	67	49	156	827	623	1,950	767	131	124
19	85	.....	74	60	49	178	770	800	2,230	678	135	126
20	84	.....	72	58	49	205	713	834	2,230	617	140	124
21	82	98	70	56	47	279	735	874	1,830	573	143	117
22	82	99	71	54	46	272	741	881	1,480	529	138	117
23	84	99	71	49	46	268	752	807	1,290	485	131	117
24	84	99	71	51	47	255	805	794	994	440	126	113
25	84	99	71	51	49	255	915	800	1,030	396	124	113
26	82	96	71	50	53	255	1,080	761	1,100	352	117	113
27	84	89	72	50	56	258	1,180	709	1,210	343	117	113
28	85	92	69	49	61	290	1,400	672	1,600	331	117	111
29	84	92	66	54	70	290	1,290	653	1,680	304	111	107
30	85	93	64	57	.....	279	1,180	635	1,440	258	111	107
31	85	.....	62	60	.....	275	.....	666	.....	222	111	.....

NOTE.—Mean discharge Nov. 13–20 estimated at 79 second-feet. Discharge interpolated on numerous days in December, January, and February and also Apr. 18, 19, and July 21–25 on account of lack of gage heights.

Monthly discharge of Big Wood River near Bellevue, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	96	82	88.2	5,420
November	99	.....	85.8	5,110
December	104	62	85.4	5,250
January	67	49	59.5	3,660
February	70	46	51.8	2,980
March	290	65	165	10,100
April	1,400	297	748	44,500
May	1,790	623	1,030	63,300
June	2,230	660	1,290	76,800
July	1,400	222	825	50,700
August	194	111	143	8,790
September	133	101	119	7,080
The year	2,230	46	391	284,000

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, 1916.

GAGE.—Lallie water-stage recorder on right bank; replaced by Gurley recorder April 20, 1916; referred to 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 during year, from water-stage recorder, 7.03 feet at 10.30 p. m. May 6 (discharge, 2,640 second-feet); minimum discharge estimated at 20 second-feet March 27.

1911–1916: Maximum stage recorded, 9.2 feet May 18, 1911 (discharge, 5,070 second-feet); "zero discharge" reported February 3, 1915.

ICE.—No ice reported. Open-channel rating curve used to determine winter flow.

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. Several fairly well defined rating curves used. Operation of water-stage recorders satisfactory except from March 23 to April 10. Daily discharge ascertained by shifting-control method or by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Gage-height record furnished and most of the discharge measurements made by Idaho Irrigation Co.

Discharge measurements of Big Wood River below Magic dam, near Richfield, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 2	Baldwin and Crosby	2.51	167	June 17	Crosby and McBride	5.28	1,700
Apr. 24	L. Crosby	5.48	1,690	July 1	McBride	4.76	1,410
May 2	do	6.21	2,150	16	do	3.62	630
15	do	4.96	1,440	27	L. Crosby	5.14	1,530
26	Baldwin and Crosby	4.61	1,250	Aug. 9	do	4.82	1,390
June 13	Crosby and Jameson	4.66	1,310	23	G. C. Baldwin	4.24	1,020

NOTE.—Crosby, Jameson, and McBride were 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	56	122	75	47	68	74	119	2,290	1,120	1,430	1,430	1,190
2	59	159	76	47	68	74	129	2,150	1,130	1,410	1,460	1,180
3	62	164	76	47	68	74	138	2,090	1,130	1,460	1,460	1,170
4	59	164	76	47	68	75	148	2,120	1,130	1,430	1,460	1,150
5	48	148	148	47	68	75	157	2,240	1,130	1,350	1,430	1,120
6	118	118	195	47	68	75	167	2,440	1,140	1,350	1,430	1,100
7	162	56	190	54	68	75	176	2,560	1,150	1,410	1,410	1,060
8	164	74	187	71	68	75	186	2,560	1,220	1,380	1,380	1,050
9	162	78	184	71	68	75	195	2,500	1,270	1,380	1,380	1,010
10	172	81	105	71	68	75	190	2,320	1,270	1,350	1,350	950
11	141	82	63	71	68	75	176	2,150	1,270	1,380	1,270	640
12	111	85	64	71	68	75	172	1,940	1,270	1,240	1,270	594
13	92	87	64	74	68	75	164	1,740	1,270	1,100	1,240	490
14	71	88	65	75	68	75	166	1,570	1,350	1,200	1,240	633
15	76	88	67	75	69	75	169	1,430	1,420	784	1,190	880
16	82	90	67	75	69	76	172	1,300	1,520	670	1,190	880
17	85	90	67	75	69	78	174	1,220	1,740	798	1,150	880
18	87	92	63	75	71	75	176	1,240	1,940	1,220	1,110	859
19	88	87	65	75	71	75	179	1,240	2,180	1,300	1,080	845
20	64	75	62	75	71	76	182	1,300	2,380	1,380	1,060	825
21	92	76	62	72	71	76	322	1,300	2,260	1,430	1,040	758
22	79	78	62	67	71	76	999	1,300	2,000	1,490	1,030	752
23	82	79	54	67	69	48	1,490	1,270	1,680	1,520	1,030	695
24	84	76	47	67	68	38	1,740	1,240	1,410	1,540	1,020	594
25	85	71	47	67	68	38	1,940	1,240	1,350	1,570	1,020	588
26	87	72	47	67	69	28	2,150	1,240	1,350	1,540	1,020	588
27	88	74	47	67	71	20	2,290	1,220	1,350	1,520	1,020	605
28	87	74	47	67	72	48	2,440	1,170	1,430	1,460	1,060	605
29	87	74	47	67	74	70	2,500	1,130	1,490	1,460	1,090	599
30	87	75	47	67	.....	100	2,440	1,120	1,520	1,460	1,090	440
31	87	.....	47	67	.....	110	.....	1,090	.....	1,460	1,160	.....

NOTE.—No gage-height record obtained Mar. 23 to Apr. 10; discharge estimated by engineers of the Idaho Irrigation Co.

Monthly discharge of Big Wood River below Magic dam, near Richfield, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	172	48	93.7	5,760
November	164	56	92.6	5,510
December	195	47	81.1	4,990
January	75	47	65.5	4,030
February	74	68	69.1	3,970
March	110	20	69.5	4,270
April	2,500	119	722	43,000
May	2,560	1,090	1,670	103,000
June	2,380	1,120	1,460	86,900
July	1,570	670	1,340	82,400
August	1,460	1,020	1,210	74,400
September	1,190	440	826	49,200
The year	2,560	20	643	467,000

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, 1916.

GAGE.—Vertical staff on left bank; read by Ed. Dayton.

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 year, 13.2 feet April 29 (discharge, 1,580 second-feet); minimum stage recorded, 6.80 feet January 6 and March 6–8 (discharge, 3 second-feet).

1911–1916: 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.

ICE.—Ice forms at gage but not at control. Open-water rating curve applied to winter discharge.

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 permanent during year. Rating curve fairly well defined. Gage read to hundredths twice daily during irrigation season and once daily during rest of year. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished and part of discharge measurements made by the Idaho Irrigation Co.

Discharge measurements of Big Wood River below North Gooding canal, near Shoshone, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft*			*Feet.*	*Sec.-ft.*
Nov. 3	G. C. Baldwin	7.70	38.2	July 15	McBride[a] and Crosby[a]	10.72	484
May 27	do	10.04	343	Aug. 23	G. C. Baldwin	8.26	81.6
June 20	McBride[a] and Crosby[a]	11.82	969				

[a] Employee, 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	26	53	49	14	5	5	31	1,470	242	259	128	105
2	26	43	59	12	5	5	40	1,420	277	242	128	105
3	24	38	67	10	5	5	21	1,370	295	277	122	105
4	26	37	72	8	5	4	12	1,320	242	277	105	95
5	26	38	67	5	5	4	26	1,370	259	234	100	76
6	16	43	40	3	5	3	23	1,370	259	188	90	90
7	26	48	28	4	5	3	24	1,370	277	180	85	76
8	26	41	30	4	5	3	23	1,420	295	166	90	76
9	26	52	23	4	5	6	24	1,420	355	140	85	72
10	26	51	23	4	5	8	28	1,320	424	160	80	72
11	26	51	44	5	5	6	28	1,170	314	173	85	259
12	26	53	36	5	5	12	24	1,030	334	377	85	195
13	30	55	38	5	6	17	22	896	334	259	80	122
14	36	45	40	5	6	11	22	734	377	218	90	90
15	38	47	40	5	6	15	24	661	377	400	90	36
16	47	51	53	6	4	50	25	531	449	210	85	32
17	45	28	63	6	4	85	26	334	502	210	85	30
18	46	45	56	6	5	76	25	314	626	195	76	36
19	51	44	26	6	6	91	26	314	773	173	85	45
20	52	50	27	6	6	107	26	377	896	146	85	40
21	31	53	37	5	7	122	28	424	896	122	85	40
22	53	53	47	5	6	140	400	400	813	140	80	40
23	37	51	31	5	6	88	983	355	561	140	80	32
24	50	50	29	5	5	36	1,170	355	295	146	80	9
25	50	50	26	5	5	35	1,320	377	195	160	80	6
26	51	37	24	5	5	48	1,370	355	195	160	80	6
27	51	34	21	5	5	50	1,530	334	180	160	90	6
28	45	34	13	5	5	95	1,530	314	234	160	85	6
29	50	21	19	5	5	56	1,580	277	242	160	85	6
30	51	56	19	5	.....	22	1,530	259	314	153	85	6
31	53	.....	17	5	.....	11	.....	234	.....	140	295	.....

NOTE.—Discharge interpolated Dec. 21, 25, 26, Dec. 31 to Jan. 2, Jan. 4, 5, 7–10, 12–19, 22–30, Feb. 1–10, 12–14, 17, 19, 20, 23, 26, 27, Mar. 1, 2, 5, 6, 9, 12, 16, 19, 20, and 23, on account of lack of gage heights.

Monthly discharge of Big Wood River below North Gooding canal, near Shoshone, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	53	16	37.6	2,310
November	56	21	45.1	2,680
December	72	13	37.5	2,310
January	14	3	5.74	353
February	7	4	5.24	301
March	140	3	39.3	2,420
April	1,580	12	398	23,700
May	1,470	234	771	47,400
June	896	180	394	23,400
July	400	122	198	12,200
August	295	76	96.3	5,920
September	259	6	63.8	3,800
The year	1,580	3	175	127,000

BIG WOOD RIVER NEAR GOODING, IDAHO.

LOCATION.—In sec. 21, T. 6 S., R. 14 E., at the Cleet ranch, 3½ miles above bridge on upper road between Bliss and Hagerman, 5 miles above diversion dam for King Hill project, and 6 miles southwest of Gooding, Gooding County.

DRIANAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 26 to September 30, 1916.

GAGE.—Vertical staff on right bank bolted to rock ledge.

DISCHARGE MEASUREMENTS.—Made by wading or from cable a short distance above the gage.

CHANNEL AND CONTROL.—Bed of lava rock, boulders, and coarse gravel. Control practically permanent during year. One channel at gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.68 feet April 30, (discharge, 1,670 second-feet); minimum discharge estimated at 1 second-foot.

ICE.—No information.

DIVERSIONS.—Below all diversions of the Twin Falls North Side Land & Water Co. and above the Big Malad Springs. Justice and Croco ditches (combined capacity about 15 second-feet) divert about 3 miles below gage; a few second-feet is occasionally wasted into river about 2 miles below gage.

REGULATION.—Flow regulated by dams and diversions above the station.

COOPERATION.—Record furnished by the Twin Falls North Side Land & Water Co.

Discharge measurements of Big Wood River near Gooding, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
April 3	Lynn Crandall	3.46	423	June 12	C. W. Kief	2.02	142
7	C. W. Kief	3.23	408	July 14	do	1.65	86.0
17	do	3.26	419	26	do	1.15	29.0
May 5	do	5.75	1,250	Aug. 14	Kief and Crandall	.86	12.5
29	G. C. Baldwin	3.31	399	Sept. 15	W. C. McConnel [a]	1.53	61.7

[a] Employee of the Idaho State engineer.

Daily discharge, in second-feet, of Big Wood River near Gooding Idaho, for the year ending Sept. 30, 1916.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	332	1,550	272	63	8	133
2	.....	363	1,510	242	20	9	7
3	.....	436	1,350	211	21	8	22
4	.....	372	1,250	218	32	20	30
5	.....	348	1,250	198	52	32	45
6	.....	315	1,220	166	30	23	57
7	.....	372	1,230	152	7	18	69
8	.....	452	1,310	139	3	15	69
9	.....	460	1,350	147	18	8	112
10	.....	482	1,310	147	3	39	100
11	.....	550	1,210	163	2	49	117
12	.....	650	1,090	136	2	42	234
13	.....	544	876	119	137	30	126
14	.....	532	715	100	81	14	103
15	.....	550	637	93	55	11	73
16	.....	441	436	112	49	10	43
17	.....	384	304	134	15	9	113
18	.....	370	147	200	4	15	137
19	.....	351	153	334	1	22	112
20	.....	262	200	550	18	18	92
21	.....	220	270	708	8	11	47
22	.....	186	278	678	6	14	28
23	.....	474	318	502	1	10	25
24	.....	1,160	322	175	1	13	24
25	.....	1,320	397	105	19	11	14
26	289	1,390	430	44	30	9	10
27	276	1,540	423	23	96	6	11
28	441	1,550	415	9	58	6	12
29	505	1,640	389	7	6	7	14
30	365	1,670	441	15	9	14	10
31	322	.....	307	.....	10	19	.....

Monthly discharge of Big Wood River near Gooding, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	1,670	186	657	39,100
May	1,550	147	744	45,800
June	708	7	203	12,100
July	137	1	27.7	1,700
August	49	6	16.8	1,030
September	234	7	66.3	3,940
The period				104,000

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, 1915, to September 30, 1916.

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, 1.7 feet April 10, 11 (discharge, 184 second-feet); minimum stage recorded, 3.27 feet at noon February 13 (discharge, 2.4 second-feet).

1915–16: Maximum stage recorded, 1.64 feet July 9, 1915 (discharge, 207 second-feet); minimum stage recorded February 13, 1916.

ICE.—Stage-discharge relation not seriously affected by ice. Open-water rating curve applicable throughout winter.

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 permanent throughout year. Rating curve well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good except for period of extremely low water January 11 to March 9.

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 89.

Discharge measurements of Big Wood Slough at Hailey, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	G. C. Baldwin	1.86	157	July 7	L. Crosby [a]	2.73	25.7
May 4	L. Crosby [a]	2.87	15.6	12	McBride [a]	2.69	29.3
24	G. C. Baldwin	3.00	9.5	26	L. Crosby [a]	2.59	39.5
June 9	L. Crosby [a]	2.52	49.6	29	do	2.77	23.7
16	do	2.20	94.7	Aug. 9	G. C. Baldwin	2.93	15.2

[a] Employee of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Big Wood Slough at Hailey, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept
1	156	156	128	112	2.5	2.5	156	12	11	29	14	10
2	165	156	137	128	2.5	2.5	165	13	9.6	31	9.6	10
3	146	146	156	146	2.5	2.5	165	13	9.6	31	9.6	10
4	156	146	165	6.4	2.5	2.5	165	15	9.6	25	9.6	10
5	156	146	165	12	2.5	2.8	165	20	21	21	12	10
6	156	156	165	12	2.5	2.8	165	21	29	21	14	9.6
7	156	156	165	7.4	2.5	2.8	165	21	29	29	15	13
8	156	146	165	7.4	2.5	2.8	174	24	37	30	14	13
9	156	156	174	9.6	2.5	2.6	137	22	48	32	13	13
10	146	146	146	9.6	2.5	9.6	184	21	53	30	13	14
11	146	146	165	6.4	2.5	165	184	20	50	29	14	14
12	156	146	146	3.3	2.5	165	174	19	43	29	14	14
13	156	128	146	6.0	2.4	7.4	165	18	42	27	14	14
14	146	137	156	6.0	2.5	146	165	15	42	24	13	14
15	146	146	137	6.7	2.5	156	165	14	64	23	11	14
16	146	165	119	3.0	2.5	165	165	13	93	21	11	14
17	146	146	146	2.8	2.5	165	165	8.9	110	23	9.6	14
18	146	156	100	2.8	2.5	165	165	8.2	128	21	11	14
19	146	165	112	3.3	2.5	156	165	12	156	17	16	14
20	146	165	146	2.5	2.5	156	165	14	146	12	9.6	14
21	146	165	156	2.5	2.5	165	165	18	128	60	8.2	14
22	146	165	165	2.5	2.6	165	27	17	110	56	8.2	14
23	146	165	165	2.6	2.6	156	62	12	93	48	8.9	14
24	146	165	128	2.8	2.5	165	33	9.6	93	48	7.4	14
25	146	146	146	2.8	2.5	156	33	12	95	43	7.4	14
26	146	156	128	2.8	2.5	156	23	12	110	39	7.4	14
27	156	137	110	2.6	2.5	156	20	9.6	128	29	7.4	14
28	156	92	137	2.5	2.5	156	20	7.8	146	27	7.4	14
29	156	128	137	2.5	2.5	156	12	7.8	137	21	7.1	14
30	165	137	78	2.5	.....	156	12	8.5	110	20	10	14
31	137	.....	137	2.5	.....	156	.....	9.6	.....	18	10	.....

NOTE.—Discharge interpolated Jan. 23, 27, Aug. 13, and Sept. 14-16 on account of lack of gage heights.

Monthly discharge of Big Wood Slough at Hailey, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	165	137	151	9,280
November	165	92	149	8,870
December	174	78	143	8,790
January	146	2.5	16.8	1,030
February	2.6	2.4	2.50	144
March	165	2.5	104	6,400
April	184	12	124	7,380
May	24	7.8	14.5	892
June	156	9.6	76.0	4,520
July	60	12	29.5	1,810
August	15	7.1	10.9	670
September	14	9.6	13.1	780
The year	184	2.4	69.6	50,600

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 the backwater of the Magic reservoir, and 4 miles southeast of Blaine. No tributaries or diversions between the station and Magic reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 9, 1912, to September 30, 1916. Results of discharge measurements made in 1911 by the Idaho Irrigation Co. are also available.

GAGE.—Gurley water-stage recorder on left bank; Lallie water-stage recorder at same location used in previous years. Location and datum of gage unchanged since 1912.

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

CHANNEL AND CONTROL.—One channel at all stages. Bed of stream rocky but control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.76 feet April 12 (measured discharge, 5,240 second-feet); minimum stage recorded, 1.13 feet at 8 p. m., September 19 (discharge, 5.8 second-feet); these records probably do not represent actual extremes for the year.

1911–1916: Maximum stage recorded, 10.76 feet April 12, 1916 (measured discharge, 5,240 second-feet); minimum stage recorded, 1.00 foot at 12.45 p. m. September 2, 1915 (discharge, 2.5 second-feet); probably not actual extremes.

ICE.—Records are discontinued during the winter.

DIVERSIONS.—Many small diversions are made above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during period of record. Rating curve well defined. Gage-height record satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Gage-height record furnished and part of discharge measurements made by Idaho Irrigation Co.

Discharge measurements of Camas Creek near Blaine, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 12	L. Crosby	10.76	5,240	July 6	McBride	2.09	70.2
May 17	do	3.60	389	13	do	1.79	36.6
25	G. C. Baldwin	3.71	394	20	do	1.59	23.3
June 8	L. Crosby	3.05	258	Aug 8	L. Crosby	1.19	6.1
15	do	2.57	138	9	G. C. Baldwin	1.17	7.7
20	McBride	2.21	77.1				

NOTE.—Crosby and McBride were employees of the Idaho Irrigation Co.

[1] Not Malad River; revision of previous decision of United States Geographic Board.

Daily discharge, in second-feet, of Camas Creek near Blaine, Idaho, for the year ending Sept. 30, 1916.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	276	75	9.2	7.4	16	.....	134	31	6.4	6.4
2	.....	269	68	9.2	7.2	17	383	142	31	6.4	6.6
3	.....	259	72	8.6	6.9	18	383	140	32	6.4	6.4
4	.....	252	72	8.3	6.6	19	383	144	30	7.2	6.4
5	.....	254	70	7.7	7.2	20	495	160	23	7.7	6.9
6	.....	256	67	7.4	8.0	21	495	154	21	8.0	6.6
7	.....	254	62	7.2	7.7	22	466	144	19	8.0	7.7
8	.....	240	55	7.2	7.4	23	438	134	17	7.7	8.9
9	.....	235	49	7.2	7.4	24	438	123	15	7.2	8.0
10	.....	225	44	6.9	8.0	25	438	108	13	6.9	7.7
11	.....	218	42	6.9	8.6	26	466	99	13	6.9	7.4
12	.....	205	39	7.2	6.9	27	438	80	11	7.2	7.7
13	.....	182	36	6.6	6.4	28	410	72	12	6.9	7.2
14	.....	160	33	6.4	6.4	29	410	73	11	7.4	7.7
15	.....	138	31	6.4	6.4	30	410	79	10	7.2	8.0
						31	330	.....	9.6	7.2	.....

NOTE.—Discharge interpolated June 13, 14, and July 21–24 on account of lack of gage heights. No record Oct. 1 to May 16.

Monthly discharge of Camas Creek near Blaine, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 17–31	495	330	426	12,700
June	276	72	174	10,400
July	75	9.6	35.9	2,210
August	9.2	6.4	7.33	451
September	8.9	6.4	7.27	433
The period	.....	.....	.....	26,200

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, 1916.

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 paints.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.25 feet morning of April 18 (discharge, 542 second-feet); minimum stage recorded, 2.30 feet morning of July 13 (discharge, 63 second-feet).

1911–1916: 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).

ICE.—Stage-discharge relation seriously affected by ice. No records obtained during winter of 1915–16.

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 changed during winter. Rating curves well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished and most of the discharge measurement made by the Idaho Irrigation Co.

Discharge measurements of Little Wood River near Richfield, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 1	G. C. Baldwin	2.68	126	June 19	McBride [a]	2.66	126
Mar. 30	L. Crosby [a]	3.27	266	Aug. 24	G. C. Baldwin	2.51	95.8
May 27	G. C. Baldwin	3.32	283				

[a] Employee of the Idaho Irrigation Co.

Daily discharge, in second-feet, of Little Wood River near Richfield, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	127	127	181	.....	249	470	249	95	90	99
2	131	126	158	.....	249	441	249	76	90	104
3	133	126	152	.....	249	399	249	90	86	106
4	129	126	154	.....	262	385	249	90	76	108
5	126	126	150	.....	275	399	249	106	75	116
6	127	129	148	.....	288	413	249	101	74	118
7	127	130	148	.....	288	441	262	95	72	114
8	129	131	150	.....	288	441	262	93	72	118
9	127	133	148	.....	302	413	249	78	76	122
10	127	131	146	.....	329	441	236	76	81	130
11	126	129	140	.....	343	413	224	69	88	136
12	129	129	145	.....	385	329	224	66	80	137
13	129	115	150	.....	528	316	212	63	85	138
14	129	158	150	.....	528	302	168	74	93	139
15	127	140	146	.....	528	288	144	75	86	139
16	131	140	131	.....	528	262	118	80	93	140
17	129	120	131	.....	528	224	114	86	97	140
18	131	135	131	.....	528	200	118	101	97	138
19	131	135	122	.....	528	177	122	106	99	136
20	133	135	122	.....	528	177	140	95	103	134
21	129	135	125	.....	456	184	155	90	99	136
22	131	139	.....	.....	441	177	144	85	97	137
23	131	139	.....	.....	456	177	144	90	95	139
24	130	140	.....	.....	441	184	126	90	95	140
25	129	136	.....	.....	441	200	114	90	95	142
26	129	133	.....	.....	441	249	95	85	95	.....
27	129	120	.....	.....	456	288	101	81	99	.....
28	129	106	.....	.....	470	288	88	80	97	.....
29	127	148	.....	249	499	262	95	81	97	.....
30	127	146	.....	262	499	249	101	81	97	.....
31	127	.....	.....	275	.....	249	.....	85	99	.....

NOTE.—Discharge interpolated, on account of lack of gage heights, Oct. 24, 31, Nov. 3, 7, 20, 25, 27, Dec. 12, Apr. 2, July 16, Sept. 3, 12, 14, 15, 18, 19, and 21–24. No record obtained Dec. 22 to Mar. 28 and Sept. 26–30.

Monthly discharge of Little Wood River near Richfield, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	133	126	129	7,930
November	158	106	132	7,860
December 1-21	181	122	144	6,000
March 29-31	275	249	262	1,560
April	528	249	411	24,500
May	470	177	304	18,700
June	262	88	175	10,400
July	106	63	85.6	5,260
August	103	72	89.6	5,510
September 1-25	142	99	128	6,350

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, Elko County, and 100 miles north of Elko, the nearest railway point.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 19, 1913, to September 30, 1916.

GAGE.—Vertical staff gage in two sections spiked to left abutment of foot bridge; read by Mrs. Hiram Salls.

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

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders. Right bank fairly high; left bank might be overflowed at extremely high stages. Control has remained permanent. Point of zero flow at gage height 1.0 foot ±0.1

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.10 feet at 4 p. m. April 11 (discharge, 1,000 second-feet); minimum stage, 0.66 feet August 29 (discharge, 12 second-feet).

1913–1916: Maximum stage occurred in 1916; minimum stage, 1.50 feet August 30 and 31, 1915 (discharge, 6.5 second-feet).

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

DIVERSIONS.—A few small ranch ditches divert water above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 20, 21 and December 29 to February 5. Rating curve well defined below 500 second-feet and fairly well defined above. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for September 16-30, when it was interpolated because of missing gage readings, and December 20, 21, and December 29 to February 5 for which it was estimated because of ice. Records obtained by use of rating table below 500 second-feet good; others fair.

Discharge measurements of Bruneau River near Rowland, Nev., during the year ending Sept. 30, 1916.

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 22	3.21	501
22	3.18	488

Daily discharge, in second-feet, of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	16	23	23	.....	52	422	550	254	126	23	14
2	14	23	23	.....	54	524	524	254	126	23	13
3	14	23	23	.....	58	602	550	254	136	21	13
4	16	23	24	.....	63	628	576	254	126	21	14
5	17	23	25	.....	63	654	602	254	105	20	14
6	17	23	25	49	66	628	628	277	100	20	14
7	17	23	25	62	64	576	628	277	93	19	14
8	17	23	24	56	63	602	602	277	87	18	14
9	16	24	24	48	72	628	602	277	82	17	14
10	19	25	24	49	105	759	498	300	77	17	14
11	19	25	25	52	126	975	447	288	70	17	16
12	19	25	25	54	146	867	422	277	64	17	15
13	19	24	27	45	198	654	372	254	58	16	15
14	20	24	27	49	187	654	348	242	54	14	15
15	20	25	25	47	231	654	324	242	48	13	14
16	21	25	24	44	254	680	300	242	47	13	14
17	21	25	24	49	266	680	277	242	49	13	14
18	21	25	25	49	324	680	288	254	44	17	14
19	21	27	25	52	372	602	312	242	43	18	15
20	21	25	24	57	524	550	288	242	40	17	15
21	21	28	28	63	576	472	288	231	37	17	15
22	21	28	27	63	524	498	277	231	36	17	16
23	21	28	27	63	524	524	277	220	33	16	16
24	21	30	19	64	397	576	300	209	33	15	16
25	21	30	23	66	372	654	324	187	33	14	17
26	21	30	.....	66	348	706	324	166	32	14	17
27	21	18	.....	63	348	759	312	156	29	13	17
28	21	19	.....	56	372	786	300	146	25	13	18
29	21	21	.....	52	372	732	288	136	24	12	18
30	21	23	.....	.....	372	602	277	126	24	16	18
31	23	.....	.....	.....	372	.....	254	.....	24	15	.....

NOTE.—Mean discharge estimated on account of ice: Dec. 26–31, 22 second-feet; Jan. 1–31, 20 second-feet; Feb. 1–5, 25 second-feet.

Monthly discharge of Bruneau River near Rowland, Nev., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	23	14	19.3	1,190
November	30	18	24.6	1,460
December	28	.....	24.1	1,480
January	.....	.....	20.0	1,230
February	66	.....	49.8	2,860
March	576	52	254	15,600
April	975	422	644	38,300
May	628	254	399	24,500
June	300	126	234	13,900
July	136	24	61.5	3,780
August	23	12	16.6	1,020
September	18	13	15.1	898
The year	975	12	146	106,000

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, 1916.

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, 4.92 feet May 10 (discharge, 1,920 second-feet); minimum stage recorded, 1.93 feet August 5 to September 23 (discharge, 7 second-feet).

1895–1903 and 1909–1916: 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).

ICE.—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 permanent during year. Rating curve well defined. Gage read once daily to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Bruneau River near Grandview, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 25	A. W. Harrington	3.93	968.
Aug. 21	G. C. Baldwin	1.93	6.8

Daily discharge, in second-feet, of Bruneau River near Grandview, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	25	115	147	183	183	270	871	1,230	879	579	70	7
2	25	115	147	183	224	270	792	1,230	879	511	16	7
3	25	115	147	183	224	270	792	1,230	879	511	16	7
4	42	115	147	183	224	270	954	1,420	879	511	16	7
5	42	115	147	183	224	270	954	1,520	962	511	7	7
6	42	115	147	224	270	270	954	1,520	962	448	7	7
7	42	115	147	224	376	321	871	1,520	1,050	448	7	7
8	42	115	147	224	635	321	871	1,720	1,050	448	7	7
9	42	115	147	224	635	321	871	1,820	1,140	388	7	7
10	42	115	147	183	635	321	1,040	1,920	1,230	388	7	7
11	42	115	147	183	435	498	1,410	1,720	1,230	332	7	7
12	42	115	147	183	321	498	1,810	1,620	1,230	332	7	7
13	42	115	183	183	270	635	1,810	1,420	1,320	332	7	7
14	87	115	183	183	270	863	1,910	1,230	1,320	280	7	7
15	87	115	183	183	270	863	1,510	1,140	1,420	233	7	7
16	115	115	183	183	224	863	1,220	1,050	1,420	233	7	7
17	115	115	183	183	224	863	1,220	962	1,420	191	7	7
18	115	115	183	183	224	1,030	1,130	879	1,230	191	7	7
19	42	115	183	183	224	1,030	1,130	800	1,050	191	7	7
20	42	147	183	183	224	1,030	1,130	800	1,050	154	7	7
21	42	147	183	183	224	1,030	1,040	800	962	154	7	7
22	25	147	183	183	224	954	1,040	800	962	154	7	7
23	25	147	183	224	224	954	871	800	800	121	7	7
24	63	147	183	224	270	871	871	800	723	121	7	16
25	115	147	183	224	270	871	954	800	650	121	7	16
26	115	147	183	183	270	871	1,040	879	650	121	7	16
27	115	147	183	183	270	871	1,310	962	650	154	7	30
28	115	147	183	183	270	1,040	1,410	962	579	154	7	30
29	115	147	183	183	270	1,310	1,410	962	579	154	7	48
30	115	147	183	183	.....	1,510	1,410	962	579	95	7	48
31	115	.....	183	183	.....	1,040	.....	879	.....	70	7	.....

Monthly discharge of Bruneau River near Grandview, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	115	25	66.4	4,080
November	147	115	127	7,560
December	183	147	169	10,400
January	224	183	192	11,800
February	635	183	297	17,100
March	1,510	270	723	44,500
April	1,910	792	1,150	68,400
May	1,920	800	1,170	71,900
June	1,420	579	991	59,000
July	579	70	278	17,100
August	70	7	9.9	609
September	48	7	12.2	726
The year	1,920	7	432	313,000

EAST FORK OF BRUNEAU RIVER NEAR THREE CREEK, IDAHO.

LOCATION.—In about sec. 7, T. 16 S., R. 11 E., in lower end of field at Dunn ranch, 4 miles by road southwest of Three Creek, Owyhee County. River enters a canyon a short distance below station.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 10, 1912, to June 30, 1914; February 24 to June 30, 1916, when station was discontinued.

GAGE.—Vertical staff on right bank; read by G. N. Carter and C. A. Ross.

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

CHANNEL AND CONTROL.—Bed composed of clay and fine gravel. Control not permanent. Stage-discharge relation at times affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.10 feet May 6–8 (discharge, 93 second-feet); minimum stage, 0.68 foot February 25, 26, March 2, 3 (discharge, 3.4 second-feet).

1912–1916: Maximum stage recorded, 2.05 feet May 16, 1914 (discharge, 110 second-feet); minimum stage recorded February 25, 26, and March 2, 3, 1916.

ICE.—Stage-discharge relation seldom affected by ice, as stream is fed largely by springs.

DIVERSIONS.—Some water is diverted above station to irrigate hay meadows.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent, but changes are well covered by numerous discharge measurements. Two well-defined rating curves used. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control methods. Records good.

COOPERATION.—Gage-height record furnished by West End Twin Falls Irrigation Co.

Discharge measurements of East Fork of Bruneau River near Three Creek, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	G. N. Carter	0.68	3.5	May 16	G. N. Carter	1.65	42.8
Mar. 4	do	.70	3.6	21	do	1.60	37.2
11	do	.85	6.2	30	do	1.32	26.8
15	do	1.02	10.9	June 5	do	1.73	48.6
21	do	1.30	20.1	10	do	1.53	37.8
Apr. 3	do	1.15	15.6	14	do	1.45	33.4
5	L. W. Roush	1.17	16.1	17	do	1.41	31.0
12	G. N. Carter	1.48	30.0	21	do	1.44	32.7
25	do	1.64	41.9	24	do	1.28	23.2
May 2	do	1.55	40.4				

Daily discharge, in second-feet, of East Fork of Bruneau River near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	3.7	15	36	27	16	.....	11	22	42	33
2	.....	3.4	15	40	30	17	.....	14	24	40	32
3	.....	3.4	15	52	30	18	.....	16	24	39	31
4	.....	3.7	15	62	40	19	.....	17	25	32	29
5	.....	3.7	15	82	49	20	.....	18	24	33	30
6	.....	3.7	15	93	45	21	.....	21	24	38	33
7	.....	3.9	16	93	44	22	.....	19	24	32	32
8	.....	4.9	16	93	44	23	.....	19	19	32	32
9	.....	5.4	17	81	46	24	3.7	17	22	29	24
10	.....	6.4	22	59	39	25	3.4	17	41	34	23
11	.....	6.4	29	58	39	26	3.4	17	48	44	22
12	.....	8.8	32	54	36	27	3.7	17	56	33	22
13	.....	13	29	42	33	28	3.7	17	66	27	22
14	.....	12	27	42	33	29	3.7	17	66	24	23
15	.....	11	22	43	33	30	.....	15	62	26	22
						31	.....	15	.....	27	.....

Monthly discharge of East Fork of Bruneau River near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 24-29	3.7	3.4	3.6	42.8
March	21	3.4	11.6	713
April	66	15	28.2	1,680
May	93	24	47.2	2,900
June	49	22	32.6	1,940
The period				7,280

THREE CREEK NEAR THREE CREEK, IDAHO.

LOCATION.—In sec. 27, T. 15 S., R. 11 E., just below mouth of Deer Creek, 1½ miles north of Three Creek post office, Owyhee County, and 4 miles below point of proposed diversion by West End Twin Falls Irrigation Co.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 9, 1912, to June 30, 1914; February 24 to June 30, 1916, when station was discontinued.

GAGE.—Vertical staff on left bank; read by C. A. Ross.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed composed of mud and gravel. Banks subject to overflow at high stages. Control not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.95 feet March 20 (discharge, 24 second-feet); minimum stage, 0.98 foot March 4 (discharge, 4.0 second-feet). Minimum discharge recorded, 2.9 second-feet June 29 (gage height, 1.14 feet).

1912–1914, 1916: Maximum stage recorded, 3.68 feet April 24, 1914 (discharge, 71 second-feet); minimum stage, 0.63 foot February 6, 1914 (discharge, 0.8 second-foot).

ICE.—Record discontinued during winter.

DIVERSIONS.—None of importance above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; changes well defined by numerous measurements. Four fairly well defined rating curves used. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table or by shifting-control method. Records good.

Discharge measurements of Three Creek near Three Creek, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 24	G. N. Carter	1.04	5.0	Apr. 26	G. N. Carter	1.60	16.1
Mar. 4	do	.98	4.1	May 3	do	1.56	15.3
11	do	1.43	13.0	16	do	1.33	9.8
16	do	1.47	14.0	20	do	1.28	8.8
21	do	1.86	22.0	30	do	1.25	8.0
25	do	1.53	14.7	June 5	do	1.36	9.8
Apr 3	do	1.34	10.4	10	do	1.58	11.9
5	L. W. Roush	1.34	10.7	14	do	1.42	9.5
5	G. N. Carter	1.34	10.9	24	do	1.32	5.7
7	L. W. Roush	1.24	8.9	27	do	1.16	3.1
20	G. N. Carter	1.42	13.6				

Daily discharge, in second-feet, of Three Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1	.....	4.5	12	15	8.6	16	.....	14	13	9.8	8.1
2	.....	4.3	12	16	10	17	.....	15	14	9.8	8.1
3	.....	4.3	11	16	10	18	.....	16	14	9.6	7.9
4	.....	4.0	11	16	11	19	.....	16	14	9.0	7.7
5	.....	4.7	11	16	10	20	.....	24	13	8.6	9.9
6	.....	4.8	10	16	11	21	.....	22	12	8.8	9.5
7	.....	4.5	8.9	16	12	22	.....	18	12	11	9.5
8	.....	6.5	9.3	16	12	23	.....	18	11	11	8.3
9	.....	12	10	16	11	24	5.0	15	11	10	5.7
10	.....	15	13	17	12	25	4.7	15	11	10	5.3
11	.....	13	18	16	12	26	5.2	15	16	10	4.5
12	.....	15	15	15	12	27	4.7	13	17	10	3.2
13	.....	18	15	14	12	28	5.0	14	18	10	3.2
14	.....	16	14	15	9.1	29	4.7	13	17	9.0	2.9
15	.....	15	13	11	8.5	30	.....	13	15	8.0	3.0
						31	.....	12	.....	8.0	.....

Monthly discharge of Three Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 24-29	5.2	4.7	4.88	58.1
March	24	4.0	12.7	781
April	18	8.9	13.0	774
May	17	8.0	12.4	762
June	12	2.9	8.60	512
The period	.....	.....	.....	2,890

CHERRY CREEK NEAR THREE CREEK, IDAHO.

LOCATION.—In sec. 32, T. 15 S., R. 11 E., one-eighth mile above Three Creek school and 1½ miles west of Three Creek store, Owyhee County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 1, 1912, to June 30, 1914; February 24 to June 30, 1916, when station was discontinued.

GAGE.—Vertical staff on right bank; read by G. N. Carter and C. A. Ross.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of mud and fine gravel. Control shifting. Stage-discharge relation at times affected by growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.98 feet March 21 and April 11 (discharge, 8.9 second-feet); minimum stage, 1.45 feet June 29, 30 (discharge, 0.3 second-foot).

1912–1916: Maximum discharge estimated at 46 second-feet April 2, 1913. No flow at times during September and October, 1913.

ICE.—Stage-discharge relation at times affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records poor, owing to small discharge.

Discharge measurements of Cherry Creek near Three Creek, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 25	G. N. Carter	1.64	0.6	Apr. 7	G. N. Carter	1.84	3.6
Mar. 4	do	1.66	1.2	20	do	1.85	4.8
16	do	1.87	5.1	24	do	1.77	2.0
21	do	1.98	8.9	May 2	do	1.89	5.4
Apr. 3	do	1.86	4.5	21	do	1.88	3.1
5	L. W. Roush	1.84	3.4	30	do	1.80	2.4
7	do	1.83	3.3	June 6	do	1.75	1.7

Daily discharge, in second-feet, of Cherry Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Day.	Feb.	Mar.	Apr.	May.	June.	Day.	Feb.	Mar.	Apr.	May.	June.
1		0.8	4.2	5.9	3.1	16		4.8	4.2	3.2	1.0
2		1.0	4.2	5.6	2.8	17		5.6	3.1	3.1	.8
3		1.0	4.5	5.6	2.9	18		5.9	5.9	3.4	.8
4		1.2	4.2	3.8	2.9	19		6.7	5.9	3.6	.8
5		1.3	3.8	3.7	3.3	20		6.7	5.2	3.6	.8
6		1.3	4.2	3.5	1.8	21		8.9	3.1	3.3	1.4
7		1.3	3.4	3.2	1.8	22		7.4	3.1	2.9	1.1
8		1.3	3.4	6.7	1.8	23		7.8	2.8	2.9	.9
9		2.0	3.1	5.7	1.9	24	0.4	7.8	2.2	2.9	.9
10		2.1	3.4	4.3	2.1	25	.6	5.9	2.1	2.9	.8
11		2.3	8.9	4.2	1.8	26	.6	5.9	1.3	4.7	.7
12		2.4	5.9	3.7	1.4	27	.6	5.9	1.6	3.5	.4
13		5.9	5.2	2.6	1.3	28	.8	5.2	4.5	2.9	.4
14		5.9	3.8	3.3	1.3	29	.8	5.2	7.8	2.5	.3
15		5.2	2.8	3.1	1.1	30		4.5	7.8	2.8	.3
						31		4.2		3.3	

Monthly discharge of Cherry Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 24–29	0.8	0.4	0.633	7.5
March	8.9	.8	4.30	264
April	8.9	1.3	4.19	249
May	6.7	2.5	3.75	231
June	3.3	.3	1.42	84.5
The period				836

DEADWOOD CREEK NEAR THREE CREEK, IDAHO.

LOCATION.—In sec. 19, T. 15 S., R. 12 E., at the Helsley ranch, 5½ miles northeast of Three Creek postoffice, Owyhee County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 9, 1912, to July 23, 1914; April 1 to June 30, 1916.

GAGE—Vertical staff on left bank about 100 yards east of ranch house; read by Soren Hesselholt.

DISCHARGE MEASUREMENT.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Stage-discharge relation affected by growth of willows and brush.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.50 feet May 7, 8 (discharge, 13 second-feet); minimum discharge estimated at 0.7 second-foot June 30.

1912–1914, 1916: Maximum stage recorded, 3.65 feet February 28, 1914 (discharge, 61 second-feet); no flow at various times.

DIVERSIONS.—None of importance above station. Point of proposed diversion to Cedar Creek reservoir is about 2 miles below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table or by shifting-control method. Records fair.

Discharge measurements of Deadwood Creek near Three Creek, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 2	G. N. Carter	1.58	3.8	May 18	G. N. Carter	1.51	3.4
8	L. W. Roush	1.57	3.4	31	do	1.52	3.6
13	G. N. Carter	1.96	6.9	June 2	do	1.27	2.1
14	do	1.90	6.9	8	do	1.62	4.3
22	do	1.91	6.9	15	do	1.41	2.8
27	do	2.12	8.7	22	do	1.60	4.0
May 17	do	1.60	3.6				

Daily discharge, in second-feet, of Deadwood Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1	4.0	8.5	3.4	11	7.7	6.8	4.1	21	7.0	2.7	4.1
2	4.0	9.0	2.0	12	7.3	9.2	3.8	22	6.7	2.5	3.5
3	3.5	9.4	2.1	13	7.1	5.3	3.5	23	6.8	2.2	3.1
4	3.5	7.7	2.0	14	6.7	3.1	3.3	24	7.0	4.1	1.9
5	3.5	10	1.9	15	6.4	3.7	2.9	25	8.5	4.8	2.2
								26	8.0	4.4	1.9
6	3.5	9.6	1.8	16	6.2	3.1	2.5	27	8.6	3.4	1.5
7	3.4	13	1.8	17	7.0	3.2	2.7	28	9.0	3.1	1.4
8	3.4	13	4.0	18	7.3	3.3	2.8	29	10	3.3	1.0
9	3.8	12	3.5	19	7.5	2.8	2.9	30	9.6	3.3	.7
10	4.8	10	4.2	20	7.0	2.9	3.1	31		3.4	

NOTE.—Gage not read Apr. 1 or June 30; discharge estimated. Channel choked with snow and ice during March.

Monthly discharge of Deadwood Creek near Three Creek, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	10	3.4	6.29	374
May	13	2.2.	5.90	363
June	4.2	.7	2.65	158
The period				895

NOTE.—See note to table of daily discharge.

OWYHEE RIVER NEAR GOLD CREEK, NEV.

LOCATION.—In the W. ½ sec. 24, T. 44 N., R. 54 E., one-eighth mile below Wild Horse dam site, 9 miles west of Gold Creek, Elko County, and 65 miles north of Elko.

DRAINAGE AREA.—209 square miles (measured on map compiled by United States Indian Irrigation Service).

RECORDS AVAILABLE.—March 26 to September 30, 1916.

GAGE.—Stevens continuous water-stage recorder on left bank; observer, H. W. Naylor.

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

CHANNEL AND CONTROL.—Bed composed of rocks and loose sand. Control is rock riffle in each of two channels where stream is divided by a small island about 500 feet below gage; subject to change by work of beavers. Left bank high and rocky; right bank is overflowed at extremely high stages; dense growth of willows along banks.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 7.7 feet April 11 (discharge, estimated by prolonging rating curve, 970 second-feet); minimum stage, 1.74 feet September 3 (discharge, 2.6 second-feet).

ICE.—No information.

DIVERSIONS.—Wild hay meadows above station irrigated during flood season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed by work of beavers below gage during August and September. Rating curve well defined between 35 and 500 second-feet and poorly defined for low stages. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except for certain periods in August and September; shifting control method used September 10–30. Records obtained by using rating table above 35 second-feet good; other records fair.

Discharge measurements of Owyhee River near Gold Creek, Nev., during the year ending Sept. 30, 1916.

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*		*Feet.*	*Sec.-ft.*
Apr 25	4.86	403	Apr. 30	4.13	272
Apr. 29	4.29	295	June 16	2.23	38
Do	4.24	294	Aug. 30	[a] 1.78	3.3

[a] Backwater from beaver dam.

Daily discharge, in second-feet, of Owyhee River near Gold Creek, Nev., for the year ending Sept. 30, 1916.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	267	243	87	17	3.0	3.0
2	.....	355	231	83	20	3.0	2.8
3	.....	430	228	78	29	3.0	2.6
4	.....	440	238	73	24	2.8	2.8
5	.....	430	250	74	19	2.8	3.2
6	.....	402	236	70	16	2.8	3.6
7	.....	346	212	65	14	3.0	3.6
8	.....	355	204	62	13	2.8	3.4
9	.....	440	186	60	12	3.0	3.4
10	.....	603	171	64	11	.....	3.6
11	.....	803	154	58	9.5	.....	4.2
12	.....	703	142	55	9.2	.....	4.4
13	.....	449	130	48	8.5	.....	4.0
14	.....	392	122	43	8.2	.....	4.0
15	.....	458	112	40	7.8	.....	4.4
16	.....	487	105	36	8.5	.....	4.4
17	.....	458	99	35	8.0	.....	4.2
18	.....	449	96	31	7.5	.....	4.2
19	.....	402	106	32	7.2	.....	4.0
20	.....	355	105	34	7.2	.....	4.4
21	.....	319	93	34	7.0	.....	4.4
22	.....	346	92	32	6.0	.....	4.6
23	.....	373	87	29	5.2	.....	5.2
24	.....	392	112	26	4.8	.....	6.0
25	.....	382	147	24	4.6	.....	6.0
26	149	411	180	23	4.6	.....	6.2
27	151	392	172	20	4.0	.....	6.5
28	168	364	151	18	3.8	.....	6.2
29	230	310	113	17	3.6	.....	6.2
30	284	267	94	17	3.6	3.0	6.5
31	250	.....	90	.....	3.4	3.2	.....

NOTE.—Discharge interpolated Aug. 10–29, 3.0 second-feet.

Monthly discharge of Owyhee River near Gold Creek Nev., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 26–31	284	149	205	2,440
April	803	267	419	24,900
May	250	87	152	9,350
June	87	17	45.6	2,710
July	29	3.4	9.91	609
August	.....	.....	2.98	183
September	6.5	2.6	4.40	262
The period	803	2.6	108	40,500

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 J. P. Jones ranch, 8 miles southeast of Owyhee, Elko County, and about 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, 1916.

GAGE.—Stevens continuous water-stage recorder on right bank; observer, O. M. Waddell.

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; fairly permanent. One channel at all stages. Banks covered with brush; both subject to overflow. At low stages control is riffle between gage and Jones Brook; at high stages rapids below brook may become control.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 9.75 feet at 3 a. m. April 12 (discharge, 1,490 second-feet); minimum stage from water-stage recorder, 1.60 feet September 9 (discharge, 10 second-feet).

1913–1916: Maximum stage occurred in 1916; minimum stage, 1.35 feet August 23, 1915 (discharge, 7.5 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—No important diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; assumed ice effect December 28 to January 31. Rating curve well defined for all stages. The operation of water-stage recorder satisfactory except for breaks in record as shown in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except for periods when stage-discharge relation was affected by ice or when clock was not running. Records obtained by use of rating table good; others poor.

Discharge measurements of Owyhee River near Owyhee, Nev., during the year ending Sept. 30, 1916.

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
April 27	7.10	795
September 1	1.68	12.3

Daily discharge, in second-feet, of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	19	17	34	52	540	602	307	.....	.....	11
2	12	19	18	34	51	663	572	290	.....	.....	11
3	12	19	18	37	50	700	572	282	.....	.....	11
4	15	19	19	37	45	742	602	.....	.....	.....	11
5	17	19	20	41	41	742	651	.....	.....	.....	11
6	18	19	19	83	45	700	651	.....	.....	.....	11
7	18	19	19	76	56	651	616	.....	.....	.....	10
8	18	19	19	83	104	640	602	.....	.....	.....	10
9	18	20	19	90	143	713	564	.....	.....	.....	10
10	18	22	18	76	183	878	508	.....	.....	.....	10
11	18	20	18	.....	256	1,220	448	.....	.....	14	11
12	19	20	16	.....	223	1,280	398	.....	.....	.....	11
13	19	21	18	.....	215	1,100	360	.....	.....	.....	11
14	20	30	19	.....	223	900	324	.....	.....	.....	11
15	20	26	18	.....	290	700	307	.....	.....	.....	11
16	20	24	19	.....	360	750	290	.....	.....	.....	11
17	20	22	24	.....	478	800	282	.....	.....	.....	11
18	20	24	30	.....	640	.....	282	.....	.....	.....	12
19	20	22	35	.....	700	.....	290	.....	.....	.....	12
20	20	22	31	.....	663	.....	290	.....	.....	.....	12
21	19	24	24	.....	772	.....	282	.....	.....	.....	12
22	19	26	29	.....	564	700	282	.....	.....	.....	12
23	19	23	32	.....	438	.....	282	.....	.....	.....	12
24	19	24	20	.....	458	.....	307	.....	.....	.....	12
25	19	19	31	.....	458	.....	351	.....	.....	.....	12
26	19	20	28	.....	350	.....	408	.....	20	.....	12
27	19	18	22	.....	275	788	408	.....	.....	.....	13
28	19	21	.....	.....	282	788	388	.....	.....	.....	13
29	19	23	.....	.....	298	713	342	.....	.....	.....	13
30	19	19	.....	.....	428	651	316	.....	.....	.....	13
31	19	.....	.....	.....	488	.....	316	.....	.....	.....	.....

NOTE.—Discharge estimated, because of ice, from temperature records: Dec. 28–31, 22 second-feet; Jan. 1–31, 25 second-feet. No gage height record, discharge estimated, Feb. 11–29, 63 second-feet; Apr. 18–21, 750 second-feet; Apr. 23–26, 744 second-feet; June 4–30, 160 second-feet; July 1–25, 50 second-feet; July 27–31, 18 second-feet; Aug. 1–10. 16 second-feet; Aug. 12–31, 13 second-feet.

Monthly discharge of Owyhee River near Owyhee, Nev., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	12	18.2	1,120
November	30	18	21.4	1,270
December	35	16	22.2	1,360
January	.....	.....	25.0	1,540
February	.....	.....	61.7	3,550
March	772	41	311	19,100
April	1,280	540	778	46,300
May	651	282	416	25,600
June	307	.....	173	10,300
July	.....	.....	43.9	2,700
August	.....	.....	14.0	861
September	13	10	11.4	678
The year	1,280	10	158	114,000

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, 1916, when station was discontinued.

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, 9.0 feet at 5 p. m. March 23 (discharge, 12,000 second-feet); minimum stage recorded, 1.98 feet September 19–26 (discharge about 1.5 second-feet.)

1890–1896 and 1903–1916: 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).

ICE.—Stage-discharge relation often seriously affected by ice; winter flow estimated from discharge measurements, 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 changed slightly during the break-up February 6 and 7. Two rating curves used, one applicable October 1 to February 6, the other February 7 to September 30; both curves fairly well defined throughout. Gage read once a day to half tenths; record doubtful at times, expecially for low water. Daily discharge ascertained by applying daily gage height to rating table. Open-water records fair; other records poor.

Discharge measurements of Owyhee River near Owyhee, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 27	A. W. Harrington	[a] 3.58	272	June 28	G. C. Baldwin	3.22	444
Mar. 3	do	3.97	1,000	Sept. 18	L. W. Roush	2.00	1.9
May 1	L. W. Roush	5.27	2,400				

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Owyhee River near Owyhee, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	28	45	117	.....	1,250	4,320	2,440	1,250	290	7.4	6.3
2	28	45	117	.....	1,120	4,120	2,440	1,250	240	7.4	6.3
3	28	45	117	.....	986	4,320	2,240	1,160	195	7.4	6.3
4	28	55	133	.....	822	4,730	2,040	986	154	7.4	6.3
5	28	66	117	.....	784	4,730	2,040	944	154	7.4	6.3
6	28	66	117	.....	745	4,520	1,920	903	264	7.4	6.3
7	28	66	117	4,730	707	4,520	.....	862	264	7.4	6.3
8	28	66	117	3,060	745	3,930	.....	862	217	7.4	6.3
9	28	66	103	2,040	822	3,560	.....	822	240	7.4	6.3
10	28	66	103	1,700	1,590	3,390	.....	783	240	7.4	6.3
11	28	78	103	2,040	2,040	3,560	.....	764	217	7.4	6.3
12	36	66	103	1,920	4,120	3,740	.....	745	173	7.4	6.3
13	45	66	103	1,440	4,950	4,120	.....	707	118	7.4	6.3
14	45	78	103	1,350	6,430	4,020	1,490	670	101	7.4	6.3
15	45	78	117	1,250	6,160	3,930	.....	633	73	7.4	6.3
16	45	90	117	1,120	5,180	3,740	.....	670	61	7.4	6.3
17	45	90	117	1,300	5,410	3,560	.....	708	49	7.4	1.7
18	45	90	117	1,440	6,710	3,220	.....	745	39	7.4	1.7
19	45	90	.....	1,350	8,210	3,060	.....	612	22	7.4	1.5
20	45	90	.....	1,440	8,210	2,900	.....	542	22	7.4	1.5
21	45	90	.....	1,440	11,600	2,900	.....	576	30	7.4	1.5
22	45	90	.....	1,350	11,300	2,740	.....	670	39	6.3	1.5
23	45	103	.....	1,350	12,000	2,590	.....	576	30	6.3	1.5
24	45	103	205	1,440	9,530	2,590	.....	783	22	6.3	1.5
25	45	103	205	1,590	7,280	2,440	.....	745	22	6.3	1.5
26	45	103	205	1,590	6,230	2,440	.....	542	13	6.3	1.5
27	45	117	.....	1,590	5,180	2,300	.....	495	13	6.3	5.2
28	45	117	.....	1,440	4,950	2,300	.....	448	7.4	6.3	5.2
29	45	117	.....	1,350	4,730	2,300	1,590	396	7.4	6.3	11
30	45	117	.....	.....	5,650	2,300	1,470	345	7.4	6.3	11
31	45	.....	.....	.....	4,520	.....	1,350	.....	7.4	6.3	.....

NOTE.—Stage-discharge relation affected by ice Dec. 19–23 and Dec. 27 to Feb. 6; discharge estimated as follows: Dec. 19, 117 second-feet; Dec. 20, 170 second-feet; Dec. 21–23, 205 second-feet; Dec. 27–31, 147 second-feet; Jan. 1–23, 139 second-feet; Jan. 24–31, 404 second-feet; Feb. 1–6, 550 second-feet. No gage-height records May 7–13 (discharge estimated, 1,700 second-feet) and May 15–28 (discharge estimated, 1,540 second-feet).

Monthly discharge of Owyhee River near Owyhee, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	45	28	38.7	2,380
November	117	45	82.1	4,890
December	.....	.....	138	8,480
January	.....	.....	207	12,700
February	4,730	.....	1,470	84,600
March	12,000	707	4,840	298,000
April	4,730	2,300	3,430	204,000
May	.....	.....	1,690	101,000
June	1,250	345	740	44,000
July	290	7.4	107	6,580
August	7.4	6.3	7.05	433
September	11	1.5	4.95	295
The year	12,000	1.5	106	767,000

JACK CREEK NEAR TUSCARORA, NEV.

LOCATION.—In sec. 35, T. 42 N., R. 52 E., at R. M. Woodward's ranch on 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, 1916.

GAGE.—Vertical staff on left bank about 500 feet below Woodward's house. Read by R. M. Woodward. Datum raised 1.50 feet September 1, 1914.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and small boulders; practically permanent. Banks low and lined with willows; may be overflowed to some extent during high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.70 feet May 6, June 16, 18, and 19 (discharge, 121 second-feet); minimum stage, 0.36 foot September 13–18 (discharge, 2.3 second-feet).

1913–1916: Maximum stage recorded, 2.17 feet (present datum) April 10, 1914 (discharge, 244 second-feet), minimum stage recorded, 0.3 foot February 14 and August 18–26, 1915 (discharge, 1.5 second-feet). Flow is believed to have been as low as 1 second-foot for a few days in December and January and possibly between August 27 and 31, 1915.

ICE.—Stage-discharge relation seriously affected by ice.

DIVERSION.—No important diversions above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 15 to February 5. Rating curves well defined between 0 and 150 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for period of ice effect when it was estimated from observer's notes and weather records, and for days when gage was not read when it was interpolated. Records good.

Discharge measurements of Jack Creek near Tuscarora, Nev., during the year ending Sept. 30, 1916.

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Apr. 26	1.51	88.8
June 17	1.61	101
Aug. 31	.43	3.6

Daily discharge, in second-feet, of Jack Creek near Tuscarora, Nev., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.8	5.5	7.2	.....	12	29	73	58	60	7.4	3.4
2	4.8	5.5	7.2	.....	12	29	76	60	63	7.4	3.4
3	5.2	5.5	7.2	.....	12	34	82	63	58	6.9	3.4
4	5.2	5.5	7.2	.....	12	38	82	63	55	6.9	3.4
5	5.2	5.5	7.4	.....	12	38	114	73	48	6.3	3.0
6	5.2	5.5	7.4	7.4	12	34	121	88	44	6.3	3.0
7	5.2	5.5	7.4	7.4	12	48	112	104	42	5.8	3.0
8	5.2	5.5	7.4	7.4	12	60	104	101	40	5.8	2.7
9	5.2	5.5	7.4	7.4	13	73	98	104	38	5.8	2.7
10	5.2	5.5	7.7	7.8	13	88	82	107	36	5.2	2.7
11	5.2	5.5	7.7	8.3	15	85	76	111	34	5.2	2.7
12	5.2	5.8	8.0	8.7	18	85	73	111	34	5.2	2.7
13	5.2	5.8	8.0	9.2	33	72	55	114	31	4.8	2.3
14	5.2	5.8	8.0	9.6	36	58	46	114	29	4.8	2.3
15	5.2	5.9	.....	10	36	55	44	118	28	4.8	2.3
16	5.2	6.0	.....	10	48	58	42	121	28	4.8	2.3
17	5.2	6.0	.....	12	38	55	44	106	25	4.8	2.3
18	5.2	6.0	.....	12	48	53	44	121	22	4.8	2.3
19	5.2	6.2	.....	12	48	48	44	121	21	4.8	2.4
20	5.2	6.3	.....	12	68	48	44	111	21	4.3	2.4
21	5.2	6.3	.....	12	73	48	44	104	18	4.3	2.5
22	5.2	6.6	.....	12	48	58	46	88	16	4.3	2.7
23	5.2	6.6	.....	12	36	60	46	68	14	4.3	2.7
24	5.2	6.6	.....	12	36	73	46	58	12	4.3	2.7
25	5.2	6.9	.....	12	34	85	48	58	11	3.9	2.7
26	5.2	6.9	.....	13	36	88	50	60	9.4	3.9	2.7
27	5.5	6.9	.....	13	36	88	50	60	8.7	3.9	3.0
28	5.5	6.9	.....	12	34	91	50	63	8.7	3.9	3.0
29	5.5	6.9	.....	12	33	82	53	60	8.7	3.9	3.0
30	5.5	7.2	.....	.....	31	73	53	60	8.0	3.9	3.0
31	5.5	.....	.....	.....	29	.....	55	.....	8.0	3.4	.....

NOTE.—Discharge estimated, because of ice, from observer's notes, and temperature records: Dec. 15–23, 7 second-feet; Dec. 24–31, 4 second-feet; Jan. 1–15, 5.5 second-feet; Jan. 16–25, 4 second-feet; Jan. 26–31, 3 second-feet, and Feb. 1–5, 5 second-feet.

Monthly discharge of Jack Creek near Tuscarora, Nev., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.5	4.8	5.22	321
November	7.2	5.5	6.07	361
December	8.0	.....	6.46	397
January	.....	.....	4.53	279
February	13	.....	9.52	548
March	73	12	30.2	1,860
April	91	29	61.1	3,640
May	121	32	64.4	3,960
June	121	58	88.3	5,250
July	63	8.0	28.4	1,750
August	7.4	3.4	5.04	310
September	3.4	2.3	2.76	164
The year	121	2.3	25.9	18,800

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, 1916.

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, 8.5 feet at 10 a. m., April 12 (discharge, 1,470 second-feet); practically no flow during August and September.

1911–1916: 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, 1915, and 1916.

ICE.—Stage-discharge relation seriously affected by ice; winter 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 permanent except as affected by ice. Rating curve well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good except for winter months.

The following discharge measurement was made by G. C. Baldwin:
April 27, 1916: Gage height, 6.93 feet; discharge, 786 second-feet.

Daily discharge, in second-feet, of Jordan Creek near Jordan Valley, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1	.....	1.0	16	.....	177	655	626	230	93	1.8
2	.....	1.2	18	.....	161	655	529	224	131	1.5
3	.....	1.4	17	.....	145	689	559	217	134	1.3
4	.....	1.4	15	.....	145	724	529	211	138	1.0
5	.....	1.5	14	.....	152	736	590	211	124	.8
6	.....	1.7	18	.....	160	748	622	220	105	.7
7	.....	2.0	18	.....	152	760	655	230	90	.7
8	.....	2.2	19	.....	145	724	655	230	74	.7
9	.....	2.3	20	.....	211	780	592	230	58	.6
10	.....	2.4	20	.....	328	837	529	250	49	.6
11	.....	2.5	20	.....	529	1,050	474	240	49	.6
12	.....	2.7	20	.....	689	1,470	419	230	36	.4
13	.....	2.8	19	.....	870	1,000	364	212	31	.3
14	.....	3.4	19	.....	1,050	918	334	195	29	.3
15	.....	4.0	.....	.....	798	877	304	178	26	.3
16	.....	4.7	.....	.....	760	877	271	160	24	.2
17	.....	4.2	.....	.....	918	877	266	160	22	.2
18	.....	4.9	.....	271	1,050	818	260	145	19	.2
19	.....	5.6	.....	260	1,180	760	288	250	19	.2
20	.....	6.6	.....	250	1,220	691	316	293	18	.2
21	.....	7.5	.....	250	1,370	622	293	271	16	.2
22	.....	9.4	.....	250	1,320	590	288	211	14	.2
23	.....	10	.....	260	1,180	622	282	190	12	.2
24	.....	12	.....	250	1,020	622	271	168	11	.2
25	.....	15	.....	250	853	673	318	145	9.2	.2
26	.....	15	.....	260	689	724	364	131	7.8	.2
27	.....	15	.....	250	672	760	316	118	6.4	.1
28	.....	15	.....	222	655	837	288	118	4.4	.6
29	0.7	15	.....	193	877	780	260	110	2.5	.....
30	.8	16	.....	.....	724	724	250	101	2.8	.....
31	.8	.....	.....	.....	655	.....	240	.....	2.1	.....

NOTE.—Stage-discharge relation affected by ice Dec. 15 to Feb. 17; mean discharge estimated from weather records and observer's notes as follows: Dec. 15–31, 16 second-feet; Jan. 1–31, 10 second feet; Feb. 1–17, 168 second-feet. Discharge interpolated on numerous days on which gage was not read. Practically no flow during October and September.

Monthly discharge of Jordan Creek near Jordan Valley, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 29–31	0.8	0.7	0.77	4.6
November	16	1.0	6.28	374
December			16.9	1,040
January			10.0	615
February			201	11,600
March	1,370	145	673	41,400
April	1,470	590	787	46,800
May	655	240	398	24,500
June	293	101	196	11,700
July	138	2.1	43.8	2,690
August	1.8	.1	.48	29.5
The period				141,000

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, 1916, when station was discontinued.

GAGE.—Inclined staff on right bank at upstream side of bridge; read by King and Bigelow. Gage read in 1904 and 1905 was on left bank a quarter of a mile upstream from present site. All records from October 5, 1911, to date have been referred to present gage.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge or by wading near gage.

CHANNEL AND CONTROL.—Bed of canal is clean and smooth. Control not well defined but fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.28 feet at 2:55 p. m. July 5 (discharge, 226 second-feet); canal dry at times during winter.

1904-5 and 1911-1916: Maximum stage recorded 5.2 feet May 23, 1915 (discharge, 240 second-feet); canal dry at various times each year 1912-1916.

ICE.—No gage-height records available for winter. Water in canal freezes.

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 three 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 practically permanent during irrigation season. Two well-defined rating curves used, one applicable October 1 to December 19, the other March 20 to September 30. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records for irrigation season good.

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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*			*Feet.*	*Sec-ft.*
Jan. 26	A. W. Harrington	a1.20	0.9	June 28	G. C. Baldwin	5.07	209
Mar. 3	do	.86	.0	Sept. 17	L. W. Roush	3.94	124
Apr. 30	L. W. Roush	5.13	216				

a Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Owyhee canal near Owyhee, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	140	156	148	.....	166	222	214	198	158	129
2	140	156	148	.....	174	214	214	198	158	126
3	140	156	148	.....	182	206	214	194	154	122
4	140	156	148	.....	190	214	214	206	150	122
5	140	156	148	.....	190	206	214	226	147	122
6	140	156	148	.....	198	206	214	216	143	122
7	148	156	148	.....	190	206	214	216	147	119
8	148	156	148	.....	190	214	214	214	147	122
9	156	156	148	.....	190	214	222	218	140	119
10	156	156	148	.....	190	214	222	216	143	122
11	148	156	148	.....	198	206	222	218	143	119
12	156	156	148	.....	198	214	214	214	143	122
13	164	156	148	.....	206	214	222	218	136	122
14	164	156	148	.....	206	214	214	214	143	122
15	164	156	148	.....	198	214	214	206	136	126
16	164	156	148	.....	190	214	222	214	133	126
17	164	156	148	.....	198	214	222	199	140	125
18	164	148	148	.....	190	214	222	198	140	129
19	164	148	148	.....	198	214	174	198	136	129
20	164	148	.....	37	198	214	206	194	136	129
21	156	148	.....	108	206	214	206	190	236	133
22	156	148	.....	122	206	214	214	174	133	136
23	156	148	.....	122	206	214	206	174	133	143
24	156	148	.....	122	206	206	86	166	129	147
25	156	148	.....	115	206	206	77	174	129	147
26	156	148	.....	108	206	206	206	174	129	147
27	156	148	.....	129	206	206	214	170	133	150
28	156	148	.....	129	214	214	210	166	129	150
29	156	148	.....	158	214	214	210	166	128	150
30	156	148	.....	190	214	214	206	158	129	154
31	156	.....	.....	174	.....	214	.....	158	129	.....

NOTE.—Discharge estimated June 24 and 25. Head gates reported closed Dec. 19 to Mar. 19. Discharge in January probably due to melting snow along canal.

Monthly discharge of Owyhee canal near Owyhee, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	164	140	154	9,470
November	156	148	153	9,100
December 1-19	148	148	148	5,580
March 20-31	174	37	126	3,000
April	214	166	197	11,700
May	222	206	212	13,000
June	222	77	204	12,100
July	226	158	195	12,000
August	158	128	139	8,550
September	154	119	131	7,800

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, 1916.

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.—1911–1916: Maximum stage recorded, 7.37 feet at 6 a. m. June 19, 1916 (discharge, 8,530 second-feet); minimum stage recorded 1.82 feet at 4 p. m. March 4, 1916 (discharge, 185 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; winter 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 permanent except as affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory except as affected by ice. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair for January and February, good for December and March, and excellent for rest of year.

COOPERATION.—Occasional discharge measurements made by employees of United States Reclamation Service.

Discharge measurements of Boise River near Twin Springs, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 21	A. W. Harrington	2.06	313	June 29	A. W. Harrington	5.46	4,830
Jan. 13	do	[a] 2.14	315	July 11	do	4.62	3,290
Apr. 10	do	4.26	2,930	12	do	4.74	3,560
24	do	4.56	3,370	21	do	3.62	1,740
May 2	do	5.04	4,020	29	do	3.06	1,140
11	do	4.93	3,960	Aug. 6	do	2.74	835
15	A. C. Price [b]	4.09	2,380	12	do	2.59	691
16	Baldwin and Harrington	4.16	2,590	19	do	2.61	724
				25	do	2.41	578
23	A. W. Harrington	4.66	3,460	Sept. 3	do	2.29	472
30	do	4.26	2,700	9	do	2.28	450
June 10	do	5.86	5,590	18	do	2.22	407
20	do	6.22	6,320	23	do	2.19	424
21	do	5.63	5,100				

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

Daily discharge, in second-feet, of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	339	321	327	.....	314	244	1,370	3,810	2,940	3,810	980	499
2	321	321	314	.....	314	217	1,490	4,170	2,850	4,630	943	485
3	333	321	397	.....	314	201	1,710	4,720	3,200	4,260	908	492
4	358	321	437	.....	314	191	1,980	5,650	3,900	3,550	882	514
5	339	314	458	.....	314	244	1,980	6,410	4,540	3,370	847	499
6	333	314	417	.....	314	238	1,840	6,800	4,810	3,900	805	492
7	327	308	410	.....	314	211	1,910	7,390	4,900	4,170	772	485
8	327	302	390	.....	314	222	2,130	6,220	5,090	4,350	756	471
9	321	327	384	.....	314	278	2,280	5,650	5,460	4,440	740	485
10	321	321	333	.....	314	506	2,690	4,720	5,650	3,900	724	535
11	327	314	333	.....	314	764	3,900	3,990	5,270	3,460	700	506
12	327	339	308	.....	314	917	3,990	3,370	4,720	3,370	685	492
13	327	256	358	315	314	1,110	3,370	2,940	4,630	3,280	677	478
14	333	211	390	314	316	1,040	3,370	2,600	5,090	3,110	662	464
15	333	345	302	314	318	1,030	3,550	2,520	5,650	2,850	646	464
16	327	390	206	.....	321	1,180	3,460	2,520	6,220	2,600	638	458
17	321	321	308	.....	323	1,550	3,200	2,690	6,800	2,770	677	444
18	321	339	333	.....	325	1,770	3,020	3,110	7,390	2,280	882	430
19	321	345	250	.....	327	1,910	2,690	3,640	7,990	1,980	724	424
20	314	352	364	.....	329	2,280	2,360	3,810	6,610	1,770	662	424
21	314	371	499	.....	331	2,200	2,360	3,990	5,090	1,710	638	417
22	308	364	556	321	333	1,840	2,440	3,810	4,170	1,580	608	417
23	314	352	549	.....	332	1,580	2,520	3,370	3,550	1,470	586	410
24	327	378	437	.....	331	1,360	3,280	3,110	3,460	1,400	564	404
25	327	333	410	.....	329	1,230	4,260	2,850	3,900	1,350	556	404
26	333	327	390	.....	327	1,140	5,270	2,600	4,630	1,320	535	404
27	333	284	314	.....	333	1,110	6,030	2,440	5,090	1,250	528	410
28	333	211	371	.....	296	1,330	5,460	2,520	5,270	1,170	528	397
29	327	314	333	.....	267	1,360	4,540	2,690	5,090	1,100	521	397
30	321	390	.....	.....	.....	1,290	3,900	2,770	4,080	1,040	535	404
31	314	.....	.....	.....	.....	1,300	.....	2,940	.....	1,010	514	.....

NOTE.—Mean discharge estimated because of ice as follows: Dec. 30 to Jan. 12, 300 second-feet; Jan. 16–21 and 23–31, 315 second-feet. Discharge interpolated Feb. 2–4, 6–12, 14–18, 20, 21, and 23–25, because of lack of gage-height record.

Monthly discharge of Boise River near Twin Springs, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 830 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	358	308	326	0.393	0.45	20,000
November	390	211	324	.390	.44	19,300
December	556	206	370	.446	.51	22,800
January	.....	.....	309	.372	.43	19,000
February	333	267	318	.383	.41	18,300
March	2,280	191	1,030	1.24	1.43	63,300
April	6,030	1,370	3,080	3.71	4.14	183,000
May	7,390	2,440	3,870	4.66	5.37	238,000
June	7,990	2,850	4,930	5.94	6.63	293,000
July	4,630	1,010	2,650	3.19	3.68	163,000
August	980	574	691	.833	.96	42,500
September	535	397	454	.547	.61	27,000
The year	7,990	191	1,530	1.84	25.06	1,110,000

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, 1916.

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, 8.34 feet at 4 p. m. June 19 (discharge, 13,600 second-feet); minimum stage recorded, 2.04 feet at 11.30 a. m. March 22 (discharge, 295 second-feet).

1911–1916: Maximum stage recorded, 8.7 feet June 13, 1911 (discharge, 15,100 second-feet); minimum stage recorded March 22, 1916.

ICE.—Stage-discharge relation at times seriously affected by ice; winter 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 irrigating season.

ACCURACY.—Stage-discharge relation not permanent, but three rating curves are well defined by the numerous discharge measurements. Operations of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except as noted in footnote to table of daily discharge. Records excellent.

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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Price and Tallman	2.78	697	July 7	Price and Steward	6.02	5,830
Nov. 3	Price and Paul	2.36	462	8	A. W. Harrington	6.15	6,170
14	A. W. Harrington	2.32	425	8	do	6.52	7,160
Jan. 10	do	2.34	437	15	do	5.43	4,540
Mar. 12	do	4.75	3,140	18	Steward and Paul	5.29	4,010
22	Price and Elford	2.04	295	19	A. W. Harrington	4.87	3,350
27	Price and Steward	4.53	2,790	20	Tallman and Steward	4.85	3,160
Apr. 4	A. W. Harrington	5.43	4,670	25	A. W. Harrington	5.09	3,750
5	do	5.66	5,280	26	do	5.04	3,670
6	Price and Harrington	5.82	5,560	31	Paul and Steward	4.92	3,350
11	A. W. Harrington	5.87	5,720	Aug. 2	A. W. Harrington	4.80	3,160
15	do	6.01	6,170	11	do	4.67	2,930
18	do	6.25	6,880	14	Paul and Steward	3.61	1,350
May 1	do	6.42	7,240	15	Steward and Green	3.90	1,690
8	do	6.89	8,830	16	A. W. Harrington	4.23	2,230
25	do	6.23	6,550	25	Paul and Steward	4.23	2,200
27	do	5.57	5,020	28	A. W. Harrington	4.22	2,270
June 7	do	6.19	6,320	30	do	4.20	2,200
16	Price and Steward	6.73	7,420	Sept. 5	do	4.29	2,360
19	A. W. Harrington	8.22	13,900	6	Price and Steward	4.28	2,270
19	Price and Tallman	8.32	13,400	14	Tallman and Price	4.21	2,180
21	Price and Steward	6.75	7,730	19	A. W. Harrington	4.01	1,920
22	A. W. Harrington	6.76	8,400	21	do	3.74	1,540
July 5	do	6.04	6,020	21	A. C. Price	3.74	1,550

NOTE.—Price, Paul, Elford, Steward, and Green were employees of the United States Reclamation Service; Tallman of the Idaho State Engineer.

Daily discharge, in second-feet, of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	940	441	430	391	687	1,620	3,690	7,420	4,210	6,550	3,290	2,260
2	841	430	430	405	693	1,590	4,230	7,420	4,210	6,550	3,290	2,340
3	772	441	430	410	693	1,480	4,690	7,570	4,320	7,110	3,190	2,340
4	750	441	441	420	673	1,410	4,810	7,730	4,770	6,410	3,190	2,340
5	772	446	456	420	758	1,410	5,180	8,050	5,880	5,620	3,190	2,340
6	787	441	467	420	1,010	1,410	5,430	8,210	6,280	5,370	3,100	2,340
7	758	462	451	420	1,150	1,380	5,560	8,540	6,410	5,880	3,100	2,340
8	736	472	436	420	1,270	1,290	5,560	8,870	6,410	6,690	3,100	2,340
9	722	441	441	425	1,500	1,270	5,560	9,040	6,970	7,400	3,100	2,260
10	707	420	446	425	1,430	1,330	5,560	9,040	7,550	6,690	3,010	2,260
11	693	441	446	425	1,340	1,740	5,700	9,040	7,700	5,500	3,010	2,180
12	693	462	446	540	1,340	3,530	5,830	9,040	7,700	5,250	2,490	2,180
13	687	441	456	570	1,350	4,040	5,970	8,870	7,700	5,130	1,400	2,260
14	707	415	456	570	1,340	3,940	6,100	8,870	7,850	4,890	1,480	2,180
15	714	420	456	570	1,150	3,830	6,100	8,710	7,850	4,540	1,900	2,180
16	714	446	456	660	1,160	3,830	6,100	8,540	8,000	4,210	2,260	2,040
17	818	467	462	690	1,350	3,830	6,530	8,370	8,150	4,210	2,420	1,970
18	818	478	462	693	1,600	3,830	6,820	6,820	10,500	4,100	2,340	1,970
19	743	489	467	693	1,670	3,940	6,530	5,700	13,100	3,380	2,340	1,900
20	736	494	467	690	1,670	3,940	6,240	6,240	11,200	3,380	2,340	1,830
21	729	489	467	690	1,400	2,710	6,240	6,820	8,000	3,680	2,340	1,590
22	750	500	472	700	1,230	849	6,240	7,260	8,000	3,990	2,260	1,610
23	687	500	472	680	1,350	5,700	6,240	7,730	7,850	3,890	2,260	1,600
24	640	489	472	687	1,430	4,450	6,240	7,570	6,970	3,780	2,260	1,640
25	614	441	478	693	1,500	2,740	6,380	7,110	6,970	3,780	2,260	1,600
26	653	400	478	693	1,500	2,740	6,380	6,380	6,550	3,680	2,180	1,560
27	653	405	462	693	1,590	2,740	6,670	5,300	6,010	3,680	2,180	1,600
28	653	410	410	693	1,650	3,100	6,960	4,500	6,280	3,580	2,180	1,600
29	627	415	405	690	1,640	3,690	7,110	4,100	7,700	3,580	2,180	1,640
30	595	420	420	690	.....	3,690	7,260	4,100	7,550	3,580	2,260	1,470
31	517	.....	406	690	.....	3,690	.....	4,100	.....	3,480	2,260	.....

NOTE.—Stage-discharge relation believed to have been affected by ice Dec. 31, Jan. 16, 17, 20-22, 26, 27, and 29-31; discharge estimated from observer's notes.

Monthly discharge of Boise River at Dowling's ranch, near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	940	517	717	44,100
November	500	400	449	26,700
December	478	405	450	27,700
January	.....	391	576	35,400
February	1,670	673	1,280	73,600
March	5,700	849	2,800	172,000
April	7,260	3,690	5,930	353,000
May	9,040	4,100	7,320	450,000
June	13,100	4,210	7,290	434,000
July	7,400	3,380	4,820	296,000
August	3,290	1,400	2,520	155,000
September	2,340	1,470	1,990	118,000
The year	13,100	391	3,010	2,190,000

BOISE RIVER BELOW MOORE CREEK, NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 21, T. 3 N., R. 4 E., Ada County, one-fourth mile below Moore Creek, 1 mile below Dowling gaging-station, and 5 miles below Arrowrock; 2¼ miles above site of gaging-station described as "Boise River near Highland."

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 25, 1915, to September 30, 1916. Records are also available for station near Boise, 10 miles downstream, December 15, 1894, to October 31, 1904, and for station designated as "Boise River near Highland" March 18, 1905, to August 24, 1915, records for the latter station being directly comparable with those obtained at the present station.

GAGE.—Friez water-stage recorder on left bank; installed November 15, 1915, about 150 feet above temporary vertical staff installed by engineers of United States Reclamation Service August 25, 1915. Relation between the two gages not determined. Edgar Kirk, observer.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet above Friez gage.

CHANNEL AND CONTROL.—Control consists of cobbles and coarse gravel and some sand; may shift during high or low stages. One channel at gage section at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.0 feet at 9 p. m. June 19 (discharge, 15,100 second-feet); minimum stage recorded, 0.25 foot on temporary gage at 10 a. m. November 14 (discharge, 432 second-feet).

A maximum discharge of 17,000 second-feet for the period 1905–1915 was recorded April 15, 1907, at the Highland station.

A maximum discharge of 40,100 second-feet was recorded June 14, 1896, at the old station near Boise.

Records at Highland station show no discharge less than 432 second-feet.

ICE.—Stage-discharge relation seldom affected by ice; open-water rating curves applicable throughout almost entire winter.

DIVERSIONS.—No important diversions above station. The New York canal of the Boise project, United States Reclamation Service, diverts about 9 miles below and has a maximum capacity of about 2,500 second-feet. A number of smaller canals of total maximum capacity of about 2,500 second-feet divert below the New York canal.

REGULATION.—With exception of the water of Moore Creek, the flow past the station has been regulated since February 21, 1915, at Arrowrock dam, 5 miles upstream.

ACCURACY.—Stage-discharge relation not permanent but the three rating curves are well defined by frequent discharge measurements. Staff gage read to half-tenths once daily October 1 to November 15; operation of water-stage recorder satisfactory. Daily discharge ascertained by shifting-control method or by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent except for January, February, and March, for which they are good.

COOPERATION.—Two discharge measurements were furnished by the United States Reclamation Service.

Discharge measurements of Boise River below Moore Creek, near Arrowrock, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 16	A. W. Harrington	3.76	515	May 29	A. W. Harrington	6.95	4,860
Dec. 7	Harrington and Price	3.81	515	June 8	do	7.86	7,280
Jan. 10	A. W. Harrington	3.76	522	24	do	8.02	7,870
Mar. 12	do	7.09	4,540	July 3	do	8.17	8,130
12	do	7.43	5,570	18	do	6.62	4,060
21	Price and Steward	8.18	8,120	26	do	6.53	3,790
22	Price and Elford	5.33	1,800	Aug. 2	do	6.33	3,430
Apr. 3	A. W. Harrington	7.72	6,690	16	do	5.70	2,390
7	do	7.99	7,620	29	do	5.67	2,340
17	do	8.36	8,690	Sept. 4	do	5.77	2,450
May 8	do	8.75	10,500	19	do	5.46	2,040
19	Baldwin and Harrington.	7.67	6,680				

NOTE.—Price, Steward, and Elford were employees of the United States Reclamation Service.

Daily discharge, in second-feet, of Boise River below Moore Creek, near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,060	505	498	473	833	2,060	5,620	8,960	4,980	7,190	3,460	2,420
2	895	480	493	493	819	2,000	6,450	8,960	4,980	7,190	3,360	2,420
3	820	480	514	529	819	1,800	6,890	8,960	5,110	7,980	3,360	2,420
4	785	480	550	550	812	1,740	7,190	9,310	5,620	7,040	3,270	2,420
5	785	480	572	539	928	1,800	7,500	9,660	6,600	6,310	3,360	2,420
6	820	480	572	534	1,230	1,800	7,500	10,000	7,040	5,760	3,270	2,420
7	785	505	556	534	1,440	1,680	7,660	10,000	7,190	6,170	3,270	2,420
8	785	532	545	524	1,730	1,620	7,660	10,000	7,190	7,190	3,270	2,420
9	750	532	539	519	1,970	1,680	7,660	10,400	7,980	7,660	3,180	2,420
10	750	455	524	514	1,840	2,000	7,980	10,000	8,300	6,890	3,180	2,420
11	750	480	529	514	1,760	2,740	8,960	10,000	8,300	5,760	3,090	2,350
12	750	505	529	594	1,760	5,110	8,630	10,000	8,300	5,620	2,580	2,350
13	750	532	550	657	1,700	5,520	8,300	9,660	8,300	5,490	1,450	2,350
14	750	432	572	657	1,690	5,310	8,300	9,660	8,300	5,110	1,560	2,350
15	750	455	534	663	1,520	5,110	8,630	9,310	8,630	4,740	2,000	2,280
16	750	514	493	720	1,510	5,160	8,630	9,310	8,630	4,400	2,350	2,130
17	750	519	514	745	1,740	5,310	8,630	9,310	8,960	4,400	2,500	2,130
18	895	529	508	778	2,060	5,490	8,960	7,660	11,500	4,290	2,500	2,060
19	785	561	508	785	2,130	5,670	8,300	6,600	14,600	3,550	2,500	2,000
20	785	572	519	764	2,130	6,140	7,980	7,190	12,200	3,550	2,500	1,930
21	785	577	539	732	1,860	5,490	7,980	7,500	8,960	3,860	2,500	1,680
22	785	588	583	812	1,680	3,000	7,980	7,980	8,960	4,180	2,420	1,680
23	820	588	634	846	1,800	7,660	7,980	8,300	8,960	3,960	2,420	1,680
24	685	588	599	880	1,800	5,890	7,980	8,300	7,660	3,960	2,420	1,740
25	685	524	599	913	2,000	3,960	8,300	7,980	7,660	3,860	2,420	1,680
26	718	469	594	898	2,000	3,960	8,630	7,040	7,190	3,860	2,350	1,620
27	718	473	566	884	2,130	4,070	8,960	5,890	6,600	3,860	2,350	1,680
28	718	464	514	847	2,130	4,980	8,960	5,110	7,040	3,750	2,280	1,680
29	718	478	493	840	2,060	5,760	8,960	4,740	8,300	3,750	2,350	1,680
30	718	498	498	840	.....	5,490	8,960	4,740	8,300	3,650	2,350	1,560
31	652	.....	486	840	.....	5,360	.....	4,860	.....	3,650	2,420	.....

NOTE.—Stage-discharge relation affected by ice Jan. 16 and 17; discharge estimated.

Monthly discharge of Boise River below Moore Creek, near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,060	652	773	47,500
November	588	432	509	30,300
December	634	486	539	33,100
January	913	473	691	42,500
February	2,130	812	1,650	94,900
March	7,660	1,620	4,040	248,000
April	8,960	5,620	8,070	480,000
May	10,400	4,740	8,300	510,000
June	14,600	4,980	8,080	481,000
July	7,980	3,550	5,120	315,000
August	3,460	1,450	2,650	163,000
September	2,420	1,560	2,090	124,000
The year	14,600	432	3,540	2,570,000

COTTONWOOD CREEK NEAR ARROWROCK, IDAHO.

LOCATION.—In sec. 35, T. 4 N., R. 5 E., Boise County, 200 feet above bridge where Twin Springs-Arrowrock road crosses the creek and one-fourth mile north of south boundary of Boise National Forest, 1½ miles above mouth of creek and about 13 miles from Arrowrock by road.

DRAINAGE AREA.—23 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 7, 1914, to September 30, 1916.

GAGE.—Vertical staff, reading from 0.0 to 3.0 feet, spiked to large cottonwood tree on left bank. From May 19 to July 4, 1916, readings were made on temporary vertical staff about 6 feet downstream, set to approximately the same datum. Vertical staff gage installed in stilling well just below original gage September 29, 1916, and at same datum. Gage read by Mrs. Eldora Hedrick.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; rough. One channel at all stages. A reinforced concrete artificial control was constructed about 15 feet below gage October 24, 1915.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.15 feet at 6 p. m. April 27 (discharge, 134 second-feet); minimum stage recorded, 0.79 foot morning and evening September 24 (discharge, 1.4 second-feet).

1914–1916: Maximum stage recorded April 27, 1916; minimum stage recorded, 0.03 foot August 12–15, 1915 (discharge, 0.4 second-foot).

ICE.—Observations discontinued during winter months. Stage-discharge relation not affected by ice during period of record.

DIVERSIONS.—No diversions of consequence made above the gage. One small ranch diversion made at a brush dam about 250 feet below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curves well defined. Artificial control was undermined July 5–19, and estimates have been made covering this period. Gage read to quarter-tenths twice daily during high stages; to hundredths at other times. Rough water at high and medium stages render accurate gage reading difficult; stilling well installed September 29. Daily discharge obtained by applying mean daily gage height to rating tables. Records good.

Discharge measurements of Cottonwood Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 24	A. W. Harrington	0.81	1.9	June 20	A. W. Harrington	[a] 1.52	32.4
25	do	.82	2.1	29	do	[a] 1.24	15.9
Jan. 12	do	.96	4.0	July 10	do	[a] .86	8.4
Apr. 12	do	2.08	119	20	do	1.01	5.9
21	do	1.82	70.4	21	do	1.01	5.8
28	A. C. Price	2.00	89.1	28	do	.95	4.1
29	A. W. Harrington	1.88	86.2	Aug. 5	do	.87	2.7
May 2	do	1.85	79.0	12	do	.84	2.2
6	do	1.92	83.8	19	do	.93	4.0
15	A. C. Price	[a] 1.66	44.3	25	do	.85	2.4
15	Harrington and Baldwin	[a] 1.67	42.9	Sept. 2	do	.81	1.6
20	A. W. Harrington	[a] 1.72	46.2	9	do	.84	2.1
30	do	[a] 1.61	39.5	18	do	.82	1.9
June 10	do	[a] 1.59	38.2	24	do	.79	1.4
					do		

[a] Reading on auxiliary staff gage installed May 15, 1916.

NOTE.—A. C. Price is an employee of the United States Reclamation Service.

Daily discharge, in second-feet, of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.8	13	62	89	39	14	3.2	1.8
2	1.8	13	77	82	40	17	2.5	1.8
3	1.8	13	72	85	40	18	2.7	1.8
4	1.8	11	77	85	40	16	2.7	1.8
5	2.0	18	77	89	42	.....	2.9	1.8
6	2.1	16	82	94	42	.....	2.5	2.0
7	2.1	13	85	89	43	.....	2.7	1.8
8	1.8	18	99	79	42	.....	2.5	1.8
9	1.8	33	106	69	43	.....	2.7	2.0
10	.....	33	112	69	40	8.4	2.5	2.2
11	.....	35	119	71	36	.....	2.2	2.2
12	.....	38	117	69	33	.....	2.2	2.2
13	.....	38	99	63	33	.....	2.2	2.0
14	.....	38	94	53	33	.....	2.2	2.2
15	.....	49	99	43	29	.....	2.2	2.2
16	.....	49	89	43	26	.....	2.2	2.2
17	.....	49	89	43	24	.....	3.7	2.0
18	.....	62	75	58	24	.....	4.8	1.7
19	.....	62	66	53	30	.....	3.7	1.5
20	.....	66	68	50	31	5.9	3.2	1.5
21	.....	77	69	48	27	5.5	2.9	1.8
22	.....	94	72	40	25	5.5	2.9	1.8
23	.....	94	77	38	23	5.5	2.5	1.5
24	1.9	72	101	42	22	5.5	2.4	1.4
25	2.1	69	101	46	20	5.5	2.4	1.5
26	.....	43	107	42	19	5.5	2.2	1.5
27	.....	49	123	38	18	5.5	2.2	1.5
28	.....	53	121	40	17	4.8	2.2	1.8
29	.....	58	92	40	16	4.6	2.2	2.2
30	.....	58	92	39	15	4.6	2.2	2.2
31	.....	58	.....	39	.....	3.7	2.2	.....

NOTE.—No gage-height record Oct. 10–23 or 26–31; mean discharge estimated as follows: Oct. 10–23, 1.8 second-feet; Oct. 26–31, 2.0 second-feet. Water leaking under artificial control July 5–19; mean discharge estimated at 12 second-feet, July 5–9, and at 7.0 second-feet July 11–19. No gage-height record Nov. 1 to Feb. 29.

Monthly discharge of Cottonwood Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 23 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	.....	.....	1.88	0.817	0.94	116
March	94	11	44.9	1.95	2.25	2,760
April	123	62	90.6	3.94	4.40	5,390
May	94	38	59.0	2.57	2.96	3,630
June	43	15	30.4	1.32	1.47	1,810
July	18	3.7	8.34	.363	.42	513
August	4.8	2.2	2.64	.115	.13	162
September	2.2	1.4	1.86	.081	.09	111

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 the flow line of the 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 was formerly designated "South Fork of Boise River near Prairie, Idaho."

DRAINAGE AREA.—1,090 square miles (measured on topographic maps).

RECORDS AVAILABLE.—March 24, 1911, to September 30, 1916.

GAGE.—Friez water-stage recorder on right bank; installed April 11, 1915, at same datum, but about 25 feet below original inclined gage. Records from March 24, 1911, to April 10, 1915, refer to the inclined gage; R. S. Sandlin, observer.

DISCHARGE MEASUREMENTS.—Made from a cable about 100 feet upstream from the gage, or by wading at a section about 150 feet below the gage.

CHANNEL AND CONTROL.—Bed consists of mud and gravel. Control coarse gravel and rock, practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—1911-1916: Maximum stage recorded during year, 8.68 feet at 11 a. m. May 7, 1916 (discharge, 7,530 second-feet); minimum stage recorded, 1.94 feet at 1 p. m. December 16, 1915 (discharge, 197 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice, estimates of flow usually necessary for short periods only.

DIVERSIONS.—No diversions of importance made above the gage and none below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve used October 1 to November 14, based on measurements made in 1915 and well defined for stages recorded; curve used after November 14 based on 18 measurements made during 1916 and well defined for stages up to 6,500 second-feet. Operation of water-stage recorder satisfactory throughout the year. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting recorder graph. Winter records good; those for rest of year excellent.

COOPERATION.—Occasional discharge measurements made by employees of United States Reclamation Service.

Discharge measurements of South Fork of Boise River near Lenox, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 22	A. W. Harrington	2.29	284	June 27	A. W. Harrington	6.34	3,420
Jan. 15	do	2.41	310	July 13	do	5.02	1,890
Apr. 13	do	6.47	3,710	14	do	4.82	1,740
25	do	7.15	4,820	23	do	3.85	1,030
May 5	do	8.05	6,360	30	do	3.42	761
17	A. C. Price[a]	5.72	2,530	Aug. 8	do	3.03	535
17	Baldwin and Harrington	5.71	2,630	23	do	2.81	452
June 2	A. W. Harrington	5.78	2,810	Sept. 7	do	2.61	378
13	do	6.62	3,940	8	do	2.59	367
				25	do	2.49	328

[a] Employee 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, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	292	281	337	.....	340	427	1,560	4,150	2,750	2,690	680	400
2	286	286	337	.....	357	415	1,730	4,310	2,690	3,000	665	389
3	286	292	354	.....	374	407	1,950	4,640	2,810	3,000	634	378
4	295	292	385	.....	340	404	2,190	5,510	3,260	2,570	619	385
5	298	289	423	.....	367	439	2,300	6,240	3,840	2,400	610	392
6	295	289	371	.....	350	423	2,300	6,620	4,150	2,520	605	385
7	295	286	343	.....	439	396	2,350	7,180	4,150	2,570	585	381
8	295	284	334	324	443	415	2,570	6,430	4,310	2,520	566	378
9	292	292	318	328	381	485	2,750	5,880	4,640	2,570	552	374
10	289	295	303	324	392	665	3,260	4,990	4,810	2,350	547	404
11	289	278	281	318	439	826	3,990	4,310	4,480	2,140	529	415
12	292	289	287	357	400	916	4,150	3,690	4,150	2,000	516	411
13	295	281	303	354	364	1,050	3,840	3,260	3,840	1,900	498	400
14	301	232	357	354	360	1,050	3,840	2,940	3,990	1,770	489	385
15	298	281	298	315	360	980	3,990	2,750	4,310	1,650	476	381
16	298	374	231	.....	381	980	3,990	2,630	4,810	1,560	476	371
17	298	315	271	.....	400	1,150	3,840	2,630	5,160	1,600	480	364
18	298	303	318	.....	385	1,370	3,990	2,870	5,510	1,440	524	354
19	298	315	263	.....	423	1,480	3,400	3,540	5,880	1,330	524	347
20	298	334	315	.....	419	1,730	2,870	3,540	5,160	1,220	502	347
21	295	350	411	493	423	1,770	2,940	3,690	3,990	1,150	485	347
22	292	324	468	634	427	1,650	3,130	3,690	3,400	1,080	472	343
23	284	318	464	480	459	1,480	3,260	3,400	2,940	1,010	451	340
24	281	318	357	404	464	1,290	3,840	3,130	2,750	980	427	340
25	281	301	301	389	464	1,220	4,640	3,000	2,870	916	415	340
26	284	287	312	.....	455	1,150	5,510	2,750	3,130	916	407	340
27	284	306	298	.....	472	1,150	6,240	2,570	3,400	855	400	340
28	284	271	318	.....	476	1,370	5,880	2,460	3,690	826	396	340
29	281	306	312	306	443	1,410	4,990	2,520	3,540	790	392	340
30	281	381	.....	331	.....	1,410	4,310	2,570	3,000	745	443	343
31	281	.....	.....	337	.....	1,440	.....	2,690	.....	707	423	.....

NOTE.—Discharge interpolated Nov. 2. Mean discharge estimated, because of ice, from weather records and observer's notes, as follows: Dec. 30 to Jan. 7, 300 second-feet; Jan. 16–20 and 26–28, 320 second-feet.

Monthly discharge of South Fork of Boise River near Lenox, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	301	281	291	0.267	0.31	17,900
November	381	232	302	.277	.31	18,000
December	468	231	331	.304	.35	20,400
January	634	.....	345	.317	.37	21,200
February	476	340	407	.373	.40	23,400
March	1,770	396	1,010	.927	1.07	62,100
April	6,240	1,560	3,520	3.23	3.60	209,000
May	7,180	2,460	3,890	3.57	4.12	239,000
June	5,880	2,690	3,910	3.59	4.00	233,000
July	3,000	707	1,700	1.56	1.80	105,000
August	680	392	509	.467	.54	31,300
September	415	340	368	.338	.38	21,900
The year	7,180	231	1,380	1.27	17.25	1,000,000

SMITH CREEK NEAR LENOX, IDAHO.

LOCATION.—In sec. 12, T. 2 N., R. 6 E., at lower crossing, half a mile above mouth and 5 miles northwest of Lenox, Elmore County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1 to September 30, 1916. A few measurements were made by the United States Reclamation Service prior to 1916.

GAGE.—Vertical staff on right bank 40 feet above bridge; read by A. R. Krall.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading at sections above gage.

CHANNEL AND CONTROL.—Bed composed of lava bed-rock and large lava boulders with some sand and gravel. Control practically permanent. One channel except in very high stages, when creek may overflow around right end of bridge. Stream turbulent in spring.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 3.6 feet, April 11 (discharge, 302 second-feet); minimum stage recorded, −0.28 foot August 23 and 30 (discharge, 0.2 second-foot).

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

DIVERSIONS.—Practically entire summer flow of creek diverted for irrigation above the station on Smith Prairie and by Krall's ditch, which heads one-eighth mile above gage. No diversions below gage.

REGULATION.—Artificial regulation to a very slight extent by several small storage reservoirs on headwaters of stream.

ACCURACY.—Stage discharge relation practically permanent. Rating curve well-defined up to 250 second-feet; roughly approximate above. Gage read to quarter-tenths or hundredths (the degree depending on the stage), two or three times per week. Daily discharge obtained by applying available gage heights to rating table and interpolating discharge on intervening days. On account of infrequent gage readings record is considered only fair; poor in August and September.

Discharge measurements of Smith Creek near Lenox, Idaho, during the years ending Sept. 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
May 7	Price and Steward	0.92	30.3	17	Harrington and Baldwin	2.00	90.7
27	A. C. Price	1.15	43.5	June 2	A. W. Harrington	2.03	103
June 15	Price and Steward	.43	9.6	14	do	2.52	146
Nov. 17	Price and Elford	.40	7.6	27	do	2.31	122
1916.				July 14	do	1.37	49.1
Jan. 15	A. W. Harrington	.55	13.6	22	do	.92	27.7
April 14	do	3.14	233	30	do	.47	10.6
26	do	3.21	239	Aug. 8	do	.10	3.0
May 3	do	2.19	109	23	do	−.28	.2
17	A. C. Price	2.00	90.8	Sept. 8	do	−.26	.2
				25	do	−.19	.4

NOTE.—Price, Steward, and Elford were employees of the United States Reclamation Service.

Daily discharge, in second-feet, of Smith Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Day.	Jan.	Feb.	Apr.	May.	June.	July.	Aug.	Sept.
1	23	15	181	168	97	111	4.5	0.2
2	23	15	186	168	98	116	3.0	.2
3	25	14	190	168	108	110	4.2	.2
4	27	13	195	168	118	104	5.3	.2
5	24	13	195	168	129	98	4.7	.2
6	22	24	195	175	139	92	4.2	.2
7	19	35	195	182	149	86	3.6	.2
8	18	32	222	188	143	81	3.0	.2
9	16	28	248	195	138	75	.6	.2
10	15	25	275	170	136	69	.5	.3
11	14	22	302	146	135	63	.4	.3
12	13	23	276	121	134	57	.4	.3
13	12	24	250	111	132	51	.4	.3
14	12	25	224	105	143	48	.4	.3
15	13	26	213	99	156	45	.4	.2
16	13	27	202	93	168	41	.4	.4
17	13	29	192	93	181	38	3.8	.4
18	13	31	181	110	195	35	7.2	.4
19	13	31	168	126	210	33	4.9	.4
20	13	32	156	121	224	31	2.5	.4
21	13	32	143	116	190	29	.2	.4
22	15	32	156	111	155	28	.2	.4
23	17	32	169	106	121	26	.2	.4
24	18	31	182	100	121	25	.2	.4
25	20	31	195	95	121	22	.2	.5
26	20	32	239	89	121	19	.2	.5
27	19	32	232	90	121	16	.2	.5
28	18	32	224	92	116	14	.2	.6
29	17	32	205	93	111	12	.2	.6
30	16	.....	187	94	106	11	.2	.6
31	15	.....	.....	95	.....	6	.2	.....

Monthly discharge of Smith Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January	27	12	17.1	1,050
February	35	13	26.6	1,530
April	302	143	206	12,300
May	195	89	128	7,870
June	224	97	141	8,390
July	116	6	51.4	3,160
August	7.2	.2	1.83	113
September	.6	.2	.347	20.6

LONG GULCH CREEK NEAR LENOX, IDAHO.

LOCATION.—In sec. 2, T. 2 N., R. 6 E., at lower crossing, one-eighth mile above mouth and 8 miles northwest of Lenox, Elmore County.

DRAINAGE AREA.—Not measured.

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

GAGE.—Vertical staff on right bank between the bridge and the ford; read by A. R. Krall.

DISCHARGE MEASUREMENTS.—Made by wading near the gage.

CHANNEL AND CONTROL.—Bed consists of lava rocks and sand. Control fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 1.65 feet April 1 and 4 (discharge, 34 second-feet); minimum stage recorded, —0.10 foot July 31 and August 2, 4, and 11 (discharge, 0.10 second-foot).

ICE.—Stage-discharge relation not affected by ice during period of record; open water rating curve used.

DIVERSIONS.—Practically entire flow of stream diverted during irrigation season by ranches above station. Flow of stream intercepted just below gage by Krall's ditch. No water therefore reaches South Fork of Boise River from Long Gulch Creek during most of summer.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined below 25 second-feet, roughly approximate above. Open-water rating curve applicable throughout period of record. Gage read to hundredths two or three times a week. Daily discharge obtained by applying gage height to rating table and interpolating for discharge on intervening days. On account of infrequent gage readings, record considered fair only in April, May, and June and poor during rest of period.

Discharge measurements of Long Gulch Creek near Lenox, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 17	C. F. Elford	0.09	1.1	June 2	A. W. Harrington	0.40	3.2
Jan. 14	A. W. Harrington	.09	2.2	14	do	.24	1.2
Apr. 14	do	1.47	26.7	27	do	.19	1.6
25	do	.96	12.3	July 14	do	.09	.8
May 4	do	.68	6.9	23	do	.00	.4
13	do	.48	4.5	Aug. 8	do	—.06	.2
17	A. C. Price	.52	5.0	23	do	.00	.4
17	Harrington and Baldwin	.51	4.9	Sept. 8	do	—.03	.3

NOTE.—Elford and Price were employees of the United States Reclamation Service.

Daily discharge, in second-feet, of Long Gulch Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Day.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1	2.6	34	8.9	3.5	1.8	0.1	0.2
2	2.6	34	8.2	3.3	2.5	.1	.2
3	2.8	34	7.6	3.0	.....	.1	.2
4	2.9	34	7.0	2.7	.....	.1	.2
5	2.7	31	7.0	2.4	.....	.1	.2
6	2.5	27	7.0	2.1	.....	.2	.2
7	2.3	24	6.9	1.8	.....	.2	.2
8	2.3	26	6.8	2.0	.....	.2	.3
9	2.4	28	6.7	1.4	.....	.1	.3
10	2.4	30	6.5	1.4	.....	.1	.4
11	2.5	32	6.3	1.4	.....	.1	.4
12	2.6	30	6.1	1.5	.....	.1	.4
13	2.7	28	4.3	1.5	.6	.1	.4
14	2.2	26	4.6	1.8	.8	.1	.4
15	2.2	24	4.9	1.4	.8	.1	.3
16	2.2	23	5.2	1.1	.8	.2	.2
17	2.2	22	4.8	1.3	.8	.4	.2
18	2.2	20	4.9	1.6	.6	.5	.2
19	2.2	18	5.0	1.8	.5	.4	.2
20	2.2	16	4.7	2.0	.4	.4	.2
21	2.2	14	4.5	2.0	.2	.3	.2
22	3.2	14	4.3	2.0	.3	.4	.2
23	4.2	13	4.1	1.8	.4	.4	.2
24	5.2	12	4.3	1.7	.2	.4	.2
25	6.1	12	4.6	1.5	.2	.3	.3
26	5.5	12	4.9	1.4	.2	.3	.3
27	4.9	12	4.7	1.4	.2	.2	.3
28	4.3	11	4.4	1.3	.2	.2	.3
29	4.3	10	4.2	1.3	.2	.2	.3
30	4.4	9.6	3.9	1.2	.1	.2	.3
31	4.4	.....	3.7	.....	.1	.2	.....

NOTE.—Mean discharge July 3-12, 1.5 second-feet.

Monthly discharge of Long Gulch Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
January	6.1	2.2	3.14	193
April	34	9.6	22.0	1,310
May	8.9	3.7	5.52	339
June	3.5	1.1	1.82	108
July	2.5	.1	.858	53.4
August	.5	.1	.219	13.5
September	.4	.2	.263	15.6

RATTLESNAKE CREEK NEAR LENOX, IDAHO.

LOCATION.—In secs. 27 and 28, T. 3 N., R. 6 E., Elmore County, half a mile above mouth of creek, 13 miles (by water) southeast of Arrowrock and 13 miles (by wagon road) northwest of Lenox.

DRAINAGE AREA. 46 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1915, to September 30, 1916. Several discharge measurements were made by engineers of the United States Reclamation Service during summer and fall of 1915.

GAGE.—Prior to June 29, 1916, a vertical staff attached to downstream corner of right abutment of bridge one-fourth mile above mouth; since June 29, a vertical staff, on left bank about 300 feet farther upstream, and above the influence of backwater. Gage read jointly by A. R. Krall and S. F. Kesl.

DISCHARGE MEASUREMENTS.—Made by wading at all but extremely high stages, when measurements may be made from highway bridge, though conditions are unfavorable.

CHANNEL AND CONTROL.—Control for both gages composed of small boulders, coarse gravel, and sand. Since the recession of backwater from the old gage, the control has been so changed by deposits of sand as to render records from this gage valueless. Control for upper gage probably fairly permanent. Channel of stream winding, banks fairly high and brushy, and stream turbulent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.9 feet Mar. 21 (discharge, 182 second-feet); minimum stage recorded, 0.83 foot October 3 and 5, and November 13 (discharge, 7.7 second-feet).

ICE.—Stage-discharge relation seriously affected December 21 to January 1; flow estimated from observer's notes and weather records. Small, practically constant ice effect probably extended throughout January.

DIVERSIONS.—Kesl's ditch diverts from right side of creek about 3 miles above gage, but the average amount of water diverted during the 1916 season probably did not exceed 1 second-foot. A few other small diversions are made from tributaries farther upstream.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent for both gages. Rating curve fairly well defined; slight shift to parallel curve indicated by measurement made in January, probably due to ice. Gage read at rather irregular intervals, averaging about three times a week; during high stages read to half-tenths only as rough water renders reading very difficult; low-stage readings made to hundredths. Daily discharge ascertained by applying gage height to rating table and interpolating for days on which gage was not read. Records poor December to March because of meager data; good for rest of year.

Discharge measurements of Rattlesnake Creek near Lenox, Idaho, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
May 7	Price and Steward	1.13	26.8	May 18	A. C. Price	1.60	65.4
27	A. C. Price	1.40	46.8	18	Harrington and Baldwin	1.59	64.3
June 16	Price and Steward	1.15	24.0	26	A. W. Harrington	1.49	51.7
July 2	C. F. Elford	.99	14.1	June 2	do	1.53	59.7
16	Harrington and Price	.95	13.7	14	do	1.58	59.8
30	A. C. Price	.88	10.0	26	do	1.54	55.9
Aug. 13	C. F. Elford	.85	8.0	July 9	do	1.61	44.2
Nov. 17	Price and Elford	.98	15.9	14	do	1.53	35.2
1916.				23	do	1.45	26.4
Jan. 14	A. W. Harrington	1.08	14.4	29	do	1.38	22.6
Apr. 14	do	2.28	132	Aug. 8	do	1.33	18.9
26	do	2.18	114	22	do	1.26	15.0
May 5	do	2.15	112	Sept. 8	do	1.21	11.2
12	do	1.61	65.5	24	do	1.20	10.7

NOTE.—Beginning July 9, 1916, gage heights refer to staff gage 300 feet upstream from original gage. Price, Steward, and Elford were employees of United States Reclamation Service.

Daily discharge, in second-feet, of Rattlesnake Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	8.2	11.0	18.0	.....	26	60	137	112	60	56	20	13
2	8.2	11.0	19.0	20	28	60	137	110	60	59	19	13
3	7.7	13.0	20.0	23	29	60	137	113	64	67	20	13
4	7.7	12.0	27.0	26	33	60	137	116	67	60	20	13
5	7.7	13.0	34.0	24	37	60	137	119	70	54	19	12
6	8.6	14.0	26.0	22	41	60	137	117	74	53	19	12
7	8.4	14.0	19.0	20	45	60	137	114	83	53	19	12
8	8.2	14.0	22.0	18	49	65	132	112	83	52	19	12
9	8.6	12.0	25.0	16	53	98	128	110	78	46	18	15
10	9.1	12.0	28.0	14	53	131	137	98	76	48	18	14
11	8.6	11.0	32.0	15	53	164	146	86	74	50	17	13
12	8.8	8.6	24.0	15	53	173	140	74	74	45	17	13
13	9.1	7.7	16.0	16	52	174	134	56	65	41	17	13
14	8.8	12.0	8.6	15	52	175	128	59	65	36	17	12
15	8.6	16.0	15.0	13	52	176	128	62	74	35	16	12
16	8.8	16.0	17.0	14	56	177	122	65	74	35	15	12
17	9.1	15.0	20.0	15	60	178	116	60	75	34	18	12
18	9.6	15.0	22.0	16	65	179	110	65	76	32	21	12
19	9.6	15.0	25.0	16	65	180	114	65	77	31	19	12
20	9.6	16.0	27.0	15	65	181	119	74	78	29	18	12
21	9.8	16.0	.....	15	65	182	92	71	72	28	16	12
22	10.0	16.0	.....	24	65	170	99	68	65	28	15	11
23	10.0	17.0	.....	34	62	157	106	65	65	28	15	11
24	11.0	17.0	.....	38	60	144	112	62	78	25	14	11
25	10.0	17.0	.....	70	60	132	119	59	69	24	13	10
26	10.0	17.0	.....	64	60	119	119	56	60	24	13	10
27	11.0	18.0	.....	58	60	122	119	58	60	24	14	10
28	10.0	17.0	.....	52	60	125	119	60	60	25	14	10
29	11.0	16.0	.....	45	60	128	117	60	61	22	13	11
30	12.0	17.0	.....	39	.....	131	114	60	52	22	12	11
31	12.0	.....	.....	32	.....	134	.....	60	.....	21	13	.....

NOTE.—Mean discharge Dec. 21 to Jan. 1 estimated on account of ice at 20 second-feet.

Monthly discharge of Rattlesnake Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 46 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	12	7.7	9.35	0.203	0.23	575
November	18	7.7	14.2	.309	.34	845
December	34	8.6	21.4	.465	.54	1,320
January	70	13	26.6	.578	.67	1,640
February	65	26	52.4	1.14	1.23	3,010
March	182	60	130	2.83	3.26	7,990
April	146	92	124	2.70	3.01	7,380
May	119	56	79.5	1.73	1.99	4,890
June	83	52	69.6	1.51	1.68	4,140
July	67	21	38.3	.833	.96	2,360
August	21	12	16.7	.363	.42	1,030
September	15	10	12.0	.261	.29	714
The year	182	7.7	49.4	1.07	14.62	35,900

WILLOW CREEK NEAR LENOX, IDAHO.

LOCATION.—In sec. 1, T. 2 N., R. 5 E., 100 feet above extreme backwater from Arrowrock dam, three-eighths of a mile above mouth of creek, and 17 miles northwest of Lenox, Elmore County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 1 to September 30, 1916. A few discharge measurements were made by employees of United States Reclamation Service during the summer and fall of 1915.

GAGE.—Graduations to feet and tenths chiseled on sloping face of granite boulder on right bank. From November 19, 1915, to May 16, 1916, gage was 250 feet below, and consisted of graduations chiseled on two large lava rocks. No relation between the two gages. Gage read by S. F. Kesl.

DISCHARGE MEASUREMENTS.—At low and medium stages made by wading; no equipment for high-stage measurements.

CHANNEL AND CONTROL.—Bed composed of large boulders and rocks, with cobbles and sand; very rough. Rocks in control probably permanent, but stage-discharge relation may be affected by scour or deposition of sand. Banks high; one channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.40 feet April 2 (discharge, 194 second-feet); a gage height of 3.00 feet recorded March 18, not very dependable; minimum stage recorded, 0.26 foot August 7 (discharge, 1.5 second-feet).

ICE.—No information.

DIVERSIONS.—Many diversions made for irrigation from Willow Creek and Wood Creek above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curves well defined up to 80 second-feet; roughly approximate above. Gage read to hundredths about twice a week. Daily discharge ascertained by applying gage height to rating table and interpolating for days on which gage was not read. Records only fair.

Discharge measurements of Willow Creek near Lenox, Idaho, during the years ending Sept. 30, 1915 and 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1915.		*Feet.*	*Sec.-ft.*	1916.		*Feet.*	*Sec.-ft.*
May 26	Price and Steward	0.70	22.0	May 16	A. C. Price	0.89	19.3
June 16	do	.70	5.9	26	A. W. Harrington	.95	23.6
July 3	Price and Elford	.52	2.3	June 1	do	.81	15.1
17	Harrington and Price	.47	2.0	12	do	.69	9.7
31	A. C. Price	.43	2.0	26	do	.70	9.6
Nov. 19	C. F. Elford	.65	8.8	July 9	do	.50	4.8
1916.				14	do	.42	3.2
Apr. 19	A. W. Harrington	1.40	80.4	23	do	.35	2.4
26	do	1.09	46.6	29	do	.34	2.3
May 4	do	.88	32.8	Aug. 7	do	.27	1.6
6	do	.85	29.0	22	do	.38	2.4
12	do	.82	22.5	Sept. 7	do	.34	2.0
16	Baldwin and Harrington	.89	19.4	24	do	.40	2.8

NOTE.—Price, Steward, and Elford were employees of the United States Reclamation Service.
Gage heights prior to Nov. 19, 1915, refer to a staff gage one-fourth mile above the mouth of the creek; Nov. 19, 1915, to May 15, 1916, to gage installed Nov. 19; May 16 to Sept. 30, 1916, to gage installed May 16.

Daily discharge, in second-feet, of Willow Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	194	45	15	11	2.0	1.9	16	124	19	13	4.7	2.2	2.5
2	194	41	15	11	2.1	2.0	17	113	20	15	4.4	2.3	2.5
3	185	37	18	10	2.1	2.0	18	102	21	16	4.1	2.7	2.5
4	176	33	20	10	2.0	2.0	19	91	22	15	3.8	3.1	2.6
5	167	31	18	10	1.8	2.0	20	88	23	15	3.5	3.5	2.6
6	158	29	17	9	1.6	2.0	21	85	24	14	2.9	3.0	2.6
7	150	29	15	8	1.5	2.2	22	81	25	13	2.3	2.6	2.6
8	143	29	14	8	1.6	2.2	23	78	26	12	2.3	2.5	2.7
9	135	26	12	4.5	1.6	2.1	24	70	27	12	2.4	2.5	2.8
10	134	24	11	5	1.7	2.2	25	62	26	11	2.6	2.4	2.9
11	132	23	11	6	1.8	2.2	26	55	24	10	2.6	2.3	3.0
12	131	22	10	6	1.8	2.3	27	53	23	11	2.7	2.2	3.1
13	130	20	7	4.6	1.9	2.4	28	51	22	11	2.7	2.2	3.2
14	128	20	9	3.1	2.0	2.4	29	50	22	12	2.2	2.1	3.3
15	126	20	11	3.9	2.1	2.4	30	48	21	12	1.9	2.0	3.3
							31	.....	18	.....	1.9	1.9	.....

Monthly discharge of Willow Creek near Lenox, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April	194	48	114	6,780
May	45	18	25.5	1,570
June	20	7	13.2	786
July	11	1.9	5.07	312
August	3.5	1.5	2.16	133
September	3.3	1.9	2.48	148
The period	.....	.....	.....	9,730

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, 1916 (discharge measurements only, prior to December 1, 1915).

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.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.3 feet April 11 (discharge, 3,140 second-feet); minimum stage recorded, 1.10 feet September 6 to 9. (Minimum discharge of 46 second-feet occurred December 17 and 18 at a gage height of 1.20 feet.)

1915-16; Maximum stage recorded April 11, 1916; minimum stage recorded 0. 67 foot August 30, 1915 (measured discharge, 17.8 second-feet).

ICE.—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.

ACCURACY.—Stage-discharge relation changed during low stages of December and January and again during the fairly high stages of March and April; both changes of control probably gradual. Rating curves fairly well defined between 1,000 and 2,000 second-feet and well defined below 1,000 second-feet, although time of shifts is somewhat uncertain. Gage read to quarter-tenths three times a week, except during irrigation season, when daily readings were made. On account of rough water, especially at the higher stages, it is difficult to read gage with refinement. Daily discharge obtained by applying gage height to rating table and interpolating for days on which gage was not read. Records December to March, fair; April to September, good.

COOPERATION.—Several discharge measurements made by employees of United States Reclamation Service.

Discharge measurements of Moore Creek near Arrowrock, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 12	Price and Tallman	1.10	49.3	July 3	A. W. Harrington	3.42	648
21	do	1.20	54.7	7	Price and Steward	2.95	398
Nov. 3	Price and Paul	1.27	58.0	7	A. W. Harrington	2.88	385
24	A. C. Price	1.78	120	15	do	2.22	242
Dec. 7	Harrington and Price	1.80	140	18	Paul and Steward	2.15	230
Jan. 10	A. W. Harrington	1.72	103	20	Tallman and Steward	2.05	202
Mar. 12	do	4.30	858	24	A. W. Harrington	1.79	145
21	Price and Steward	5.20	1,820	31	Paul and Steward	1.54	123
27	do	4.20	862	Aug. 2	A. W. Harrington	1.46	87.3
Apr. 4	A. W. Harrington	5.12	1,920	7	Paul and Steward	1.34	82.5
7	do	5.00	1,700	11	A. W. Harrington	1.27	69.0
18	do	5.22	2,000	14	Paul and Steward	1.22	63.4
22	do	4.80	1,550	18	A. W. Harrington	1.70	132
28	do	5.30	2,050	25	Paul and Steward	1.23	71.3
May 10	do	4.30	1,150	28	A. W. Harrington	1.18	57.1
19	do	3.98	918	30	do	1.20	59.8
29	do	3.58	632	Sept. 5	do	1.15	53.4
June 8	do	3.88	871	6	Price and Steward	1.10	57.1
16	do	3.84	832	16	A. W. Harrington	1.20	58.4
21	Price and Steward	3.90	836	27	do	1.15	52.8
24	A. W. Harrington	3.59	661				
30	do	3.24	490				

NOTE.—Price, Paul, and Steward were employees of the United States Reclamation Service; Tallman of the Idaho State engineer.

Daily discharge, in second-feet, of Moore Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	69	140	351	1,570	1,400	680	536	116	58
2	.....	90	140	316	2,060	1,400	680	570	98	51
3	.....	112	137	280	2,060	1,400	680	604	94	51
4	124	104	134	244	1,860	1,460	739	531	87	51
5	130	95	132	278	2,060	1,520	798	458	80	53
6	135	97	158	313	1,910	1,580	798	425	73	49
7	140	99	184	296	1,760	1,490	798	392	76	49
8	136	101	268	278	2,060	1,400	862	364	73	49
9	132	104	351	455	2,060	1,280	862	358	73	49
10	120	108	364	633	2,280	1,150	862	351	73	66
11	107	87	378	811	3,140	1,050	862	338	70	66
12	112	66	392	1,020	2,810	958	862	326	70	66
13	116	64	352	1,180	2,700	862	830	295	66	60
14	121	62	313	1,140	2,600	771	798	264	65	58
15	84	60	301	1,110	2,490	680	798	234	63	54
16	47	57	289	1,120	2,380	680	798	218	63	58
17	46	54	297	1,130	2,170	680	862	203	63	54
18	46	67	305	1,140	1,960	804	1,050	198	132	53
19	64	80	313	1,270	1,860	929	1,230	194	108	53
20	82	80	313	1,400	1,770	737	1,050	194	94	53
21	100	80	313	1,960	1,670	737	862	180	87	53
22	118	80	326	1,680	1,580	737	801	166	84	53
23	115	123	338	1,490	1,670	737	740	158	80	53
24	111	166	338	1,290	1,760	737	680	149	70	53
25	108	175	338	1,100	1,910	718	642	140	65	53
26	115	184	338	1,070	2,060	699	604	132	60	53
27	122	172	351	1,040	2,060	680	604	116	54	53
28	118	160	364	1,250	2,060	680	604	116	56	53
29	113	149	358	1,460	1,960	680	560	116	51	53
30	98	144	.....	1,500	1,680	680	516	116	56	53
31	84	140	.....	1,540	.....	680	.....	116	60	.....

NOTE.—Mean discharge Dec. 1-3 estimated at 75 second-feet.

Monthly discharge of Moore Creek near Arrowrock, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 426 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
December	140	46	102	0.239	0.28	6,270
January	184	54	104	.244	.28	6,400
February	392	132	287	.674	.73	16,500
March	1,960	244	972	2.28	2.63	59,800
April	3,140	1,570	2,070	4.86	5.42	123,000
May	1,580	680	968	2.27	2.62	59,500
June	1,230	516	784	1.84	2.05	46,700
July	604	116	276	.648	.75	17,000
August	132	51	76.1	.179	.21	4,680
September	66	49	54.4	.128	.14	3,240
The period						343,000

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, Malheur County.

DRAINAGE AREA.—About 1,100 square miles.

RECORDS AVAILABLE.—December 9, 1914, to September 30, 1916. 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, 6.55 feet 9 p. m., April 5 (discharge, 3,650 second-feet); minimum stage recorded, 0.82 foot September 4, 5 (discharge, 10 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.

ICE.—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 changed during flood March 21. Two rating curves used, one applicable October 1 to March 21, fairly well defined between 5 and 100 second-feet and well defined 100 to 1,500 second-feet, the other applicable March 22 to September 30, well defined 100 to 1,500 second-feet and fairly well defined above and below. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent April to July, good October to December, February, March, August, and September, and poor for January.

Discharge measurements of Malheur River at Warm Springs reservoir site, near Riverside Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 23	A. W. Harrington	[a] 1.58	66.1	Apr. 27	L. W. Roush	4.08	1,370
Feb. 9	G. C. Baldwin	3.21	810	June 25	G. C. Baldwin	1.66	213
10	do	3.29	840				

[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, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	23	41	68	194	222	890	1,020	306	210	32	15
2	23	43	68	229	201	1,780	940	318	254	28	14
3	23	45	68	494	187	1,780	890	306	274	24	14
4	23	46	72	326	187	1,530	890	278	238	23	11
5	26	48	80	250	318	1,450	890	270	210	21	13
6	26	50	75	1,240	474	1,370	890	278	190	18	18
7	28	50	78	1,670	402	1,260	890	286	174	17	18
8	26	52	78	1,430	382	1,260	865	294	162	16	18
9	26	52	78	865	490	1,370	750	306	158	15	21
10	26	52	.....	965	890	1,530	694	318	150	14	22
11	28	52	.....	1,590	1,280	1,960	646	342	143	14	24
12	26	52	.....	730	1,590	2,410	578	346	130	16	26
13	28	52	.....	458	1,840	1,780	510	326	114	42	28
14	29	52	.....	366	1,750	1,530	462	302	105	23	29
15	29	52	.....	274	1,180	1,530	418	290	100	15	29
16	29	52	.....	278	1,080	1,530	378	286	94	16	27
17	40	55	.....	274	1,350	1,450	354	298	80	16	28
18	32	60	.....	258	1,670	1,370	358	318	80	17	29
19	34	62	.....	250	1,840	1,200	470	338	80	16	29
20	34	62	.....	270	2,800	1,040	530	390	80	15	32
21	35	65	.....	270	3,300	940	478	386	73	15	34
22	35	68	.....	290	1,960	965	434	342	68	17	34
23	35	68	101	326	1,610	1,020	418	286	59	17	34
24	36	65	120	338	1,100	990	406	242	55	16	35
25	38	65	110	362	890	1,100	394	214	50	16	36
26	40	65	83	382	840	1,230	402	210	48	17	38
27	40	68	65	346	940	1,300	390	202	46	17	39
28	41	68	.....	294	1,100	1,370	346	202	42	16	39
29	41	55	.....	240	965	1,370	322	206	41	15	42
30	41	52	.....	.....	818	1,160	306	202	35	14	42
31	41	.....	.....	.....	750	.....	302	.....	35	15	.....

NOTE.—Stage-discharge relation affected by ice Dec. 10–22, Dec. 28 to Jan. 31; discharge estimated Dec. 10–14, 60 second-feet; Dec. 15–22, 45 second-feet; Dec. 28–31, 35 second-feet; Jan. 1–6, 30 second-feet; Jan. 7–12, 60 second-feet; Jan. 13–25, 55 second-feet; Jan. 26–28, 540 second-feet; Jan. 29–31, 145 second-feet. Possibly a slight effect Feb. 1–5, but open-water rating curve has been used. Discharge interpolated Nov. 11–15, Feb. 14, and May 4–6, when recorder was not operating.

Monthly discharge of Malheur River, at Warm Springs reservoir site, near Riverside, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	41	23	31.7	1,950
November	68	41	55.6	3,310
December	120		62.7	3,860
January			107	6,580
February	1,670	194	526	30,300
March	3,300	187	1,110	68,200
April	2,410	890	1,380	82,100
May	1,020	302	568	34,900
June	390	202	290	17,300
July	274	35	115	7,070
August	42	14	18.5	1,140
September	42	11	27.3	1,620
The year	3,300	11	356	258,000

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, 1916.

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, 1915, at gage height 1.88 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.7 feet February 6 (discharge indeterminate because of ice jam); maximum open-water stage recorded, 9.1 feet February 7 (discharge, estimated from extension of rating curve, 8,450 second-feet); minimum stage recorded, 2.5 feet December 30 (discharge, estimated on account of ice effect, 20 second-feet).

1913–1916: Maximum stage recorded in February, 1916; minimum discharge recorded, 15 second-feet August 8–10, 1914 (gage height, 2.40 feet).

ICE.—Stage-discharge relation seriously affected by ice; winter 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 practically permanent except as affected by ice. Rating curve well defined between 15 and 4,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Open-water records excellent.

Discharge measurements of Malheur River near Namorf, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Set.-ft.*
Jan. 24	A. W. Harrington	[a] 4.01	469	Apr. 28	L. W. Roush	5.20	2,120
Feb. 11	G. C. Baldwin	6.25	3,740	June 26	G. C. Baldwin	3.53	428

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	119	151	.....	.....	543	1,520	1,760	580	415	63	50
2	57	116	191	.....	.....	446	2,150	1,640	580	476	63	53
3	57	116	191	.....	.....	387	2,710	1,520	543	510	63	53
4	57	116	178	.....	.....	404	2,430	1,520	510	510	53	53
5	63	125	178	.....	.....	476	2,430	1,580	510	446	40	57
6	69	125	178	.....	.....	698	2,150	1,640	543	404	40	53
7	63	125	178	.....	6,580	698	2,150	1,640	543	359	45	53
8	63	125	178	.....	4,890	617	2,150	1,640	580	349	45	53
9	69	125	178	.....	2,430	786	2,150	1,520	617	307	45	53
10	69	132	170	.....	2,860	1,520	2,290	1,300	617	297	45	53
11	69	132	170	.....	4,250	2,430	2,710	1,190	698	282	50	53
12	73	125	151	.....	2,290	2,570	3,460	1,080	658	268	53	53
13	73	132	.....	.....	1,140	2,860	2,860	980	698	268	53	53
14	73	125	.....	.....	742	2,860	2,430	880	580	212	53	63
15	78	106	.....	.....	698	2,570	2,430	786	580	191	73	73
16	86	132	.....	.....	617	2,290	2,430	786	580	191	86	73
17	94	140	.....	.....	658	2,020	2,290	617	617	170	69	63
18	94	162	.....	.....	617	2,430	2,290	617	617	170	53	53
19	99	162	.....	.....	617	3,010	2,150	698	698	170	63	53
20	94	162	.....	.....	698	3,610	1,890	880	786	151	63	53
21	99	170	.....	.....	698	4,410	1,640	880	880	132	63	53
22	99	170	.....	.....	698	3,770	1,640	880	698	125	63	53
23	99	170	.....	.....	742	2,570	1,640	786	617	116	53	57
24	99	170	.....	.....	786	2,020	1,760	698	543	106	53	57
25	99	170	.....	.....	880	1,640	1,640	658	476	99	53	57
26	106	170	.....	880	880	1,410	1,890	786	446	94	53	57
27	99	162	.....	.....	786	1,520	2,020	698	415	94	53	69
28	106	204	.....	.....	742	1,830	2,150	658	446	86	53	73
29	106	132	.....	.....	698	1,640	2,020	617	415	78	53	73
30	116	212	.....	.....	.....	1,580	1,890	580	415	78	53	73
31	116	.....	.....	.....	.....	1,410	.....	617	.....	73	53	.....

NOTE.—Stage-discharge relation affected by ice Dec. 13 to Feb. 6 except Jan. 26; discharge estimated 129 second-feet Dec. 13–31; 179 second-feet Jan. 1–25; 306 second-feet Jan. 27–31, and 523 second-feet Feb. 1–6.

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Monthly discharge of Malheur River near Namorf, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	116	53	83.8	5,150
November	212	106	144	8,570
December	.....	.....	147	9,040
January	.....	.....	222	13,600
February	6,580	.....	1,350	77,600
March	4,410	387	1,840	113,000
April	3,460	1,520	2,180	130,000
May	1,760	580	1,040	64,000
June	880	415	583	34,700
July	510	73	233	14,300
August	86	40	55.5	3,410
September	73	50	58.1	3,460
The year	6,580	.....	656	477,000

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, 1916. 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 by 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, 4.2 feet at noon March 13 (discharge, 1,200 second-feet); minimum stage recorded, 0.72 foot August 2–5 (discharge, 1.8 second-feet).

1903–16: Maximum stage recorded, 8.6 feet March 1, 1910 (discharge estimated from extension of partly developed rating curve at 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, discharge at gage during this and other periods probably zero.

ICE.—Stage-discharge relation seriously affected by ice. Winter flow 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 subject to frequent changes due to changes in control, growth or decay of vegetation, and ice. Insufficient number of measurements to define all changes satisfactorily so that individual records of daily discharge may be subject to large errors at times. Gage read once daily to quarter-tenths. Numerous parallel rating carves used applicable for short periods, full weight being given to each discharge measurement. Daily discharge ascertained by applying daily gage height to rating table except March 21–25, April 30 to June 13, June 28 to August 25, when the shifting control method was used. Records fair February to April and poor for rest of year.

Discharge measurements of Bully Creek at Warm Springs, near Vale, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Jan. 20	A. W. Harrington	0.91	2.8	June 27	G. C. Baldwin	0.80	4.5
Feb. 17	G. C. Baldwin	1.74	122	Aug. 26	do	.78	2.6
Apr. 29	L. W. Rousch	1.57	76.2				

Daily discharge, in second-feet, of Bully Creek at Warm Springs, near Vale, Oreg., for the year ending Sept. 30, 1916.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		3.0	135	275	74	25	6.3	2.4	3.0
2		3.0	114	342	74	23	7.6	1.8	3.0
3		3.0	95	325	74	22	7.6	1.8	3.0
4		3.0	95	325	74	22	8.8	1.8	3.0
5		3.0	238	308	69	17	15	1.8	3.0
6		3.0	269	275	69	15	17	2.2	3.0
7		5.4	238	259	69	14	17	2.2	3.0
8		1,080	184	244	69	12	17	2.2	3.0
9		632	372	244	66	10	15	2.2	3.0
10		318	493	244	66	10	14	2.2	3.0
11		538	960	308	65	7.6	12	2.2	3.0
12		372	960	275	65	6.2	12	2.2	3.0
13		238	1,200	275	65	5.0	10	2.8	3.0
14		159	960	230	60	4.6	8.8	2.8	3.0
15		159	845	230	60	4.6	8.8	2.8	3.0
16		135	657	176	56	4.6	8.8	2.8	3.0
17		124	845	164	53	4.6	11	2.8	3.0
18		131	960	144	51	6.6	13	2.8	3.0
19		159	960	129	47	9.4	13	2.8	3.0
20	2.8	184	1,020	108	47	5.4	11	2.8	3.0
21	3.0	178	954	89	44	4.6	8.2	3.4	3.0
22	3.0	210	746	80	44	4.6	7.0	3.4	3.8
23	3.0	210	613	77	42	4.6	4.6	3.4	3.8
24	3.0	238	493	77	42	4.6	3.8	3.4	5.0
25	8.8	269	402	77	40	3.8	3.8	3.4	5.0
26	5.4	238	342	77	34	3.8	3.8	2.6	5.0
27	4.2	210	342	77	34	4.6	3.0	3.0	5.0
28	3.0	184	342	77	32	4.2	3.0	3.0	5.0
29	3.0	147	325	76	30	4.2	2.4	3.0	5.0
30	3.0	.....	291	74	27	5.0	2.4	3.0	5.0
31	3.0	.....	275	.....	27	.....	2.4	3.0	.....

NOTE.—Discharge estimated at 4 second-feet Oct. 1 to Dec. 31, when gates at Bully Creek dam above were closed and flow remained practically constant, and at 3 second-feet Jan. 1–19, when stage-discharge relation was affected by ice.

Monthly discharge of Bully Creek at Warm Springs, near Vale, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maxium.	Minimum.	Mean.	
October	.....	.....	4	246
November	.....	.....	4	238
December	.....	.....	4	246
January	8.8	.....	3.30	203
February	1,080	3.0	212	12,200
March	1,200	95	540	33,200
April	342	74	189	11,200
May	74	27	53.8	3,310
June	25	3.8	9.09	541
July	17	2.4	8.97	552
August	3.4	1.8	2.65	163
September	5.0	3.0	3.52	209
The year	1,200	.....	85.8	62.300

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, 1916, 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 & Lawrence water-stage recorder on right bank about 200 feet above the railroad crossing; inclined staff on right bank at former site. S. H. McAlister, 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.—1906–1916: Maximum stage recorded, 9.45 feet (from water-stage recorder) at 6 a. m. June 20, 1916 (discharge, 19,600 second-feet); minimum stage, 0.8 foot November 13, 14, 1915 (discharge, 630 second-feet).

ICE.—Stage-discharge relation seriously affected by ice; no record obtained during winter of 1915–16.

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.—Stage-discharge relation permanent during period of record. Rating curve well defined. Operation of water-stage recorder not entirely satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

Discharge measurements of Payette River near Horseshoe Bend, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec-ft.*
Feb. 19	A. W. Harrington	1.89	1,550
May 12	G. C. Baldwin	6.14	10,200
Sept. 20	L. W. Roush	1.47	1,090

Daily discharge, in second-feet, of Payette River near Horseshoe Bend, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	814	789	869	.....	.....	4,160	10,800	8,220	12,100	3,110	1,360
2	821	801	808	.....	.....	4,790	11,000	8,470	12,400	2,760	1,340
3	808	795	898	.....	.....	5,470	11,600	8,720	12,600	2,600	1,320
4	848	789	1,020	.....	.....	6,160	12,600	9,480	12,400	2,520	1,300
5	835	795	1,120	.....	1,440	6,050	14,000	10,500	12,100	2,450	1,270
6	821	795	1,100	.....	1,440	5,930	14,600	11,300	11,800	2,300	1,240
7	814	795	1,130	.....	1,380	6,050	15,400	11,800	11,800	2,220	1,220
8	814	789	1,120	.....	1,390	6,760	15,400	12,600	11,800	2,150	1,190
9	814	808	1,070	.....	1,500	7,000	14,000	13,200	11,800	2,080	1,180
10	814	801	1,040	.....	1,700	7,480	12,600	14,300	11,600	2,010	1,260
11	814	770	974	.....	2,150	9,220	11,600	14,300	11,000	1,950	1,240
12	821	782	906	.....	2,520	10,300	10,500	13,700	10,500	1,880	1,230
13	828	733	906	.....	2,850	9,480	9,480	13,700	10,000	1,880	1,220
14	835	630	1,020	.....	2,850	9,480	8,470	13,700	9,480	1,820	1,220
15	848	789	906	.....	2,680	10,000	7,970	14,300	8,970	1,820	1,190
16	835	950	776	.....	2,680	10,300	7,720	15,100	8,220	1,760	1,190
17	842	801	751	.....	3,020	9,740	7,720	16,500	7,970	1,760	1,150
18	835	842	828	1,480	3,380	9,740	8,470	17,700	7,480	2,150	1,120
19	828	890	782	1,510	3,760	9,220	9,480	19,100	6,760	2,150	1,120
20	828	936	764	1,520	4,580	8,220	10,000	19,100	6,050	1,950	1,110
21	821	966	943	1,520	5,120	8,220	10,300	17,700	5,700	1,820	1,090
22	821	958	1,040	1,500	4,900	9,480	10,300	16,000	5,350	1,760	1,070
23	808	990	1,310	1,510	4,580	9,220	10,000	14,000	5,120	1,700	1,060
24	842	1,030	1,110	1,520	4,060	9,740	9,480	12,900	4,790	1,640	1,060
25	842	966	1,080	1,520	3,760	11,000	9,220	12,100	4,580	1,610	1,060
26	848	848	1,050	.....	3,470	12,400	8,720	12,100	4,370	1,560	1,050
27	842	764	898	.....	3,470	13,700	8,220	12,400	4,160	1,520	1,040
28	821	739	936	.....	3,760	13,500	7,970	13,200	3,960	1,500	1,040
29	821	727	.....	.....	3,860	12,400	7,970	13,200	3,660	1,450	1,040
30	808	890	.....	.....	3,860	11,300	7,970	12,600	3,470	1,370	1,040
31	795	.....	.....	.....	3,860	.....	8,220	.....	3,290	1,360	.....

NOTE.—No gage height record Dec. 29 to Feb. 17 and Feb. 26 to Mar. 4. Discharge interpolated Oct. 8 and 9. Recorder clock not running May 7–12, 14, and 15; discharge estimated from marks on recorder sheet.

Monthly discharge of Payette River near Horseshoe Bend, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off (in acre-feet).
	Maximum.	Minimum.	Mean.	
October	848	795	825	50,700
November	1,030	630	832	49,500
December 1–28	1,310	751	970	53,900
February 18–25	1,520	1,480	1,510	24,000
March 5–31	5,120	1,380	3,110	167,000
April	13,700	4,160	8,880	528,000
May	15,400	7,720	10,400	640,000
June	19,100	8,220	13,400	797,000
July	12,600	3,290	8,230	506,000
August	3,110	1,360	1,960	121,000
September	1,360	1,040	1,170	69,600

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, 1916.

GAGE.—Inclined staff on left bank installed July 25, 1911; read 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, 7.2 feet at 7 p. m. June 19 (discharge, 3,410 second-feet); minimum stage recorded, 1.35 feet November 12–17 (discharge, 10 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).

ICE.—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 permanent during year. Rating curve well defined. Gage read once daily to quarter-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of North Fork of Payette River at Lardo, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 6	G. C. Baldwin	5.23	1,650
Sept. 22	L. W. Roush	2.07	57.0

Daily discharge, in second-feet, of North Fork of Payette River at Lardo, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	19	12	18	37	74	72	102	928	999	2,150	237	86
2	19	12	19	39	74	72	102	1,040	1,070	2,060	215	86
3	19	12	19	39	78	72	105	1,150	1,300	1,970	198	82
4	19	12	19	41	78	72	110	1,300	1,460	1,970	186	78
5	18	11	20	43	78	72	110	1,300	1,800	1,970	170	78
6	18	11	20	45	78	72	110	1,460	1,800	1,970	166	78
7	18	11	20	48	78	72	116	1,880	1,880	1,880	160	74
8	18	11	22	48	74	72	120	1,880	1,970	1,800	153	74
9	16	11	22	48	74	72	130	1,800	2,150	1,800	146	72
10	16	11	22	50	74	78	153	1,630	2,150	1,630	142	72
11	16	11	22	50	74	78	192	1,460	2,240	1,550	137	69
12	16	10	22	50	72	78	222	1,300	2,320	1,460	130	65
13	16	10	22	50	72	82	237	1,150	2,320	1,300	130	65
14	16	10	24	51	72	82	254	999	2,500	1,220	124	62
15	16	10	24	51	72	86	271	1,070	2,600	1,150	120	60
16	16	10	26	54	72	86	290	1,150	2,870	1,070	116	60
17	14	10	26	54	72	86	290	1,220	3,050	999	110	60
18	14	11	27	57	72	86	328	1,300	3,230	928	110	60
19	14	11	27	60	72	88	328	1,460	3,410	860	105	60
20	14	12	28	62	72	88	348	1,630	2,960	794	105	60
21	14	13	28	62	72	93	369	1,630	2,680	731	102	57
22	14	14	30	65	72	93	369	1,550	2,420	700	102	57
23	13	16	32	69	72	98	348	1,460	2,150	670	98	54
24	13	16	32	69	72	102	369	1,300	1,880	613	98	54
25	13	16	32	72	72	102	412	1,220	1,880	507	93	51
26	13	16	34	72	72	102	507	1,150	1,970	458	93	51
27	13	16	34	72	72	102	641	1,070	2,060	412	93	51
28	13	18	35	72	72	102	731	999	2,150	369	93	50
29	12	18	35	72	72	102	826	963	2,150	328	88	50
30	12	18	35	72	.....	102	860	928	2,150	290	88	48
31	12	.....	37	72	.....	102	.....	928	.....	254	88	.....

Monthly discharge of North Fork of Payette River at Lardo, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 131 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	19	12	15.3	0.117	0.13	941
November	18	10	12.7	.097	.11	756
December	37	18	26.2	.200	.23	1,610
January	72	37	56.3	.430	.50	3,460
February	78	72	73.4	.560	.60	4,220
March	102	72	86.0	.656	.76	5,290
April	860	102	312	2.38	2.66	18,600
May	1,880	928	1,300	9.92	11.44	79,900
June	3,410	999	2,190	16.7	18.63	130,000
July	2,150	254	1,160	8.86	10.22	71,300
August	237	88	129	.985	1.14	7,930
September	86	48	64.1	.489	.55	3,810
The year	3,410	10	451	3.44	46.97	328,000

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 June 30, 1916. 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, 7.9 feet June 19 (discharge, 7,320 second-feet); minimum stage occurred when gage height was not recorded.

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).

ICE.—Stage-discharge relation seriously affected by ice; winter flow 1915–16 not determined.

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Two rating curves used. Gage read once daily to tenths; gage height not recorded October 1 to December 31; observations January 1 to March 16 too meager for determination of daily discharge. Daily discharge ascertained by applying gage height to rating table or by shifting-control method. Records poor.

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, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 4	G. C. Baldwin	5.96	3,670
5	do	6.12	4,070
Sept. 21	L. W. Roush	1.82	212

Daily discharge, in second-feet, of North Fork of Payette River at Van Wyck, Idaho, for the year ending Sept. 30, 1916.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1		1,500	4,280	2,590	16		2,110	2,470	6,330
2		1,500	4,120	2,730	17	1,330	2,110	2,590	6,530
3		1,500	3,670	2,940	18	1,500	2,230	2,720	7,090
4		1,460	3,750	3,150	19	1,500	2,590	2,840	7,320
5		1,410	3,970	3,440	20	1,660	2,720	2,980	7,140
6		1,500	4,120	3,900	21	1,900	2,980	3,110	6,970
7		1,500	4,590	4,290	22	1,900	2,980	3,250	6,800
8		1,600	3,820	4,390	23	1,900	3,110	2,980	6,720
9		1,600	4,120	4,720	24	1,900	3,250	2,840	6,630
10		1,600	4,280	5,050	25	1,790	3,530	2,720	6,460
11		1,690	4,120	5,230	26	1,790	3,820	2,590	6,460
12		1,790	3,530	5,570	27	1,690	3,970	2,530	6,550
13		1,790	2,980	5,910	28	1,600	4,280	2,470	6,630
14		1,900	2,720	6,010	29	1,600	4,750	2,530	6,720
15		2,000	2,590	6,130	30	1,600	4,590	2,590	6,800
					31	1,600		2,590	

Monthly discharge of North Fork of Payette River at Van Wyck, Idaho, for the year ending Sept. 30, 1916.

[Drainage area 586 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
March 17–31	1,900	1,330	1,680	2.87	1.60	50,000
April	4,750	1,410	2,450	4.18	4.66	146,000
May	4,590	2,470	3,240	5.53	6.38	199,000
June	7,320	2,590	5,570	9.51	10.61	331,000
The period						726,000

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; January 23 to April 8, 1916.

GAGE.—Staff on right bank in three vertical sections and one inclined section; read by Gilbert Thornton, gatekeeper 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, 5.4 feet March 18–31 (discharge, 909 second-feet); gates at dam closed during part of year (discharge 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.

ICE.—No record during winter of 1915–16.

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 permanent during period of record. Rating curve fairly well defined. Gage read once daily to tenths. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

The following discharge measurement was made by G. C. Baldwin:

May 8, 1916: Gage height, 2.62 feet; discharge, 47.5 feet.

Daily discharge, in second-feet, of Crane Creek near Midvale, Idaho, for the year ending Sept. 30, 1916.

Day.	Jan.	Feb.	Mar.	Apr.	Day.	Jan.	Feb.	Mar.	Apr.
1	.....	789	789	680	16	.....	789	789	.....
2	.....	789	789	680	17	.....	789	848	.....
3	.....	789	789	680	18	.....	789	909	.....
4	.....	300	789	680	19	.....	789	909	.....
5	.....	789	789	680	20	.....	789	909	.....
6	.....	789	789	680	21	.....	789	909	.....
7	.....	789	789	680	22	.....	789	909	.....
8	.....	789	789	680	23	680	789	909	.....
9	.....	789	789	.....	24	733	789	909	.....
10	.....	789	789	.....	25	789	789	909	.....
11	.....	789	789	.....	26	789	789	909	.....
12	.....	789	789	.....	27	789	789	909	.....
13	.....	789	789	.....	28	789	789	909	.....
14	.....	789	789	.....	29	789	789	909	.....
15	.....	789	789	.....	30	789	.....	909	.....
					31	789	.....	909	.....

NOTE.—Very small flow Oct. 1 to Jan. 22 and from April 9 to May 5 as gates at dam were closed most of the time, probably about 48 second-feet flowing May 6–8. Water reported flowing over the spillway Feb. 13–19, Mar. 13, 20–23; the amount is not known and is not included in the record. Gates were shut for 15 hours Feb. 4.

Monthly discharge of Crane Creek near Midvale, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 23–31	789	680	771	13,800
February	789	300	772	44,400
March	909	789	845	52,000
April 1–8	680	680	680	10,800
The period	.....	.....	.....	121,000

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, 1915, to November 30, 1916, when station was discontinued.

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 during year, 3.80 feet April 25–29 (discharge, from extension of rating curve, 585 second-feet); minimum stage recorded, 0.15 foot September 17–25 (discharge, 0.8 second-foot).

1915–16: Maximum stage recorded April 25–29, 1916, but river was probably higher while records were suspended; minimum stage recorded, August 21–22, 1915 (discharge, 0.3 second-foot).

ICE.—No records obtained during winter.

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.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed while records were suspended. Rating curve used October 1 to November 6, 1915, well defined between 1 and 200 second-feet; curve used April 22 to November 30, 1916, well defined between 2 and 30 second-feet; above 30 second-feet curve is an extension defined by only one discharge measurement. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 5	Henshaw and Stricklin.	3.15	430	July 16	Donnelly and Ingram..	0.38	4.23
June 28	Donnelly and Ingram..	.70	21.5	Aug. 6	H. K. Donnelly.....	.28	1.99

Daily discharge, in second-feet, of North Fork of Burnt River at Audrey, Oreg., for the period Oct. 1, 1915, to Nov. 30, 1916.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	4.4	5.9	.....	372	140	21	2.0	2.0	2.0	7.5
2	5.9	5.9	.....	372	125	29	2.0	2.0	2.0	7.5
3	5.9	5.9	.....	416	125	29	2.0	2.0	2.0	7.5
4	5.9	5.9	.....	460	125	18	2.0	2.0	2.0	7.5
5	5.9	5.9	.....	427	125	18	2.0	2.6	2.0	7.5
6	5.9	5.9	.....	416	96	10	2.0	2.6	3.5	7.5
7	5.9	.....	.....	328	96	10	2.0	3.5	3.5	7.5
8	5.9	.....	.....	328	83	10	2.0	3.5	3.5	7.5
9	5.9	.....	.....	288	83	7.5	2.0	3.5	3.5	7.5
10	5.9	.....	.....	288	83	7.5	2.0	3.5	3.5	7.5
11	5.9	.....	.....	268	59	7.5	2.0	3.5	3.5	7.5
12	5.9	.....	.....	268	43	7.5	2.0	3.5	3.5	5.0
13	5.9	.....	.....	268	38	5.0	2.0	1.0	3.5	5.0
14	5.9	.....	.....	228	38	3.5	2.0	1.0	3.5	5.0
15	5.9	.....	.....	172	29	3.5	2.0	1.0	5.0	5.0
16	5.9	.....	.....	172	25	3.5	2.0	1.0	5.0	5.0
17	5.9	.....	.....	172	25	3.5	2.0	.8	5.0	5.0
18	5.9	.....	.....	125	29	3.5	2.0	.8	5.0	5.0
19	5.9	.....	.....	125	29	3.5	2.0	.8	5.0	5.0
20	5 9	.....	.....	125	29	3.5	4.4	.8	5.0	5.0
21	5.9	.....	.....	208	29	1.5	4.4	.8	5.0	5.0
22	5.9	.....	228	208	29	1.5	4.4	.8	5.0	5.0
23	5.9	.....	485	208	25	2.0	4.4	.8	5.0	5.0
24	5.9	.....	535	176	25	2.0	4.4	.8	5.0	5.0
25	5.9	.....	585	172	21	2.0	4 4	.8	5.0	5.0
26	5.9	.....	585	172	21	2.0	4.4	1.0	5.0	2.0
27	5.9	.....	585	156	21	2.0	4.4	1.0	5.0	2.0
28	5.9	.....	585	172	21	2.0	4.4	1.0	5.0	2.0
29	5.9	.....	585	172	21	2.0	3.5	1.0	7.5	2.0
30	5.9	.....	372	140	21	2.0	3.5	2.0	7.5	2.0
31	5.9	.....	.....	140	.....	2.0	2.0	.....	7.5	.....

Monthly discharge of North Fork of Burnt River near Audrey, Oreg., for the period Oct., 1915, to Nov., 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1915.				
October	5.9	4.4	5.85	360
November 1–6	5.9	5.9	5.9	70
1916.				
April 22–30	585	228	505	9,020
May	460	125	243	14,900
June	140	21	55.3	3,290
July	29	1.5	7.27	447
August	4.4	2.0	2.79	172
September	3.5	.8	1.71	102
October	7.5	2.0	4.32	266
November	7.5	2.0	5.42	323

BURNT RIVER NEAR HEREFORD, OREG.

LOCATION.—In sec. 25, T. 12 S., R. 36 E., 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; April 25 to September 4, 1916, when station was discontinued.

GAGE.—Vertical staff on left bank. Gage reader, T. B. Van Cleave.

DISCHARGE MEASUREMENTS.—Made by wading at medium and low stages; 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 during year, 5.18 feet April 27 (discharge, 926 second-feet); minimum stage recorded, 0.32 foot August 30 and 31 (discharge, 11 second-feet).

1915-1916: Maximum stage is that of 1916. Minimum stage recorded, −0.05 foot August 24, 1915 (discharge, 2.5 second-feet).

ICE.—No record for period when stream was frozen.

DIVERSIONS.—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 10 and 400 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Burnt River near Hereford, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 25	C. E. Stricklin	4.95	778	June 8	C. E. Stricklin	1.90	159
27	do	5.18	924	12	do	1.60	117
May 5	F. F. Henshaw	4.57	582	28	Donnelly and Ingram	1.20	73.9
21	C. E. Stricklin	3.00	314	July 22	R. C. Ingram	.58	24.0
24	do	2.62	252	Aug. 28	do	.40	13.9
31	do	2.15	196				

Daily discharge, in second-feet, of Burnt River near Hereford, Oreg., for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	494	184	96	18	12	16	.....	188	68	19	20	.....
2	.....	529	174	98	18	12	17	.....	181	76	26	25	.....
3	.....	545	154	84	16	13	18	.....	267	78	26	20	.....
4	.....	592	151	76	15	14	19	.....	364	157	24	19	.....
5	.....	607	135	56	15	.....	20	.....	274	188	22	18	.....
6	.....	565	135	52	14	.....	21	.....	313	157	22	16	.....
7	.....	502	141	45	14	.....	22	.....	285	129	20	19	.....
8	.....	404	148	39	15	.....	23	.....	274	108	19	19	.....
9	.....	395	141	32	14	.....	24	.....	237	96	19	18	.....
10	.....	348	124	32	16	.....	25	478	240	88	16	14	.....
11	.....	297	117	33	16	.....	26	702	212	76	20	14	.....
12	.....	240	106	26	16	.....	27	926	206	76	19	15	.....
13	.....	220	115	38	19	.....	28	806	198	88	19	15	.....
14	.....	220	76	28	18	.....	29	484	195	68	19	13	.....
15	.....	198	66	24	16	.....	30	494	192	61	18	11	.....
							31	.....	188	.....	16	11	.....

NOTE.—Discharge Apr. 26 and Aug. 27 interpolated.

Monthly discharge of Burnt River near Hereford, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 25–30	926	478	648	7,710
May	607	181	322	19,800
June	188	61	116	6,900
July	98	16	34.9	2,150
August	25	11	16.4	1,010
September 1–4	14	12	12.8	102
The period	.....	.....	.....	37,700

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 November 30, 1915; April 1 to September 30, 1916, when station was discontinued.

GAGE.—Vertical staff on left bank 30 feet above highway bridge; read by Eva McCorkle.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Gravel; probably shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.40 feet at 2 p. m. April 12 (discharge, 1,280 second-feet); minimum stage recorded, 1.20 feet October 2–8 (discharge, 1.0 second-foot).

1915–16: Maximum stage recorded April 12, 1916; minumum stage recorded, 1.18 feet September 18–22, 24, 25, 1915 (discharge, 0.9 second-foot).

ICE.—No records for periods during which stream was frozen.

DIVERSIONS.—14,600 acres were irrigated above the canyon, the entrance of which lies about 2 miles below the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed while station was temporarily discontinued during winter. Rating curves well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for August and September, for which they are poor.

COOPERATION.—Field data furnished by State engineer of Oregon.

Discharge measurements of Burnt River at Bridgeport, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	Stricklin and Donnelly.	6.05	1,010	June 10	C. E. Stricklin	3.12	159
26	do	5.65	719	29	Donnelly and Ingram	2.80	92.7
May 6	F. F. Henshaw	5.50	652	July 18	R. C. Ingram	1.90	14.5
23	C. E. Stricklin	4.50	360	30	Donnelly and Ingram	1.65	5.69
31	do	3.62	215				

Daily discharge, in second-feet, of Burnt River at Bridgeport, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.0	5.0	1,000	700	212	244	7	4
2	1.0	5.6	1,010	560	212	212	4	4
3	1.0	6.0	1,180	560	188	199	6	4
4	1.0	6.0	1,180	590	188	98	2	4
5	1.0	8.4	1,090	590	150	89	2	6
6	1.0	5.6	1,090	700	150	77	2	7
7	1.0	9.7	1,090	700	136	77	2	7
8	1.0	12	1,090	660	122	77	4	6
9	2.5	23	1,090	590	122	62	4	6
10	2.5	18	1,180	590	136	62	4	7
11	2.5	18	1,180	530	108	62	4	7
12	2.5	28	1,280	470	108	62	4	7
13	2.5	28	1,180	444	90	32	3	7
14	2.5	28	940	350	84	25	4	7
15	3.2	28	940	350	72	18	4	7
16	3.2	42	1,010	293	84	19	4	7
17	4.0	28	1,010	293	84	18	3	7
18	4.4	35	940	260	49	16	3	7
19	5.0	50	870	276	49	16	3	7
20	4.0	50	870	330	96	10	3	7
21	5.0	42	700	444	212	10	2	7
22	4.0	42	700	372	228	9	3	7
23	3.7	44	660	361	196	9	4	7
24	4.0	46	590	350	180	7	4	7
25	3.7	50	590	350	108	7	4	7
26	3.7	50	750	310	90	16	6	10
27	4.0	56	810	310	96	7	6	9
28	4.0	50	810	244	122	9	6	9
29	4.0	42	750	244	96	6	4	10
30	5.0	36	700	244	96	6	4	12
31	5.0	.....	.....	212	.....	7	7	.....

Monthly discharge of Burnt River at Bridgeport, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	5.0	1.0	3.00	184
November	56	5.0	29.7	1,770
April	1,280	590	943	56,100
May	700	212	428	26,300
June	228	49	129	7,680
July	244	6	50.6	3,110
August	7	2	3.94	242
September	12	4	7.00	417

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; April 21 to August 31, 1916, when station was discontinued.

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.—1915–1916: Maximum stage recorded, 2.50 feet April 21–29, and May 3, 1916 (discharge, 25 second-feet); minimum stage recorded, 0.50 foot at 3.15 p. m. August 5, 1916 (discharge, 0.3 second-foot).

ICE.—No records of flow when stream is frozen.

DIVERSIONS.—One ditch diverts water about a mile above the gage and irrigates about 100 acres.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during season. Rating curve well defined between 2 and 25 second-feet. Gage read to hundredths about three times a week. Daily discharge ascertained by applying gage height to rating table and interpolating for days on which gage was not read. Records fair.

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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 21	C. E. Stricklin	2.50	24.6	June 15	C. E. Stricklin	1.20	2.1
May 3	do	2.50	26.1	27	Donnelly and Ingram	1.10	1.8
26	do	2.01	14.5	Aug. 5	do	.50	*a*.3

a Estimated.

Daily discharge in second-feet, of Middle Fork of Burnt River near Audrey, Oreg., for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1		22	8.8	2.4	0.3	16		10.4	2.4	2.0	1.4
2		24	9.0	2.4	.3	17		10.4	2.4	2.0	1.4
3		25	9.6	1.7	.3	18		10.4	2.4	2.0	.7
4		24	9.0	1.7	.3	19		14	2.4	.4	.3
5		23	8.0	1.7	.3	20		18	2.4	.4	.4
6		22	7.0	1.8	.3	21	25	18	2.4	.4	.4
7		21	6.0	2.0	.3	22	25	18	2.4	.4	.4
8		20	5.8	2.0	.3	23	25	18	2.4	.4	.3
9		20	6.0	2.0	.4	24	25	19	2.4	.4	.3
10		20	6.6	2.0	.4	25	25	16	2.4	.4	.3
11		20	5.0	2.0	.4	26	25	14	2.5	.4	.3
12		17	4.5	2.0	.4	27	25	12	2.9	.4	.3
13		13	4.0	2.0	.4	28	25	10.4	2.0	.4	.3
14		10.4	3.0	2.0	1.4	29	25	11.2	1.7	.4	.3
15		10.4	2.4	2.0	1.4	30	24	11.2	1.7	.4	.3
						31		11.2		.5	.3

Monthly discharge of Middle Fork of Burnt River near Audrey, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
April 21-30	25	24	24.9	494
May	25	10.4	16.6	1,020
June	9.6	1.7	4.18	249
July	2.4	.4	1.32	81
August	14	.3	2.31	142
The period				1,990

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, 1915, to September 19, 1916, when station was discontinued.

GAGE.—Vertical staff on right bank. Gage reader, J. L. Hendricks.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel with some rock at control; fairly permanent.

EXTREMES OF DISCHARGE.—For period March 14, 1915, to September 19, 1916: No gage reading when stage was highest; minimum stage recorded, 0.75 foot October 26 and 30, 1915 (discharge, 10 second-feet).

ICE.—Stream does not freeze, as most of the low-water flow comes from springs.

DIVERSIONS.—An old mining ditch, the Eldorado, takes water from most of the tributaries of South Fork above the station and carries it over the Beam Creek divide into Willow Creek, from which it is used for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 14 and 50 second-feet. Gage read to hundredths occasionally. Daily discharge ascertained by applying gage height to rating table and interpolating for days on which gage was not read. Records good for days on which gage was read.

COOPERATION.—Gage-height record 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, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
May 27	C. E. Stricklin	1.28	37.2	July 12	R. C. Ingram	1.15	27.3
June 14	do	1.30	40.4	July 23	Donnelly and Ingram	1.05	20.0
July 4	Donnelly and Ingram	1.20	27.8	Sept. 2	R. C. Ingram	1.00	19.0

Daily discharge, in second-feet, of South Fork of Burnt River near Unity, Oreg., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1						33	19	18
2						32	19	18
3						30	19	18
4		10				30	20	18
5						30	20	18
6						29	20	17
7		10				28	20	17
8						28	20	17
9						27	20	17
10						26	20	17
11						26	20	17
12		16				26	20	18
13						25	19	17
14					39	23	19	17
15						21	19	17
16						20	20	17
17						19	20	18
18						19	20	18
19						18	20	18
20						18	20	.....
21						19	20	.....
22						19	20	.....
23						20	19	.....
24						20	18	.....
25						20	18	.....
26	10					20	18	.....
27				37		20	18	.....
28		19	76			20	18	.....
29			58			19	18	.....
30	10					19	18	.....
31						19	18	.....

NOTE.—Discharge estimated July 1-3. Gage was read 6 times in July, 16 times in August, and 10 times between Sept. 1 and 19.

Monthly discharge of South Fork of Burnt River near Unity, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	33	18	23.3	1,430
August	20	18	19.3	1,190
September 1-19	18	17	17.5	659

SOUTH FORK OF BURNT RIVER AT HARDMAN RANCH, NEAR UNITY, OREG.

LOCATION.—In the NW. ¼ sec. 27, T. 13 S., R. 36 E., at ranch of J. R. Hardman, 8 miles southwest of Unity, Baker County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 13 to September 30, 1916.

GAGE.—Vertical staff attached to upper side of right abutment of private wagon bridge. Gage reader, O. M. Hardman.

DISCHARGE MEASUREMENTS.—Made from downstream side of bridge.

CHANNEL AND CONTROL.—Firm and rocky; practically permanent. Control is the same for all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 1.5 feet April 27, May 5, 6, and 7, June 18, 19, and 20 (discharge, 66 second-feet); minimum stage recorded, 0.7 foot September 19 to 30 (discharge, 15 second-feet).

ICE.—Stage-discharge relation not affected by ice; low water flow mostly from springs.

DIVERSIONS.—Eldorado ditch diverts water above gage, and one small ditch diverts water during two or three months of the irrigating season.

REGULATION.—Discharge regulated by operation of head gates on irrigation ditches above.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined between 15 and 70 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

Discharge measurements of South Fork of Burnt River at Hardman ranch, near Unity, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 14	C. E. Stricklin	1.35	55.7	June 27	Donnelly and Ingram	1.22	47.0
28	do	1.50	65.4	July 12	R. C. Ingram	1.00	29.5
May 28	do	1.28	47.6	Aug. 6	Donnelly and Ingram	.90	21.6

Daily discharge, in second-feet, of South Burnt River at Hardman ranch, near Unity Oreg., for the year ending Sept. 30, 1916.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	50	50	43	23	18	16	58	40	50	26	23	18
2	.....	50	46	43	23	18	17	54	40	58	26	22	18
3	.....	54	43	43	23	18	18	50	46	66	23	22	18
4	.....	58	43	43	23	18	19	46	50	66	23	22	15
5	.....	66	46	43	23	18	20	50	50	66	23	22	15
6	.....	66	50	43	23	18	21	43	50	62	23	22	15
7	.....	66	50	40	23	18	22	43	50	58	23	22	15
8	.....	58	54	36	23	18	23	43	50	50	20	20	15
9	.....	56	58	36	23	18	24	50	50	43	20	20	15
10	.....	50	58	36	23	18	25	53	49	43	18	18	15
11	.....	50	58	36	23	18	26	62	49	43	18	18	15
12	.....	46	50	36	23	18	27	66	50	43	18	18	15
13	54	43	50	36	23	18	28	58	50	43	23	18	15
14	50	43	50	36	23	18	29	54	50	43	23	18	15
15	56	42	49	36	23	18	30	54	50	43	23	18	15
							31	.....	50	.....	23	18	.....

Monthly discharge of South Fork of Burnt River at Hardman ranch, near Unity, Oreg., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
April 13–30	66	43	52.7	1,880
May	66	40	50.7	3,120
June	66	43	51.1	3,040
July	43	18	30.3	1,860
August	23	18	21.5	1,320
September	18	15	16.8	1,000
The period	.....	.....	.....	12,200

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 reservoir.

DRAINAGE AREA.—775 square miles; at lower end of Thief Valley, 826 square miles.

RECORDS AVAILABLE.—May 20, 1913, to September 30, 1915; March 10 to July 31, 1916, when station was discontinued. 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.—Inclined staff on left bank just below entrance to short canyon below North Powder Valley, about 8 feet below vertical staff at same datum used June 20, 1913, to October 12, 1914. Vertical staff a short distance above, at independent datum, used May 20 to June 19, 1913.

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

CHANNEL AND CONTROL.—Rocks with some sand; probably shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.5 feet at 4 p. m. March 21 and June 17 (discharge, 1,550 second-feet); minimum stage recorded, 0.95 foot July 31 (discharge, 28 second-feet).

1909–1916: Maximum stage recorded, 10 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.

ICE.—Stage-discharge relation seriously affected by ice. Station not in operation during winter of 1915–16.

DIVERSIONS.—Water is diverted from Powder River and its tributaries for irrigating 72,000 acres of land above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation affected by a beaver dam part of year, and although gage was read October 1 to December 12 discharge can not be determined. Rating curve fairly well defined. Gage read to half-tenths once daily except in July, when it was read every other day. Daily discharge ascertained by applying daily gage height to rating table. Records good except for March, when one gage reading may not indicate closely the mean for the day on account of diurnal fluctuation.

Discharge measurements made in 1916 indicate that determinations of discharge exceeding 500 second-feet, previously published, are too large; records for flood period of 1914 have been recomputed; very few gage heights above critical stage in 1915 or in 1913 after new gage was installed.

Discharge measurements of Powder River near North Powder, Oreg., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 4	F. F. Henshaw	4.88	1,220
July 18	Rhea Luper	2.48	308

Daily discharge, in second-feet, of Powder River near North Powder, Oreg., for the years ending Sept. 30, 1914, and 1916.

Day.	1914.				1916.				
	Mar.	Apr.	May.	June.	Mar.	Apr.	May.	June.	July.
1	650	570	610	610	.....	870	1,300	510	710
2	630	530	530	650	.....	870	1,300	475	.....
3	610	510	570	670	.....	950	1,350	440	710
4	570	492	610	710	.....	1,030	1,260	440	.....
5	590	570	590	710	.....	1,120	1,300	510	670
6	610	650	530	670	.....	1,120	1,350	590	.....
7	610	710	530	650	.....	1,080	1,350	710	650
8	650	790	492	570	.....	1,030	1,300	670	.....
9	610	870	492	550	.....	1,030	1,260	750	630
10	590	950	458	492	1,210	1,120	1,210	790	.....
11	610	990	422	458	1,350	1,300	1,210	830	590
12	630	990	405	422	1,160	1,260	1,160	990	.....
13	650	1,030	422	458	1,210	1,210	1,120	1,080	590
14	630	1,030	440	570	1,210	1,160	630	1,120	.....
15	650	1,030	458	530	1,080	1,120	550	1,210	550
16	670	1,030	492	530	1,030	1,030	475	1,350	.....
17	750	990	492	530	1,210	1,030	550	1,550	510
18	830	990	530	492	1,080	1,030	590	1,500	303
19	830	1,030	492	458	1,120	990	670	1,500	164
20	870	990	422	422	1,300	950	750	1,350	.....
21	910	950	492	388	1,550	870	710	1,210	164
22	950	950	530	353	1,500	830	710	1,120	.....
23	990	910	570	320	1,260	910	790	1,030	102
24	910	910	1,260	288	1,160	990	830	950	.....
25	910	910	1,080	320	1,080	1,080	750	870	69
26	830	870	1,030	320	910	1,160	710	830	.....
27	750	790	990	320	870	1,160	670	750	48
28	710	670	910	257	790	1,210	750	750	.....
29	670	670	830	530	750	1,210	710	710	31
30	630	650	750	458	910	1,260	630	710	.....
31	570	.....	670	.....	950	.....	550	.....	28

NOTE.—These figures for daily discharge for March to June, 1914, supersede those published in Water Supply Paper 393, page 205.

Monthly discharge of Powder River near North Powder, Oreg., for the years ending Sept. 30, 1914 and 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1914.				
March	990	570	712	43,800
April	1,030	492	834	49,600
May	1,260	405	616	37,900
June	710	257	490	29,200
The year [a]	1,260	13	291	210,000
1916.				
March 10–31	1,550	750	1,120	48,900
April	1,300	830	1,070	63,700
May	1,350	475	919	56,500
June	1,550	440	910	54,100
July	710	28	383	23,600
The period	.....	.....	.....	247,000

[a] For entire year see Water Supply Paper 393, p. 206, for values for October to February and July to September.

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, 1916.

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, 8.2 feet at 2.30 p. m. June 19 (discharge, 11,600 second-feet); minimum stage occurred during winter (discharge not accurately known).

1912–1916: 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.

ICE.—Stage-discharge relation affected by ice from December to February. 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.—Stage-discharge relation permanent except as affected by ice. Rating curve well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for winter period.

Discharge measurements of Salmon River at Salmon, Idaho, during the year ending Sept. 30, 1916.

[Made by G. C. Baldwin.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 15	6.52	8,040
16	6.90	8,600

Daily discharge, in second-feet, of Salmon River at Salmon, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,140	1,100	1,140	.....	1,060	1,230	4,460	3,310	9,350	2,730	1,730
2	1,140	1,100	1,140	.....	1,060	1,250	4,460	3,460	8,800	2,730	1,730
3	1,140	1,100	1,140	.....	1,100	1,270	3,460	4,560	8,260	2,590	1,730
4	1,140	1,140	1,140	.....	1,140	1,270	4,460	5,660	7,830	2,590	1,730
5	1,140	1,140	1,140	.....	1,140	1,270	4,820	6,770	7,400	2,590	1,730
6	1,060	1,140	1,140	.....	1,140	1,270	5,380	5,570	7,400	2,520	1,730
7	1,060	1,140	1,140	.....	1,230	1,270	5,670	5,960	7,620	2,460	1,730
8	1,060	1,100	1,140	.....	1,320	1,270	5,960	7,620	7,620	2,460	1,730
9	1,100	1,100	1,140	.....	1,420	1,340	5,570	8,480	7,830	2,330	1,730
10	1,140	1,100	1,140	.....	1,420	1,420	4,820	7,620	8,040	2,330	1,730
11	1,140	1,100	1,140	.....	1,420	1,420	4,460	7,620	8,260	2,200	1,730
12	1,140	1,140	1,140	.....	1,420	1,620	3,780	7,620	7,190	2,140	1,730
13	1,140	1,140	1,140	.....	1,420	1,840	3,310	7,190	6,770	2,080	1,620
14	1,140	1,140	1,140	2,200	1,420	2,080	3,240	7,190	6,770	2,080	1,620
15	1,140	1,180	1,140	2,080	1,420	2,200	3,160	8,040	6,360	2,080	1,620
16	1,140	1,180	1,140	2,080	1,420	2,260	2,870	9,350	6,060	2,080	1,620
17	1,140	1,180	1,100	2,080	1,420	2,330	2,870	10,000	5,760	2,080	1,620
18	1,140	1,180	1,060	2,080	1,420	2,080	2,870	10,900	5,570	2,080	1,620
19	1,140	1,180	1,020	1,960	1,420	2,080	2,460	11,600	4,820	2,080	1,620
20	1,140	1,180	.....	1,900	1,420	2,080	2,460	11,100	4,460	2,080	1,620
21	1,140	1,140	.....	1,840	1,420	1,960	2,400	10,200	4,120	2,080	1,620
22	1,180	1,140	.....	1,840	1,420	1,840	2,330	8,910	3,950	1,960	1,520
23	1,180	1,140	.....	1,420	1,420	1,900	2,330	7,620	3,700	1,960	1,520
24	1,140	1,140	.....	1,320	1,420	1,960	2,330	6,770	3,460	1,840	1,520
25	1,140	1,140	.....	1,270	1,320	2,330	2,460	7,080	3,460	1,840	1,520
26	1,140	1,140	.....	1,180	1,320	2,870	2,730	7,400	3,460	1,840	1,520
27	1,140	1,140	.....	1,140	1,320	3,310	3,010	8,040	3,460	1,780	1,520
28	1,140	1,140	.....	1,100	1,320	3,460	2,940	8,480	3,310	1,730	1,420
29	1,140	1,140	.....	1,020	1,320	3,620	2,870	9,790	3,160	1,730	1,420
30	1,140	1,140	.....	.....	1,270	4,040	3,020	9,130	3,030	1,730	1,420
31	1,100	.....	.....	.....	1,230	.....	3,160	.....	2,870	1,730	.....

NOTE.—Mean discharge estimated on account of lack of gage heights and ice effect from observer's notes as follows: Dec. 20–31, 950 second-feet; Jan. 1–31, 1,050 second-feet; Feb. 1–13, 1,200 second-feet. Discharge interpolated on numerous days.

Monthly discharge of Salmon River at Salmon, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,180	1,060	1,130	69,500
November	1,180	1,100	1,140	67,800
December	1,140	.....	1,060	65,200
January	.....	.....	1,050	64,600
February	2,200	.....	1,450	83,400
March	1,420	1,060	1,320	81,200
April	4,040	1,230	2,000	119,000
May	5,960	2,330	3,550	218,000
June	11,600	3,310	7,770	462,000
July	9,350	2,870	5,810	357,000
August	2,730	1,730	2,150	132,000
September	1,730	1,420	1,620	96,400
The year	11,600	.....	2,500	1,820,000

SALMON RIVER AT WHITEBIRD, IDAHO.

LOCATION.—In sec. 22, T. 28 N., R. 1 E., at Canfield ferry at Whitebird, Idaho County, 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 18, 1910, to September 30, 1916.

GAGE.—Inclined staff in two sections on left bank beneath ferry cable; installed October 4, 1915; read by William Cantonwine and M. C. Shuck. Gage used prior to October 4, 1915, consisted of low-water section on right bank at ferry landing and high-water section on left bank 75 feet below cable, at same datum.

DISCHARGE MEASUREMENTS.—Made from gaging car suspended from ferry cable.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile below gage but slightly curved immediately above; one channel at all stages. Banks not subject to overflow. Control composed of large boulders 1,000 feet below gage; permanent.

EXTREMES OF DISCHARGE.—1910–1916: Maximum stage recorded, 20.05 feet at 6 p. m. June 19, 1916 (discharge, 85,100 second-feet); minimum stage recorded, 0.90 foot at 7.30 a. m. January 1, 1916 (discharge, 2,600 second-feet).

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

DIVERSIONS.—Amount of water diverted for irrigation above station inconsiderable.

REGULATION:—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice January 6 to February 7. Rating curve well defined. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records excellent; others fair.

Discharge measurements of Salmon River at Whitebird, Idaho, during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.		Discharge.
		Old gage.	New gage.	
		Feet.	*Feet.*	*Sec.-ft.*
Oct. 1	C. O. Brown	2.22	2.33	4,220
Aug. 13	C. G. Paulsen	4.12	4.22	8,670

Daily discharge, in second-feet, of Salmon River at Whitebird Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4,170	4,100	3,820	2,690	.....	4,720	7,520	23,900	25,300	53,600	12,700	5,820
2	4,170	4,100	3,820	2,790	.....	4,560	8,060	23,500	25,700	55,200	12,000	5,620
3	4,320	4,100	3,820	2,890	.....	4,400	8,620	26,100	27,100	58,000	11,400	5,620
4	4,470	4,100	3,820	3,320	.....	4,400	9,200	31,300	31,800	55,200	11,000	5,820
5	4,560	4,100	4,400	3,440	.....	4,560	9,500	38,700	38,200	49,800	10,700	5,820
6	4,560	4,100	4,720	.....	.....	4,720	9,500	43,400	42,300	49,200	10,400	5,620
7	4,400	4,100	4,720	.....	.....	4,720	9,200	47,600	44,900	49,800	9,800	5,620
8	4,400	3,960	4,720	.....	4,100	4,560	9,200	47,100	47,600	50,900	9,500	5,420
9	4,250	3,960	4,560	.....	4,400	4,880	9,500	43,900	51,400	51,900	9,500	5,820
10	4,250	3,960	4,400	.....	4,720	5,620	10,400	39,700	55,700	50,900	9,200	5,820
11	4,250	3,960	4,250	.....	4,880	7,000	12,700	35,200	55,700	47,100	8,900	6,040
12	4,400	3,960	4,100	.....	4,880	8,900	15,500	30,800	52,500	43,900	8,620	6,040
13	4,250	3,820	4,100	.....	4,720	9,200	16,200	27,500	50,300	41,300	8,340	6,040
14	4,250	3,690	3,960	.....	4,720	9,200	15,100	24,400	52,500	39,200	8,340	5,820
15	4,400	3,690	4,250	.....	4,560	8,340	15,500	22,600	58,000	36,200	7,780	5,620
16	4,400	3,960	4,100	.....	4,560	7,780	17,000	21,400	64,700	33,700	7,780	5,420
17	4,400	4,100	3,960	.....	4,720	7,260	17,400	21,000	72,500	31,800	7,780	5,240
18	4,400	4,250	3,820	.....	5,060	8,060	17,000	21,800	79,300	30,300	8,900	5,240
19	4,250	4,100	3,440	.....	5,060	9,500	15,900	25,300	84,900	27,500	9,800	5,060
20	4,250	4,100	3,100	.....	5,060	11,400	14,800	28,400	82,100	24,800	8,900	5,060
21	4,250	4,250	3,210	.....	5,060	13,400	13,700	30,300	71,400	23,100	8,340	5,060
22	4,100	4,400	3,820	.....	5,060	13,400	13,700	30,300	60,800	21,400	7,780	4,880
23	4,100	4,250	4,560	.....	4,880	12,000	13,400	28,900	52,500	20,100	7,260	4,880
24	4,250	4,400	4,880	.....	4,880	11,000	13,700	27,100	48,700	19,300	7,260	4,880
25	4,100	4,400	4,400	.....	5,060	9,800	15,900	25,700	47,600	17,800	6,740	4,880
26	4,100	4,250	3,820	.....	5,060	8,900	21,000	24,400	50,300	17,000	6,500	5,060
27	4,250	4,100	3,690	.....	5,240	8,340	27,100	23,500	54,100	17,000	6,500	5,060
28	4,250	3,960	3,560	.....	5,240	8,340	30,800	23,100	58,500	15,900	6,260	5,060
29	4,100	3,560	3,560	.....	4,880	8,060	30,300	23,500	62,500	14,800	6,040	4,880
30	4,100	3,320	3,210	.....	.....	7,780	26,600	23,900	58,500	14,100	6,040	4,880
31	4,100	.....	2,790	.....	.....	7,520	.....	24,800	.....	13,400	5,820	.....

NOTE.—Discharge Jan. 6 to Feb. 7 estimated on account of ice, as follows: Jan. 6–14, 3,550 second-feet; Jan. 15–22, 3,010 second-feet; Jan. 23–31, 3,550 second-feet; Feb. 1–7, 3,460 second-feet.

Monthly discharge of Salmon River at Whitebird, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	4,560	4,100	4,270	263,000
November	4,400	3,320	4,030	240,000
December	4,880	2,790	3,980	245,000
January	.....	2,690	3,330	205,000
February	5,240	.....	4,520	260,000
March	13,400	4,400	7,820	481,000
April	30,800	7,520	15,100	898,000
May	47,600	21,000	29,300	1,800,000
June	84,900	25,300	53,600	3,190,000
July	58,000	13,400	34,700	2,130,000
August	12,700	5,820	8,580	528,000
September	6,040	4,880	5,400	321,000
The year	84,900	2,690	14,600	10,600,000

CLEARWATER RIVER AT KAMIAH, IDAHO.

LOCATION.—In sec. 1, T. 33 N., R. 3 E., at toll bridge in town of Kamiah, Lewis County, 6 miles below mouth of South Fork of Clearwater River.

DRAINAGE AREA.—4,850 square miles (measured on General Land Office map, edition of 1909).

RECORDS AVAILABLE.—August 20, 1910, to September 30, 1916, when station was discontinued.

GAGE.—Chain gage attached to downstream handrail of toll bridge; installed May 30, 1911; read by Mrs. J. W. McGuire. Prior to May 30, 1911, gage painted on lower steel caisson of first pier from left abutment, at datum 0.06 foot lower than that of present gage.

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

CHANNEL AND CONTROL.—Bed at gage and control consists of heavy boulders and gravel; control 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 year, 13.7 feet June 19 (discharge, 56,000 second-feet); minimum stage, 2.5 feet December 31 (discharge, 1,430 second-feet).

1910–1916: Maximum stage recorded, 16.1 feet May 26, 1913 (discharge, 76,600 second-feet); minimum stage, 2.0 feet December 5–6, 1913 (discharge, 950 second-feet).

ICE.—Stage-discharge relation affected by ice; flow estimated from weather records.

DIVERSIONS.—Several small ditches divert water for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 21 to March 2. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Open-water records excellent; others poor.

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

No discharge measurements made during year.

Daily discharge, in second-feet, of Clearwater River at Kamiah, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1,660	1,780	2,680	3,230	9,770	21,100	21,100	31,900	4,510	1,780
2	1,780	2,200	2,050	3,230	11,700	20,600	21,700	29,400	4,280	1,780
3	2,050	2,200	1,910	3,230	11,700	22,800	23,400	31,300	3,630	1,910
4	2,860	2,350	2,350	3,630	12,100	29,400	28,200	27,600	3,630	2,350
5	2,510	2,510	2,680	4,060	12,500	36,600	36,600	25,200	3,430	2,680
6	2,350	2,510	2,510	3,840	11,700	39,300	31,900	25,700	3,230	2,200
7	2,200	2,680	2,680	3,630	10,900	44,400	30,700	26,300	3,040	2,050
8	2,050	2,350	2,510	3,630	11,300	37,300	31,900	25,700	2,680	1,780
9	2,050	2,200	2,510	9,410	12,100	33,900	36,600	25,200	3,230	2,350
10	1,910	2,200	3,230	12,500	12,100	28,800	35,200	20,600	3,430	3,630
11	1,780	2,050	2,860	14,700	15,600	24,600	31,300	19,000	3,230	3,430
12	1,910	2,050	2,680	15,200	18,000	21,700	30,000	16,600	3,040	2,860
13	1,780	2,050	2,350	14,700	16,100	20,000	30,000	15,600	3,040	2,680
14	1,780	1,780	2,510	13,000	15,600	18,500	34,600	14,700	3,040	2,350
15	2,350	1,780	2,680	11,300	17,500	17,500	39,300	13,000	2,860	2,200
16	2,200	2,200	2,350	10,500	18,000	17,000	45,800	11,700	2,680	2,200
17	1,910	2,350	2,350	10,100	18,000	18,500	49,600	11,300	2,680	2,050
18	1,780	2,200	2,350	11,300	18,000	21,100	53,600	12,100	3,230	1,910
19	1,660	2,200	1,780	12,500	17,000	24,000	56,000	10,900	4,280	1,780
20	1,660	4,750	1,780	17,000	15,200	27,600	48,100	9,060	3,430	1,780
21	1,780	3,630	.....	20,600	13,800	26,900	35,900	8,390	2,680	1,660
22	1,780	3,040	.....	19,000	14,300	25,700	29,400	7,460	2,510	1,660
23	1,780	2,680	.....	17,500	13,000	22,800	25,700	7,160	2,510	1,910
24	1,910	3,430	.....	14,700	13,000	21,100	24,000	6,870	2,050	1,780
25	1,910	3,230	.....	12,500	15,600	20,000	24,000	6,310	2,050	2,200
26	2,050	2,860	.....	11,700	21,100	18,500	27,600	6,040	2,200	2,050
27	2,050	2,860	.....	11,300	27,600	19,000	29,400	5,770	2,050	2,510
28	2,050	2,510	.....	10,500	30,000	19,500	33,900	5,510	1,910	3,040
29	2,050	2,050	.....	10,500	27,600	19,500	36,600	5,770	1,910	2,680
30	1,910	2,350	.....	9,410	23,400	20,000	31,300	5,250	1,910	2,350
31	1,910	.....	1,430	8,720	.....	20,600	.....	4,750	1,780	.....

NOTE.—Discharge estimated because of ice: Dec. 21–30, 1,600 second-feet; Jan. 1–10, 1,400 second-feet; Jan. 11–20, 1,300 second-feet; Jan. 21–31, 1,800 second-feet; Feb. 1–10, 2,500 second-feet; Feb. 11–20, 3,500 second-feet; Feb. 21–29, 3,200 second-feet.

Monthly discharge of Clearwater River at Kamiah, Idaho, for the year ending Sept. 30, 1916.

[Drainage area, 4,850 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
October	2,860	1,660	1,980	0.408	0.47	122,000
November	4,750	1,780	2,500	.515	.57	149,000
December			2,140	.441	.51	132,000
January			1,510	.311	.36	92,800
February			3,170	.654	.71	182,000
March	20,600	3,230	10,600	2.19	2.52	652,000
April	30,000	9,770	16,100	3.32	3.70	958,000
May	44,400	17,000	24,500	5.05	5.82	1,510,000
June	56,000	21,100	33,800	6.97	7.78	2,010,000
July	31,900	4,750	15,200	3.13	3.61	935,000
August	4,510	1,780	2,910	.600	.69	179,000
September	3,630	1,660	2,250	.464	.52	134,000
The year	56,000		9,710	2.00	27.26	7,060,000

SOUTH FORK OF CLEARWATER RIVER NEAR GRANGEVILLE, IDAHO.

LOCATION.—In 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, Idaho County, and 19 miles above mouth.

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, 1916, when station was discontinued.

GAGE.—Since May 30, 1912, vertical staff in two sections on right bank; lower section, reading from 1.0 foot to 4.0 feet, on rock point of right bank 75 feet below power house; upper section nailed to vertical timbers in tailrace of power plant, at datum 0.22 foot higher than that of lower section, the difference representing fall between the sections at stage 4.0 feet. Previous gages as follows: November 14, 1910, to November 1, 1911, vertical staff reading from 0.5 foot to 11.0 feet, 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 J. T. Kelly.

DISCHARGE MEASUREMENTS.—Made from cable just above power house or, below stage 2.5 feet, by wading. Measured flow of flume is added to that of river to obtain discharge at gage.

CHANNEL AND CONTROL.—Bed composed of large boulders; shifts only at high stages; gradient steep; channel curved at gage. Left bank subject to overflow during extremely high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.30 feet May 7 (discharge, 5,050 second-feet); minimum discharge estimated at 103 second-feet January 17 (stage-discharge relation affected by ice).

1910–1916: Maximum stage recorded, 9.7 feet May 30, 1912 (discharge, 9,830 second-feet); minimum discharge January 17, 1916.

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

DIVERSIONS.—None.

REGULATION.—Operation of power plant causes slight fluctuations in stage.

ACCURACY.—Stage-discharge relation practically permanent; affected by ice December 19 to March 2. Rating curve well defined between 150 and 3,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Open-water records excellent; others poor.

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

Discharge measurements of South Fork of Clearwater River near Grangeville, Idaho, during the year ending Sept. 30, 1916.

[Made by C. G. Paulsen.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 26	5.20	[a] 2,360
Aug. 11	2.59	[b] 383

[a] Includes 99 second-feet in Grangeville Electric Light & Power Co.'s canal.
[b] Includes 100 second-feet in canal.

Daily discharge, in second-feet, of South Fork of Clearwater River near Grangeville, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	213	213	221	380	1,580	3,230	2,770	1,940	485	213
2	213	221	244	380	1,940	3,470	2,550	2,660	460	213
3	435	260	244	386	2,040	3,590	2,660	2,660	435	221
4	435	252	252	410	2,140	4,270	2,990	2,240	410	386
5	339	260	252	410	1,940	4,730	3,230	2,040	435	294
6	339	316	316	362	1,760	4,890	2,990	1,940	410	260
7	232	294	316	339	1,760	5,050	2,990	1,940	410	252
8	221	252	316	386	1,940	4,270	3,230	1,760	386	244
9	221	260	294	990	1,940	4,130	3,350	1,760	435	537
10	244	252	339	1,490	2,040	3,470	3,230	1,670	435	647
11	260	232	339	1,670	2,990	3,110	2,880	1,490	386	485
12	252	213	316	1,850	2,770	2,880	2,770	1,400	362	435
13	252	170	273	1,850	2,550	2,660	2,770	1,400	339	386
14	244	177	339	1,490	2,550	2,440	2,770	1,240	386	294
15	294	260	316	1,400	3,110	2,240	2,990	1,170	339	294
16	316	273	273	1,240	2,990	2,240	3,230	1,100	316	260
17	273	252	260	1,320	2,990	2,240	3,350	1,240	339	252
18	260	232	221	1,400	2,880	2,550	3,470	1,240	537	232
19	252	260	.....	1,760	2,770	2,990	3,990	1,100	485	232
20	244	339	.....	2,550	2,440	2,990	3,470	955	386	213
21	221	294	.....	2,550	2,440	2,990	2,990	890	339	213
22	213	206	.....	2,340	2,340	2,880	2,770	825	316	213
23	213	339	.....	1,940	2,240	2,770	2,550	765	316	244
24	244	386	.....	1,670	2,340	2,660	2,340	705	294	260
25	252	410	.....	1,490	2,990	2,550	2,340	676	273	273
26	294	273	.....	1,400	3,710	2,550	2,340	705	252	252
27	252	260	.....	1,490	4,410	2,550	2,340	676	252	273
28	232	260	.....	1,400	4,130	2,770	2,550	647	244	339
29	232	244	.....	1,320	3,710	2,660	2,340	591	232	252
30	213	294	.....	1,240	3,230	2,660	2,140	537	232	252
31	213	.....	.....	1,240	.....	2,660	.....	485	232	.....

NOTE.—Discharge estimated, because of ice, from observer's notes and weather records, Dec. 19 to Mar. 2, as follows: Dec. 19–31, 180 second-feet; Jan. 1–10, 170 second-feet; Jan. 11–20, 130 second-feet; Jan. 21–31, 210 second-feet; Feb. 1–10, 200 second-feet; Feb. 11–20, 300 second-feet; Feb. 21 to Mar. 2, 380 second-feet.

Monthly discharge of South Fork of Clearwater River near Grangeville, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	435	213	262	16,100
November	410	170	265	15,800
December	339	.....	241	14,800
January	.....	.....	171	10,500
February	.....	.....	290	16,700
March	2,550	.....	1,290	79,300
April	4,410	1,580	2,620	156,000
May	5,050	2,240	3,130	192,000
June	3,990	2,140	2,880	171,000
July	2,660	485	1,300	79,900
August	537	232	360	22,100
September	647	213	297	17,700
The year	5,050	.....	1,090	792,000

TUCANNON RIVER NEAR STARBUCK, WASH.

LOCATION.—In sec. 23, T. 12 N., R. 38 E., half a mile below Pataha Creek and 6 miles east of Starbuck, Columbia County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 8, 1914, to September 30, 1916.

GAGE.—Inclined staff in two sections on left bank; read by Wesley Martin.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from bridge 1 mile below gage.

CHANNEL AND CONTROL.—Bed composed of solid rock. Channel straight for 100 feet above and below gage. Banks of light soil; wooded; left bank high; water overflows right bank at gage height 5.5 feet. Control is vertical drop of 2 feet over solid rock, 100 feet below gage. Stage-discharge relation affected by cutting of left bank at bend at control. Stage of zero flow, according to measurements made September 28, 1915, gage height 0.60 ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.5 feet at 7 p. m. February 10 (discharge, 5,740 second-feet); minimum stage recorded, 1.71 feet at 7.20 a. m. October 2 (discharge, 50 second-feet).

1914–1916: Maximum stage recorded February 10, 1916; minimum stage recorded 1.60 feet August 24–31, 1915 (discharge, 39 second-feet).

ICE.—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; amount diverted probably 10 per cent of usual flow during July and August. A large part of the diverted water seeps back to river above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed when wing dam at control, which is used to divert water into canal, was washed out January 22, and from February 11 to 19, when river was cutting left bank at control; affected by ice December 30 to January 22 and January 28 to February 7. Rating curve used prior to change in January well defined; curve used January 23 to February 10 well defined below 600 second-feet; curve used after February 11 well defined between 100 and 1,500 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used February 11–19. Records good for periods of low water, fair for January and February, and excellent for rest of year.

Daily discharge, in second-feet, of Tucannon River near Starbuck, Wash., for the year ending, Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	53	61	92	.....	.....	225	495	425	360	360	78	69
2	51	61	88	.....	.....	211	495	392	335	360	76	69
3	61	66	94	.....	.....	197	495	495	335	290	78	69
4	81	66	90	.....	.....	197	425	565	335	290	76	69
5	71	64	100	.....	.....	218	360	600	360	251	75	69
6	65	64	103	.....	.....	218	360	635	392	251	72	69
7	61	64	103	.....	.....	270	335	600	425	251	69	72
8	61	64	103	.....	1,400	392	335	565	425	232	69	74
9	61	74	148	.....	2,080	785	310	565	425	218	92	75
10	60	69	129	.....	5,000	1,110	392	460	425	194	81	74
11	59	69	129	.....	2,150	1,110	425	360	425	180	75	70
12	59	74	120	.....	658	980	392	335	392	163	70	69
13	61	70	112	.....	558	860	360	270	460	161	69	69
14	59	71	100	.....	529	785	360	251	425	156	69	69
15	59	71	103	.....	664	565	360	232	425	142	69	69
16	59	73	103	.....	696	495	360	270	425	142	69	69
17	56	74	103	.....	770	425	360	270	425	140	70	72
18	56	91	103	.....	679	425	360	310	460	133	81	69
19	56	97	91	.....	622	425	335	360	460	124	74	69
20	59	103	96	.....	565	1,020	310	495	495	120	72	70
21	60	103	112	.....	495	860	310	495	392	114	69	70
22	59	103	204	.....	425	1,110	290	495	360	101	70	69
23	59	112	304	1,480	392	750	270	460	335	101	69	72
24	61	112	258	323	360	565	270	425	425	98	69	72
25	59	120	230	208	335	565	310	392	360	98	69	75
26	61	112	217	173	310	720	425	360	251	98	67	75
27	61	112	204	162	290	980	565	360	530	94	67	72
28	60	103	180	.....	251	1,020	530	360	460	91	69	75
29	61	102	158	.....	232	785	495	335	392	84	67	75
30	61	100	.....	.....	.....	635	460	360	360	84	65	75
31	59	.....	.....	.....	.....	530	.....	360	.....	81	67	.....

NOTE.—Discharge estimated on account of ice: Dec. 30–31, 148 second-feet; Jan. 1–10, 95 second-feet Jan. 11–22, 80 second-feet; Jan. 28 to Feb. 7, 120 second-feet.

Monthly discharge of Tucannon River near Starbuck, Wash., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	81	51	60.3	3,710
November	120	61	84.2	5,010
December	304	88	138	8,480
January	1,480	.....	153	9,410
February	5,000	.....	700	40,300
March	1,110	197	627	38,600
April	565	270	385	22,900
May	635	232	415	25,500
June	530	251	402	23,900
July	360	81	168	10,300
August	92	65	72.0	4,430
September	75	69	71.1	4,230
The year	5,000	51	271	197,000

PALOUSE RIVER NEAR POTLATCH, IDAHO.

LOCATION.—One-fourth mile above Kennedy Ford, three-fourths mile below Deep Creek, and 3½ miles below Potlatch, Latah County

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 24, 1914, to September 30, 1916.

GAGE.—Stevens continuous water-stage recorder on right bank.

DISCHARGE MEASUREMENTS.—Made from bridge three-fourths mile below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and solid rock; practically permanent. At extremely high stages water flows around gage on right bank.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 13.98 feet at 9.15 a. m. March 21 (discharge, 5,090 second-feet); minimum stage, 0.10 foot at 10 a. m. October 1 and 2 (discharge, 1.5 second-feet).

1914–1916: Maximum stage recorded March 21, 1916; minimum stage recorded, 0.02 foot at 3 a. m. December 21, 1914 (discharge about 1 second-foot).

ICE.—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 26 to February 10. Rating curve well defined. Operation of water-stage recorder satisfactory except March 10–15, when it was removed, March 20–22 and 27, when float was caught at floor (stage during these periods determined from frequent readings by observer), and May 7–15, when float was caught (no record). Daily discharge for greater part of year ascertained by use of discharge integrator; for September by applying to rating table mean daily gage height obtained by inspecting gage-height graph; for a number of days scattered through the year by, applying gage heights for shorter periods. Records excellent except for periods of extremely low water and for period during which stage-discharge relation was affected by ice.

Discharge measurements of Palouse River near Potlatch, Idaho, during the year ending Sept. 30, 1916.

[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.*
Feb. 1	2.67	88	Mar. 11	12.05	3,540	Mar. 27	13.30	4,520
Mar. 9	12.75	3,910	16	5.45	936	29	9.56	2,210
10	13.20	4,400	16	5.47	985	Aug 25	.71	24.2

Daily discharge, in second-feet, of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	6.4	13.0	27	.....	294	1,170	1,000	220	79	25	13.4
2	7.4	10.5	25	.....	301	1,300	1,070	208	86	20	13.9
3	13.2	12.0	27	.....	267	1,320	1,020	185	101	16.0	18.0
4	8.9	11.3	39	.....	200	1,290	896	176	122	15.0	15.4
5	11.0	14.3	45	.....	223	1,270	807	202	172	17.0	13.9
6	13.3	10.0	49	.....	242	1,170	837	195	74	16.0	16.3
7	13.0	16.0	89	.....	255	1,050	.....	158	78	15.2	16.8
8	10.6	9.3	60	.....	511	1,070	.....	110	76	15.0	15.8
9	9.5	12.9	83	.....	3,070	1,200	.....	72	78	16.8	18.5
10	13.2	15.3	80	.....	4,230	1,350	.....	162	55	18.7	17.4
11	13.0	15.9	103	1,010	3,430	1,640	.....	147	38	14.7	16.8
12	10.0	12.2	66	777	3,080	2,240	.....	72	42	16.1	21
13	11.6	14.1	54	838	2,740	2,040	.....	112	48	19.4	18.0
14	11.8	15.9	62	829	2,060	1,410	.....	106	62	16.3	21
15	12.0	14.9	48	984	1,290	1,260	.....	107	56	16.2	15.4
16	11.9	13.6	42	1,100	918	1,180	250	90	48	18.8	18.5
17	12.4	20	34	1,180	938	1,070	255	77	52	20	19.7
18	12.3	24	38	1,060	1,040	1,060	266	37	51	18.4	18.5
19	13.1	18.8	32	880	1,330	1,060	397	64	62	25	16.3
20	14.2	25	34	776	2,960	902	470	120	89	35	16.3
21	12.7	117	51	691	4,960	876	428	122	67	36	15.8
22	12.8	31	331	582	4,110	790	400	155	43	20	15.4
23	14.6	38	488	527	3,200	755	356	158	38	20	14.9
24	14.0	73	211	506	1,980	608	298	86	38	19.5	14.4
25	13.0	38	108	466	1,580	712	306	85	35	19.1	15.8
26	12.3	46	.....	531	3,170	751	283	101	33	15.8	13.0
27	12.6	44	.....	520	4,320	526	290	104	36	21	15.4
28	12.5	37	.....	472	3,320	399	266	146	36	15.4	14.9
29	13.1	30	.....	444	2,240	562	248	141	33	17.4	14.9
30	14.0	27	.....	.....	1,510	851	266	109	31	13.4	13.0
31	13.0	.....	.....	.....	1,170	.....	236	.....	30	15.8	.....

NOTE.—Discharge estimated, on account of ice, as follows: Dec. 26–31, 60 second-feet; Jan. 1–10, 30 second-feet; Jan. 11–20, 35 second-feet; Jan. 21–31, 65 second-feet; Feb. 1–10, 95 second-feet. Operation of water-stage recorder May 7–15 not satisfactory; discharge estimated at 540 second-feet by comparison with record of flow obtained at Winona.

Monthly discharge of Palouse River near Potlatch, Idaho, for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	14.6	6.4	12.0	738
November	117	9.3	26.0	1,550
December	488	.....	83.4	5,130
January	.....	.....	44.0	2,710
February	1,180	.....	521	30,000
March	4,960	200	1,970	121,000
April	2,240	399	1,100	65,500
May	1,070	236	500	30,700
June	220	37	128	7,620
July	172	30	60.9	3,740
August	36	13.4	19.0	1,170
September	21	13	16.3	970
The year	4,960	6.4	373	271,000

PALOUSE RIVER NEAR WINONA, WASH.

LOCATION.—In sec. 5, T. 16 N., R. 39 E., 1,000 feet below Rock Creek, 7 miles southwest of Winona, Whitman County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 16, 1914, to September 30, 1916.

GAGE.—Inclined staff on right bank; installed November 12, 1915; read by Theodore McDougall. Prior to November 12, 1915, inclined and vertical staff on right bank about 200 feet below Rock Creek.

DISCHARGE MEASUREMENTS.[1]—Made from cable at gage or by wading.

CHANNEL AND CONTROL.—Bed consists of gravel; shifting. Right bank high; left bank subject to overflow at high stages. Stage of zero flow, according to measurements made November 12, 1915, gage height, 1.0±0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 14.0 feet February 11 (discharge, 11,200 second-feet); minimum stage recorded, 0.51 foot October 1 (discharge, 11 second-feet).

ICE.—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 individually small they probably take in the aggregate a large proportion of the extreme low-water flow.

REGULATION.—Flow slightly regulated by splash dams in Idaho.

ACCURACY.—Stage-discharge relation changed during high water February 10–11; affected by ice January 11–21 and January 28 to February 7. Rating curve for gage used prior to November 12 well defined; curve for new gage poorly defined before change in February and well defined thereafter. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Open-water records good; others fair.

Discharge measurements of Palouse River near Winona, Wash., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Nov. 12	C. O. Brown	[a]1.66	15.9	Feb. 15	C. G. Paulsen	10.66	6,200
Jan. 21	do	2.49	68	16	do	10.70	6,380
25	do	4.36	635	24	C. O. Brown	6.34	1,900
25	do	4.33	605	Mar. 4	do	5.00	1,060
Feb. 13	C. G. Paulsen	8.15	3,120	May 24	C. G. Paulsen	4.09	573
14	do	8.14	3,280	Aug. 19	C. O. Brown	2.02	61
14	do	8.87	4,070				

[a] Old gage read 0.62 foot.

[1] For measurements of discharge of Rock Creek at mouth and of Palouse River above mouth of Rock Creek, see Miscellaneous measurements, p. 182.

Daily discharge, in second-feet, of Palouse River near Winona, Wash., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	11	30	89	77	.....	1,380	2,880	1,090	340	224	68	55
2	14	37	77	83	.....	1,040	2,720	1,040	340	200	68	51
3	19	27	73	83	.....	1,040	2,640	980	308	212	73	47
4	17	21	69	83	.....	1,040	2,560	928	308	160	68	49
5	14	21	83	66	.....	1,090	2,420	980	264	178	68	64
6	16	20	124	77	.....	1,040	2,350	1,060	264	200	68	59
7	13	23	124	77	.....	928	2,140	1,140	278	200	64	59
8	12	27	139	89	185	1,140	1,930	826	224	160	64	59
9	12	23	175	89	248	5,350	1,960	928	200	144	68	55
10	19	20	131	89	7,040	8,240	2,000	826	200	144	64	59
11	19	27	147	.....	10,200	7,040	2,420	728	160	136	73	55
12	14	21	116	.....	6,750	5,900	2,490	632	250	136	64	43
13	12	38	131	.....	3,300	5,090	2,800	586	200	114	89	37
14	17	31	147	.....	3,580	4,340	2,560	540	160	101	68	43
15	14	33	116	.....	6,180	3,480	2,140	496	178	101	64	50
16	14	39	139	.....	6,320	2,720	1,860	434	169	101	68	47
17	16	45	116	.....	6,040	2,350	1,790	434	178	114	64	42
18	18	49	96	.....	4,960	2,210	1,650	444	160	114	59	43
19	16	66	89	.....	3,890	2,210	1,720	454	169	108	59	40
20	16	66	96	.....	3,300	4,340	1,580	591	144	101	59	40
21	14	66	96	.....	2,800	5,760	1,510	728	144	101	59	36
22	14	61	102	116	2,420	7,040	1,510	632	212	101	59	31
23	14	131	514	2,170	2,070	6,890	1,380	609	218	121	59	35
24	23	102	690	1,160	1,860	5,090	1,320	586	224	101	64	45
25	27	83	432	556	1,650	4,000	1,090	454	200	89	64	59
26	17	89	196	358	1,580	9,140	1,320	434	200	89	59	59
27	17	102	116	234	1,720	8,090	1,320	434	224	89	55	55
28	20	89	147	.....	1,510	7,340	1,580	414	264	78	55	51
29	22	83	102	.....	1,260	5,620	1,510	414	224	84	55	51
30	25	83	77	.....	.....	4,110	1,440	340	250	78	55	51
31	27	.....	89	.....	.....	3,300	.....	414	.....	68	55	.....

NOTE.—Gage not read Oct. 28–31, Dec. 3, Feb. 12, 18, Apr. 9, 29, May 6, 18, 20, 23, and June 23; discharge interpolated. Discharge estimated, on account of ice, Jan. 11–21, 55 second-feet, Jan. 28–31, 190 second-feet, Feb. 1–7, 165 second-feet.

Monthly discharge of Palouse River near Winona, Wash., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	27	11	16.9	1,040
November	131	20	51.8	3,080
December	690	69	156	9,590
January	2,170	.....	218	13,400
February	10,200	.....	2,760	159,000
March	9,140	928	4,140	255,000
April	2,880	1,090	1,950	116,000
May	1,140	340	664	40,800
June	340	144	222	13,200
July	224	68	127	7,810
August	89	55	63.8	3,920
September	64	31	49.0	2,920
The year	10,200	11	861	626,000

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PALOUSE RIVER AT HOOPER, WASH.

LOCATION.—In sec. 25, 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 March 31, 1916, when station was discontinued.

GAGE.—Vertical and inclined staff in four sections on right bank, 300 feet above and across the river from Oregon-Washington Railroad & Navigation Co.'s water tank; read by Mrs. L. C. Huffman. April 1 to August 31, 1897, vertical staff 1 mile above site of present gage; since September 9, 1897, several gages at present site and datum.

DISCHARGE MEASUREMENTS.—Made from a cable 200 feet below highway bridge at Hooper, or by wading.

CHANNEL AND CONTROL.—Gage is in long riffle-controlled pool. Bed of stream composed of solid rock covered with loose boulders which shift during floods. Left bank high; not subject to overflow; right bank low and covered with brush.

EXTREMES OF DISCHARGE.—Maximum stage recorded October 1, 1915, to March 31, 1916, 16.0 feet at 11.30 p. m. February 10 (discharge, 17,800 second-feet); minimum stage recorded, 0.55 foot October 2 (discharge, 6 second-feet).

1897–1916: 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.

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

DIVERSIONS.—Several small irrigation ditches divert water above the gage, the largest being the Palouse Irrigation & Power Co.'s canal (capacity about 15 second-feet).

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 20 and 10,000 second-feet. Gage read once daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records excellent except for extremely high and low water.

Discharge measurements of Palouse River at Hooper, Wash., during the year ending Sept. 30, 1916.

[Made by C. O. Brown.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
Oct. 11	0.70	11.9
Jan. 24	6.54	2,430
Feb. 12 [a]	10.30	7,140

[a] Made by observing velocity of floating ice at cable section; area of section obtained from previous measurements.

Daily discharge, in second-feet, of Palouse River at Hooper, Wash., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1	8	33	90	105	330	1,620	16	22	42	121	76	7,980	3,920
2	6	33	90	98	315	1,200	17	22	52	121	70	7,470	3,070
3	7	33	98	105	286	1,100	18	22	52	121	70	5,920	2,400
4	7	33	98	105	244	1,040	19	25	58	90	70	5,130	2,320
5	8	33	98	98	232	1,150	20	25	66	98	83	4,160	4,520
6	8	27	98	90	208	1,150	21	25	70	105	76	3,700	6,200
7	8	25	147	90	196	1,100	22	25	70	105	98	3,070	9,000
8	8	29	156	105	196	1,040	23	25	70	271	2,400	2,160	10,700
9	10	31	147	90	271	5,780	24	23	156	591	2,580	2,160	7,300
10	10	25	175	105	9,540	9,000	25	23	113	271	1,040	1,810	9,000
11	10	25	156	105	14,200	10,800	26	23	90	330	634	1,740	13,800
12	15	25	147	90	7,640	8,830	27	23	147	315	362	2,020	9,900
13	22	31	147	76	5,130	5,390	28	23	121	258	550	1,810	9,900
14	22	31	138	76	4,160	5,650	29	23	98	156	470	1,740	8,490
15	22	38	138	76	8,830	4,880	30	25	90	156	396	.....	6,500
							31	25	.....	156	300	.....	4,520

Monthly discharge of Palouse River at Hooper, Wash., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	25	6	17.7	1,090
November	156	25	58.2	3,460
December	591	90	167	10,300
January	2,580	70	345	21,200
February	14,200	196	3,540	204,000
March	13,800	1,040	5,520	339,000
The period	.....	.....	.....	579,000

ROCK CREEK NEAR EWAN, WASH.[1]

LOCATION.—In sec. 13, T. 19 N., R. 40 E., at county bridge 200 feet below outlet of Rock Lake, 1½ miles north of Ewan, 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, 1916.

GAGE.—Vertical staff on downstream caisson of second bridge pier from left bank; read by Herbert Babcock. Gage used from October 15, 1903, to September 30, 1905, was vertical staff on fifth pile bent of left approach to bridge at outlet of Rock Lake, at different datum.

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

CHANNEL AND CONTROL.—Bed of stream composed of solid rock covered with sharp volcanic débris. Right bank high; left bank low and subject to overflow at gage height 5.0 feet, when stream flows in two channels. Control for stages up to gage height 2 feet is rock riffle 100 feet below gage; for stages above 2 feet it is an unfinished earth and loose rock dam half a mile below gage; low-water control permanent; high-water control changeable. Stage of zero flow, according to measurements made October 29, 1914, gage height 0.35 ± 0.05 foot.

[1] For discharge of Rock Creek at mouth see Miscellaneous measurements, p. 182.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.71 feet February 17 (discharge, 1,520 second-feet); minimum stage recorded, 0.6 foot October 1–3 8–28, and November 4–6 (discharge, 1.5 second-feet).

1903–1905 and 1914–1916: 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).

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

DIVERSIONS.—None.

REGULATION.—Gates in low dam at outlet of Rock Lake are seldom changed.

ACCURACY.—Stage-discharge relation changed during high water February 16. Rating curves used before and after change fairly well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Rock Creek near Ewan, Wash., during the year ending Sept. 30, 1916.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 16	C. O. Brown	6.35	1,340	Mar. 15	C. O. Brown	5.27	909
25	do	4.26	529	15	do	5.23	870
Mar. 1	do	3.45	360	May 25	C. G. Paulsen	1.80	98
1	do	3.35	345	Aug. 26	C. O. Brown	1.16	23

Daily discharge, in second-feet, of Rock Creek near Ewan, Wash., for the year ending Sept. 30, 1916.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	1.5	3.2	9.0	21	50	350	790	174	75	57	43	23
2	1.5	3.2	9.3	22	52	310	755	160	72	57	44	22
3	1.5	3.2	9.3	22	50	292	720	160	70	57	43	22
4	3.2	1.5	9.3	22	49	275	655	153	69	59	43	22
5	3.2	1.5	9.3	22	50	275	595	153	68	57	43	22
6	3.2	1.5	9.3	22	50	330	565	153	68	56	42	22
7	3.2	2.0	9.7	22	52	330	485	146	66	56	42	22
8	1.5	2.4	9.7	23	52	330	390	139	66	55	42	21
9	1.5	2.4	10	23	52	310	390	139	65	54	41	21
10	1.5	2.4	10	24	85	1,180	390	139	64	53	41	20
11	1.5	2.7	10	24	134	1,420	390	132	64	52	40	19
12	1.5	2.7	11	25	465	1,370	370	132	62	50	38	19
13	1.5	2.7	13	24	830	1,370	370	125	62	50	38	19
14	1.5	3.0	13	24	770	1,060	350	118	61	50	37	18
15	1.5	3.2	14	23	900	860	310	111	62	49	36	18
16	1.5	4.0	14	23	1,420	720	310	111	61	49	36	18
17	1.5	4.5	15	23	1,520	655	310	111	61	48	35	18
18	1.5	4.5	15	23	1,370	565	310	104	61	48	34	17
19	1.5	4.5	16	22	1,370	485	310	104	60	48	32	17
20	1.5	4.8	17	23	1,100	655	310	104	60	47	32	17
21	1.5	5.3	17	23	940	720	310	104	61	47	30	17
22	1.5	5.5	18	25	825	720	292	97	61	46	27	16
23	1.5	5.8	19	26	790	860	292	96	60	47	26	16
24	1.5	6.5	20	28	565	900	275	94	60	46	26	16
25	1.5	7.2	20	29	535	1,020	275	90	59	46	25	16
26	1.5	7.9	20	30	485	1,180	275	86	59	46	24	15
27	1.5	7.9	21	32	435	1,140	275	83	57	45	24	15
28	1.5	9.0	21	34	370	1,100	242	82	60	45	24	14
29	3.2	9.0	21	37	350	1,020	210	80	59	44	24	14
30	3.2	9.0	21	42	.....	1,020	210	79	57	44	24	13
31	3.2	.....	21	48	.....	980	.....	76	.....	44	23	.....

Monthly discharge of Rock Creek near Ewan, Wash., for the year ending Sept. 30, 1916.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	3.2	1.5	1.88	116
November	9.0	1.5	4.43	264
December	21	9.0	14.6	898
January	48	21	26.2	1,610
February	1,520	49	542	31,200
March	1,420	275	768	47,200
April	790	210	391	23,300
May	174	76	117	7,190
June	75	57	63.0	3,750
July	59	44	50.1	3,080
August	44	23	34.2	2,100
September	23	13	18.3	1,090
The year	1,520	1.5	168	122,000

MISCELLANEOUS DISCHARGE MEASUREMENTS.

Discharge measurements of streams in the Snake River basin at points other than regular gaging stations, made during the year ending September 30, 1916, are listed in the following table:

Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1916.

Date.	Stream.	Tributary to or diverting from.	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept. 8	Fish Creek	Snake River	Wilson, Wyo.		84.5
12	Hoback River	do	Just above mouth, near Cheney, Wyo.		350
July 16	Salt River	do	Lower ford near Alpine, Idaho.		619
Sept. 5	do	do	McNeel's ford near Alpine, Idaho.	2.16	732
Aug. 4	Henrys Fork	do	Outlet of Henrys Lake, near Yellowstone, Mont.		104
July 25	Danskin canal	do	Heading at Porterville bridge, near Blackfoot, Idaho.	2.51	133
Aug. 26	do	do	do	3.11	151
Sept. 15[a]	do	do	do	2.33	102
May 24	Sand Creek	do	Below intersection with Idaho (Government) canal near Firth, Idaho.		131
June 2	Upper Fort Hall canal	Blackfoot River	South boundary of Fort Hall Indian Reservation, near Tyhee, Idaho.		77.3
Aug. 5	do	do	do		181
Mar. 17	Spring Creek	Portneuf River	⅛ mile below head in N.W. ¼, sec. 5, T. 4 S., R. 34 E., about 11 miles south of Blackfoot, Idaho.		195
April 20	Birch Creek feeder canal.	Birch Creek	Near headgates in sec. 24, T. 14 S., R. 23 E., about 5 miles southeast of Oakley, Idaho.		5.8
19	Big Cottonwood Creek	Snake River	Former gaging station near Oakley, Idaho, in sec. 19, T. 13 S., R. 21 E., ¼ mile above heading of Twin Falls-Oakley Land & Water Co., feeder canal.		31.0
22	do	do	do		27.5
Aug. 20	do	do	do		1.7
12	Salmon Falls Creek	do	Above heading of Upper Vineyard ditch in sec. 5, T. 44 N., R. 63 E., 10 miles southwest of Contact, Nev.		410

[a] Furnished by S. E. Vance, jr., deputy state engineer.

Miscellaneous discharge measurements in Snake River drainage basin during the year ending Sept. 30, 1916—Continued.

Date.	Stream.	Tributary to or diverting from.	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Apr. 11	Jakes Creek	Salmon Falls Creek.	Below Hubbard ranch, in sec. 33, T. 44 N., R. 63 E., about 9 miles southwest of Contact, Nev.		3.8
11	do	do	do		3.9
13	Shoshone Creek	do	Above heading of North Side ditch, in sec. 17, T. 47 N., R. 65 E., about 11 miles northeast of San Jacinto, Nev.		303
Sept. 3	do	do	do		6.8
Nov. 2	Big Wood River	Snake River	Below Camas Creek and above Magic dam near Stanton, Idaho.	2.40	96.3
June 24[a]	do	do	Above North Gooding diversion near Gooding, Idaho.		514
July 17[a]	Little Wood River	Big Wood River	Below Richfield diversion near Richfield, Idaho.		698
Mar. 25	Grandview canal	Bruneau River	Former gaging station near Grandview, Idaho, in sec. 35, T. 5 S., R. 4 E., 1½ miles below heading.		0.0
Aug. 21	do	do	do	4.29	81
Apr. 28[b]	Bull Run Creek	South Fork of Owyhee.	Highway Bridge on Tuscarora-Whiterock Road at mouth of canyon in sec. 35, T. 44 N., R. 51 E., near Edgemont, Elko County, Nev.	[c]2.77 Below R. P.	136
Aug. 31	do	do	do	[c]4.24 Below R. P.	0.2
July 11	Lambing Creek	Boise River (above Cottonwood Creek).	Near Arrowrock, Idaho		.5
May 13	Krall's ditch	Smith Creek	Near Lenox, Idaho		2.9
Apr. 9	Deer Creek	Boise River	Arrowrock, Idaho		12.0
30	do	do	do		5.8
June 4	Willow Creek	Malheur River	Former gaging station in sec. 6, T. 14 S., R. 41 E., 2 miles south of Malheur, Oreg.	1.71	35.8
Jan. 25	Seepage	East portal of Tunnel No. 1.	Near Namorf, Oreg		.8
Aug. 31	South Fork of Payette River.	Payette River	Ranger's cabin 3 miles above Garden Valley, Idaho.	4.76	863
June 15	Idaho Power Co.'s canal.	Payette River	Horseshoe Bend, Idaho		698
June 26	Grangeville Electric Light & Power Co.'s canal.	South Fork Clearwater River	Just above power plant near Grangeville, Idaho.		99
Aug. 11	do	do	do		100
Feb. 24	Palouse River	Snake River	Above Rock Creek, near Winona, Wash.		1,110
Oct. 11	Washington Development Co.'s canal.	Palouse River	Hooper, Wash	1.73	9.3
Oct. 12	do	do	do	1.30	3.9
12	do	do	do	1.15	2.9
12	do	do	do	.90	.83
Nov. 12	Rock Creek	do	Mouth		6.7
May 24	do	do	do		128

[a] 10 second-feet diverted above bridge for irrigation.
[b] Reference point is 8d nail in side of downstream end of center beam of bridge.
[c] Furnished by Idaho Irrigation Co.

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 Superin-

tendent 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., 704, Journal 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., 606 Post Office Building.
Tacoma, Wash., 406 Federal Building.
San Francisco, Cal., 328 Customhouse.
Los Angeles, Cal., 619 Federal Building.
Austin, Tex., Capitol 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 4,100 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September, 1890.
12th A, pt. 2	....do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions. measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 2	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.

Stream flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
20th A, pt. 4	Monthly discharge (also for many earlier years)	1898.
W 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A, pt. 4	Monthly discharge	1899.
W 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907–8.
W 261 to 272	do	1809.
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.
W 431 to 444	do	1916.

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 1916. 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 1916, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, and 431, which contain records for the New England streams from 1903 to 1916. 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, 1899–1916.

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	[l] 82, 83	[k] 83, 84	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 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	26	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
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444

[a] Rating tables and index to Water-Supply Papers 35-39 contained in Water-Supply Paper 39. Tables fos 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 for monthly charge 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 (p. xxxii).

GAGING STATIONS.

NOTE.—Date after a date indicates that station was being maintained September 30, 1916. 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), nead Hoodsport, Wash., 1910–11; 1913.
Nisqually River near Ashford, Wash., 1910–1914.
Nisqually River near La Grande, Wash., 1906–1911.
Puyallup River near Electron, Wash., 1909–
Puyallup River near Alderton, Wash., 1914–
Puyallup River at Puyallup, Wash., 1914–
Carbon River at Fairfax, Wash., 1910–1912.
White River below Forks, near Enumclaw, Wash., 1911–12.

Nooksack River,[1] North Fork (head of Nooksack River), near Glacier, Wash., 1910–11.
Nooksack River near Deming, Wash., 1910–11.
Middle Fork of Nooksack River at ranger station near Deming, Wash., 1910–11.
Middle Fork of Nooksack River near Deming, Wash., 1910–11.

COLUMBIA RIVER BASIN.

Columbia River at Trail, British Columbia, 1913–
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., 1910–1915.
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., 1910–1915.
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 of 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–
Stillwater River near Kalispell, Mont., 1906–7.
Whitefish River near Kalispell, Mont., 1906.
Ashley Creek, Kila, Mont., 1916–
Swan River near Big Fork, Mont., 1910–11.
Little Bitterroot River near Marion, Mont., 1910–

[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., 1910–1915.
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 North Yakima, Wash., 1897; 1904; 1911; 1912.
Yakima River at Union Gap, near Yakima City, 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.
Yakima River near Richland, Wash., 1906–1911.
Cabin Creek near Easton, Wash., 1909–1911.
Kachess Lake (on Kachess River) near Easton, Wash., 1905–

Columbia River tributaries—Continued.
Yakima River tributaries—Continued.
New Reservation canal near Parker (Yakima City), Wash., 1904–
Old Reservation canal near Parker (Wapato), Wash., 1904–
Sunnyside canal near Parker (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 of Yellowstone National Park, 1913–
Jackson Lake (Snake River) at Moran, Wyo., 1909–10 (fragmentary); 1911–
Snake River [1] near Moran, Wyo., 1903–
Snake River [1] at Grovont, Wyo., 1899.
Snake River at Alpine, Idaho, 1916–
Snake River [1] near Lyon, Idaho, 1903–1911.
Snake River [1] 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 at Porterville Bridge near Blackfoot, Idaho, 1916–
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 at Riparia, Wash., 1916–
Snake River near Burbank, Wash., 1907–
Pacific Creek near Moran, Wyo., 1906.
Buffalo River near Elk, Wyo., 1906.
Henrys Fork [2] at Warm River, Idaho, 1910–1915.
Henrys Fork near Ora, Idaho, 1902–1909.
Henrys Fork in canyon above Fall River, Idaho, 1890–91.
Henrys Fork near Rexburg, Idaho, 1909–
Warm River at Warm River, Idaho, 1912–1915.
Robinson Creek at Warm River, Idaho, 1912–1915.

[1] Decision of United States Geographic Board; formerly called South Fork of Snake River.
[2] Decision of United States Geographic Board; formerly called North Fork of Snake River.

Columbia River tributaries—Continued.
Snake River tributaries—Continued.
Malheur River near Ontario, Oreg., 1903–4.
South Fork of Malheur River at Riverside, Oreg., 1910–1913; 1913–1915.
North Fork of Malheur River at Scotts ranch, near Beulah, Oreg., 1914.
North Fork of Malheur River at Foley's ranch, near Beulah, Oreg., 1909–1912; 1913–14.
Vines ditch near Little Valley, Oreg., 1904–5; 1914.
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; 1912–1915.
Willow Creek near Brogan, Oreg., 1910–
Willow Creek at Dell, Oreg., 1904–1906.
Cow Creek near Brogan, Oreg., 1912–
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., 1915–16.
Burnt River near Hereford, Oreg., 1915–16.
Burnt River near Bridgeport, Oreg., 1915–16.
Middle Fork of Burnt River near Audrey, Oreg., 1915–16.
South Fork of Burnt River near Unity, Oreg., 1915–16.
South Fork of Burnt River at Hardman ranch near Unity, Oreg., 1916–
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; 1913–1916.
Baldock Slough at Baker, Oreg., 1913; 1914.
Old Settlers Slough at Baker, Oreg., 1913; 1914.

Columbia River tributaries—Continued.
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., 1911–1916.
Sandy River above Bull Run River, near Bull Run, Oreg., 1910–1912.
Sandy River below Bull Run River, near Bull Run, Oreg., 1910–1914.
Clear Fork of Sandy River near Welches, Oreg., 1913; 1914–15.
Lost Creek near Brightwood, Oreg., 1913–
Sandy River canal near Marmot, Oreg., 1916–
Still Creek near Rowe, Oreg., 1910–1912.
Salmon River near Rowe, Oreg., 1910–1912.
Salmon River at Welches, Oreg., 1913–14.
Salmon River at Fish Hatchery, near Brightwood, Oreg., 1912–13.
Bull Run River near Bull Run, Oreg., 1895–
Little Sandy River near Marmot, Oreg., 1913–
Little Sandy River near Bull Run, Oreg., 1911–1913.
Little Sandy flume near Bull Run, Oreg., 1912–13.
Willamette River, Middle Fork (head of Willamette River), above Salt Creek, near Oakridge, Oreg., 1913–14.
Willamette River, Middle Fork, below North Fork, near Oakridge, Oreg., 1911–12.
Willamette River, Middle Fork, at Jasper, Oreg., 1905–1912. 1913–
Willamette River at Springfield, Oreg., 1911–1913.
Willamette River at Albany, Oreg., 1878–1880; 1892–
Willamette River at Salem, Oreg., 1909–
Willamette River at Oregon City, Oreg., 1909–1912.
Salt Creek near Oakridge, Oreg., 1913–14.
Salmon Creek near Oakridge, Oreg., 1913–
North Fork of Middle Fork of Willamette River near Oakridge (Hazeldell), Oreg., 1909–1912; 1913–
Fall Creek near Fall Creek, Oreg., 1911.
Coast Fork of Willamette River near Goshen, Oreg., 1905–1912.
Row River near Disston, Oreg., 1910–1913.
McKenzie River at Clear Lake, Oreg., 1912–1915.
McKenzie River at McKenzie Bridge, Oreg., 1910–
McKenzie River at Martins Rapids, Oreg., 1910–11.
McKenzie River near Springfield, Oreg., 1905–1915.
Eugene power canal near Walterville, Oreg., 1912–1915.
North Santiam River near Hoover, Oreg., 1910–13.
North Santiam River at Detroit, Oreg., 1907–1909.
North Santiam River at Niagara, Oreg., 1908–
North Santiam River at Mehama, Oreg., 1905–1907; 1910–1914.
Santiam River at Jefferson, Oreg., 1905–6; 1908–
Marion Fork of Santiam River at Marion Lake, near Hoover, Oreg., 1907; 1909–1912.
Puzzle Creek near Detroit (Hoover), Oreg., 1907; 1909.
North Fork of Puzzle Creek near Hoover, Oreg., 1909–1912.
South Fork of Puzzle Creek near Hoover, Oreg., 1909–1912.
Pamelia Creek near Detroit, Oreg., 1907; 1909; 1913.

[1] Records published in U. S. Geol. Survey Water-Supply Paper 272, pp. 428–429.

Columbia River tributaries—Continued.
Williamette River tributaries—Continued.
Santiam River tributaries—Continued.
Whitewater Creek near Detroit, Oreg., 1907; 1913.
Breitenbush Creek near Detroit, Oreg., 1910–1913.
South Santiam River near Cascadia, Oreg., 1910–1913.
South Santiam River near Foster, Oreg., 1911.
South Santiam River at Waterloo, Oreg., 1905–1907; 1910–11.
Middle Santiam River near Foster, Oreg , 1911.
Luckiamute River near Suver, Oreg., 1905–1911.
Yamhill River, South Fork (head of Yamhill River), at Sheridan, Oreg., 1906–1913.
Yamhill River at La Fayette, Oreg., 1908–1914.
Molalla River near Molalla, Oreg., 1905; 1909–
Clackamas River near Cazadero, Oreg., 1909; 1916–
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., 1913–14; 1916.
Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., 1909–1914; 1916–
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; 1916–
Ohanapecosh River near Lewis, Wash., 1907–
Cowlitz River at Lewis, Wash., 1911–1916.
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., 1911–1915.
Lake Creek at outlet of Packwood Lake, near Lewis, Wash., 1911–
Lake Creek at mouth, near Lewis, Wash., 1907–1915.
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.
Youngs River near Astoria, Oreg., 1916–

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.

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 Goverrment 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 Harnei 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 geological 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 basin, 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 basin, the geologic history, physiography and river history, climate, settlement, and development, population, and transportation; gives steam-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 reconnaissance 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.

86. Ellensburg, Wash. 5c.

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.

104. Silver City, Idaho. 5c.

106. Mount Stuart, Wash.

*139. Snoqualmie, Washington.

[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.

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 calssifiable 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 akaline 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. 15c. [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 wast 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 water-works 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.

427. Bibliography and index of the publications of the United States Geological Survey relating to ground water, by O. E. Meinzer. 1918. 169 pp., 1 pl.

Includes publications prepared, in whole or in part, by the Geological Survey that treat any phase of the subject of ground water or any subject directly applicable to ground water. Illustrated by map showing reports that cover specific areas more or less thoroughly.

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 140. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891–92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. *Pt. III, Irrigation, xi, 486 pp., 77 pls. $1.85. Contains:

*American irrigation engineering, by H. M. Wilson, pp. 101–349, pls. 111 to 146. Discusses the economical aspects of irrigation, alkaline drainage, silt, and sedimentation; gives brief history of legislation; describes perennial canals in Idaho, California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892–93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. *Pt. II, Accompanying papers, xx, 597 pp., 73 pls. $2.10. Contains:

*The potable waters of eastern United States, by W. J. McGee, pp. 1–47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

*Natural mineral waters of the United States, by A. C. Peale, pp. 49–88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral-spring resorts; contains also some analyses.

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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.

616. The data of geochemistry (third edition), by F. W. Clarke. 1916. 821 pp. 45c.

Earlier editions were published as Bulletins 330 and 491. Contains a discussion of the statement and interpretation of water analyses and a chapter on "Mineral wells and springs" (pp. 179–216). Discusses the definition and classification of mineral waters, changes in the composition of water, deposits of calcareous, ocherous, and siliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to volcanism. Describes the different kinds of ground water and gives typical analyses. Includes a brief bibliography of papers containing water analyses.

INDEX BY AREAS AND SUBJECTS.

[A=Annual Reports; M=Monograph; B=Bulletin; P=Professional Paper; W=Water-Supply Paper; G F=Geologic folio.]

[1] Many of the reports contain brief subject bibliographies. See abstracts.

[2] Many analyses of river, spring, and well waters are scattered through publications, as noted in abstracts.

INDEX OF STREAMS.

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