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ALBERT B. FALL, Secretary

---

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, Director

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Water-Supply Paper 460

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# SURFACE WATER SUPPLY OF THE UNITED STATES

1917

## PART X. THE GREAT BASIN

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Prepared in cooperation with the States of  
UTAH, NEVADA, CALIFORNIA, OREGON, AND WYOMING



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# SURFACE WATER SUPPLY OF THE GREAT BASIN, 1917.

## AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting records or measurements of flow made on streams in the United States during the year ending September 30, 1917.

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

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

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

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

*Annual appropriations for the fiscal years ending June 30, 1895-1918.*

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
1918.....	175,000

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 pages 13 and 14.

Measurements of stream flow have been made at about 4,240 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1917, 1,180 gaging stations were being maintained by the Survey and the cooperating organizations. Many

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

### DEFINITION OF TERMS.

The volume of water flowing in a stream—the “run-off” or “discharge”—is expressed in various terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those that represent a rate of flow, as second-feet, gallons per minute, 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.

“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.

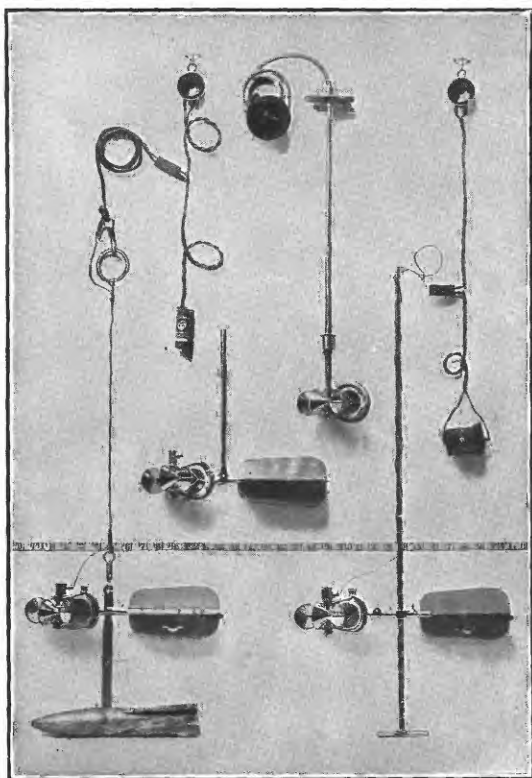
An “acre-foot,” equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

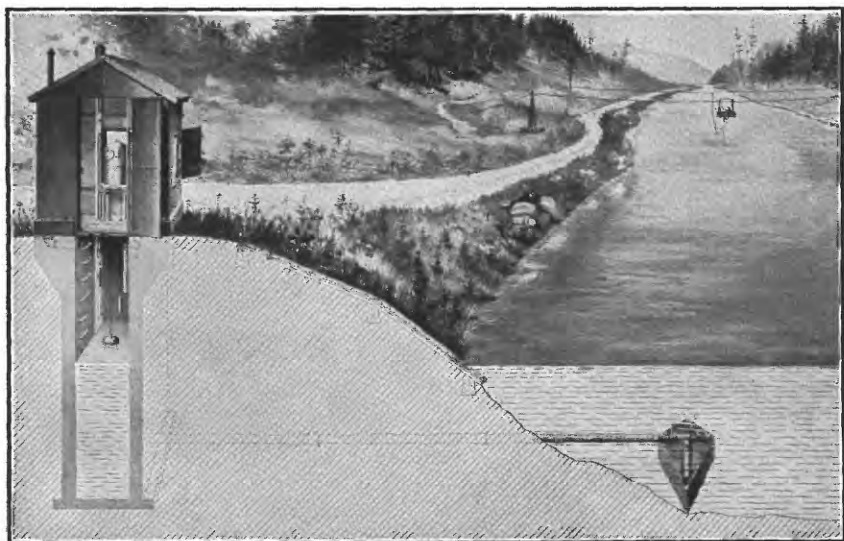
“Stage-discharge relation,” an abbreviation for the term “relation of gage height to discharge.”

“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 section or sections at all stages.

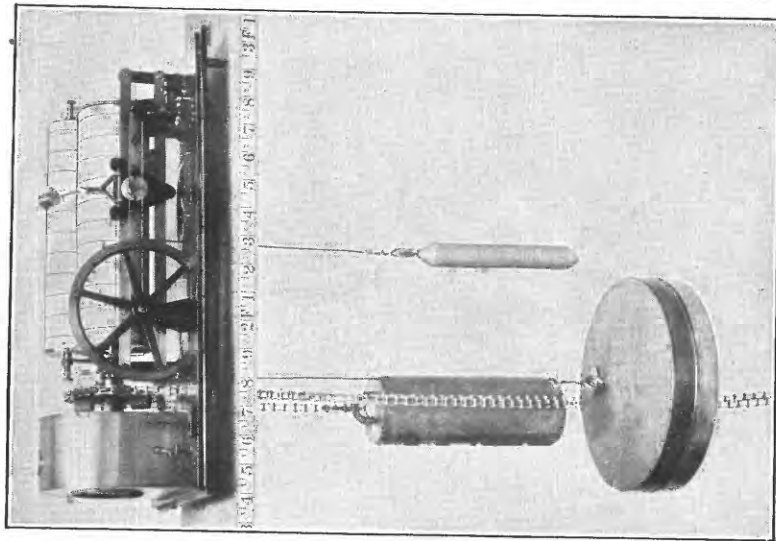
The “point of zero flow” for a gaging station is that point on the gage—the gage height—to which the surface of the river falls when the discharge is reduced to zero.



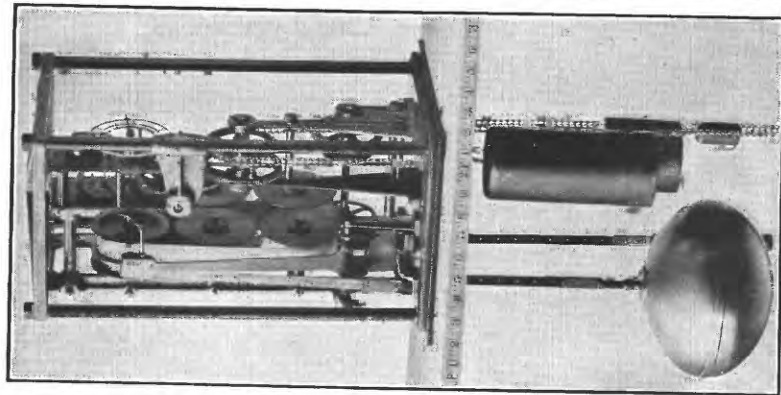
A. PRICE CURRENT METERS.



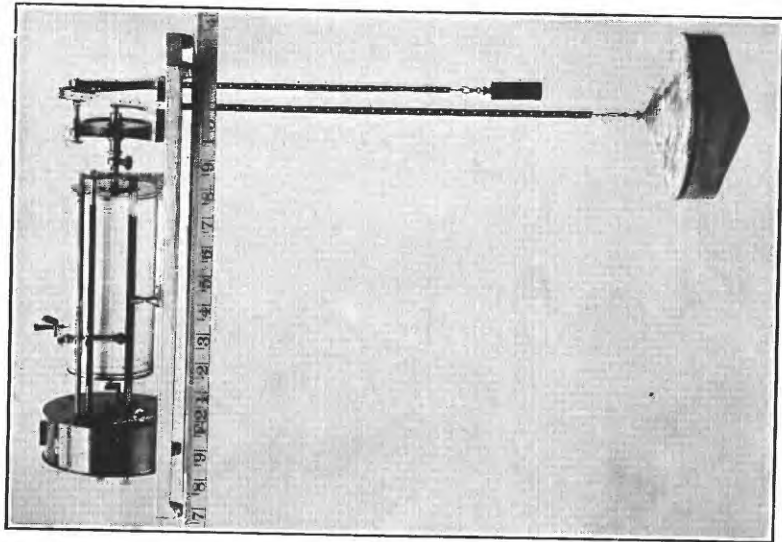
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.  
WATER-STAGE RECORDERS.



C. FRIEZ.

### EXPLANATION OF DATA.

The data presented in this report cover the year beginning October 1, 1916, and ending September 30, 1917. At the first 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 in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up; at the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for a year beginning October 1 is practically all derived from precipitation within that year.

The base data collected at gaging stations (Pl. I, *B*) consist of records of stage, measurements of discharge, and general information used to supplement the gage heights and discharge measurements in determining the daily flow. The records of stage are obtained either from direct readings on a staff gage or from a water-stage recorder (Pl. II) 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.

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 back-water; it gives also information as to diversions that decrease the flow at the gage, artificial regulation, maximum and minimum recorded stages, and the accuracy of the records.

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and the mean daily gage height may not be the true mean discharge for the

day. If such stations are equipped with water-stage recorders the mean daily discharge is obtained by averaging the discharge at regular intervals during the day or by use of the discharge integrator, an instrument operating on the principle of the planimeter and utilizing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations for the remaining columns, which are defined on page 10, 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 observation of stage, measurement of flow, and interpretation of records.

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and depth 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 (depths in inches)" previously published by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

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

### COOPERATION.

During the year ending September 30, 1917, the work in Utah, Nevada, California, Oregon, and Wyoming has been done under co-operative agreements between the United States Geological Survey and the respective States.

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

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

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

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

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

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

Special acknowledgments are due to W. D. Beers, succeeded by G. F. McGonagle, State engineer of Utah; W. M. Kearney, succeeded by J. G. Scrugham, State engineer of Nevada; W. F. McClure, State engineer of California; the State Water Commissioner of California, W. A. Johnstone, president; John H. Lewis, State engineer of Oregon, and James B. True, State engineer of Wyoming, for the very efficient manner in which they have represented their States in the co-operative investigations.

Acknowledgments are also due to the officials and employees of the United States Reclamation Service, the United States Forest Service, the United States Office of Indian Affairs, and the United States Weather Bureau for free use of data collected by them.

Financial assistance has been rendered by the Utah State Agricultural College; Salt Lake City Corporation; Department of Public Service, Los Angeles, Calif.; Southern Pacific Co.; Utah Power & Light Co.; Logan, Hyde Park & Smithfield Canal Co.; Beaver County Irrigation Co.; Elko-Lamoille Light & Power Co.; Humboldt-Lovelocks Irrigation, Light & Power Co.; Chewacan Land & Cattle Co.; Northwest Townsite Co.; Harney Basin Development Co.; Eastern Oregon Live Stock Co. (successor to the Wm. Hanley Co.); and various canal and reservoir companies operating in Sevier River basin.

### DIVISION OF WORK.

Data for stations in Utah and Nevada were collected and prepared for publication under the direction of C. C. Jacob, district engineer, assisted by A. B. Purton, L. W. Jordan, J. J. Sanford, W. E. Dickinson, C. W. Bennett, W. B. Maughan, and Miss Ruby Christensen.

For stations in California the data were collected and prepared for publication under the direction of H. D. McGlashan, district engineer, assisted by William Kessler, Charles Leidl, J. F. Kunesch, J. E. Jones, H. J. Tompkins, and M. B. Trelease.

For stations in Oregon the data were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by J. E. Stewart and R. C. Briggs.

For stations in Idaho the data were collected and prepared for publication under the direction of G. C. Baldwin, district engineer, assisted by T. R. Newell and Miss E. H. Hauge.

For the station in Wyoming the data were collected and prepared for publication under the direction of Robert Follansbee, district engineer, assisted by H. K. Smith, S. B. Soulé, P. V. Hodges, and Miss Bessie Meyers.

The records were reviewed and the manuscript assembled by W. E. Dickinson and B. L. Bigwood.

### GAGING-STATION RECORDS.

#### GREAT SALT LAKE BASIN.

##### GAGES ON GREAT SALT LAKE.

LOCATION.—At Saltair, on southeast shore of Great Salt Lake, about 15 miles west of Salt Lake City, and at Midlake, on Lucin cut-off of Southern Pacific Railroad, about 30 miles west of Ogden, Weber County, Utah.

**RECORDS AVAILABLE.**—September 14, 1875, to December 15, 1899; March to July, 1904; October 1, 1912, to September 30, 1917. Records have appeared in publications of United States Geological Survey, as follows: Gage heights September 14, 1875, to January 4, 1890, in Monograph I, "Lake Bonneville," by G. K. Gilbert; gage heights September, 1875, to December, 1891, in the Thirteenth Annual Report of the Director, Part III; gage heights September 14, 1875, to December 15, 1899, in Water-Supply Paper 38; gage heights March 9, to July 21 1904, in Water-Supply Paper 133; since October 1, 1912, gage heights have been published in water-supply papers. Chart showing variation in level of Great Salt Lake and monthly and annual precipitation in Great Salt Lake basin from 1850 to 1913 compiled from chart in office of chief engineer of Oregon Short Line Railroad, Salt Lake City, Utah, published by United States Geological Survey in Water-Supply Paper 330.

**GAGES.**—Midlake gage read August 15, 1902, to September 30, 1917. Saltair gage July 1, 1903, to September 30, 1917. The first gage was installed at Blackrock in September, 1875, and was used until October, 1877. A gage at Farmington was used from November, 1877, to November, 1879; and one at Lake Shore from November, 1879, to September, 1881. Gages at Garfield Landing were used April, 1881, to December, 1899. In 1916, E. C. LaRue, hydraulic engineer, United States Geological Survey, installed a gage at Lake Point and by means of comparative readings for one month determined the relation between this gage and the gages at Saltair and Midlake. The elevation of the zero of the gage at Lake Point was determined from United States Geological Survey bench marks, the elevations of which had been adjusted in 1912 by United States Coast and Geodetic Survey from precise leveling. From the Lake Point gage and the table of elevations given by G. K. Gilbert in Monograph I, Mr. LaRue determined the elevations above mean sea level of the zeros of the various gages to be as follows:

	Feet.
Blackrock.....	4, 208. 30
Farmington.....	4, 206. 80
Lake Shore.....	4, 203. 00
Garfield Landing (U. S. G. S.).....	4, 198. 40
Garfield (Marcus E. Jones).....	4, 198. 40
Midlake.....	4, 198. 01
Saltair.....	4, 196. 77

**EXTREMES OF STAGE.**—Maximum stage recorded during year, 6.5 feet (Saltair datum), 5.3 feet (Midlake datum), June 15; minimum stage, 4.4 feet (Saltair datum), 3.2 feet (Midlake datum), October 1.

1850-1917: Maximum stage recorded, 13.3 feet (Midlake datum), July 12, 1877; estimated maximum stage, 14.5 feet (Midlake datum), occurred in 1868 (data furnished by Marcus E. Jones, Salt Lake City); minimum stage, -2.3 feet (Midlake datum) in 1902.

**COOPERATION.**—Readings on the Midlake gage are furnished by Southern Pacific Co.; readings on the Saltair gage by United States Weather Bureau.

*Gage height, in feet, of Great Salt Lake, Utah, for the year ending Sept. 30, 1917.*

Day.	October.		November.		December.		January.		February.		March.	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1.....	4.4	3.2	4.5	3.2	4.5	3.3	4.6	3.4	4.7	3.6	5.0	3.8
15.....	4.5	3.2	4.5	3.3	4.6	3.4	4.7	3.6	4.8	3.7	5.2	3.9

*Gage height, in feet, of Great Salt Lake, Utah, for the year ending Sept. 30, 1917—Con.*

Day.	April.		May.		June.		July.		August.		September	
	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.	Salt-air.	Mid-lake.
1.....	5.4	4.1	5.9	4.6	6.2	5.0	6.5	5.2	6.3	5.1	5.8	4.9
15.....	5.7	4.3	6.0	4.8	6.5	5.3	6.4	5.2	6.0	4.9	5.7	4.5

### BEAR RIVER BASIN.

#### BEAR RIVER NEAR EVANSTON, WYO.

**LOCATION.**—In sec. 1, T. 15 N., R. 121 W., 300 feet above highway bridge and 3½ miles northwest of Evanston, Uinta County, Wyo. Nearest tributary, a small stream entering from the southwest half a mile above.

**DRAINAGE AREA.**—645 square miles (measured on topographic map, and on map issued by the United States Geological Survey; scale, 1 to 500,000).

**RECORDS AVAILABLE.**—October 26, 1913, to September 30, 1917.

**GAGE.**—Chain gage on left bank, 300 feet above bridge; read to Mrs. Marion McClure.

**DISCHARGE MEASUREMENTS.**—Made from cable just below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of coarse gravel. Control at riffle a short distance below gage; slightly shifting. Left bank is overflowed at stage of about 5 feet, the amount of overflow increasing with the stage; right bank is also overflowed at stage above 5 feet, but to a much less extent than left bank.

**EXTREMES OF DISCHARGE.**—Maximum discharge, estimated as 2,500 second-feet, June 17 to 18; minimum open-water stage recorded, 1.26 feet August 30 (discharge, 49 second-feet); minimum discharge probably occurred during winter.

1913–1917: Maximum discharge, estimated at 2,500 second-feet, June 17–18, 1917; maximum stage recorded, 5.9 feet at 7 p. m., May 24, 1914 (discharge, 2,480 second-feet); channel reported nearly dry August 15, 1915.

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

**DIVERSIONS.**—Prior to December 1, 1916, there were adjudicated diversions of 249 second-feet from Bear River, in Wyoming, above station, and 516 second-feet below.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation shifted slightly during high water of 1917; affected by ice during winter. Rating curve well defined between 25 and 1,800 second-feet, and fairly well defined above 1,800 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except period June 15 to September 30, for which shifting-control method was used; daily discharge not determined during winter. Open-water records excellent below 1,800 second-feet, and fair above 1,800 second-feet.

*Discharge measurements of Bear River near Evanston, Wyo., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 15	H. K. Smith.....	4.76	1,580
Sept. 22	S. B. Soulé.....	1.35	62

*Daily discharge, in second-feet, of Bear River near Evanston, Wyo., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	25	58	-----	502	890	1,560	352	67
2.....	61	67	-----	460	995	1,490	284	72
3.....	84	70	-----	524	1,050	1,370	252	64
4.....	84	66	-----	440	1,290	1,310	223	77
5.....	84	67	-----	401	1,170	1,250	158	74
6.....	70	61	-----	440	1,230	1,240	140	81
7.....	88	55	-----	522	1,350	1,180	158	134
8.....	121	52	-----	524	1,170	1,180	158	117
9.....	88	60	-----	481	1,810	1,060	142	81
10.....	88	55	-----	524	2,120	951	142	77
11.....	106	52	-----	592	1,810	700	138	79
12.....	110	51	-----	640	1,350	800	129	102
13.....	98	46	-----	640	1,230	750	129	97
14.....	104	58	-----	690	1,290	602	117	77
15.....	113	51	1,110	1,110	1,660	428	127	74
16.....	97	54	1,110	1,290	2,030	352	140	81
17.....	100	49	1,350	1,230	2,500	428	140	81
18.....	110	46	1,050	1,290	2,500	371	147	61
19.....	119	-----	640	1,600	2,400	334	182	66
20.....	106	-----	740	1,740	2,360	334	142	70
21.....	98	-----	690	1,670	2,260	300	129	61
22.....	81	-----	1,670	1,470	2,260	284	117	58
23.....	106	-----	1,890	1,230	2,180	284	106	77
24.....	95	-----	1,740	1,050	2,180	268	97	106
25.....	61	-----	1,530	1,050	2,340	252	91	102
26.....	81	-----	1,890	1,110	2,250	252	74	67
27.....	91	-----	1,230	890	2,000	252	86	77
28.....	76	-----	690	840	2,240	448	88	86
29.....	70	-----	569	995	1,840	448	84	81
30.....	70	-----	524	1,170	1,920	700	49	86
31.....	69	-----	-----	1,050	-----	554	54	-----

NOTE.—Water too high to read gage June 17-19; discharge estimated by comparison with record for Blacks Fork near Urie. Stage-discharge relation affected by ice Nov. 19 to Apr. 14; observations discontinued.

*Monthly discharge of Bear River near Evanston, Wyo., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	121	25	88.8	5,460
November 1-18.....	70	46	56.6	2,020
April 15-30.....	1,890	524	1,150	36,500
May.....	1,740	401	911	56,000
June.....	2,500	890	1,790	107,000
July.....	1,560	252	701	43,100
August.....	352	49	141	8,670
September.....	134	58	81.1	4,830

#### BEAR RIVER NEAR PRESTON, IDAHO.

LOCATION.—In sec. 9, T. 15 S., R. 39 E., at Seamons's ranch at Battle Creek highway bridge, half a mile above mouth of Battle Creek and  $4\frac{1}{2}$  miles northwest of Preston, Franklin County.

DRAINAGE AREA.—4,500 square miles.

RECORDS AVAILABLE.—October 11, 1889, to September 30, 1917. (Gage heights only January 16 to September 30, 1917.)

187044°—21—WSP 460—2

**GAGE.**—Vertical staff attached to old bridge pile near right bank; installed July 22, 1915; read by O. M. Seamons. Inclined staff with vertical low-water section on left bank 50 feet below bridge, used December, 1904, to July 21, 1915, except from April 3, 1909, to July 6, 1914, when an inclined staff 500 feet below bridge on right bank was used. Gages used prior to December, 1904, were of vertical staff or wire type and were attached to old Battle Creek bridge. Relation of datum of present gage to that of previous gages is not known, but datum is about 0.5 foot higher than that of gage installed December, 1904.

**DISCHARGE MEASUREMENTS.**—Made from cable about 200 feet below bridge or by wading.

**CHANNEL AND CONTROL.**—Bed composed of sand, clay, and gravel; one channel at all stages. Control fairly permanent except during flood stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year 9.04 feet at 5 p. m. January 17 and 5 p. m. January 18 (stage-discharge relation affected by ice jam); maximum discharge probably occurred at 6 p. m. May 27 when a gage height of 5.45 feet was recorded.

Maximum stage recorded during period of published discharge, October 1, 1916, to January 15, 1917, 3.47 feet at 8 a. m. January 10 (discharge, 3,270 second-feet); minimum stage, 0.07 foot at 8 a. m. November 15 (discharge, 229 second-feet).

1889–1917: Maximum stage recorded, 9.04 feet January 17 and 18, 1917, caused by ice jam below gage; minimum discharge of 158 second-feet occurred August 1–4 and 6–20, 1905, at gage height 0.5 foot on gage then in use. See paragraph on “Gage” for changes in gage datum.

**ICE.**—Stage-discharge relation seriously affected at times by backwater from ice.

**DIVERSIONS.**—Numerous ditches divert water for irrigation above station. Last Chance canal, which diverts about 4 miles below Alexander station, carried 270 second-feet May 25, 1911 (measurement by engineer of Telluride Power Co.). West Cache canal, which heads several miles above station, carried 26 second-feet July 24, 1911, and 5 second-feet August 5, 1911. Water diverted by Telluride Power Co. about 6 miles below Alexander station is used for power development and returned to the river above this station.

**REGULATION.**—Considerable fluctuation is caused by release of water from Mud or North Lake, about 150 miles above station, and by operation of power plants above station.

**ACCURACY.**—Stage-discharge relation probably changed by ice jam January 15. Rating curve used to January 15, well defined. Gage read to quarter-tenths twice daily. Large diurnal fluctuations due apparently to operation of power plants upstream make daily discharges rather unreliable, but monthly means are believed reliable. Daily discharge determined by applying mean daily gage height to the rating table prior to January 15. Discharge application not warranted subsequent to January 15 because of ice and uncertain definition of rating.

**COOPERATION.**—Gage-height record furnished by Utah-Idaho Sugar Co.

Records at this station show practically the amount of water passing from Idaho into Utah and will be of value in the final adjudication of water rights.

*Discharge measurements of Bear River near Preston, Idaho, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
Nov. 26	G. C. Baldwin.....	<i>Feet.</i> 0.84	<i>Sec.-ft.</i> 511
Feb. 11	T. R. Newell.....	a 3.34	904

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Bear River near Preston, Idaho, for the period Oct. 1, 1916, to Jan. 15, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Day.	Oct.	Nov.	Dec.	Jan.
1	830	548	716	1,230	16	645	645	1,680	
2	955	871	548	1,470	17	752	1,230	1,470	
3	1,180	752	998	1,570	18	1,230	1,270	1,330	
4	1,040	519	1,420	1,680	19	871	871	791	
5	998	582	1,230	1,470	20	580	1,090	1,900	
6	871	645	324	998	21	679	912	830	
7	1,370	791	1,900	830	22	1,470	871	1,180	
8	645	830	2,020	1,900	23	955	912	1,180	
9	370	679	349	1,130	24	752	955	1,090	
10	679	548	244	2,260	25	1,040	830	548	
11	955	752	791	871	26	390	519	548	
12	1,130	645	955	1,270	27	1,040	1,370	998	
13	716	1,470	998	1,370	28	1,900	390	1,040	
14	1,040	645	1,180	1,040	29	321	1,180	1,230	
15	519	229	2,130	955	30	279	548	1,370	
					31	611		1,790	

*Daily gage height, in feet, of Bear River near Preston, Idaho, for the period Jan. 16 to Sept. 30, 1917.*

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		5.3	1.35	1.8	2.3	4.3	3.9	1.9	1.6
2		5.1	1.4	1.15	2.7	4.2	3.8	1.8	1.55
3		5.3	1.35	1.15	2.2	4.2	3.6	1.9	1.45
4		5.2	1.85	1.35	2.3	4.2	3.4	1.8	1.9
5		5.0	1.75	1.8	1.95	4.0	3.3	1.7	1.25
6		4.3	1.65	1.75	2.4	4.2	3.2	2.1	1.5
7		3.9	1.25	1.3	2.2	4.1	2.9	1.7	1.55
8		3.6	1.5	1.45	2.2	4.1	3.0	2.1	1.85
9		2.5	1.1	2.4	2.3	4.0	2.8	1.75	1.5
10		2.5	1.15	2.3	2.3	3.9	3.0	1.5	1.15
11		3.3	1.25	2.4	2.4	4.0	2.7	2.0	1.6
12		4.3	1.25	2.4	2.6	3.9	2.4	1.3	1.65
13		1.9	1.25	2.4	3.4	4.2	2.5	1.5	1.8
14		1.65	1.2	1.85	3.3	3.9	2.3	1.75	1.8
15		1.55	1.2	2.0	3.4	4.0	2.1	1.75	1.6
16	4.5	1.7	1.3	1.75	4.1	4.2	2.1	1.7	1.5
17	6.6	1.2	1.0	1.55	4.1	4.1	2.2	1.65	1.65
18	6.8	2.1	1.4	1.75	4.0	4.2	1.6	1.6	1.75
19	6.1	1.4	1.3	1.35	4.3	4.2	1.95	1.5	1.75
20	6.2	1.5	1.35	1.9	3.8	4.2	1.8	1.9	1.7
21	6.0	1.3	1.2	2.3	3.8	-----	1.55	1.5	1.8
22	5.6	1.15	1.25	2.5	3.2	4.1	1.5	1.4	1.7
23	5.6	1.15	1.15	3.0	2.8	4.1	2.0	1.2	1.35
24	5.2	1.75	1.3	3.0	2.9	4.1	1.65	1.6	1.8
25	5.1	1.3	1.6	2.9	3.7	4.0	1.6	1.6	1.55
26	5.1	1.95	1.3	3.7	4.1	4.0	1.7	1.45	1.7
27	5.1	1.85	1.1	3.8	4.7	4.0	1.85	1.45	1.85
28	5.0	1.75	1.2	3.5	4.5	3.9	1.7	1.55	1.55
29	4.9	-----	1.4	3.0	4.6	3.9	1.6	1.45	1.35
30	5.1	-----	2.0	2.8	4.2	3.9	1.65	1.45	1.15
31	5.3	-----	1.85	-----	4.2	-----	1.7	1.65	-----

*Monthly discharge of Bear River near Preston, Idaho, for the period Oct. 1, 1916, to Jan. 15, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	1,900	279	865	53,200
November.....	1,470	229	803	47,800
December.....	2,130	244	1,110	68,200
January 1-15.....	2,260	830	1,340	39,900

## BEAR RIVER NEAR COLLINSTON, UTAH.

**LOCATION.**—In W.  $\frac{1}{4}$  sec. 34, T. 13 N., R. 2 W., about a quarter of a mile below power plant of Utah Power & Light Co., at railroad siding called Wheelon, 4 miles north of Collinston, Boxelder County. Little Malad River enters about 20 miles below station.

**DRAINAGE AREA.**—6,000 square miles.

**RECORDS AVAILABLE.**—July 1, 1889, to September 30, 1917.

**GAGE.**—Gurley 8-day water-stage recorder on left bank about 12 feet above cable; used February 26, 1914, to September 30, 1917; inspected by employees of Utah Power & Light Co.; original gage July 1, 1889, to February 9, 1905, vertical iron bar driven into bed of stream on right bank directly opposite present gage; February 10, 1905, to November 7, 1913, inclined staff on right bank; November 8, 1913, to February 25, 1914, Friez water-stage recorder at present site. Datum raised 0.05 foot November 8, 1913.

**DISCHARGE MEASUREMENTS.**—Made from cable.

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand. Left bank high, covered with willows, not subject to overflow; right bank fairly high, covered with willows, may be overflowed by exceptionally high floods. Control not well defined; semipermanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 6.55 feet at 3.30 p. m. May 19 (discharge, 8,170 second-feet); minimum stage, 1.74 feet at 6 p. m. October 31 (discharge, 888 second-feet.)

1889-1917: Maximum stage recorded, 7.7 feet June 7-10, 1909 (discharge, 11,600 second-feet); minimum stage, -0.55 foot August 4-12, 1905 (discharge, 10 second-feet).

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

**DIVERSIONS.**—West Side canal and Hammond (East Side) canal divert water about 2 miles above station; water can be used from either or both of these canals to supply the Wheelon power plant; water passing the Wheelon penstocks is used for irrigation or returned to the river. There are several large power plants farther upstream and considerable water is diverted for irrigation.

**REGULATION.**—Flow at station is affected to some extent by operation of power plant and storage and release of water from Bear Lake reservoir.

**ACCURACY.**—Stage-discharge relation changed in April; affected by ice January 1-25 and January 31 to February 15. Rating curve used October 1 to April 5 well defined for all stages; that used April 12 to September 30 fairly well defined above 1,000 second-feet. Operation of water-stage recorder satisfactory except for short periods during October and November, and from November 23 to December 31 when clock was not running, and staff gage was read once daily. Daily discharge ascertained by applying to rating table mean daily gage height taken by inspecting recorder graph except for breaks in record when daily staff gage readings were used; shifting-control method used April 6-11; discharge estimated for periods for which stage-discharge relation was affected by ice. Records good.

*Discharge measurements of Bear River near Collinston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 19	A. B. Purton.....	2.45	1,710	Apr. 27	L. C. Monson.....	5.10	5,490
Jan. 9	L. W. Jordan.....	2.49	1,780	June 15	A. B. Purton.....	5.96	7,090
24	H. L. Stoner a.....	2.78	1,960	July 24	L. W. Jordan.....	2.40	1,580
Feb. 14	L. C. Monson a.....	2.65	1,790	30	L. C. Monson a.....	2.46	1,590
Mar. 23	.....do.....	2.50	1,940	Aug. 29	.....do.....	2.20	1,280

a Engineers of Utah Power & Light Co.



*Daily discharge, in second-feet, of Bear River near Collinston, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	945	1,100	1,440	.....	1,750	2,400	2,860	5,370	8,070	5,870	1,880	1,140
2.....	1,200	1,320	1,200	.....	1,680	2,320	2,830	5,050	8,070	5,700	1,740	1,060
3.....	1,560	1,320	1,200	.....	1,620	2,020	2,800	4,460	7,880	5,530	1,620	1,080
4.....	2,100	1,380	1,560	.....	.....	1,960	2,480	4,190	7,690	5,370	1,620	1,000
5.....	1,820	1,260	1,620	.....	.....	1,820	2,320	3,960	7,690	4,900	1,550	1,080
6.....	1,620	1,260	1,620	.....	.....	2,020	2,480	3,780	7,500	4,460	1,490	1,140
7.....	1,260	1,320	1,620	.....	.....	1,880	3,110	3,710	7,690	4,070	1,550	1,190
8.....	1,620	1,380	2,020	.....	.....	1,880	3,660	3,840	7,500	3,960	1,370	1,190
9.....	1,380	1,320	1,500	.....	.....	1,880	4,510	3,960	7,500	3,840	1,340	1,370
10.....	1,150	1,320	1,560	.....	.....	1,880	5,420	4,070	7,500	3,640	1,310	1,250
11.....	1,320	1,200	1,040	.....	.....	1,820	5,720	4,320	7,690	3,390	1,250	1,310
12.....	1,440	1,260	898	.....	.....	1,680	5,700	4,750	7,690	3,210	1,430	1,250
13.....	1,380	1,320	1,320	.....	.....	1,750	5,370	5,210	7,690	2,780	1,060	1,250
14.....	1,380	1,440	1,960	.....	.....	1,820	5,210	5,700	7,500	2,460	970	1,310
15.....	1,560	1,680	2,240	.....	.....	1,680	4,750	6,390	7,120	2,390	950	1,370
16.....	1,380	995	1,620	.....	1,750	1,750	4,460	7,120	6,750	2,090	1,140	1,430
17.....	1,200	1,140	1,320	.....	1,750	1,750	4,190	7,880	6,570	1,810	1,190	1,310
18.....	1,320	1,620	1,560	.....	1,880	1,680	3,780	7,880	6,750	2,020	1,190	1,430
19.....	1,620	1,680	1,820	.....	1,960	1,560	3,640	7,880	6,750	1,680	1,190	1,370
20.....	1,620	1,500	1,750	.....	1,820	1,680	3,120	7,880	7,120	1,370	1,190	1,310
21.....	1,560	1,620	1,750	.....	1,820	1,880	3,030	7,880	7,120	1,430	1,310	1,370
22.....	1,560	1,560	1,820	.....	1,820	.....	3,390	7,880	7,120	1,370	1,140	1,490
23.....	1,320	1,500	1,620	.....	1,850	.....	3,960	7,500	6,930	1,370	1,140	1,370
24.....	1,440	1,500	1,620	.....	1,880	.....	4,460	6,840	6,750	1,490	1,140	1,550
25.....	1,560	1,500	1,560	.....	2,170	1,960	4,750	6,750	6,570	1,490	1,080	1,620
26.....	1,500	1,500	1,560	1,820	2,400	1,820	5,050	6,750	6,390	1,430	1,140	1,950
27.....	1,260	1,440	1,620	1,960	2,400	2,100	5,530	6,750	6,390	1,310	1,140	2,020
28.....	1,440	1,440	2,100	1,960	2,400	2,020	6,390	6,930	6,210	1,430	1,250	2,020
29.....	1,750	1,440	1,560	1,880	.....	2,100	6,390	7,310	6,040	1,550	1,310	2,020
30.....	1,100	1,440	1,750	1,880	.....	2,480	6,040	7,690	5,870	1,740	1,190	1,950
31.....	898	.....	1,750	1,820	.....	2,880	.....	8,070	.....	1,810	1,310	.....

NOTE.—Discharge Jan. 1-25 and Feb. 4-15 estimated because of ice, 1,750 second-feet; Mar. 22-24, interpolated, 1,920 second-feet.

*Monthly discharge of Bear River near Collinston, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	2,100	898	1,430	87,900
November.....	1,680	995	1,390	82,700
December.....	2,240	898	1,600	98,400
January.....	.....	.....	1,780	109,000
February.....	2,400	.....	1,860	103,000
March.....	2,880	1,560	1,940	119,000
April.....	6,390	2,320	4,250	253,000
May.....	8,070	3,710	6,060	373,000
June.....	8,070	5,870	7,140	425,000
July.....	5,870	1,310	2,810	173,000
August.....	1,880	950	1,300	79,900
September.....	2,020	1,000	1,410	83,900
The year.....	8,070	898	2,740	1,990,000

#### SODA CREEK NEAR SODA SPRINGS, IDAHO.

LOCATION.—In sec. 24, T. 8 S., R. 41 E., at George Schmidt's ranch, one-eighth of a mile below confluence of two branches of creek, 5 miles north of Soda Springs, Bannock County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 5, 1913, to September 30, 1917.

GAGE.—Vertical staff on left bank, a quarter of a mile south of ranch house; installed August 1, 1913; read by George Schmidt. Gage used March 5 to July 30, 1913, was 30 feet upstream, but had same control. Datum of old gage between 0.1 and 0.2 feet above that of present gage.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of lava rock. Control is a reef about 15 feet below gage. Stage-discharge relation affected by aquatic growth during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.8 feet at 1 p. m. April 30 (discharge, 193 second-feet); minimum stage, 3.98 feet March 12-28 and April 3-8 (discharge, 45 second-feet); minimum discharge of 44 second-feet occurred October 4-10.

1913-1917: Maximum stage recorded, 5.3 feet April 6, 1913 (discharge, 324 second-feet); minimum stage, 3.98 feet March 12-28 and April 3-8, 1917; minimum discharge of 38 second-feet occurred March 4-9, 1916.

ICE.—Stage-discharge relation not affected by ice. Heavy snowdrifts caused temporary backwater February 21-25 and discharge for this period interpolated upon basis of observer's notes.

DIVERSIONS.—Practically no water diverted above station; a small ditch takes water just below gage.

ACCURACY.—Stage-discharge relation not permanent on account of effect of aquatic growth; not affected by ice, but affected by backwater from drifted snow February 21-25, 1917, when daily discharge was estimated from observer's notes. Gage read to quarter-tenths daily. Daily discharge ascertained by applying daily gage height to several rating tables, and by shifting-control method. Records good.

*Discharge measurements of Soda Creek near Soda Springs, Idaho, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 9	G. C. Baldwin.....	4.08	45.6	Apr. 29	C. G. Baldwin.....	4.60	148
Feb. 13	T. R. Newell.....	3.99	46.0	Aug. 7	do.....	4.18	60

*Daily discharge, in second-feet, of Soda Creek near Soda Springs, Idaho, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	47	46	46	46	46	47	47	170	73	62	62	55
2.....	47	46	46	46	46	47	47	159	73	73	62	55
3.....	47	46	46	46	46	47	45	117	73	69	62	59
4.....	44	46	46	46	45	47	45	89	73	69	62	59
5.....	44	46	46	46	46	47	45	81	70	65	62	59
6.....	44	46	46	46	45	47	45	76	70	62	62	62
7.....	44	48	46	46	46	47	45	73	70	62	59	62
8.....	44	48	46	46	46	47	45	70	70	73	62	62
9.....	44	46	46	46	46	47	47	70	70	73	62	62
10.....	44	48	46	46	47	47	49	66	72	69	62	59
11.....	46	48	46	46	47	47	49	66	72	65	62	59
12.....	48	48	46	46	47	45	59	66	72	65	62	59
13.....	48	48	46	46	46	45	59	66	70	62	62	59
14.....	48	48	46	46	47	45	59	66	70	62	62	59
15.....	48	48	46	46	47	45	59	66	70	62	62	59
16.....	48	48	46	46	47	45	62	66	69	62	62	59
17.....	48	48	46	46	47	45	66	66	69	62	62	62
18.....	48	48	46	46	47	45	62	66	69	62	62	62
19.....	48	48	46	46	47	45	59	66	67	62	59	62
20.....	48	46	46	46	47	45	57	66	67	62	59	65
21.....	48	46	48	46	48	45	53	66	67	62	59	65
22.....	48	46	48	46	48	45	59	66	66	59	55	65
23.....	48	46	48	46	48	45	73	66	66	59	55	62
24.....	48	46	46	46	48	45	81	66	66	55	55	62
25.....	48	46	46	46	48	45	81	66	65	55	55	59
26.....	48	46	46	46	49	45	159	66	65	55	55	59
27.....	48	46	46	46	49	45	182	70	65	55	55	59
28.....	48	46	46	46	47	45	81	73	63	59	55	57
29.....	48	46	46	46	47	47	148	73	63	62	55	57
30.....	46	46	46	46	47	47	193	73	63	62	55	57
31.....	46	46	46	46	47	47	73	73	62	55	55	57

*Monthly discharge of Soda Creek near Soda Springs, Idaho, for the year ending, Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	48	44	46.8	2,880
November.....	48	46	46.8	2,780
December.....	48	46	46.2	2,840
January.....	46	46	46.0	2,830
February.....	49	45	47.0	2,610
March.....	47	45	45.9	2,820
April.....	193	45	72.0	4,280
May.....	170	66	77.1	4,740
June.....	73	63	68.6	4,080
July.....	73	55	62.8	3,860
August.....	62	55	59.4	3,650
September.....	65	55	60.0	3,570
The year.....	193	44	56.6	40,900

#### LOGAN RIVER ABOVE STATE DAM, NEAR LOGAN, UTAH.

**LOCATION.**—In sec. 36, T. 12 N., R. 1 E., at Logan plant of Utah Power & Light Co., 125 feet above confluence of tailrace with river and  $2\frac{1}{2}$  miles above Logan, Cache County.

**DRAINAGE AREA.**—218 square miles.

**RECORDS AVAILABLE.**—May 7, 1913, to September 30, 1917; June 1, 1896, to July 17, 1903, and April 14, 1904, to December 31, 1912, at old station a quarter of a mile downstream; flow at present station plus that of tailrace comparable to that at old station.

**GAGE.**—Stevens continuous water-stage recorder on right bank about 100 feet west of power house; inspected by employees of Utah Power & Light Co.

**DISCHARGE MEASUREMENTS.**—Made by wading at gage; high-water measurements made from cable 400 feet downstream and flow in tailrace deducted.

**CHANNEL AND CONTROL.**—Banks high, clean, and not subject to overflow; right bank is a dry rubble retaining wall. Control is a concrete cut-off wall about 6 feet below the gage. Stage of zero flow, 0.45 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder 4.2 feet at 4 a. m. June 10 (discharge, 1,100 second-feet); minimum stage from water-stage recorder 0.90 foot at noon November 29 (discharge, 19 second-feet).

1913-1917: Maximum stage recorded, 5.6 feet at 9.30 a. m. March 21, 1916 (discharge, estimated 2,000 second-feet); minimum stage, 0.36 foot September 18, 1913 (discharge, 16 second-feet); minimum discharge, 8 second-feet December 11, 1915. Artificial control installed September 24-26, 1913, and stage-discharge relation thereby changed.

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

**DIVERSIONS.**—The Utah Power & Light Co. diverts water above station for power and the Logan, Hyde Park & Smithfield canal diverts for irrigation. The city of Logan has a municipal power plant about 2 miles above station, but water is returned to river above the two diversions noted.

**REGULATION.**—Some diurnal fluctuation is caused at times by operation of the two power plants.

ACCURACY.—Stage-discharge relation permanent except when affected by backwater from State dam during December, January, and February. Rating curve well defined below 150 second-feet, fairly well defined for medium discharge, and poorly defined for discharge above 700 second-feet. Operation of water-stage recorder satisfactory except for January 11 to March 23, when outside staff gage was read to hundredths twice daily. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or the mean of two daily staff gage readings when water-stage recorder was not recording, except for periods in December, January, and February, which were estimated. Records of discharge below 160 second-feet, good; others fair.

*Discharge measurements of Logan River above State dam, near Logan, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 5	A. B. Purton.....	1.316	60	Apr. 23	L. C. Monson <sup>b</sup> .....	1.71	121
7	L. W. Jordan.....	1.45	75	June 13	A. B. Purton <sup>c</sup> .....	3.37	883
13	A. B. Purton.....	1.39	67	July 22	L. W. Jordan <sup>d</sup> .....	2.56	290
Jan. 10	L. W. Jordan.....	<sup>a</sup> 1.13	33.6	Aug. 25	A. B. Purton.....	1.59	100
Mar. 24	H. L. Stoner <sup>b</sup> .....	1.23	58				

<sup>a</sup> Backwater from State dam.

<sup>b</sup> Engineers of Utah Power & Light Co.

<sup>c</sup> Measured at switchrack bridge and flow of tailrace deducted.

<sup>d</sup> Measured at cable; flow of tailrace deducted.

*Daily discharge, in second-feet, of Logan River above State dam, near Logan, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	75	52	25			37	46	150	661	802	211	94
2	79	52	27			36	47	135	722		201	91
3	76	50	27			36	44	140	696		196	89
4	67	50				44	43	160	748		194	86
5	64	54				53	42	160	748		184	86
6	63	52				48	44	203	775		175	90
7	75	47				48	43	278	830		166	81
8	73	44	27		44	46	55	290	887	593	158	76
9	75	44	32		44	46	74	321	976	575	152	71
10	79	46		34	43	46	79	382	1,040	557	148	71
11	89	43			38	41	71	446	858	534	142	71
12	73	40			39	42	77	458	696	504	137	69
13	69	33			40	42	73	466	666	474	131	69
14	67	37			41	46	74	584	661	454	128	68
15	64	36			40	45	79	701	696	426	124	67
16	64	36	32		41	45	70	696	802	408	121	64
17	63	36			41	43	65	622	858	386	118	63
18	67	37			40	42	63	641	916	372	118	89
19	63	34			40	45	63	603	916	361	113	63
20	61	35			41	44	68	589	916	351	105	63
21	61	31			41	46	84	500	946	331	102	62
22	59	29			40	45	97	466	946	306	97	63
23	59	29			31	45	111	534	946	296	95	76
24	58	28				49	166	608	976	281	95	76
25	58	25				61	229	584	946	276	94	90
26	58	29				50	281	598	916	261	94	86
27	57	26				52	290	598	916	267	91	91
28	57	28			41	50	218	608	887	267	82	79
29	54	24				53	182	696	858	245	81	79
30	54	25	40			55	175	722	830	234	84	79
31	53		40			50		681		226	93	

NOTE.—Discharge estimated, on account of backwater from State dam, Dec. 4-7, 27 second-feet; Dec. 17-29 and Jan. 1-9, 33 second-feet; Jan. 11 to Feb. 7, 40 second-feet; and Feb. 24-27, 36 second-feet. Discharge estimated Dec. 10-15, 30 second-feet, and interpolated July 2-7, 698 second-feet, because of missing gage heights.

*Monthly discharge of Logan River above State dam, near Logan, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	89	53	65.6	4,030
November.....	54	24	37.7	2,240
December.....		25	31.2	1,920
January.....			37.8	2,320
February.....			39.6	2,200
March.....	61	36	46.2	2,840
April.....	290	42	102	6,070
May.....	722	135	472	29,000
June.....	1,040	661	841	50,000
July.....	802	226	451	27,700
August.....	211	81	130	7,990
September.....	94	62	76.7	4,560
The year.....	1,040	24	195	141,000

#### LOGAN RIVER BELOW LOGAN NORTHERN CANAL, NEAR LOGAN, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 36, T. 12 N., R. 1 E., 500 feet below heading of Logan Northern canal, 850 feet below State dam, and 2 miles above Logan, Cache County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—July 26, 1915, to June 13, 1917, when station was discontinued.

**GAGE.**—Stevens continuous water-stage recorder on left bank 200 feet southwest of the bridge by which State road crosses Logan Northern canal.

**DISCHARGE MEASUREMENTS.**—Made by wading or from cable 125 feet below gage.

**CHANNEL AND CONTROL.**—Bed composed of gravel and large boulders; shifting. Banks not subject to overflow. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 7.25 feet at 11 a. m. June 10 (discharge, 940 second-feet); minimum stage from water-stage recorder, 3.7 feet at 3 p. m. March 2 (discharge, estimated 30 second-feet).

1915-1917: Maximum stage recorded, 8.35 feet at 9.45 a. m. March 21, 1916 (discharge, 1,500 second-feet); minimum stage, 3.71 feet October 21-25, 1915 (discharge, 26 second-feet).

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

**DIVERSIONS.**—Logan, Hyde Park & Smithfield canal and Logan Northern canal divert water above station for irrigation.

**REGULATION.**—Operation of power plants above causes some diurnal fluctuation at times during low-water periods.

**ACCURACY.**—Stage-discharge relation permanent during year; not affected by ice.

Rating curve well defined between 50 and 200 second-feet and fairly well defined for higher stages. Operations 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 the mean daily gage height obtained by inspecting recorder graph, except for periods for which gage-height record is missing when discharge was estimated from hydrograph of stations above State dam. Records good except for periods estimated, for which they are fair.

*Discharge measurements of Logan River below Logan Northern canal, near Logan, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 5	L. W. Jordan.....	4.76	142	Oct. 14	L. W. Jordan.....	4.80	150
6	do.....	4.76	144	14	A. B. Purton.....	4.81	148
9	do.....	4.82	154	17	L. W. Jordan.....	4.77	147
12	A. B. Purton.....	4.82	158	Jan. 10	do.....	4.64	119

*Daily discharge, in second-feet, of Logan River below Logan Northern canal, near Logan, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	115	137	124	115	.....	108	108	218	657
2	137	137	124	118	.....	100	108	205	676
3	154	136	108	112	.....	100	104	212	695
4	146	132	118	115	.....	87	103	223	713
5	143	124	120	118	.....	103	104	214	732
6	145	137	124	111	.....	108	108	252	751
7	158	132	124	104	.....	100	108	313	779
8	158	115	132	106	.....	103	103	330	799
9	154	129	132	108	.....	103	.....	366	858
10	160	.....	115	.....	.....	109	.....	426	898
11	167	.....	113	.....	.....	81	.....	468	858
12	160	.....	110	.....	.....	103	.....	502	760
13	152	.....	108	.....	.....	100	.....	485	665
14	150	.....	108	.....	.....	100	.....	574	.....
15	150	.....	108	.....	.....	103	152	665	.....
16	150	.....	108	.....	.....	108	143	665	.....
17	146	.....	108	.....	.....	105	137	610	.....
18	145	.....	108	.....	.....	102	136	610	.....
19	146	.....	108	.....	.....	100	136	574	.....
20	146	.....	108	.....	.....	103	136	592	.....
21	145	.....	108	.....	.....	103	148	520	.....
22	145	.....	108	.....	.....	103	160	485	.....
23	143	.....	112	.....	.....	102	184	538	.....
24	124	.....	110	.....	.....	106	218	592	.....
25	137	.....	110	.....	.....	87	273	574	.....
26	132	.....	109	.....	.....	100	327	574	.....
27	143	.....	108	.....	112	103	342	592	.....
28	141	.....	104	.....	106	100	270	592	.....
29	139	.....	108	.....	.....	102	244	601	.....
30	137	.....	110	.....	.....	102	237	620	.....
31	137	.....	113	.....	.....	108	.....	639	.....

NOTE.—Discharge estimated, on account of breaks in recording gage record, as follows: Nov. 10-30, 125 second-feet; Jan. 10 to Feb. 26, 100 second-feet; interpolated Apr. 9-14, 128 second-feet.

*Monthly discharge of Logan River, below Logan Northern canal, near Logan, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	167	115	145	8,920
November.....	137	115	127	7,560
December.....	132	108	113	6,950
January.....	118	.....	103	6,330
February.....	.....	.....	101	5,610
March.....	109	81	101	6,210
April.....	342	103	162	9,640
May.....	665	205	478	29,400
June 1-13.....	898	657	757	19,600
The period.....	.....	.....	.....	100,000

## UTAH POWER &amp; LIGHT CO.'S TAILRACE NEAR LOGAN, UTAH.

LOCATION.—In NE.  $\frac{1}{4}$  sec. 36, T. 12 N., R. 1 E., 100 feet below power house at plant of Utah Power & Light Co.,  $2\frac{1}{2}$  miles above Logan, Cache County.

RECORDS AVAILABLE.—May 7, 1913, to September 30, 1917.

GAGE.—Friez water-stage recorder on right bank just above weir; inspected by employees of Utah Power & Light Co.

DISCHARGE MEASUREMENTS.—Made from a footbridge just above gage.

CHANNEL AND CONTROL.—A rectangular wooden weir, with a metal crest strip, just below gage acts as control. Capacity of channel above weir not sufficient to eliminate all velocity of approach. Stage of zero flow, zero on gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.45 feet September 25-28 (discharge, 118 second-feet); no flow at times during repairs to flume or machinery.

1913-1917: Maximum stage recorded, 1.77 feet May 8, 1914 (discharge, 162 second-feet); no flow at times.

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

REGULATION.—Flow at station affected by operation of power plant.

ACCURACY.—Stage-discharge relation permanent, Rating curve well defined for range of stage during year. Operation of water-stage recorder satisfactory except for short periods 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 water-stage recorder was not operating satisfactorily, for which it was estimated from daily staff gage readings and watt-meter record at power plant. Records obtained by use of rating table excellent; others good.

Canal diverts water from right bank of Logan River in sec. 30, T. 13 N., R. 2. E. Water is returned to river 125 feet below gaging station on Logan River above State dam, in N.  $\frac{1}{4}$  sec. 36, T. 12 N., R. 1 E. Water is used for power development.

*Discharge measurements of Utah Power & Light Co.'s tailrace near Logan, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 6	A. B. Purton.....	1.24	91	May 17	Utah Power & Light Co.	1.31	101
Jan. 10	L. W. Jordan.....	1.125	78	June 13	A. B. Purton.....	1.30	100
Mar. 24	Utah Power & Light Co.	96	61	July 22	L. W. Jordan.....	1.32	100
Apr. 23	do.....	1.27	95	Aug. 25	A. B. Purton.....	1.32	101

*Daily discharge, in second-feet, of Utah Power & Light Co.'s trailrace near Logan, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	91	95	104	89	56	54	74	99	82	99	100	112
2.....	92	95	103	94	57	49	76	99	40	99	100	112
3.....	92	95	103	91	69	45	74	99	95	99	100	112
4.....	92	95	103	89	.....	54	73	99	102	100	100	112
5.....	84	97	102	88	.....	63	74	99	106	100	99	112
6.....	92	97	102	87	.....	60	76	99	87	100	99	112
7.....	92	98	100	84	.....	57	78	98	55	100	100	112
8.....	92	100	102	85	.....	58	77	99	32	100	100	111
9.....	91	103	102	82	.....	60	73	99	32	100	100	111
10.....	91	103	99	83	.....	66	83	99	32	100	100	112
11.....	89	102	95	80	63	58	84	100	99	100	100	112
12.....	92	102	99	82	64	59	85	100	99	100	100	113
13.....	91	98	104	70	63	58	85	100	99	100	100	115
14.....	93	99	93	74	63	62	87	100	.....	100	102	.....
15.....	93	103	89	.....	60	61	89	100	.....	100	102	.....
16.....	92	103	93	.....	61	59	89	100	.....	102	102	.....
17.....	93	103	95	.....	65	61	88	100	.....	99	102	.....
18.....	93	103	93	.....	63	59	89	99	.....	102	102	80
19.....	93	103	98	.....	61	63	89	99	.....	102	102	.....
20.....	93	103	98	70	61	64	89	99	.....	102	102	.....
21.....	94	103	98	.....	59	55	89	99	.....	102	102	.....
22.....	95	103	97	.....	61	59	93	99	.....	99	102	115
23.....	95	103	100	.....	40	60	94	99	102	103	102	112
24.....	95	103	102	.....	85	58	98	99	102	100	102	118
25.....	95	103	100	.....	80	34	102	99	76	99	102	118
26.....	95	102	98	.....	74	50	100	99	100	100	102	118
27.....	95	102	95	.....	68	55	104	99	100	87	103	82
28.....	95	103	92	.....	65	57	103	93	94	93	111	112
29.....	95	102	92	.....	.....	64	102	45	99	102	111	115
30.....	95	103	80	.....	.....	70	100	45	99	102	111	113
31.....	95	.....	82	59	.....	73	.....	82	.....	100	112	.....

NOTE.—During periods when water-stage recorder was not operating satisfactorily the discharge was estimated from daily staff gage readings and watt-meter record at power plant as follows: Jan. 15-19, 60 second-feet; Jan. 21-30, 65 second-feet; Feb. 4-10, 66 second-feet; June 14-22, 100 second-feet; Sept. 15-18 and 20-22, 115 second-feet.

*Monthly discharge of Utah Power & Light Co.'s trailrace near Logan, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	95	84	92.7	5,700
November.....	103	95	101	6,010
December.....	104	80	97.2	5,980
January.....	94	.....	72.8	4,480
February.....	85	40	64.3	3,570
March.....	73	34	58.2	3,580
April.....	104	73	87.2	5,190
May.....	100	45	95.0	5,840
June.....	106	32	87.7	6,130
July.....	103	87	99.7	6,130
August.....	112	99	102	6,270
September.....	118	80	112	6,660
The year.....	118	32	89.2	64,600



**LOGAN, HYDE PARK & SMITHFIELD CANAL NEAR LOGAN, UTAH.**

**LOCATION.**—In NW.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 31, T. 12 N., R. 2 E., at concrete rating flume half a mile below head of canal, 1 mile below city power plant, 1 mile above plant of Utah Power & Light Co., and  $3\frac{1}{2}$  miles from Logan, Cache County.

**RECORDS AVAILABLE.**—Fragmentary records 1904–1912. Fairly continuous records April 22, 1912, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on right bank near lower end of rating flume; installed June 6, 1913; inspected by Robert McCulloch. Records April 22, 1912, to March 31, 1913, obtained from vertical staff gage at point  $1\frac{1}{2}$  miles below present gage; two wasteways between the two points. Prior to April 22, 1912, gages were maintained at various points.

**DISCHARGE MEASUREMENTS.**—Made from a footplank at flume or by wading.

**CHANNEL AND CONTROL.**—Rectangular concrete rating flume. Stage of zero flow, after control board was installed in April, 1915, 0.35 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 2.50 feet at 10 a. m. July 28 (discharge, 119 second-feet).

1912–1917: Maximum stage occurred in 1917, minimum discharge probably zero (while canal is being cleaned).

**ICE.**—Recording gage usually removed during winter. A small flow of water is maintained for domestic use.

**DIVERSIONS.**—None above the gage.

**REGULATION.**—Flow regulated by head gates at diversion works.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except for breaks in record as shown in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph except that for October 1–16 which was estimated, and that for June 18–21 and August 18–24 which was interpolated. Records obtained by use of rating table good.

Canal diverts water from Logan River in NE.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 31, T. 12 N., R. 2 E., for irrigation and domestic use in the territory north of Logan.

*Discharge measurements of Logan, Hyde Park & Smithfield canal near Logan, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
June 13	A. B. Purton.....	1.63	58
July 22	L. W. Jordan.....	2.43	111
Aug. 25	A. B. Purton.....	2.06	86

*Daily discharge, in second-feet, of Logan, Hyde Park & Smithfield canal near Logan, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1.....		22			99	102	60
2.....		22			99	99	60
3.....		22			99	98	60
4.....		22			99	97	60
5.....		23			101	102	59
6.....	33	23			101	108	59
7.....		23			110	107	63
8.....		23			108	108	64
9.....		23			112	108	64
10.....		15	22		114	108	64
11.....		14	21		113	107	64
12.....		13	19		112	106	63
13.....		14	16	59	115	105	63
14.....		15	25	74	115	104	63
15.....		15	56	85	114	103	63
16.....		15		92	113	102	63
17.....	22	15		94	115	101	62
18.....	22	15			112		67
19.....	22	14			113		61
20.....	22	13			113		
21.....	22	14			113		
22.....	22	15		94	113		
23.....	22	15		92	111		
24.....	22	15		91	110		
25.....	22			102	110	88	
26.....	22			101	108	88	
27.....	22			98	109	88	
28.....	22			97	111	87	
29.....	22			97	108	85	
30.....	22			98	105	79	
31.....	22				104	64	

NOTE.—Mean discharge estimated from flow of Logan River above State dam when water-stage recorder was not operating Oct. 1-5, 38 second-feet; Oct. 6, 33 second-feet; Oct. 7-16, 22 second-feet; not determined Nov. 25 to May 9, May 16 to June 12, and Sept. 20-30; mean discharge interpolated June 18-21 and Aug. 18-24, 94 second-feet.

*Monthly discharge of Logan, Hyde Park & Smithfield canal near Logan, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....			24.9	1,530
November 1-24.....	23	13	17.5	833
June 13-30.....	102	59	91.7	3,270
July.....	115	99	109	6,700
August.....	108	64	96.8	5,950
September 1-19.....	67	59	62.2	2,340

NOTE.—No record kept Nov. 25, May 9, May 16 to June 12, and Sept. 20 to 30.

#### **BLACKSMITH FORK ABOVE UTAH POWER & LIGHT CO.'S DAM, NEAR HYRUM, UTAH.**

LOCATION.—In NE.  $\frac{1}{4}$  sec. 8, T. 10 N., R. 2 E., 1 mile above diversion dam,  $3\frac{1}{2}$  miles above power plant of Utah Power & Light Co., and 6 miles east of Hyrum, Cache County.

DRAINAGE AREA.—About 260 square miles (measured on topographic maps and map of Cache National Forest).

RECORDS AVAILABLE.—July 19, 1900, to December 31, 1902; November 28, 1913, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on left bank 500 feet above wagon bridge and nearly a mile above dam; installed November 28, 1913; inspected by employees of Utah Power & Light Co. Gage at old tollgate in mouth of canyon about  $3\frac{1}{2}$  miles downstream was used July 19, 1900, to December 31, 1902. Flow approximately the same at both points.

DISCHARGE MEASUREMENTS.—Made by wading about three-eighths of a mile above gage, or from cable a quarter of a mile above gage. Conditions at wading section, good; at cable, poor; especially at high stages.

CHANNEL AND CONTROL.—Bed rough but fairly permanent; one channel at all stages.  
 EXTREMES OF DISCHARGE.—Maximum stage during year determined from high-water mark in well by levels, 6.5 feet May 15 (discharge estimated by extending rating curve, 1,620 second-feet); minimum stage from water-stage recorder, 1.22 feet February 1 (discharge, 60 second-feet).

1913-1917: Maximum stage occurred in 1917; minimum stage, 0.85 foot at 6 a.m. February 6, 1916 (discharge estimated from an extension of rating curve 22 second-feet).

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

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 50 and 700 second-feet. Operation of water-stage recorder satisfactory except that inlet pipe was more or less clogged from October 1 to July 23; corrections to graph based on occasional outside staff gage readings. Daily discharge determined by applying to rating table mean daily gage height taken from graph by inspection, except for short periods when water-stage recorder was not operating for which it was interpolated. Records for period October 1 to July 23, fair; others, good.

*Discharge measurements of Blacksmith Fork above Utah Power & Light Co.'s dam near Hyrum, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 18	Purton and Jordan.....	1.67	108	Apr. 24	L. C. Monson <sup>a</sup> .....	2.93	392
Jan. 11	L. W. Jordan.....	1.48	83	June 13	A. B. Purton.....	2.93	423
26	H. L. Stoner <sup>a</sup> .....	1.46	80	July 23	L. W. Jordan.....	2.14	211
Mar. 22	do.....	1.46	84	Aug. 25	A. B. Purton.....	2.02	176

<sup>a</sup> Engineer, Utah Power & Light Co.

*Daily discharge, in second-feet, of Blacksmith Fork above Utah Power & Light Co.'s dam near Hyrum, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	129	107	96	79	71	83	109	282	577	274	204	167
2.....	128	107	96	86	73	85	109	269	546	269	200	167
3.....	126	107	96	79	86	72	105	.....	546	266	196	165
4.....	119	107	96	85	83	79	102	.....	530	264	192	165
5.....	115	107	94	85	82	80	102	.....	530	264	188	165
6.....	112	105	96	86	79	80	105	269	514	259	186	165
7.....	112	102	90	86	78	78	117	350	514	253	186	162
8.....	112	99	82	86	78	77	131	379	514	248	184	160
9.....	113	101	87	85	78	77	160	486	546	243	182	158
10.....	115	102	92	84	78	77	186	593	593	238	182	158
11.....	120	101	94	84	78	76	180	1,020	561	236	182	160
12.....	120	99	92	84	77	76	191	821	484	230	182	158
13.....	119	92	92	84	77	75	169	788	411	228	180	156
14.....	115	90	89	.....	77	77	180	1,090	408	226	180	156
15.....	113	92	86	.....	78	76	186	1,300	414	223	182	156
16.....	112	96	87	.....	78	77	165	1,230	426	220	182	154
17.....	112	96	90	.....	78	77	150	1,060	438	218	180	154
18.....	112	95	89	.....	79	78	156	956	435	216	177	152
19.....	112	95	89	.....	80	.....	158	905	420	213	175	150
20.....	110	95	89	.....	80	.....	173	888	402	211	173	150
21.....	109	94	89	.....	77	.....	204	755	385	209	173	150
22.....	107	92	90	.....	73	80	238	641	373	206	171	150
23.....	107	94	90	.....	75	82	325	722	356	200	171	160
24.....	107	92	90	.....	89	82	468	788	336	197	171	156
25.....	107	94	.....	.....	92	83	530	738	325	197	171	152
26.....	107	96	.....	80	92	83	593	706	314	195	171	150
27.....	107	95	.....	80	90	84	546	657	306	197	171	148
28.....	107	95	.....	82	87	85	379	625	295	220	169	146
29.....	107	92	.....	83	.....	92	322	611	290	216	169	144
30.....	107	96	82	83	.....	109	302	706	282	212	169	142
31.....	107	.....	72	78	.....	110	.....	657	.....	208	169	.....

NOTE.—Discharge interpolated for days when water-stage recorder was not operating satisfactorily as follows: Dec. 25-29, 86 second-feet; Jan. 14-25, 82 second-feet; Mar. 19-21, 79 second-feet; May 3-5, 269 second-feet; July 30 to Aug. 4, as in table.

*Monthly discharge of Blacksmith Fork above Utah Power & Light Co.'s dam, near Hyrum, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	129	107	113	6,950
November.....	107	90	97.8	5,820
December.....	96	72	89.2	5,480
January.....	86		82.7	5,080
February.....	92	71	80.1	4,450
March.....	110	72	81.5	5,010
April.....	593	102	228	13,600
May.....	1,300		682	41,900
June.....	593	282	436	25,900
July.....	274	195	228	14,000
August.....	204	169	180	11,100
September.....	167	142	156	9,280
The year.....	1,300	71	205	149,000

**BLACKSMITH FORK BELOW UTAH POWER & LIGHT CO.'S PLANT, NEAR HYRUM, UTAH.**

**LOCATION.**—In sec. 2, T. 10 N., R. 2 E., 600 or 700 feet below heading of Hyrum power canal and mouth of Utah Power & Light Co.'s tailrace and  $2\frac{1}{2}$  miles east of Hyrum, Cache County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—July 19, 1900, to December 31, 1902; May 16, 1904, to December 31, 1910; April 15, 1914, to December 13, 1916, when station was discontinued.

**GAGE.**—Stevens continuous water-stage recorder on right bank; installed April 15, 1915; inspected by Joseph Appleyard. Gage used 1904–1910 was a vertical staff about 300 feet above present site and at different datum.

**DISCHARGE MEASUREMENTS.**—Made by wading at various sections or from cable about 100 feet below gage. Conditions for measuring poor and there are many springs along this section of the river.

**CHANNEL AND CONTROL.**—Bed composed of gravel and boulders; steep. Banks low and covered with willows, but probably not overflowed except during extraordinary floods. Concrete wall about 10 feet below gage acted as control until undermined in spring of 1916.

**EXTREMES OF DISCHARGE.**—1904–1910 and 1914–1916: Maximum stage recorded 6.8 feet April 16, 1907 (discharge, 1,810 second-feet); minimum stage, 4.49 feet October 15 and 16, 1915 (discharge, 2 second-feet). New datum in 1915. See "Gage."

**ICE.**—Stage-discharge relation not usually affected by ice on account of springs in the vicinity.

**DIVERSIONS.**—Water diverted above station by Hyrum power canal is returned to river about a quarter of a mile downstream. Utah Power & Light Co. diverts about  $2\frac{1}{2}$  miles upstream, but the tailrace of this plant enters just above head of Hyrum canal.

**REGULATION.**—Flow at gage affected by operation of the two plants.

**ACCURACY.**—Stage-discharge relation permanent during October to December. Rating curve fairly well defined except for discharge below 20 second-feet. Operation of water-stage recorder satisfactory. Daily discharge determined by applying to the rating table mean daily gage height, obtained by inspecting recorder graph. Records fair.

*Discharge measurements of Blacksmith Fork below Utah Power & Light Co.'s plant near Hyrum, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 18	A. B. Purton.....	4.66	35.6
Jan. 11	L. W. Jordan.....	4.10	18.9

*Daily discharge, in second-feet, of Blacksmith Fork below Utah Power & Light Co.'s plant near Hyrum, Utah, for the period Oct. 1 to Dec. 13, 1916.*

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1.....	42	32	28	11.....	41	33	19	21.....	34	27	.....
2.....	40	32	27	12.....	41	30	20	22.....	39	27	.....
3.....	32	32	26	13.....	39	28	19	23.....	36	27	.....
4.....	32	32	29	14.....	38	23	.....	24.....	34	28	.....
5.....	26	32	30	15.....	38	29	.....	25.....	34	26	.....
6.....	28	34	30	16.....	37	30	.....	26.....	33	26	.....
7.....	30	34	24	17.....	37	30	.....	27.....	34	28	.....
8.....	29	32	19	18.....	36	30	.....	28.....	34	26	.....
9.....	36	32	20	19.....	36	28	.....	29.....	34	26	.....
10.....	40	34	19	20.....	36	27	.....	30.....	32	24	.....
								31.....	32	.....	.....

*Monthly discharge of Blacksmith Fork below Utah Power & Light Co.'s plant near Hyrum, Utah, for the period Oct. 1 to Dec. 13, 1916.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	42	26	35.2	2,160
November.....	34	23	29.3	1,740
December 1-13.....	30	19	23.8	614
The period.....				4,510

#### HYRUM CITY POWER CANAL NEAR HYRUM, UTAH.

**LOCATION.**—In sec. 2, T. 10 N., R. 1 E. about 300 feet below head of canal, which diverts immediately below confluence of Utah Power & Light Co.'s tailrace with river;  $2\frac{1}{2}$  miles east of Hyrum, Cache County.

**RECORDS AVAILABLE.**—1904-1910, and April 15, 1914, to June 13, 1917, when station was discontinued. Records from 1904 to 1910 were published under head "Blacksmith Fork (or Hyrum) power-plant race near Hyrum, Utah."

**GAGE.**—Stevens continuous water-stage recorder on right bank immediately below footbridge; inspected by Joseph Appleyard. Gage used 1904-1910 was vertical staff at about same site but different datum.

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

**CHANNEL AND CONTROL.**—Bed composed of earth and gravel. Right bank covered with willows. Control not clearly defined.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.56 feet 5 a. m. May 15 (discharge, 134 second-feet); minimum stage undetermined.

1904-1910, 1914-1917: Maximum stage recorded, 6.56 feet May 15, 1917 (discharge, 134 second-feet); canal dry at times during 1916.

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

DIVERSIONS.—None.

REGULATION.—Flow regulated by gates at head of canal.

ACCURACY.—Stage-discharge relation considered permanent. Rating curve fairly well defined for normal flow of canal. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or by averaging hourly discharge for days when canal fluctuated considerably. Records fair.

Canal diverts water from left side of Blacksmith Fork in sec. 2, T. 10 N., R. 1 E., immediately below tailrace of Utah Power & Light Co. Water used for power development at Hyrum power plant and is returned to the river.

*Discharge measurements of Hyrum city power canal near Hyrum, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 18	Purton and Jordan.....	6.10	91
Jan. 11	L. W. Jordan.....	6.09	85
June 13	A. B. Purton.....	5.99	84

*Daily discharge, in second-feet, of Hyrum city power canal near Hyrum, Utah, for the period Oct. 1, 1916, to June 13, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....	94	91	87	97	80	103	99	95	88
2.....	97	91	87	94	82	99	89	94	87
3.....	88	91	86	93	107	101	88	94	85
4.....		91	88	93	99	104	86	94	86
5.....		90	88	88	98	109	87	92	86
6.....		92	89	91	99	104	87	92	86
7.....		90	84	89	94	100	92	101	86
8.....		88	77	88	96	100	93	102	86
9.....		88	96	88	97	101	85	104	88
10.....		89	98	90	95	101	86	112	90
11.....		88	97	90	95	96		117	88
12.....		88	100	89	95	96		119	84
13.....		87	100	82	96	96		117	82
14.....		82	95	88	94	100		120	
15.....	89	86	95	82	95	94		123	
16.....	92	87	98	65	95	96		119	
17.....	92	87	99	70	97	93		109	
18.....	90	87	98	79	96	94		109	
19.....	90	86	97	90	98	95		107	
20.....	90	84	97	111	99	93		105	
21.....	89	85	92	108	97	94		100	
22.....	75	85	92	104	104	94		94	
23.....	92	85	93	105	92	93		95	
24.....	90	86	94	103	104	94		98	
25.....	90	85	94	103	113	96	115	95	
26.....	91	84	91	102	115	92	117	94	
27.....	92	87	89	99	107	93	115	93	
28.....	91	84	86	99	105	96	105	90	
29.....	91	85	93	98		106	99	91	
30.....	90	85	82	99		90	95	94	
31.....	91		79	90		111		92	

NOTE.—Gage-height record in error Oct. 4-14 and Apr. 11-24; discharge estimated as follows: Oct. 4-14, 88 second-feet; Apr. 11-24, 90 second-feet.

*Monthly discharge at Hyrum city power canal near Hyrum, Utah, for the period Oct. 1, 1916, to June 13, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	97	75	89.4	5,500
November.....	92	82	87.1	5,180
December.....	100	77	91.6	5,630
January.....	111	65	92.5	5,690
February.....	115	80	98.0	5,450
March.....	111	92	97.9	6,020
April.....			93.3	5,550
May.....	123	90	102	6,270
June 1-13.....	90	82	86.3	2,230
The period.....				47,500

#### WEST SIDE CANAL NEAR COLLINSTON, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 34, T. 13 N., R. 2 W., at Wheelon siding on Oregon Short Line Railroad, 600 feet below penstock of Utah Power & Light Co.'s Wheelon plant, 1,000 feet northwest of gaging station on Bear River, and 4 miles north of Collinston, Boxelder County.

**RECORDS AVAILABLE.**—June 1, 1912, to September 30, 1917.

**GAGE.**—Friez water-stage recorder on left bank installed May 22, 1914, at same site and datum as inclined gage used prior to that time; inspected by employees of Utah Power & Light Co.

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

**CHANNEL AND CONTROL.**—Bed composed of earth and gravel. Banks steep and clean. Control not well defined; stage-discharge relation is affected probably by vegetal growth and slight silt deposit.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.59 feet July 27 (discharge, 554 second-feet); canal dry March 10 and April 10 to May 15.

1912-1917: Maximum stage recorded, 7.86 feet July 1, 1912 (discharge, 563 second-feet); canal dry at various times in 1913, 1915, 1916, and 1917.

**ICE.**—Stage-discharge relation seriously affected at times by ice.

**DIVERSIONS.**—Water is taken out of canal, about 600 feet above gage, for the power plant, and, if necessary, water can also be siphoned across the river to the Hammond canal.

**REGULATION.**—Flow can be regulated at head gates and also at fore bay of power plant.

**ACCURACY.**—Stage-discharge relation changed during October and in spring when canal was cleaned; affected by ice December 25 to March 30. Rating curves fairly well defined. Daily discharge ascertained by applying mean daily gage height to rating tables except for periods when stage-discharge relation was affected by shifting control or ice. Records obtained by use of rating tables good; others fair.

**COOPERATION.**—Record of daily mean gage height and some discharge measurements furnished by Utah Power & Light Co.

Canal diverts water from west side of Bear River in SW.  $\frac{1}{4}$  sec. 23, T. 13 N., R. 2 W., by means of a low diversion dam. Part of the water is used through the Wheelon plant of the Utah Power & Light Co. about  $1\frac{1}{2}$  miles below; the rest which passes gaging station is used for irrigation on west side of river. When cleaning or repairing the Hammond canal in the canyon, water can be siphoned across the river at power plant from the West Side canal.

*Discharge measurements of West Side canal near Collinston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 19	A. B. Purton.....	3.60	108	May 18	Utah Power & Light Co	2.70	70
Dec. 5	Utah Power & Light Co	3.05	70	June 15	A. B. Purton.....	5.02	241
Jan. 9	L. W. Jordan.....	3.55	38.7	July 24	L. W. Jordan.....	7.55	525
Feb. 14	Utah Power & Light Co.	4.0	22	30	Utah Power & Light Co.	6.95	506
Mar. 23	.....do.....	1.70	8.7	Aug. 29	.....do.....	7.04	484

<sup>a</sup> Stage-discharge relation affected by ice.

<sup>b</sup> Estimated.

<sup>c</sup> Canal cleaned previous to measurement.

*Daily discharge, in second-feet, of West Side canal near Collinston, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	246	112	69			3		69	491	468	489
2.....	245	122	69			3		72	493	468	487
3.....	244	114	69			3		80	491	468	486
4.....	154	111	52			3		93	490	461	490
5.....	138	110	81			7		104	490	447	491
6.....	150	106	64			7		103	490	450	490
7.....	145	106	49			7		101	491	452	491
8.....	131	101	49			7		118	490	474	493
9.....	135	101	49	39		7		117	490	477	493
10.....	140	102	49					123	490	478	491
11.....	136	125	64					126	489	478	491
12.....	131	110	64					132	491	480	485
13.....	128	108	64					158	496	484	480
14.....	114	78	54					188	508	493	468
15.....	109	26	54					252	508	504	442
16.....	105	45	41				28	301	506	511	456
17.....	105	59	93				28	284	506	513	455
18.....	101	64	66				69	313	513	507	455
19.....	100	64	59				64	371	504	491	454
20.....	101	59	62				69	165	519	487	454
21.....	112	75	69				69	426	546	474	448
22.....	122	59	69				68	447	542	470	444
23.....	127	59	62				66	450	546	479	380
24.....	126	33	56		9		45	447	545	469	337
25.....	105	26					59	447	548	472	313
26.....	107	64					75	455	551	476	260
27.....	115	75					78	405	554	487	223
28.....	111	69					82	458	510	486	223
29.....	111	64					86	464	484	484	225
30.....	111	75					72	490	480	489	225
31.....	114				3		60		469	489	

NOTE.—Discharge estimated because of ice Dec. 25-31, 50 second-feet; Jan. 1-8, 40 second-feet; Jan. 10 to Mar. 9, 35 second-feet; Mar. 11-22, 25 second-feet; Mar. 24-30, 7 second-feet; canal dry Mar. 10 and Apr. 10 to May 15.

*Monthly discharge of West Side canal near Collinston, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	246	100	133	8,180
November.....	125	26	80.7	4,800
December.....	93	41	58.9	3,620
January.....			36.4	2,240
February.....			35.0	1,940
March.....			21.8	1,340
April.....	7	0	1.57	93
May.....	86	0	32.8	2,020
June.....	490	69	261	15,500
July.....	554	469	507	31,200
August.....	513	447	479	29,500
September.....	493	223	421	25,100
The year.....	554	0	137	126,000



**HAMMOND (EAST SIDE) CANAL NEAR COLLINSTON, UTAH.**

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 34, T. 13 N., R. 2 W., at Wheelon siding on Oregon Short Line Railroad, 400 feet below penstock of Utah Power & Light Co. and 4 miles north of Collinston, Boxelder County.

**RECORDS AVAILABLE.**—June 1, 1912, to September 30, 1917.

**GAGE.**—Friez water-stage recorder on right bank, installed May 22, 1914, at same site and datum as inclined staff used until that date; inspected by employees of Utah Power & Light Co.

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

**CHANNEL AND CONTROL.**—Bed composed of earth and gravel. Control not well defined.

**EXTREMES OF DISCHARGE.**—See monthly discharge table. Mean daily discharge only is available. No record during winter.

1912-1917: Maximum stage, 4.80 feet September 2, 1916 (discharge, 126 second-feet).

**ICE.**—No record was kept during winter, but canal was dry at least part of the time.

**DIVERSIONS.**—Water is taken from this canal about 400 feet above gage for the power plant.

**REGULATION.**—Flow can be regulated at head gates and by means of a wasteway at power-plant forebay; is also affected by operation of plant.

**ACCURACY.**—Stage-discharge relation remained permanent; no record during winter. Rating curve well defined up to gage height 4.5 feet, at which stage measuring bridge below gage submerges and causes backwater. Daily discharge ascertained by applying to rating table mean daily gage height, except for stages affected by back water from measuring bridge when a correction was applied to gage heights. Records good.

**COOPERATION.**—Mean daily gage heights taken from water-stage recorder are furnished by Utah Power & Light Co.

Canal diverts water on east side of Bear River in SW.  $\frac{1}{4}$  sec. 23, at the same diversion dam as the West Side canal. Part of the water is used by the Wheelon plant of the Utah Power & Light Co., and the rest is either wasted into the river or passes the gaging station for irrigation use.

*Discharge measurements of Hammond (East Side) canal near Collinston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 19	A. B. Purton.....	1.98	14.7	July 30	Utah Power & Light Co.	3.96	86
July 24	L. W. Jordan.....	<sup>a</sup> 4.68	113	Aug. 29	.....do.....	4.36	104

<sup>a</sup> Measuring bridge stringers submerged about 0.2 foot, causing backwater at gage.

*Daily discharge, in second-feet, of Hammond (East Side) canal near Collinston, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	June.	July.	Aug.	Sept.	Day.	Oct.	June.	July.	Aug.	Sept.
1.....	39	.....	73	73	104	16.....	16	10	111	111	83
2.....	27	.....	83	65	104	17.....	16	9.4	113	106	83
3.....	12	.....	73	63	104	18.....	15	13	111	101	86
4.....	0	.....	92	57	101	19.....	15	31	113	78	83
5.....	0	.....	90	55	101	20.....	15	63	113	65	83
6.....	0	.....	94	63	92	21.....	16	78	113	83	80
7.....	20	.....	90	76	88	22.....	15	57	113	83	65
8.....	22	.....	106	92	88	23.....	6	53	113	90	36
9.....	26	.....	86	99	88	24.....	.....	51	113	99	14
10.....	26	.....	83	101	83	25.....	.....	49	111	101	9.8
11.....	20	.....	88	101	86	26.....	.....	40	97	104	11
12.....	16	.....	69	106	78	27.....	.....	43	97	106	10
13.....	15	.....	86	106	88	28.....	.....	78	92	106	9.6
14.....	16	.....	108	111	88	29.....	.....	113	92	104	9.4
15.....	16	.....	111	111	88	30.....	.....	88	86	101	9.2
						31.....	.....	.....	80	104	.....

NOTE.—Canal dry Oct. 4-6. Water turned out Oct. 24; no record from November to May; water turned into canal June 16.

*Monthly discharge of Hammond (East Side) canal near Collinston, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-23.....	39	0	16.0	730
June 16-30.....	113	9.4	51.8	1,540
July.....	113	69	96.8	5,950
August.....	111	55	91.0	5,600
September.....	104	9.2	68.4	4,070
The period.....	.....	.....	.....	17,900

## WEBER RIVER BASIN.

### WEBER RIVER NEAR OAKLEY, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 15, T. 1 S., R. 6 E., near mouth of canyon, about 3 miles above Oakley, Summit County. South Fork of Weber River enters 2 miles above station, and Beaver or Kamas Creek 6 miles below.

**DRAINAGE AREA.**—163 square miles.

**RECORDS AVAILABLE.**—October 22, 1904, to September 30, 1917.

**GAGE.**—Inclined staff on left bank about a quarter of a mile above upper ditch diverting from Weber River; read by John Franson.

**DISCHARGE MEASUREMENTS.**—Made from cable 500 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and boulders. One channel at all stages; steep and rough, but apparently fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year 8.0 feet, June 18, 19, and 22-24 (discharge on June 18 during period of shifting control, 2,760 second-feet); minimum discharge probably occurred during January but was not determined.

1904-1917: Maximum stage recorded 8.5 feet, July 6, 1907, and June 5-7, 1909 (discharge, 4,010 second-feet); minimum stage, 4.0 feet for periods during February and March, 1908 (discharge, 46 second-feet).

**ICE.**—Stage-discharge relation seriously affected by ice; discharge estimated from observer's notes and climatic records.

DIVERSIONS.—Above all important diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water in June; affected by ice during November to March. Rating curve used before June 16, well defined, between 70 and 2,000 second-feet; that used for remainder of year well defined between 75 and 1,600 second-feet. Gage read to half-tenths once daily except during January, February, and March, when it was read once a week. Daily discharge determined by applying daily gage height to rating tables except for periods when stage-discharge relation was affected by ice or shifting control. Records obtained by use of rating tables, good; others fair.

*Discharge measurements of Weber River near Oakley, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
Nov. 2...	J. J. Sanford.....	<i>Fect.</i> 4.20	<i>Sec.-ft.</i> 100
July 27...	L. W. Jordan.....	4.86	245

*Daily discharge, in second-feet, of Weber River near Oakley, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	161	92	.....	.....	75	192	642	1,840	222	101
2.....	135	92	75	.....	75	161	707	1,750	205	101
3.....	135	92	75	.....	84	161	775	1,580	188	101
4.....	112	92	75	.....	84	161	775	1,420	173	92
5.....	112	92	75	.....	92	161	775	1,420	173	92
6.....	112	92	75	.....	92	161	846	1,340	158	101
7.....	112	92	.....	.....	102	192	995	1,580	158	96
8.....	135	92	.....	.....	102	210	1,420	1,190	145	92
9.....	135	84	.....	.....	102	227	1,520	1,110	145	92
10.....	135	84	.....	.....	102	267	1,940	899	132	92
11.....	135	84	135	.....	112	289	1,420	899	132	110
12.....	135	75	161	.....	112	311	1,160	833	132	101
13.....	135	68	92	.....	112	358	1,080	833	132	92
14.....	135	68	.....	.....	112	579	1,340	710	132	92
15.....	135	.....	.....	.....	112	919	1,720	596	132	92
16.....	135	.....	.....	.....	112	995	2,240	542	132	92
17.....	124	.....	.....	.....	112	995	2,400	490	132	92
18.....	124	.....	.....	.....	112	995	2,760	490	132	85
19.....	124	75	.....	.....	112	995	2,720	440	121	85
20.....	124	.....	.....	.....	124	919	2,300	440	121	78
21.....	124	.....	.....	60	124	846	2,460	392	121	78
22.....	124	.....	.....	60	135	707	2,620	369	121	85
23.....	124	.....	.....	62	135	707	2,580	346	121	110
24.....	112	92	.....	64	161	707	2,550	302	110	101
25.....	112	92	.....	66	311	707	2,150	302	110	101
26.....	112	84	.....	68	358	642	2,020	281	110	92
27.....	112	75	.....	70	267	642	2,020	281	110	85
28.....	102	75	.....	72	267	579	2,020	260	110	78
29.....	102	.....	.....	75	227	579	2,020	260	110	80
30.....	102	.....	.....	75	192	707	1,930	302	101	82
31.....	92	.....	.....	75	.....	707	.....	260	101	.....

NOTE.—Discharge estimated because of ice Nov. 15-18, 160 second-feet; Nov. 20-23, 85 second-feet; Nov. 29 to Dec. 1, Dec. 7-10 and 14-31, 100 second-feet; Jan. 1-5, 70 second-feet; Jan. 6-31, 45 second-feet; Feb. 1-28, 60 second-feet; Mar. 1-7, 70 second-feet; Mar. 8-15, 75 second-feet; and Mar. 16-20, 70 second-feet. Shifting-control method used June 16-25.

*Monthly discharge of Weber River near Oakley, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre- feet.
	Maximum.	Minimum.	Mean.	
October.....	161	92	123	7,560
November.....		68	95.7	5,690
December.....	161	75	98.8	6,080
January.....			49.0	3,010
February.....			60	3,330
March.....			70.9	4,360
April.....	358	75	140	8,330
May.....	995	161	541	33,300
June.....	2,760	642	1,730	103,000
July.....	1,840	260	766	47,100
August.....	222	101	136	8,360
September.....	110	78	92.4	5,500
The year.....	2,760		325	236,000

#### WEBER RIVER AT DEVILS SLIDE, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 19, T. 4 N., R. 4 E., 300 feet north of hotel and 500 feet downstream from highway bridge at Devils Slide, Morgan County. Lost Creek enters from right a quarter of a mile above station.

**DRAINAGE AREA.**—1,090 square miles.

**RECORDS AVAILABLE.**—February 1, 1905, to September 30, 1917.

**GAGE.**—Vertical staff on left bank just above cable, installed September 21, 1915, at same site and datum as inclined staff used March 9, 1912, to September 20, 1915; read by A. E. Lucas. Original gage used February 1, 1905, to March 8, 1912, was an inclined staff at same datum but on opposite bank of river.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand; shifts occasionally. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.65 feet at 1 p. m. May 16 (discharge, 4,180 second-feet); minimum discharge not determined; probably occurred during ice-affected period, January 20–31.

1905–1917: Maximum stage recorded, 7.0 feet May 28 and June 4–8, 1909 (discharge, 5,120 second-feet); minimum discharge, 48 second-feet September 7 and 8, 1915.

**ICE.**—Stage-discharge relation not seriously affected.

**DIVERSIONS.**—A number of canals divert water above this station for irrigation and domestic use.

**REGULATION.**—None other than diversions for irrigation.

**ACCURACY.**—Stage-discharge relation assumed to have changed May 15–21; affected by ice January 10–12 and 20–31. Rating curves well defined. Gage read once daily to hundredths. Daily discharge ascertained by applying daily gage height to rating tables, one applicable October 1, 1916, to May 14, 1917, and the other May 22 to September 30, 1917. Discharge estimated on account of ice January 10–12 and 20–31, and shifting-control method used May 15–21. Records good.

*Discharge measurements of Weber River at Devils Slide, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis- charge.
Nov. 3	J. J. Sanford.....	<i>Feet.</i> 2.57	<i>Sec.-ft.</i> 256
July 28	L. W. Jordan.....	2.96	343

*Daily discharge, in second-feet, of Weber River at Devils Slide, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	202	268	202	169	163	179	400	1,060	2,500	2,390	415	166
2.....	376	268	238	223	169	195	353	1,060	2,500	2,280	389	159
3.....	440	260	238	238	179	195	309	1,020	2,500	2,160	363	153
4.....	362	260	260	249	189	195	276	1,150	2,620	1,940	339	153
5.....	318	260	276	212	189	223	309	1,060	2,620	1,840	315	153
6.....	288	309	288	230	179	202	450	979	2,500	1,840	293	176
7.....	410	268	169	189	195	195	503	1,200	2,500	1,840	271	194
8.....	376	260	157	179	195	195	683	1,200	2,620	1,740	271	187
9.....	353	288	179	179	189	212	1,150	1,330	2,980	1,480	251	187
10.....	344	301	189	.....	195	223	1,150	1,480	3,350	1,240	231	176
11.....	492	268	179	.....	195	195	1,060	1,580	3,480	1,050	231	212
12.....	440	195	223	.....	195	169	1,330	1,860	2,740	960	224	201
13.....	376	189	238	169	179	163	1,150	2,080	2,390	797	212	201
14.....	372	195	179	169	189	179	1,330	2,670	2,500	723	212	201
15.....	376	202	179	169	189	202	1,330	3,620	2,740	654	201	194
16.....	362	230	179	169	189	195	787	4,120	2,980	558	194	154
17.....	344	268	223	163	189	169	717	3,580	3,220	528	212	194
18.....	331	288	202	163	179	179	683	3,820	3,486	499	224	194
19.....	353	268	238	157	169	195	683	3,540	3,610	415	231	194
20.....	331	249	238	.....	179	202	683	3,520	3,480	363	224	187
21.....	331	230	230	.....	149	195	1,020	3,500	3,220	363	212	187
22.....	318	195	233	.....	169	189	1,240	2,860	3,220	363	201	187
23.....	318	230	238	.....	169	202	1,640	2,740	3,350	363	194	201
24.....	309	212	223	.....	189	223	1,750	2,866	3,220	339	187	251
25.....	301	195	195	.....	223	212	1,970	2,740	3,220	339	176	239
26.....	301	212	238	.....	268	195	2,670	2,860	2,980	324	194	251
27.....	301	238	195	.....	260	223	2,430	2,740	2,860	315	194	231
28.....	288	238	212	.....	223	230	1,530	2,500	2,740	349	194	231
29.....	288	169	195	.....	.....	331	1,240	2,626	2,620	528	187	231
30.....	288	189	157	.....	.....	651	1,116	3,220	2,500	470	187	231
31.....	276	.....	141	.....	.....	425	.....	2,740	.....	470	176	.....

NOTE.—Discharge estimated on account of ice Jan. 10-12, 160 second-feet, and Jan. 20-31, 130 second-feet.

*Monthly discharge of Weber River, at Devils Slide, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	492	202	341	21,000
November.....	309	169	240	14,300
December.....	288	141	210	12,900
January.....	249	.....	163	10,000
February.....	268	163	191	10,600
March.....	651	163	224	13,800
April.....	2,670	276	1,060	63,100
May.....	4,120	979	2,360	145,000
June.....	3,610	2,390	2,910	173,000
July.....	2,390	315	952	58,500
August.....	415	176	239	14,700
September.....	251	153	197	11,700
The year.....	4,120	.....	759	549,000

#### WEBER RIVER NEAR PLAIN CITY, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 5, T. 6 N., R. 2 W., at county highway bridge 1 mile south of Plain City, Weber County, on road to Ogden, 1 mile below mouth of Four-mile Creek, 2 miles below Mill Creek, 6 miles below Ogden River, and 6 miles above point where Weber River empties into Great Salt Lake.

DRAINAGE AREA.—2,060 square miles.

RECORDS AVAILABLE.—May 14, 1905, to September 30, 1917.

Records were obtained at this point in 1904 by the State engineer.

GAGE.—Chain gage on upstream side of highway bridge installed November 12, 1914, at same datum as old gage; read by W. E. Davies. Gage used 1904 to November 11, 1914, was painted on upstream side of middle pier of bridge.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading. Conditions fair.

CHANNEL AND CONTROL.—Bed composed of sand and mud; shifting. One channel at all stages. Banks are high.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 18.9 feet, May 17 (discharge, 6,910 second-feet); minimum stage below 1.72 feet, August 15 to September 4 (discharge estimated, 10 second-feet).

1904-1917: Maximum stage recorded, 19.1 feet, June 6, 1909 (discharge, 7,580 second-feet); water standing in pools July 14 and 15, 1915, and July 30 to August 4, 1916; stage below 2.0 feet.

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

**DIVERSIONS.**—In summer practically the entire flow of Weber River above station is diverted for irrigation.

**REGULATION.**—Flow affected by diversions.

**ACCURACY.**—Stage-discharge relation not permanent for stages below 10 feet (about 2,000 second-feet); affected by ice December 15-17 and December 27 to February 13. Rating curve well defined for all stages. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods when stage-discharge relation was affected by ice or shifting control, and during August and September when water did not reach gage. Records obtained by use of table, good; others fair.

*Discharge measurements of Weber River near Plain City, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 4	J. J. Sanford.....	4.75	525	July 29	L. W. Jordan.....	7.58	1,290
June 1	C. W. Bennett.....	17.24	5,340	Sept. 5	A. B. Purton.....	1.72	12.8

*Daily discharge, in second-feet, of Weber River near Plain City, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	129	550	479	.....	773	1,270	3,350	5,450	2,160	903	.....
2	342	526	502	.....	672	1,150	3,240	5,300	2,030	799	.....
3	887	526	526	.....	722	1,090	3,140	5,140	1,930	697	.....
4	903	502	550	.....	672	1,090	3,100	4,920	1,800	598	.....
5	877	502	598	.....	672	1,060	3,140	4,850	1,700	502	15
6	747	502	647	.....	647	1,150	3,060	4,640	1,930	411	65
7	773	526	550	.....	622	1,540	3,140	4,380	1,860	314	132
8	799	550	479	.....	622	1,890	3,280	4,440	1,450	217	199
9	722	526	502	.....	647	2,720	3,350	4,640	1,180	104	199
10	697	526	526	.....	622	3,700	3,600	4,920	1,120	78	199
11	851	502	502	.....	574	3,280	4,070	4,570	1,010	53	199
12	1,040	479	502	.....	550	3,420	4,920	4,250	877	31	199
13	851	479	550	.....	502	3,320	5,300	3,750	773	22	217
14	799	479	550	598	526	3,240	5,780	3,170	574	22	254
15	747	456	.....	574	574	3,650	6,290	3,060	356	.....	294
16	747	456	.....	550	574	3,060	6,730	3,170	356	.....	356
17	722	502	.....	550	550	2,470	6,910	3,390	314	.....	356
18	697	502	598	550	574	2,370	6,730	3,510	236	.....	294
19	697	502	502	550	574	2,260	6,550	3,650	164	.....	294
20	697	526	502	550	598	2,130	6,370	3,550	118	.....	294
21	697	526	502	550	647	2,610	6,460	3,390	80	.....	294
22	697	502	456	550	647	3,000	6,200	3,320	80	.....	294
23	697	502	574	622	3,650	5,610	3,240	80	.....	378	.....
24	672	502	502	598	622	4,310	5,700	3,170	80	.....	586
25	647	479	502	799	647	5,140	5,530	3,060	67	.....	660
26	622	502	502	903	672	6,030	5,370	2,960	67	.....	710
27	598	502	.....	957	697	6,370	5,450	2,750	67	.....	734
28	574	502	.....	903	697	6,030	5,370	2,610	336	.....	734
29	574	479	.....	.....	957	4,780	5,300	2,440	1,300	.....	734
30	574	456	.....	.....	1,300	3,700	5,450	2,300	1,120	.....	710
31	550	.....	.....	.....	1,610	.....	5,940	.....	1,010	.....	.....

NOTE.—Discharge estimated because of ice, from observer's notes and climatic records, Dec. 15-17, 575 second-feet; Dec. 27-31, 550 second-feet; Jan. 1-15, 500 second-feet; Jan. 16-31, 370 second-feet; Feb. 1-13, 450 second-feet; estimated from observer's notes and one discharge measurement Aug. 15 to Sept. 4, 10 second-feet; water surface below gage.

*Monthly discharge of Weber River near Plain City, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet
	Maximum.	Minimum.	Mean.	
October.....	1,040	129	698	42,900
November.....	550	456	502	29,900
December.....	647	456	532	32,700
January.....			433	26,600
February.....	957		557	30,900
March.....	1,610	502	690	42,400
April.....	6,370	1,060	3,050	181,000
May.....	6,910	3,060	4,980	306,000
June.....	5,450	2,300	3,800	226,000
July.....	2,160	67	846	52,000
August.....	903		159	9,780
September.....	734		315	18,700
The year.....	6,910		1,360	999,000

## JORDAN RIVER BASIN.

## JORDAN RIVER NEAR LEHI, UTAH.

**LOCATION.**—In sec. 25, T. 5 S., R. 1 W., 800 feet below pump house at outlet of Utah Lake and 4 miles southwest of Lehi, Utah County.

**DRAINAGE AREA.**—2,570 square miles.

**RECORDS AVAILABLE.**—May 30 to December 31, 1904; and July 22, 1913, to September 30, 1917.

**GAGE.**—Vertical staff in stilling well on right bank about 25 feet above bridge January 6, 1914, to September 30, 1917; read by W. A. Knight. May 30 to December 31, 1904, and July 22, 1913, to January 5, 1914, vertical staff nailed to upstream side of right bridge abutment; same datum 1904-1917.

**DISCHARGE MEASUREMENTS.**—Made from cable about 400 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of clay and hardpan. Banks clean and low; not subject to overflow. One channel at the gage. Area slightly constricted below by highway bridge. Slope is very flat and stage-discharge relation may be slightly affected when flashboards are placed in the old impounding dam in Jordan Narrows about 6 miles north of station (about 12 miles by river).

**EXTREMES OF DISCHARGE.**—Maximum stage recorded, 6.30 feet June 25 and also on July 5 (due to wind), discharge, 922 second-feet. Minimum stage, 2.05 feet November 28 (discharge, 114 second-feet).

1904, 1913-1917: Maximum stage occurred in 1917 (see preceding paragraph); minimum stage occurred at 6 p. m. December 15, 1915, when river was dry due to a strong north wind which blew the water in the lake away from the outlet gates.

**ICE.**—Stage-discharge relation seldom seriously affected by ice. During unusually cold weather, however, the river freezes over below station and the open-channel rating is not applicable.

**DIVERSIONS.**—None above station. In the Narrows about 6 miles north (several miles farther by river) a number of large canals divert for irrigation in Salt Lake Valley and for use by smelters, etc., in vicinity of Garfield.

**REGULATION.**—During the irrigation season, when the natural flow from Utah Lake is inadequate for the demands below, water is pumped from the lake into Jordan River. A pumping plant with a capacity of about 800 cubic feet per second is located at outlet of lake, 800 feet above gage, and is owned and operated by various canal companies interested in the stream.

ACCURACY.—Stage-discharge relation permanent throughout year except as affected by ice January 8 to February 20. Rating curve well defined. Gage read to hundredths once daily except December 22–31 when no record was secured, and mean discharge was interpolated. For remainder of year daily discharge ascertained by applying daily gage height to rating table except for October 2 and 3 and November 21 for which it was determined by averaging the results obtained by applying hourly gage heights to rating table, and for January 8 to February 20 when the stage-discharge relation was affected by ice and corrections for back-water were applied to gage heights before using table. Records good.

*Discharge measurements of Jordan River near Lehi, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
Feb. 2 <sup>a</sup>	J. J. Sanford.....	Feet. 3.93	Sec.-ft. 321	June 8 <sup>c</sup>	C. W. Bennett.....	Feet. 6.11	Sec.-ft. 839
June 6 <sup>b</sup>	C. W. Bennett.....	6.08	789	28 <sup>d</sup>	.....do.....	6.24	938

<sup>a</sup> River frozen over farther downstream; ice 2 feet wide on shores at gage.

<sup>b</sup> Moderate upstream breeze.

<sup>c</sup> Light downstream breeze.

<sup>d</sup> Strong, gusty downstream breeze.

*Daily discharge, in second-feet, of Jordan River near Lehi, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	308	174	132	206	322	465	514	655	850	884	724	551
2.....	300	176	137	209	320	467	514	657	850	874	720	553
3.....	250	195	136	209	319	467	516	662	855	869	713	544
4.....	224	109	138	209	322	471	514	669	838	862	699	538
5.....	223	179	139	260	320	457	516	674	869	867	703	536
6.....	186	202	144	331	322	475	506	674	874	922	696	531
7.....	150	179	169	329	326	475	516	562	876	826	692	529
8.....	155	182	150	324	326	479	516	687	874	850	690	531
9.....	159	182	182	320	327	483	521	692	910	724	683	531
10.....	150	186	152	317	329	483	521	694	720	838	676	531
11.....	159	186	159	307	329	485	523	703	876	840	671	487
12.....	126	187	160	307	331	487	540	708	881	869	664	521
13.....	162	188	160	302	332	493	527	540	881	826	655	521
14.....	151	195	162	295	339	500	527	731	881	816	650	512
15.....	154	199	161	295	350	502	531	790	884	692	641	508
16.....	156	206	161	294	357	500	551	713	886	807	639	508
17.....	159	208	161	292	372	498	498	713	891	764	632	558
18.....	162	209	161	290	387	500	544	722	898	785	628	512
19.....	162	169	161	289	404	502	558	731	903	790	621	516
20.....	165	208	170	294	425	504	560	831	905	771	617	504
21.....	166	177	164	297	437	508	569	850	814	766	662	500
22.....	168	146	.....	300	439	504	544	720	910	756	628	408
23.....	169	143	.....	305	441	508	586	766	910	715	604	498
24.....	169	132	.....	307	447	508	599	778	915	749	584	500
25.....	156	124	.....	308	451	502	617	790	922	742	580	427
26.....	169	117	.....	310	457	510	558	824	920	742	573	495
27.....	173	116	.....	312	461	514	619	828	915	761	580	495
28.....	172	114	.....	314	465	514	639	838	908	696	577	564
29.....	174	132	.....	317	.....	514	621	845	900	742	573	489
30.....	176	126	.....	319	.....	467	617	862	891	733	569	489
31.....	176	.....	.....	320	.....	498	.....	766	.....	731	560	.....

NOTE.—Mean discharge Dec. 22–31 interpolated 185 second-feet on account of break in gage-height record. Estimated Sept. 26 and 27.



*Monthly discharge of Jordan River near Lehi, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	308	126	178	10,900
November.....	209	114	168	10,000
December.....	.....	132	165	10,100
January.....	331	206	293	18,000
February.....	465	319	373	20,700
March.....	514	457	492	30,300
April.....	639	498	549	32,700
May.....	862	540	731	44,900
June.....	922	720	880	52,400
July.....	922	692	794	48,800
August.....	724	560	642	39,500
September.....	564	408	513	30,500
The year.....	922	114	482	349,000

#### SPANISH FORK AT THISTLE, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  sec. 28, T. 9 S., R. 4 E., in Thistle, Utah County, 800 feet below point at which Soldier Fork and Thistle Creek unite to form Spanish Fork and 3 miles above Diamond Fork.

**DRAINAGE AREA.**—490 square miles.

**RECORDS AVAILABLE.**—December 3, 1907, to September 30, 1917.

**GAGE.**—Inclined staff on right bank 10 feet below cable May 4, 1915, to September 30, 1917; read by Mrs. Effie Gordon. November 21, 1912, to May 3, 1915, vertical staff on right bank at same site and datum. December 3, 1907, to November 20, 1912, vertical staff on left bank about a mile downstream.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand. One channel at all stages. Left bank low and subject to overflow; right bank high and partly wooded. Channel straight for 100 feet above and 600 feet below gage. Control is a gravel bar about 30 feet below gage; shifting.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.30 feet June 10 (discharge, 733 second-feet); minimum discharge, estimated because of ice, 30 second-feet, December 31.

1907-1917: Maximum discharge recorded, 920 second-feet May 10, 1914; minimum discharge, 18.5 second-feet, December 20, 1913.

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

**DIVERSIONS.**—No important diversions above station.

**REGULATION.**—None.

**ACCURACY.**—Records published as received from United States Reclamation Service.

**COOPERATION.**—Records since January 1, 1911, furnished by United States Reclamation Service.

*Discharge measurements of Spanish Fork at Thistle, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by	Gage height.	Discharge.
		Feet.	Sec.-ft.			Feet.	Sec.-ft.
May 3	Saxton and Adams....	4.95	210	June 1	K. K. Saxton.....	6.10	594
14	R. M. Adams.....	4.13	55	21	Adams and Saxton....	5.60	283
14	.....do.....	4.20	60	July 17	R. M. Adams.....	5.12	90
May 16	Adams and Devenish..	6.25	695	Aug. 10	Saxton and Wilson....	4.97	65

*Daily discharge, in second-feet, of Spanish Fork at Thistle, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	110	52	41	126	103	49	89	208	517	157	81	55
2.....	60	51	45	115	126	71	82	221	590	151	75	55
3.....	74	51	46	106	160	62	80	208	517	151	73	57
4.....	78	51	47	62	74	58	90	218	625	151	72	57
5.....	64	51	49	49	62	50	116	212	625	141	65	55
6.....	58	51	43	56	50	49	121	212	590	134	61	59
7.....	79	50	40	61	50	61	147	218	625	128	61	59
8.....	58	50	49	82	50	46	161	218	646	123	61	59
9.....	58	55	51	93	53	53	155	228	695	123	61	59
10.....	58	54	50	86	56	56	136	236	733	116	62	61
11.....	72	51	49	78	64	50	148	280	590	110	62	59
12.....	59	49	39	79	47	50	138	317	504	98	59	59
13.....	68	44	39	82	49	46	146	469	496	98	57	59
14.....	59	49	39	82	49	56	155	469	484	96	58	59
15.....	61	85	71	82	50	67	155	593	465	88	58	59
16.....	59	42	51	90	53	60	146	628	446	80	58	59
17.....	56	41	51	100	49	62	132	642	390	80	70	59
18.....	56	41	39	74	48	62	126	660	333	80	68	59
19.....	55	42	39	100	49	68	116	660	333	75	65	59
20.....	54	44	40	110	46	72	110	662	271	74	59	59
21.....	54	39	41	126	47	74	116	617	261	73	57	59
22.....	54	39	41	126	46	74	147	605	237	110	52	59
23.....	54	40	41	125	55	75	176	618	237	80	50	71
24.....	54	43	42	68	54	82	223	597	231	75	52	71
25.....	54	43	41	60	74	89	245	597	216	73	57	71
26.....	54	43	40	50	62	98	327	610	208	70	57	71
27.....	54	42	40	80	57	100	310	538	203	92	57	70
28.....	54	42	40	50	50	107	259	545	195	81	57	70
29.....	52	42	40	50	-----	227	230	621	187	92	57	68
30.....	55	41	36	82	-----	158	208	590	176	120	57	64
31.....	55	-----	30	93	-----	108	-----	595	-----	81	55	-----

*Monthly discharge of Spanish Fork at Thistle, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	110	52	60.6	3,730
November.....	85	39	47.3	2,810
December.....	71	30	43.5	2,670
January.....	126	49	84.6	5,200
February.....	160	46	61.9	3,440
March.....	227	46	75.5	4,640
April.....	327	80	160	9,520
May.....	662	208	455	28,000
June.....	733	176	421	25,100
July.....	157	70	103	6,330
August.....	81	50	61.1	3,760
September.....	71	55	61.3	3,650
The year.....	733	30	136	98,800

NOTE.—Monthly discharge computed by U. S. Geological Survey.

## SPANISH FORK NEAR SPANISH FORK, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 2, T. 9 S., R. 3 E., half a mile below United States Reclamation Service diversion dam of Strawberry Valley project, half a mile above intake of East Bench canal, and 5 miles southeast of town of Spanish Fork, Utah County.

**DRAINAGE AREA.**—670 square miles.

**RECORDS AVAILABLE.**—May 23, 1900, to November 30, 1901; March 26, 1903, to September 30, 1917, when publication of records by United States Geological Survey was discontinued.

**GAGE.**—Inclined staff on right bank half a mile below diversion dam, January 1, 1913, to September 30, 1917; read by E. P. Johnson. Original gage, inclined staff on right bank about 600 feet above East Bench canal heading, May 23, 1900, to November 30, 1901, and March 26, 1903, to July 31, 1912; temporary gage a quarter of a mile above original gage, August 1 to December 31, 1912.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel and boulders. One channel at all stages; straight for about 200 feet above and 150 feet below gage. Banks high and may cave off during floods. Water is turbulent and control generally shifts during high water.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 9.47 feet, May 16 (discharge, 1,023 second-feet); minimum stage, river dry December 26–31.

1900–1917: Maximum stage recorded, 6.0 feet, May 21, 1907 (discharge, 1,970 second-feet); minimum stage, river dry at several different times when entire flow was being diverted at Reclamation Service dam.

**ICE.**—Stage-discharge relation affected by ice at times.

**DIVERSIONS.**—Above all important diversions except the United States Reclamation Service power canal, which supplies the high-line canal, the power plant, and the Salem canal; water can also be returned to the river at the power plant. In 1917 this canal diverted 95,700 acre-feet.

The Strawberry reservoir (capacity about 250,000 acre-feet) has been constructed to store the waters of Strawberry River, a stream in the Colorado River basin; this water is diverted to the Spanish Fork basin by means of a tunnel.

**REGULATION.**—Natural flow affected by diversion into canal of United States Reclamation Service half a mile above station, and by water supplied from Strawberry Valley reservoir.

**ACCURACY.**—Records published as received from United States Reclamation Service.

**COOPERATION.**—Since January 1, 1911, records have been furnished by United States Reclamation Service.

*Discharge measurements of Spanish Fork near Spanish Fork, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 31	W. M. Jones.....	4.85	103	June 21	Adams and Saxton....	5.88	280
Apr. 13	Saxton and Jones.....	5.58	226	June 28	.....do.....	5.30	211
May 1	Saxton and Adams.....	6.18	311	July 13	.....do.....	5.55	213
13	Adams and Devenish..	7.95	620	Aug. 21	R. M. Adams.....	5.07	164
14	.....do.....	8.30	649	28	.....do.....	4.90	171
16	.....do.....	9.28	959	.....	Adams and Hoover....	4.80	98
June 4	R. M. Adams.....	8.10	684				

*Daily discharge, in second-feet, of Spanish Fork near Spanish Fork, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	137	52	74	-----	-----	22	72	322	575	182	256	89
2.....	58	48	68	-----	-----	31	67	354	559	191	156	90
3.....	66	48	69	44	58	39	65	309	584	197	154	89
4.....	47	61	62	46	56	28	63	324	632	190	154	87
5.....	69	58	66	-----	58	38	78	317	610	185	162	84
6.....	63	49	69	44	63	48	119	312	597	203	166	86
7.....	51	66	32	-----	56	24	123	330	584	225	158	87
8.....	47	48	53	-----	70	17	151	337	588	199	209	86
9.....	47	48	67	-----	68	24	207	381	616	190	194	85
10.....	73	19	81	36	68	19	191	374	639	191	152	87
11.....	36	43	80	44	66	29	184	330	571	202	151	84
12.....	30	43	79	45	61	6.4	207	338	497	203	151	88
13.....	59	42	88	34	59	6.4	220	603	457	203	146	90
14.....	56	42	81	38	58	17	236	700	413	209	151	105
15.....	51	42	81	34	50	30	226	896	586	203	150	148
16.....	41	42	66	-----	68	18	178	1,023	392	208	152	148
17.....	53	42	52	-----	65	25	176	907	338	198	133	102
18.....	50	42	38	-----	60	24	170	879	315	208	145	87
19.....	48	52	42	-----	60	26	144	793	236	212	140	87
20.....	43	53	40	-----	59	26	142	825	244	219	145	86
21.....	48	43	44	52	58	28	165	844	264	211	160	81
22.....	48	32	49	52	63	52	198	601	254	226	151	85
23.....	47	42	48	48	71	21	261	588	256	236	144	97
24.....	43	53	53	52	71	25	322	612	259	252	142	94
25.....	48	48	52	54	84	58	371	610	240	256	135	91
26.....	48	54	0	56	80	51	528	612	229	255	135	89
27.....	47	47	0	55	51	56	449	628	190	266	135	89
28.....	49	56	0	86	19	78	359	528	196	359	109	88
29.....	40	21	0	208	-----	128	312	557	180	348	116	86
30.....	45	38	0	73	-----	150	283	632	182	412	139	88
31.....	52	-----	0	45	-----	94	-----	632	-----	261	66	-----

NOTE.—Ice jams reported Jan. 1, 2, 5, 7-9, 16-20, and Feb. 1 and 2; daily discharge not furnished. See note to monthly discharge table.

*Monthly discharge of Spanish Fork near Spanish Fork, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	137	30	52.9	3,250
November.....	66	19	45.8	2,730
December.....	88	0	49.5	3,040
January.....	208	-----	37.0	2,280
February.....	84	-----	57.1	3,170
March.....	150	6.4	40.0	2,460
April.....	528	63	209	12,400
May.....	1,023	309	564	34,700
June.....	639	180	409	24,300
July.....	412	182	229	14,100
August.....	256	66	150	9,220
September.....	148	81	92.8	5,520
The year.....	1,023	0	162	117,000

NOTE.—Monthly discharge table has been computed by U. S. Geological Survey assuming flow of zero second-feet Jan. 1, 2, 5, 7-9, 16-20 and Feb. 1 and 2, when ice jams were reported.

## SPANISH FORK AT LAKE SHORE, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 15, T. 8 S., R. 2 E., 1 mile east of Lake Shore, Utah County, 3 miles above mouth and 3 miles northwest of Spanish Fork, below all tributaries and diversions.

**DRAINAGE AREA.**—700 square miles.

**RECORDS AVAILABLE.**—December 10, 1903, to July 10, 1907; March 10, 1909, to September 30, 1917.

**GAGE.**—Inclined staff with vertical low-water extension, on right bank about half a mile below highway bridge March 10, 1909, to September 30, 1917; read by G. J. Hansen. Original gage vertical staff on left bank immediately below bridge December 10, 1903, to May 25, 1904; gage at the old cable 800 feet above the bridge May 26, 1904, to July 10, 1907.

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

**CHANNEL AND CONTROL.**—Bed soft; fairly permanent. One channel at all stages. Banks of earth, high and clean.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 14.4 feet May 16 (discharge, 925 second-feet); minimum stage, river dry June 23–30, July 1–7, 11, and 16–21.

1903–1917: Maximum stage recorded, 16.0 feet May 11, 1909 (discharge, 1,430 second-feet); minimum stage, river dry at several different times when entire flow was being diverted for irrigation.

**ICE.**—Stage-discharge relation slightly affected by ice for short periods.

**DIVERSIONS.**—Entire flow is diverted above station during latter part of irrigation season; only waste and return waters pass the gage at that time.

**REGULATION.**—Natural flow affected by irrigation diversions.

**ACCURACY.**—Records published as received from United States Reclamation Service.

**COOPERATION.**—Since January 1, 1911, records have been furnished by the United States Reclamation Service.

*Discharge measurements of Spanish Fork at Lake Shore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 30	Saxton and Adams.....	7.69	322	June 5	Adams and Saxton.....	11.00	584
May 14	Adams and Devenish..	13.45	699	18	do.....	4.05	134
17	do.....	13.75	911	Sept. 13	Adams and Hoover.....	3.70	40.4

*Daily discharge, in second-feet, of Spanish Fork at Lake Shore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	62	122	92	99	127	94	193	401	627	0	299	39
2.....	122	125	92	107	136	79	165	433	622	0	242	21
3.....	122	128	92	115	137	79	161	385	627	0	186	3
4.....	122	128	92	114	138	79	158	373	632	0	179	3
5.....	126	128	90	112	139	79	179	377	593	0	172	3
6.....	128	128	89	112	136	79	191	373	575	0	165	2
7.....	126	125	89	112	132	79	208	381	566	0	158	2
8.....	124	122	89	112	122	79	237	393	535	1	152	6
9.....	122	122	89	110	112	79	343	401	493	2	152	11
10.....	118	122	89	108	112	79	307	437	505	1	152	15
11.....	116	120	89	108	112	79	237	497	449	0	120	15
12.....	116	118	89	108	112	79	307	539	421	12	88	15
13.....	116	116	89	125	120	79	347	632	401	25	56	26
14.....	116	110	89	143	128	86	335	692	373	17	48	36
15.....	116	104	91	158	123	92	307	777	225	8	41	34
16.....	116	103	93	168	118	92	225	925	221	0	41	32
17.....	118	102	95	179	118	92	217	810	179	0	41	35
18.....	122	102	97	184	118	86	221	792	125	0	42	38
19.....	118	102	99	190	118	79	193	747	34	0	44	41
20.....	116	102	101	191	122	89	186	712	23	0	46	39
21.....	116	98	103	192	125	99	221	742	2	0	51	36
22.....	116	95	105	193	135	100	273	632	1	1	56	35
23.....	116	93	107	186	145	102	361	597	0	2	51	33
24.....	118	92	108	179	141	116	413	632	0	32	46	32
25.....	122	92	109	172	137	130	425	602	0	61	64	38
26.....	122	92	109	165	132	145	489	622	0	113	82	43
27.....	122	92	96	157	122	218	566	588	0	165	99	43
28.....	122	92	96	145	112	291	441	531	0	263	72	43
29.....	122	92	96	139	-----	319	343	544	0	361	46	45
30.....	122	92	96	128	-----	343	365	593	0	505	51	47
31.....	122	-----	96	118	-----	221	-----	642	-----	402	56	-----

*Monthly discharge of Spanish Fork at Lake Shore, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	128	62	118	7,260
November.....	128	92	109	6,490
December.....	109	89	95.4	5,870
January.....	193	99	143	8,790
February.....	145	112	126	7,000
March.....	348	79	121	7,440
April.....	566	158	287	17,100
May.....	925	373	574	35,300
June.....	632	0	274	16,300
July.....	505	0	63.6	3,910
August.....	299	41	99.9	6,140
September.....	47	2	27.0	1,610
The year.....	925	0	170	123,000

NOTE.—Monthly discharge computed by U. S. Geological Survey.

#### DIAMOND FORK NEAR THISTLE, UTAH.

LOCATION.—In NE.  $\frac{1}{4}$  SE.  $\frac{1}{4}$  sec. 17, T. 9 S., R. 4 E., at footbridge about 200 yards above mouth and  $2\frac{1}{2}$  miles from Thistle, Utah County.

DRAINAGE AREA.—157 square miles.

RECORDS AVAILABLE.—December 2, 1907, to September 30, 1917, when publication of records by United States Geological Survey was discontinued.

GAGE.—Inclined staff on left bank about 5 feet above footbridge; read by W. B. Lancaster.

DISCHARGE MEASUREMENTS.—Made from footbridge or by wading.

**CHANNEL AND CONTROL.**—Bed composed of small gravel; shifts. One channel at all stages; straight for 100 feet above and below gage. Banks covered with cottonwood trees; subject to overflow during extreme floods.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.41 feet July 26, 28, and 29 (discharge, 560 second-feet); minimum stage, 3.48 feet December 8 (discharge, 14 second-feet).

1907-1917: Maximum stage recorded, 5.6 feet May 7, 1909 (discharge, 715 second-feet); maximum discharge, 735 second-feet May 9, 1909 (stage, 5.5 feet); minimum stage, 2.74 feet January 21, 1916 (discharge 4.2 second-feet).

**ICE.**—Stage-discharge relation slightly affected by ice for short periods.

**DIVERSIONS.**—No important diversions above or below station.

**REGULATION.**—Natural flow affected by any water supplied from the Strawberry Valley reservoir.

**ACCURACY.**—Records published as received from United States Reclamation Service.

**COOPERATION.**—Since January 1, 1911, all records have been furnished by United States Reclamation Service.

*Discharge measurements of Diamond Fork near Thistle, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 12	Adams and Saxton....	4. 10	76	June 9	Saxton and Adams.....	5. 45	215
May 3	do.....	4. 50	162	22	do.....	5. 70	254
14	R. M. Adams.....	3. 58	27. 2	Aug. 10	Saxton and Wilson.....	6. 42	142
16	Adams and Devenish..	5. 70	372	Sept. 13	Adams and Hoover....	7. 25	223
June 1	K. K. Saxton.....	5. 31	235				

*Daily discharge, in second-feet, of Diamond Fork near Thistle, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	162	123	21	25	24	30	30	198	247	382	305	287
2.....	122	123	21	25	33	22	34	150	232	357	360	288
3.....	124	123	21	34	36	20	44	162	225	360	325	285
4.....	118	123	21	40	47	30	50	155	238	350	327	272
5.....	101	121	21	32	50	22	50	155	215	288	318	272
6.....	115	110	21	34	53	22	61	216	190	315	310	282
7.....	30	118	15	32	53	26	62	243	178	442	302	280
8.....	76	118	14	28	55	21	99	253	204	487	340	275
9.....	76	108	72	30	59	21	91	251	202	485	340	270
10.....	76	30	50	34	56	20	90	280	188	468	342	230
11.....	76	25	44	36	54	19	132	310	190	420	280	270
12.....	76	21	46	38	52	17	162	330	180	462	268	270
13.....	76	15	46	30	50	23	139	342	152	462	268	270
14.....	73	15	51	35	50	21	139	518	170	545	302	278
15.....	76	22	50	30	51	21	80	464	165	538	300	277
16.....	76	21	60	31	54	20	71	365	145	506	300	273
17.....	70	21	50	34	50	20	62	310	130	500	305	270
18.....	70	21	43	31	50	23	58	290	120	468	282	272
19.....	73	21	43	31	50	23	55	257	170	478	282	276
20.....	74	21	50	34	50	23	61	170	160	458	262	270
21.....	74	21	51	40	50	23	93	250	230	472	260	268
22.....	74	21	60	40	54	22	128	185	200	480	268	272
23.....	74	21	50	42	54	21	139	250	210	495	280	275
24.....	74	21	50	45	52	21	173	250	227	510	280	280
25.....	74	21	50	48	68	25	186	250	225	527	285	272
26.....	74	21	50	50	30	27	248	258	215	560	287	270
27.....	74	18	50	45	25	30	186	215	398	548	268	276
28.....	74	21	69	50	25	51	150	215	392	560	265	280
29.....	74	15	39	52	.....	68	137	250	380	560	290	280
30.....	74	21	39	52	.....	55	124	245	375	460	282	280
31.....	74	.....	20	40	.....	40	.....	250	.....	310	280	.....

*Monthly discharge of Diamond Fork near Thistle, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	162	30	82.4	5,070
November.....	123	15	50.0	2,980
December.....	72	14	41.5	2,550
January.....	52	25	37.0	2,280
February.....	68	24	47.7	2,650
March.....	68	17	26.7	1,640
April.....	248	30	104	6,190
May.....	518	150	259	15,900
June.....	398	120	218	13,000
July.....	560	288	460	28,300
August.....	342	260	295	18,100
September.....	288	230	274	16,300
The year.....	560	14	159	115,000

NOTE.—Monthly discharge computed by U. S. Geological Survey.

**UNITED STATES RECLAMATION SERVICE POWER CANAL NEAR SPANISH FORK, UTAH.**

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 2, T. 9 S., R. 3 E., near mouth of canyon, half a mile below canal head gates and 5 miles southeast of Spanish Fork, Utah County.

**RECORDS AVAILABLE.**—January 1, 1909, to September 30, 1917, when publication of records by United States Geological Survey was discontinued.

**GAGE.**—Water-stage recorder installed May 12, 1917; inclined staff on right bank graduated to tenths from 0 to 5 feet, read January 1, 1909, to May 11, 1917. Recorder inspected and staff gage read by E. P. Johnson.

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

**CHANNEL AND CONTROL.**—Concrete lined section; bottom width 4.0 feet, side slopes 1 to 1, and maximum depth of water will be about 6 feet. Control is not permanent owing to earth and rock slides below the gage.

**EXTREMES OF DISCHARGE.**—Maximum mean daily stage recorded during year, 6.65 feet July 28 (discharge, 397 second-feet); minimum stage, 2.28 feet December 8 (discharge, 54 second-feet).

1909–1917: Maximum stage occurred in 1917. Canal dry at times for cleaning and repairs.

**ICE.**—Stage-discharge relation is sometimes affected.

**DIVERSIONS.**—None above station.

**REGULATION.**—Flow controlled by head gates half a mile above gage.

**ACCURACY.**—Records published as received from United States Reclamation Service.

**COOPERATION.**—Since January 1, 1911, all records have been furnished by United States Reclamation Service.

This canal, which is designed for a capacity of 500 second-feet, diverts on the left bank of Spanish Fork in SE.  $\frac{1}{4}$  sec. 2, T. 9 S., R. 3 E. About 3 miles below the head is the forebay of the power plant. Here part of the water can be carried on in the High Line canal to irrigate lands at the south end of the project, and the remainder used to supply the power plant or turned down the wasteway. The tailrace water and that going down the wasteway is used to supply the Salem canal or returned to the river.



*Discharge measurements of United States Reclamation Service power canal near Spanish Fork, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Fect.</i>	<i>Sec.-ft.</i>			<i>Fect.</i>	<i>Sec.-ft.</i>
Apr. 13	Saxton and Jones.....	2.46	63	June 16	Adams and Saxton.....	4.37	192
May 1	Saxton and Adams.....	2.70	76	21	do.....	5.32	294
11	Adams and Devenish.....	4.85	239	28	do.....	5.58	299
12	do.....	4.77	261	July 7	do.....	6.03	361
14	do.....	3.05	91	Aug. 21	R. M. Adams.....	4.63	237
19	R. M. Adams.....	3.64	126	28	do.....	4.55	215
June 4	Adams and Saxton.....	4.19	159	Sept. 15	Hoover and Adams.....	3.75	131

*Daily discharge, in second-feet, of United States Reclamation Service power canal near Spanish Fork, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	163	117	78	67	80	69	68	72	146	313	285	182
2	150	123	82	67	76	71	74	75	139	316	335	181
3	153	123	84	74	73	69	73	75	149	316	329	181
4	143	102	81	75	71	70	71	72	157	311	341	180
5	105	116	84	74	70	77	77	74	144	299	295	178
6	90	117	86	74	73	70	78	73	158	289	281	179
7	74	113	75	72	71	70	72	75	158	265	277	180
8	73	111	54	72	70	75	72	79	157	258	269	179
9	69	105	85	71	70	76	70	77	163	252	288	182
10	71	92	86	72	71	77	69	78	164	252	176	182
11	127	84	85	75	70	74	72	158	156	260	254	189
12	107	76	86	75	72	72	70	214	149	252	204	187
13	109	75	91	74	73	70	70	85	143	286	205	190
14	110	70	88	74	71	76	70	86	148	271	195	174
15	124	75	89	72	69	76	69	82	160	250	183	122
16	118	70	90	72	73	75	69	83	170	255	183	142
17	122	74	91	69	74	73	70	93	166	255	181	186
18	118	78	99	68	72	75	69	108	166	259	184	196
19	93	79	100	69	72	79	76	134	240	269	176	204
20	136	80	102	74	71	79	74	158	239	265	171	200
21	128	74	102	76	71	77	75	143	258	272	162	199
22	126	72	100	76	73	81	75	144	255	284	153	198
23	126	78	104	77	73	78	75	160	254	324	151	202
24	128	79	102	78	73	79	70	141	258	282	145	192
25	124	77	99	78	75	76	67	142	267	305	133	199
26	124	81	100	79	68	74	76	144	279	355	133	196
27	129	78	88	76	70	77	72	157	300	341	138	199
28	124	81	88	56	66	79	70	159	293	397	154	196
29	134	71	88	62	.....	75	71	160	292	234	152	192
30	138	78	88	70	.....	74	71	157	303	248	125	194
31	128	.....	88	85	.....	71	.....	158	.....	258	139	.....

*Monthly discharge of United States Reclamation Service power canal near Spanish Fork, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	163	69	118	7,260
November.....	123	70	88.3	5,250
December.....	104	54	89.1	5,480
January.....	85	56	72.7	4,470
February.....	80	66	71.8	3,990
March.....	81	69	74.6	4,590
April.....	78	67	71.7	4,270
May.....	214	72	117	7,190
June.....	303	139	201	12,000
July.....	397	234	284	17,500
August.....	341	125	206	12,700
September.....	204	122	185	11,000
The year.....	397	54	132	95,700

NOTE.—Monthly discharge computed by U. S. Geological Survey.

## PROVO RIVER AT FORKS, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 25, T. 5 S., R. 3 E., half a mile above Vivian Park summer resort, which is just above Forks, Utah County; 2,000 feet below mouth of North Fork of Provo River, which enters from right, and 3,000 feet above South Fork, which enters from left; 1 mile above Utah Power & Light Co.'s diversion dam, and 12 miles up Provo Canyon from Provo, on highway and railroad from Provo to Heber.

**DRAINAGE AREA.**—600 square miles.

**RECORDS AVAILABLE.**—November 17, 1911, to September 30, 1917. Records have been obtained at various points below the mouth of South Fork since 1890.

**GAGE.**—Vertical staff on right bank October 5, 1915, to September 30, 1917; read by J. F. Carter. November 17, 1911, to October 4, 1915, records were obtained from an inclined staff about 2,500 feet downstream.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel; fairly permanent. Banks fairly high and not subject to overflow. One channel at all stages. Control is well defined riffle about 80 feet below gage.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.8 feet June 19 (discharge, 2,450 second-feet); minimum stage, 0.5 foot March 12 and 18 (discharge, 227 second-feet).

1911-1917: Maximum occurred in 1917 (see preceding paragraph); minimum discharge, 155 second-feet September 1, 1915.

**ICE.**—Stage-discharge relation slightly affected by ice.

**DIVERSIONS.**—Station is below diversions for irrigation in Heber Valley and above those in the vicinity of Provo.

**REGULATION.**—A number of small lakes at the headwaters have been utilized as storage reservoirs and flow is regulated to slight extent.

**ACCURACY.**—Stage-discharge relation permanent; affected by ice December 29 to January 2, January 8-11, 16-23, January 31 to February 3, February 8-9 and 11. Rating curve well defined between 200 and 1,800 second-feet. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table except for periods when stage-discharge relation was affected by ice for which it was estimated from observer's notes and climatic records. Records good.

*Discharge measurements of Provo River at Forks, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 29	J. J. Sanford.....	0.74	284	June 27	C. C. Jacob.....	3.61	1,620
Apr. 20	C. C. Jacob.....	1.40	538	July 25	.....do.....	.66	285
May 29	C. W. Bennett.....	2.64	1,050	Sept. 30	.....do.....	.86	339

*Daily discharge, in second-feet, of Provo River at Forks, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	451	349	333	271	271	286	487	720	1,020	1,360	399	286
2.....	416	333	333	271	271	256	487	934	979	1,240	366	256
3.....	524	333	317	286	286	256	399	762	979	1,120	317	271
4.....	451	333	349	302	286	271	333	762	1,070	1,070	286	271
5.....	416	333	349	302	286	286	382	720	1,180	934	286	271
6.....	382	333	366	302	286	286	434	679	1,120	934	286	302
7.....	451	333	302	286	256	242	524	720	1,120	890	286	366
8.....	416	317	271	286	256	286	600	762	1,240	1,020	256	333
9.....	382	333	271	286	256	286	804	762	1,360	890	286	317
10.....	382	333	302	302	256	286	762	804	1,670	762	286	317
11.....	469	333	286	302	256	256	762	890	2,090	679	286	366
12.....	416	302	317	302	256	227	847	934	1,670	600	286	382
13.....	399	271	333	317	271	256	847	1,020	1,480	506	286	333
14.....	399	256	317	333	256	286	890	1,240	1,360	451	286	333
15.....	416	286	286	271	242	286	804	1,540	1,600	399	286	333
16.....	399	317	286	271	271	256	639	1,810	1,950	382	286	333
17.....	399	333	286	256	286	256	600	1,810	2,090	366	286	333
18.....	382	333	333	256	256	227	562	1,740	2,300	349	286	333
19.....	399	333	317	271	256	286	562	1,740	2,450	333	286	333
20.....	382	333	333	286	256	271	543	1,740	2,300	317	286	333
21.....	382	317	317	286	271	271	679	1,670	2,230	286	286	317
22.....	382	317	302	286	286	256	890	1,240	2,230	286	271	317
23.....	366	333	317	271	286	271	1,020	1,240	2,160	286	271	349
24.....	366	317	333	271	286	271	1,120	1,240	2,160	286	271	382
25.....	349	302	333	271	317	302	1,300	1,180	2,020	286	271	382
26.....	366	333	302	271	451	317	1,420	1,070	1,880	286	256	382
27.....	366	302	271	256	382	317	1,240	1,120	1,740	302	256	366
28.....	366	317	256	271	286	349	979	1,020	1,540	286	286	366
29.....	382	286	256	302	.....	451	804	1,020	1,480	333	286	349
30.....	382	286	256	302	.....	847	720	1,120	1,420	434	286	349
31.....	382	.....	256	286	.....	600	.....	1,070	.....	469	286	.....

NOTE.—Discharge estimated because of ice, from observer's notes and climatic records Dec. 29 to Jan. 2, Jan. 8-11, 16-23, Jan. 31 to Feb. 3, Feb. 8, 9, and 11.

*Monthly discharge of Provo River at Forks, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	524	349	401	24,700
November.....	349	256	318	18,900
December.....	366	256	306	18,800
January.....	333	256	285	17,500
February.....	451	242	281	15,600
March.....	847	227	310	19,100
April.....	1,420	333	748	44,500
May.....	1,810	679	1,130	69,500
June.....	2,450	979	1,660	98,800
July.....	1,360	286	585	36,000
August.....	399	256	288	17,700
September.....	382	256	332	19,800
The year.....	2,450	227	554	401,000

#### SOUTH FORK OF PROVO RIVER AT FORKS, UTAH.

LOCATION.—In sec. 26, T. 5 S., R. 3 E., at Vivian Park, a summer resort just above Forks, Utah County, a quarter of a mile above confluence of South Fork with Provo River.

DRAINAGE AREA.—30 square miles.

RECORDS AVAILABLE.—November 17, 1911, to September 30, 1917.

GAGE.—Vertical staff nailed to cottonwood tree on right bank June 15, 1913, to September 30, 1917; read by J. F. Carter. Datum raised 2 feet on June 12, 1915. Original gage, vertical staff about 150 feet above mouth of stream, used November 17, 1911, to June 14, 1913.

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

CHANNEL AND CONTROL.—Bed composed of gravel; semi-permanent. One channel at all stages. Banks not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.92 foot May 16–20 (discharge, 72 second-feet); minimum stage, 0.42 foot July 23 (discharge, 20 second-feet).

1911–1917: Maximum discharge, 74 second-feet, June 10, 1912; minimum occurred in 1917.

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

DIVERSIONS.—Below all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined between 20 and 50 second-feet. Gage read to hundredths once daily. Daily discharge determined by applying daily gage to rating table may be subject to error at certain periods due to diurnal fluctuation. Records fair.

*Discharge measurements of South Fork of Provo River at Forks, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
Jan. 29	J. J. Sanford.....	<i>Feet.</i> 0.55	<i>Sec.-ft.</i> 28.6	June 27	C. C. Jacob.....	<i>Feet.</i> 0.65	<i>Sec.-ft.</i> 36.7
May 29	C. W. Bennett.....	.70	44.7	July 25	.....do.....	.55	30.6

*Daily discharge, in second-feet, of South Fork of Provo River at Forks, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	57	42	34	34	32	28	29	36	44	42	36	34
2.....	43	42	36	34	32	28	29	40	44	42	36	34
3.....	44	42	34	34	31	28	29	38	44	44	36	34
4.....	43	42	40	34	31	28	29	38	46	40	36	34
5.....	42	40	36	34	31	28	29	38	44	34	34	34
6.....	42	40	35	34	29	28	29	38	44	26	36	38
7.....	44	41	34	34	28	28	29	38	44	26	36	38
8.....	43	40	34	34	29	28	29	38	44	26	34	34
9.....	43	40	34	32	29	28	31	38	44	36	34	34
10.....	42	39	34	35	29	28	31	38	64	36	34	34
11.....	44	39	34	34	29	28	31	40	64	36	34	36
12.....	42	38	34	34	29	28	31	40	50	36	34	34
13.....	42	38	34	34	29	28	31	44	51	36	36	34
14.....	42	38	34	34	29	28	31	44	46	36	34	34
15.....	42	36	32	34	28	28	31	66	44	34	34	34
16.....	42	36	34	34	28	28	31	72	46	34	36	34
17.....	42	36	34	34	29	28	31	72	46	34	36	34
18.....	42	36	34	34	28	28	31	72	59	32	36	36
19.....	42	36	34	34	28	28	31	72	59	31	38	34
20.....	42	36	34	34	28	28	31	72	56	31	36	34
21.....	42	36	34	34	28	28	31	69	54	32	34	34
22.....	42	36	34	34	34	28	31	59	40	32	34	34
23.....	42	35	34	34	34	28	31	56	44	20	34	36
24.....	42	34	34	34	34	28	32	56	34	23	32	36
25.....	40	34	34	34	31	28	34	42	28	28	32	34
26.....	40	34	34	34	29	28	40	42	28	34	34	34
27.....	42	34	32	34	28	28	44	51	28	34	34	34
28.....	42	34	32	34	28	29	40	51	36	38	34	34
29.....	42	34	34	32	.....	29	38	46	34	38	34	34
30.....	42	34	34	32	.....	32	36	44	42	49	34	34
31.....	42	.....	34	32	.....	29	.....	44	.....	36	34	.....

*Monthly discharge of South Fork of Provo River at Forks, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	57	40	42.7	2,630
November.....	42	34	37.4	2,230
December.....	40	32	34.1	2,100
January.....	35	32	33.8	2,080
February.....	34	28	29.7	1,650
March.....	32	28	28.2	1,730
April.....	44	29	32.0	1,900
May.....	72	36	49.5	3,040
June.....	64	28	45.5	2,710
July.....	49	20	34.1	2,100
August.....	38	32	34.7	2,130
September.....	38	34	34.5	2,050
The year.....	72	20	36.4	26,400

## SEVIER LAKE BASIN.

## MAMMOTH CREEK NEAR HATCH, UTAH.

**LOCATION.**—In sec. 1, T. 37 S., R. 6 W., about a quarter of a mile above flow line of former Hatchtown reservoir, three quarters of a mile east of east boundary of Sevier National Forest, and 3½ miles southwest of Hatch, Garfield County.

**DRAINAGE AREA.**—151 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 15 to September 20, 1912; May 17, 1913, to August 22, 1914; October 1, 1915, to September 30, 1917; also some miscellaneous measurements in 1911 and spring of 1912.

**GAGE.**—Stevens continuous water-stage recorder on left bank, May 2 to July 3, 1914, and September 23, 1915, to September 30, 1917; original gage, vertical staff on left bank, 1½ miles above present site, in sec. 2, T. 37 S., R. 6 W., July 15 to September 20, 1912, and May 25 to July 11, 1913; Stevens water-stage recorder at site and datum of original gage, July 12, 1913, to April 25, 1914.

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

**CHANNEL AND CONTROL.**—One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.32 feet about 4 a. m. June 10 (discharge, 795 second-feet); minimum stage, 1.0 foot at 7 a. m. February 1 (discharge, 16 second-feet).

1912-1917: Maximum stage recorded, 4.32 feet at 4 a. m. June 10, 1917 (discharge, 795 second-feet); minimum stage, 0.98 foot July 31, 1913 (discharge, 10 second-feet).

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

**DIVERSIONS.**—Below all diversions.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation not permanent. Well defined standard rating curve used with several shifts to parallel curves. Operation of water-stage recorder not entirely satisfactory because of several short breaks in record. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

*Discharge measurements of Mammoth Creek near Hatch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 13	J. J. Sanford.....	2.12	89	May 17	J. J. Sanford.....	3.56	469
Jan. 10	do.....	1.48	35.1	July 18	W. B. Maughan.....	1.84	77
Mar. 10	L. W. Jordan.....	1.35	31.0	Aug. 23	J. J. Sanford.....	1.48	39.8
Apr. 7	J. J. Sanford.....	1.54	40.7	Sept. 14	do.....	1.40	36.4
May 3	do.....	1.92	74				

*Daily discharge, in second-feet, of Mammoth Creek near Hatch, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	66	76	42	44	22	26	34	73	192	143	65	38
2.....	66	76	41	43	27	25	31	74	202	136	62	36
3.....	67	74	41	42	29	25	32	72	223	130	59	34
4.....	76	72	42	42	30	27	30	86	274	128	57	33
5.....	63	70	41	42	30	31	37	86	361	120	57	32
6.....	56	63	39	42	31	30	45	78	392	117	57	34
7.....	147	62	36	36	31	28	54	87	424	116	57	35
8.....	127	58	36	42	29	29	66	79	435	110	48	35
9.....	122	56	39	45	29	31	56	73	445	103	46	35
10.....	150	52	42	36	29	29	59	69	455	99	46	37
11.....	99	51	45	32	30	32	44	68	465	91	47	40
12.....	92	42	48	34	29	30	44	97	475	84	63	38
13.....	99	45	52	25	29	27	46	169	485	83	49	37
14.....	95	48	36	28	27	31	52	87	495	98	51	37
15.....	89	51	34	30	26	28	50	406	503	81	46	38
16.....	84	54	37	31	25	27	51	510	492	76	45	37
17.....	80	57	40	31	25	27	43	510	450	77	45	37
18.....	81	60	43	31	25	28	39	484	443	70	44	37
19.....	83	63	46	32	27	29	36	380	406	69	44	37
20.....	83	66	48	32	27	27	36	285	378	66	44	36
21.....	80	69	50	28	27	26	36	246	348	65	45	34
22.....	78	52	52	28	28	26	46	252	313	66	45	35
23.....	77	50	52	28	28	23	53	228	274	62	45	35
24.....	74	48	52	30	29	27	76	218	243	61	41	34
25.....	72	48	51	31	30	30	117	202	220	61	41	34
26.....	65	48	50	31	31	30	142	173	204	69	41	34
27.....	64	48	49	27	30	30	116	169	188	61	41	34
28.....	64	48	48	32	25	34	91	194	165	60	41	34
29.....	65	45	47	31	.....	39	76	218	162	71	41	34
30.....	64	44	46	32	.....	40	74	220	150	69	40	36
31.....	74	.....	45	30	.....	35	.....	202	.....	69	40	.....

NOTE.—Discharge interpolated because of defective gage-height record, Oct. 1-2, Nov. 14-20, Dec. 9-12, 16-21, Dec. 25 to Jan. 5, May 28, June 8-14, Aug. 1-3, 5-6, Sept. 1-4.

*Monthly discharge of Mammoth Creek near Hatch, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	150	64	84.0	5,160
November.....	76	44	56.5	3,360
December.....	52	34	44.2	2,720
January.....	45	25	33.8	2,080
February.....	31	22	28.0	1,560
March.....	40	23	29.3	1,800
April.....	142	30	57.2	3,410
May.....	510	68	197	12,100
June.....	503	150	342	20,300
July.....	143	60	87.5	5,380
August.....	65	40	48.2	2,960
September.....	40	32	35.6	2,110
The year.....	510	22	87.0	62,940

## SEVIER RIVER AT HATCH, UTAH.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 28, T. 36 S., R. 5 W., at county bridge a quarter of a mile east of J. C. Barnhurst's house at Hatch, Garfield County, and  $1\frac{1}{2}$  miles below dam site of former Hatchtown reservoir.

**DRAINAGE AREA.**—260 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 3 to November 4, 1911; December 10, 1911, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder 50 feet below bridge, August 23, 1914, to September 30, 1917; inspected by J. C. Barnhurst. Original gage, about one-eighth of a mile upstream, June 3 to November 4, 1911; and December 10, 1911, to May 7, 1912; vertical staff on middle pier of bridge May 8, 1912, to May 6, 1914; Stevens water-stage recorder  $1\frac{1}{2}$  miles above bridge May 7 to May 25, 1914, when Hatchtown reservoir dam broke, releasing 11,600 acre-feet of stored water. This gage was reinstalled at the old location below bridge August 23, 1914.

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

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of sand and gravel; shifting.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 3.85 feet at 7 a. m. June 10 (discharge, 982 second-feet; minimum stage probably occurred during frozen season when water-stage recorder was not operating; estimated about 60 second-feet on February 1 from comparison with flow at station on Mammoth Creek.

1911-1917: Maximum stage occurred about 9 p. m. May 25, 1914, when Hatchtown reservoir dam failed (discharge not estimated). Maximum stage recorded, 5.8 feet, June 5, 1912 (discharge, 1,210 second-feet); minimum flow recorded, 10 second-feet on days in January, March, and April, 1912, while water was being stored at Hatchtown reservoir.

**ICE.**—Stage-discharge relation affected by ice; no records obtained December 1 to February 23.

**DIVERSIONS.**—Above all diversions except Hatch Bench canal and Panguitch Lake ditch, which divert a small quantity of water. Hillsdale ditch diverts about 4 miles downstream and several other canals about 7 miles below for irrigation in Panguitch Valley.

**REGULATION.**—Entire flow controlled by Hatchtown reservoir before May 25, 1914.

**ACCURACY.**—Stage-discharge relation subject to change during sudden changes in stage of stream. Fairly well defined standard rating curve used with several shifts in parallel curves. Operation of water-stage recorder satisfactory except for winter period and several short periods of break in record. No record secured during frozen period, December to February. Daily discharge ascertained by applying to rating table, either directly or by shifting-control method, the mean daily gage height determined by inspecting recorder graph, except for periods of break in gage-height record. Records fair.

*Discharge measurements of Sevier River at Hatch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 13	J. J. Sanford .....	1.37	240	May 17	J. J. Sanford .....	3.20	786
Jan. 10	do .....	1.06	145	June 14	C. C. Jacob .....	3.34	795
Mar. 10	L. W. Jordan .....	.82	91	July 18	W. B. Maughan .....	1.24	204
Apr. 7	J. J. Sanford .....	1.08	182	Aug. 23	Sanford and Jacob .....	1.00	129
May 3	do .....	1.62	293	Sept. 14	J. J. Sanford .....	.96	114
17	do .....	3.55	883				

*Daily discharge, in second-feet, of Sevier River at Hatch, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	187	165	.....	90	106	306	479	314	208	123
2.....	187	162	.....	90	99	314	470	303	195	121
3.....	245	162	.....	90	97	306	485	291	182	118
4.....	230	160	.....	90	97	332	524	291	168	118
5.....	195	160	.....	90	114	370	590	286	166	118
6.....	420	165	.....	90	170	346	623	277	160	118
7.....	850	165	.....	90	218	373	665	283	147	121
8.....	395	160	.....	90	258	358	727	263	143	123
9.....	365	160	.....	90	255	329	808	252	138	123
10.....	317	158	.....	94	199	323	885	243	138	129
11.....	284	155	.....	95	199	326	855	232	143	155
12.....	252	152	.....	95	205	382	820	221	160	129
13.....	240	152	.....	94	212	494	775	219	147	125
14.....	240	152	.....	94	218	620	775	217	152	123
15.....	221	151	.....	93	224	739	770	215	143	121
16.....	200	151	.....	93	213	836	735	213	143	119
17.....	195	150	.....	92	185	855	690	210	143	117
18.....	198	150	.....	92	182	840	645	207	143	115
19.....	200	149	.....	91	179	742	590	238	140	113
20.....	204	149	.....	91	175	653	530	210	138	112
21.....	204	148	.....	90	175	587	485	204	136	111
22.....	200	148	.....	90	210	578	470	204	134	110
23.....	195	138	.....	94	260	551	470	199	129	108
24.....	187	135	97	97	314	530	455	196	129	110
25.....	181	131	.....	101	388	515	425	198	129	108
26.....	176	126	87	101	473	482	410	229	127	106
27.....	173	126	87	101	464	449	390	207	129	104
28.....	170	126	87	114	425	461	370	218	129	103
29.....	170	126	.....	140	391	506	350	255	127	101
30.....	168	126	.....	136	373	497	326	238	127	101
31.....	165	.....	.....	118	.....	488	.....	221	123	.....

NOTE.—No record Dec. 1 to Feb. 3. For periods of no gage-height record, discharge determined as follows: Oct. 3-9, and Apr. 20-23, by comparison with Sevier River near Circleville; Nov. 13-20, 29-30, Feb. 17-28, Mar. 13-20, Apr. 12-14, May 30 to June 1, June 27-29, July 13-17, Aug. 1-3, Sept. 15-22, discharge interpolated; Mar. 1-9, mean discharge estimated 90 second-feet.

*Monthly discharge of Sevier River at Hatch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	246	15,000	June.....	586	34,900
November.....	149	8,870	July.....	237	14,600
March.....	97.2	5,980	August.....	146	8,980
April.....	236	14,000	September.....	117	6,960
May.....	500	30,700			

#### SEVIER RIVER NEAR CIRCLEVILLE, UTAH.

LOCATION.—About in sec. 29, T. 31 S., R. 4 W.,  $2\frac{1}{2}$  miles above mouth of Pine Creek and 8 miles southwest of Circleville, Piute County.

DRAINAGE AREA.—950 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 10 to September 19, 1912; April 23, 1914, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder, with outside and inside staff gages, about a mile below old gage, April 23, 1914, to September 30, 1917; inspected by James Meeks; vertical staff on bridge abutment during irrigation season of 1912. Flow practically the same at both places.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.



CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and rocks; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.37 feet at 9 p. m. May 18 (discharge, 1,020 second-feet); minimum stage recorded, 2.35 feet at 12.30 p. m. July 14 (discharge, 70 second-feet).

1912–1917: Maximum stage occurred in 1914 during flood resulting from failure of Hatchtown dam; discharge not determined. Maximum stage recorded, 8.0 feet August 6, 1916 (discharge estimated, 1,600 second-feet); minimum discharge recorded, 65 second-feet July 16, 1915 (stage, 2.50 feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Above all diversions for Circle Valley; below several diversions for Hatchtown project and Panguitch Valley.

REGULATION.—Flow was affected somewhat by operation of Hatchtown reservoir until dam broke, May 25, 1914.

ACCURACY.—Stage-discharge relation not permanent; affected by ice December 29 to March 8. Fairly well defined standard rating curve used, with shifts to parallel curves. Operation of water-stage recorder satisfactory except for winter and a few short periods of break in record. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; shifting-control method used for several periods. Records good.

*Discharge measurements of Sevier River near Circleville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	4.09	369	May 10	J. J. Sanford.....	4.13	420
26	.....do.....	3.50	241	16	.....do.....	5.72	861
Jan. 9	.....do.....	3.36	156	June 14	C. C. Jacob.....	5.50	727
Mar. 9	L. W. Jordan.....	3.04	198	July 6	W. B. Maughan.....	2.72	123
11	.....do.....	2.95	173	Aug. 10	.....do.....	3.31	254
Apr. 6	Manning and Sanford..	3.72	314	17	J. J. Sanford.....	2.76	124
18	Sanford and Jacob.....	3.44	244	22	Sanford and Jacob.....	2.47	77
Apr. 30	J. J. Sanford.....	4.08	388	Sept. 13	J. J. Sanford.....	2.88	144

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Sevier River near Circleville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	191	218	195	.....	192	424	588	.....	305	94
2	212	218	195	.....	185	409	552	.....	294	97
3	266	216	197	.....	185	409	549	.....	262	100
4	256	210	201	.....	181	411	563	.....	264	103
5	227	214	199	.....	185	424	608	.....	246	106
6	460	208	199	.....	264	401	664	146	230	109
7	900	220	177	.....	336	416	692	138	214	110
8	450	210	179	.....	367	429	734	148	187	112
9	426	212	171	197	445	419	779	127	165	115
10	386	214	175	197	332	393	832	112	250	122
11	365	208	167	194	282	409	856	100	206	176
12	337	197	189	192	310	445	799	90	214	168
13	322	158	208	192	332	524	779	80	204	143
14	324	149	193	192	344	650	712	74	190	160
15	304	195	181	192	329	784	675	144	146	174
16	290	208	187	192	307	895	709	168	124	177
17	273	199	197	192	303	950	695	117	120	179
18	263	197	183	192	256	960	773	106	134	181
19	259	203	187	194	252	920	614	92	124	177
20	256	206	189	200	244	820	580	119	109	179
21	254	191	177	206	246	706	497	138	91	181
22	254	195	189	221	282	670	.....	110	81	185
23	261	195	199	195	354	647	.....	134	84	196
24	250	195	187	194	427	614	.....	122	84	194
25	252	191	179	198	.....	583	.....	127	84	187
26	250	193	160	210	.....	555	.....	174	92	187
27	229	195	149	197	.....	505	.....	174	112	187
28	227	195	133	239	.....	494	.....	210	103	179
29	225	193	133	287	.....	489	.....	317	104	170
30	220	191	133	360	393	500	.....	359	102	170
31	212	.....	133	208	.....	608	.....	312	102	.....

NOTE.—For periods of no gage height, discharge determined as follows: Estimated by comparison with Sevier River at Kingston, Dec. 29-31, 133 second-feet; Jan. 1-31, 140 second-feet; Feb. 1-28, 160 second-feet; Mar. 1-8, 190 second-feet; Apr. 25-29, 450 second-feet; June 22-30, 380 second-feet; July 1-5, 205 second-feet; interpolated Sept. 3-5.

*Monthly discharge of Sevier River near Circleville, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	900	191	303	18,600
November	220	149	200	11,900
December	208	133	179	11,000
January	.....	.....	140	8,600
February	.....	.....	160	8,900
March	360	.....	205	12,600
April	.....	181	319	19,000
May	960	393	576	35,400
June	856	.....	589	35,000
July	359	74	160	9,820
August	305	84	162	10,000
September	196	94	154	9,160
The year	960	.....	263	190,000

## SEVIER RIVER NEAR KINGSTON, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 9, T. 30 S., R. 3 W., just below highway bridge on road from Kingston to Junction,  $1\frac{1}{2}$  miles above mouth of East Fork, and  $1\frac{1}{2}$  miles northwest of Kingston, Piute County.

**DRAINAGE AREA.**—1,110 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 12, 1914 to September 30, 1917; also several miscellaneous measurements in 1911 published in Water-Supply Paper 310 as "South Fork near Junction, Utah."

**GAGE.**—Stevens continuous water-stage recorder on left bank near bridge, with outside and inside staff gages, August 7, 1914 to September 30, 1917; inspected by W. S. Price. Temporary Stevens water-stage recorder 300 feet downstream, June 12 to July 15, 1914.

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

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of shifting sand and gravel.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 9.35 feet at 1 a. m. May 19 (discharge, 908 second-feet); minimum stage, 2.57 feet at 3 a. m. July 15 (discharge, 36 second-feet).

1914-1917: Maximum discharge recorded, 908 second-feet May 19, 1917; minimum discharge, 20 second-feet June 20 to July 1, 1914.

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

**DIVERSIONS.**—Below all diversions above mouth of East Fork.

**REGULATION.**—Flow affected by diversions for irrigation.

**ACCURACY.**—Stage-discharge relation continually changing due to shifting channel and backwater from Piute reservoir; affected by ice December 1-23. Frequent discharge measurements permit determination of daily discharge with a fair degree of accuracy except for a short period during winter when stage-discharge relation was affected by ice. Standard rating curve used with shifts to parallel curves. Operation of water-stage recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; shifting-control method used for several periods. Computation of daily discharge facilitated by comparison with Sevier River near Junction and East Fork of Sevier River near Kingston. Records fair.

*Discharge measurements of Sevier River near Kingston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9	J. J. Sanford.....	6.10	485	May 15	J. J. Sanford.....	8.05	753
25	.....do.....	4.26	260	June 15	C. C. Jacob.....	6.90	579
Jan. 12	.....do.....	3.40	183	July 7	Maughan and Jacob....	2.81	50
Mar. 7	L. W. Jordan.....	3.40	197	19	W. B. Maughan.....	2.66	34.8
8	.....do.....	3.48	207	Aug. 9	.....do.....	3.12	85
Apr. 5	J. J. Sanford.....	3.60	229	16	J. J. Sanford.....	3.00	80
24	.....do.....	6.04	432	Sept. 1	.....do.....	3.00	78
May 4	.....do.....	5.48	415	15	.....do.....	3.32	101
9	.....do.....	5.88	461				

*Daily discharge, in second-feet, of Sevier River near Kingston, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	120	224	.....	225	133	208	230	416	641	71	189	74
2.....	156	224	.....	230	137	202	230	401	589	68	175	68
3.....	246	224	.....	221	137	171	234	416	576	65	156	64
4.....	300	219	.....	212	128	192	238	414	576	59	133	64
5.....	236	219	.....	203	156	241	241	426	602	57	116	68
6.....	378	214	.....	194	161	241	342	408	654	54	103	71
7.....	760	219	.....	185	161	197	414	408	667	54	98	64
8.....	589	211	.....	176	171	208	446	452	693	60	92	57
9.....	492	203	.....	167	156	236	524	452	719	64	85	64
10.....	440	195	.....	158	151	224	383	402	758	68	146	71
11.....	396	187	.....	170	156	208	292	402	797	60	156	97
12.....	360	175	.....	181	171	208	302	440	804	54	166	105
13.....	336	162	.....	192	171	197	313	524	745	47	166	97
14.....	372	162	.....	133	181	192	330	641	641	41	142	101
15.....	360	169	.....	128	166	202	323	758	596	38	97	105
16.....	318	176	.....	133	166	192	292	836	616	71	78	120
17.....	300	183	.....	133	166	192	290	862	592	71	85	116
18.....	282	190	.....	128	171	192	253	894	677	54	95	113
19.....	276	197	.....	123	171	214	224	894	576	44	101	114
20.....	276	197	.....	133	171	246	214	862	466	36	93	110
21.....	282	186	.....	105	166	258	192	778	433	42	82	116
22.....	276	186	.....	100	171	282	236	693	360	40	71	125
23.....	288	192	.....	105	222	219	306	667	280	40	60	135
24.....	276	192	195	110	246	214	354	628	230	47	68	141
25.....	270	192	195	114	278	270	433	589	200	48	68	133
26.....	264	197	195	119	312	260	523	563	175	100	78	129
27.....	258	186	200	123	274	250	541	504	150	150	85	126
28.....	252	186	205	142	219	240	475	472	125	200	97	131
29.....	252	186	210	146	.....	240	486	466	100	250	101	123
30.....	246	186	215	156	.....	235	426	485	75	313	93	115
31.....	230	.....	220	156	.....	235	.....	641	.....	243	82	.....

NOTE.—Discharge estimated because of ice, Dec. 1-23, 190 second-feet. Discharge interpolated, Nov. 8-12, 14-18, 28-30; Jan. 1-5, 7-11; Mar. 26-31; Apr. 1, 3-4; June 25-30; July 26-29; Aug. 7-8, 17-18; Sept. 22.

*Monthly discharge of Sevier River near Kingston, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	760	120	319	19,600
November.....	224	162	194	11,500
December.....	220	.....	194	11,900
January.....	230	100	155	9,530
February.....	312	128	175	10,100
March.....	282	171	221	13,600
April.....	541	192	336	20,000
May.....	894	401	574	35,300
June.....	804	.....	504	30,000
July.....	313	38	84.2	5,180
August.....	189	68	108	6,640
September.....	141	57	101	6,010
The year.....	894	.....	247	179,000

#### PIUTE RESERVOIR, NEAR MARYSVALE, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 3, T. 29 S., R. 3 W., at Piute dam, 11 miles south of Marysvale, Piute County.

RECORDS AVAILABLE.—March 22, 1914, to September 30, 1917.

GAGE.—Iron pins driven every foot into rock face at outlet gates; readings between foot marks are measured with a graduated scale.

COOPERATION.—Storage table furnished by State engineer of Utah.

*Daily storage, in acre-feet, of Piute reservoir, near Marysvale, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		14,300	100	(a)	5,810	19,100	34,900	52,000	53,800	46,600	30,600	18,700
2.....		14,500	200	(a)	6,100	19,500	35,600	52,000	53,400	45,800	30,500	18,400
3.....	1,600	14,900	200	(a)	6,400	20,000	35,900	51,800	53,000	44,800	30,300	18,000
4.....	1,700	14,000	200	(a)	7,000	20,300	36,300	51,800	52,800	44,000	29,900	17,600
5.....	1,700	13,000	150	(a)	7,400	20,300	36,900	51,700	52,600	43,400	29,400	17,000
6.....	1,900	12,000	100	(a)	7,900	21,300	37,400	51,500	52,850	42,750	29,000	16,600
7.....	2,700	11,400	100	(a)	8,300	21,900	38,300	51,500	52,950	42,000	28,500	16,000
8.....	3,600	10,000	0	0	8,800	22,400	40,600	51,600	53,200	41,500	28,000	15,400
9.....	3,800	10,400	(a)	600	9,200	22,900	41,800	51,700	53,450	40,900	27,500	15,200
10.....	4,000	9,700	(a)	800	9,700	23,400	42,800	51,750	53,650	40,400	27,000	14,800
11.....	4,100	9,200	(a)	200	10,200	23,800	43,800	51,800	54,150	39,650	26,700	14,600
12.....	4,200	8,500	0	0	10,600	24,500	44,600	52,000	54,600	39,300	26,400	14,400
13.....	4,600	7,900	100	(a)	11,100	24,900	.....	52,100	54,850	38,600	25,900	13,600
14.....	4,800	7,000	100	(a)	11,600	25,400	.....	52,200	54,860	38,000	25,700	13,400
15.....	5,000	6,100	0	(a)	12,100	25,800	45,600	52,600	54,800	37,700	25,300	13,000
16.....	5,200	5,700	(a)	(a)	12,600	26,000	.....	55,700	54,590	37,200	24,900	12,600
17.....	5,400	5,200	0	(a)	13,000	26,700	.....	57,800	54,650	36,800	24,500	12,000
18.....	6,200	5,000	50	(a)	13,500	26,700	47,400	59,000	54,700	36,200	24,000	11,800
19.....	6,800	4,700	0	0	13,900	27,200	48,200	59,600	54,400	35,800	23,800	11,400
20.....	7,400	4,200	(a)	200	14,400	27,600	48,200	60,000	54,150	35,200	23,400	11,000
21.....	8,300	3,600	(a)	800	14,800	28,200	48,400	60,100	53,650	34,700	22,800	10,600
22.....	8,800	3,100	(a)	1,400	15,200	28,600	48,600	59,800	53,500	34,200	22,400	10,000
23.....	9,300	2,500	(a)	1,800	15,700	29,100	48,800	59,700	53,500	33,600	22,000	9,800
24.....	10,100	1,900	(a)	2,200	16,200	29,500	49,400	59,400	52,600	33,000	21,600	9,400
25.....	10,700	1,500	(a)	2,700	16,800	29,600	49,800	59,100	52,250	32,600	21,100	9,200
26.....	11,100	900	(a)	3,200	17,500	30,400	50,400	58,200	51,530	32,000	20,900	8,800
27.....	11,800	600	(a)	3,600	18,000	30,900	51,200	57,200	50,150	31,400	20,400	8,400
28.....	12,300	300	(a)	4,000	18,600	31,400	51,600	56,300	49,600	30,800	20,200	8,000
29.....	12,800	200	(a)	4,600	.....	.....	52,000	55,700	48,400	30,700	20,000	7,600
30.....	13,400	200	(a)	4,900	.....	33,500	52,200	54,800	47,500	30,600	19,400	7,400
31.....	13,900	.....	.....	5,400	.....	34,400	.....	54,200	.....	30,700	19,000	.....

*a* Reservoir dry.

NOTE.—In the bed of this reservoir lie the "Barsom Springs," which in 1908 and 1910 gave an average flow of 15 second-feet.

#### SEVIER RIVER BELOW PIUTE DAM, NEAR MARYSVALE, UTAH.

LOCATION.—In sec. 34, T. 28 S., R. 3 W., about 700 yards below dam of Piute reservoir, 11 miles south of Marysvale, Piute County.

DRAINAGE AREA.—2,440 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 17 to August 31, 1911; May 1, 1912, to September 30, 1917.

GAGE.—Friez water-stage recorder about 500 feet below site of former gage, May 4, 1912, to September 30, 1917; new datum; inspected by M. Morrison. Sloping gage on right bank, May 17 to August 31, 1911.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and loam. One channel at all stages.

Control is a riffle of heavy gravel and rocks located at the gage; practically permanent, shifting only slightly during high stages.

EXTREMES OF DISCHARGE.—Maximum open-water stage during year from water-stage recorder, 2.79 feet at noon May 28 (discharge, 1,770 second-feet); maximum stage, 3.19 feet at 9 a. m. January 20 (discharge, 2.5 second-feet), when stage-discharge relation was affected by ice; minimum discharge estimated 1 second-foot March 1-15 (water-stage recorder not in operation).

1911-1917: Maximum stage recorded, 3.0 feet from 4 a. m. to 4 p. m. May 27, 1914 (discharge, 1,380 second-feet); minimum in 1917.

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

DIVERSIONS.—No water diverted between this station and that near Junction.

REGULATION.—Flow past station entirely controlled by operation of gates in dam above.

ACCURACY.—Stage-discharge relation changed slightly during winter, and again during sudden rise on May 18; affected by ice December to March. Three well-defined rating curves used, applicable October 1 to January 20, March 15 to May 17, and May 18 to September 30. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for days of considerable range in stage, for which were used the means of hourly discharge. Open-water records excellent; winter records poor.

*Discharge measurements of Sevier River below Piute dam, near Marysville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec. ft.</i>			<i>Feet.</i>	<i>Sec. ft.</i>
Oct. 9	J. J. Sanford	1.99	582	May 15	J. J. Sanford	2.03	600
25	do.	.26 <sup>a</sup>	54	Aug. 16	do.	2.22	687
Jan. 13	do.	1.68	266	19	do.	2.12	633
Mar. 6	L. W. Jordan	.90	<sup>b</sup> 1.0	28	do.	2.03	574
Apr. 5	Manning and Sanford	.07	27.6	Sept. 21	do.	2.01	580
24	J. J. Sanford	1.57	354				

<sup>a</sup> Stage-discharge relation affected by ice.

<sup>b</sup> Estimated.

*Daily discharge, in second-feet, of Sevier River below Piute dam, near Marysville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	498	82	365	.....	.....	28	752	1,160	672	678	572
2.	492	110	356	.....	.....	28	752	1,160	692	678	608
3.	492	376	356	.....	.....	28	752	1,070	708	696	633
4.	498	691	356	.....	.....	28	759	994	708	737	633
5.	503	678	356	.....	.....	27	752	994	700	737	626
6.	498	671	348	.....	.....	27	710	921	700	730	620
7.	508	658	322	225	.....	28	627	885	626	730	614
8.	561	652	260	165	.....	28	603	885	584	722	608
9.	579	639	210	5	.....	28	603	885	639	722	602
10.	591	633	240	285	.....	28	603	885	672	715	602
11.	591	627	310	450	.....	28	603	885	672	715	602
12.	481	621	350	265	.....	73	603	894	672	715	614
13.	352	609	284	265	.....	146	603	894	672	708	614
14.	352	597	370	155	.....	149	603	894	672	708	608
15.	356	585	322	155	18	139	603	903	672	708	608
16.	361	573	309	200	30	139	609	816	685	685	608
17.	201	567	301	270	31	139	930	760	692	640	602
18.	53	555	.....	270	30	139	1,140	760	700	608	602
19.	53	543	.....	250	31	180	1,140	760	708	584	584
20.	53	585	.....	125	30	234	1,140	760	722	590	572
21.	52	627	.....	.....	31	234	1,150	760	715	590	566
22.	52	603	.....	.....	30	234	1,150	590	708	584	566
23.	53	579	.....	.....	31	308	1,150	530	700	584	566
24.	54	567	.....	.....	30	352	1,150	524	692	584	560
25.	54	573	.....	.....	30	383	1,160	566	692	584	554
26.	55	543	.....	.....	31	411	1,160	640	692	584	554
27.	55	503	.....	.....	31	517	1,160	659	685	584	572
28.	55	450	.....	.....	31	597	1,160	685	685	578	596
29.	55	392	.....	.....	32	690	1,160	678	685	578	506
30.	56	335	.....	.....	32	759	1,160	672	689	572	452
31.	58	.....	.....	.....	31	.....	1,160	.....	678	572	.....

NOTE.—Discharge estimated, because of ice, from comparison with Sevier River at Sevier and observer's notes: Dec. 8-12, as in table; Dec. 18-22, 310 second-feet; Dec. 23-31, 300 second-feet; Jan. 1-6, 250 second-feet; Jan. 7-20, as in table; Jan. 21-31, 2.5 second-feet; Feb. 1-28, 2.0 second-feet; Mar. 1-14, 1.0 second-foot.

*Monthly discharge of Sevier River below Piute dam, near Marysville, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	591	53	280	17,200
November.....	691	82	541	32,200
December.....	370		312	19,200
January.....			149	9,200
February.....			2.0	111
March.....	32		16.9	1,040
April.....	759	27	204	12,100
May.....	1,160	603	891	54,800
June.....	1,160	524	816	48,600
July.....	722	584	683	42,000
August.....	737	572	652	40,100
September.....	633	452	587	34,900
The year.....	1,160		429	311,000

#### SEVIER RIVER AT SEVIER, UTAH.

**LOCATION.**—In E.  $\frac{1}{2}$  sec. 32, T. 25 S., R. 4 W., at Sevier, Sevier County, 100 yards above railroad bridge on Y spur, 50 yards west of main-line track of Denver & Rio Grande Railroad, and 45 yards above mouth of Clear Creek until about November 15, 1916, when Clear Creek was diverted into Sevier River immediately above this station.

**DRAINAGE AREA.**—2,850 square miles including Clear Creek after November 15, 1916; 2,700 miles prior to November 15, 1916, when Clear Creek entered below the station.

**RECORDS AVAILABLE.**—May 20, 1911, to September 30, 1917.

**GAGE.**—Friez water-stage recorder on right bank, May 16, 1912, to September 30, 1917; inspected by F. H. Levi. Original gage, vertical staff nailed to cottonwood tree, May 20, 1911, to January 7, 1912, when carried out by ice; temporary gage, January 8 to February 23, 1912; inclined staff at same site as Friez water-stage recorder, February 24 to May 15, 1911.

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

**CHANNEL AND CONTROL.**—Permanent, except at sudden high stages

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.33 feet from 2 a. m. May 31 to 10 a. m. June 1 (discharge, 1,220 second-feet); minimum stage, 1.45 feet at 10 a. m. February 18 (discharge, 30 second-feet).

1911-1917: Maximum stage recorded, 4.75 feet at 6 p. m. June 3, 1914 (discharge, 1,600 second-feet); minimum stage, 1.29 feet at 8 a. m. October 26, 1913 (discharge, 15 second-feet).

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

**DIVERSIONS.**—A few small ditches divert between station and Piute dam.

**REGULATION.**—Flow past station practically controlled by operation of gates in Piute reservoir dam, about 27 miles above.

**ACCURACY.**—Stage-discharge relation remained permanent throughout the year. Rating curve well defined. Water-stage recorder operated satisfactorily except for a few days during winter. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good except for period of ice effect.

*Discharge measurements of Sevier River at Sevier, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec. ft.</i>			<i>Feet.</i>	<i>Sec. ft.</i>
Oct. 23	J. J. Sanford.....	1.76	87	May 7	J. J. Sanford.....	3.48	715
Jan. 15	.....do.....	2.53	269	July 12	W. B. Maughan.....	3.46	748
Mar. 13	L. W. Jordan.....	1.51	38.4	Aug. 21	J. J. Sanford.....	3.32	626
Apr. 4	Manning and Sanford..	1.64	55	Sept. 6	.....do.....	3.34	607
23	J. J. Sanford.....	2.56	298	20	.....do.....	3.25	581

*Daily discharge, in second-feet, of Sevier River at Sevier, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	520	86	429	278	.....	49	70	742	1,210	754	698	578
2.....	499	116	392	282	.....	43	72	754	1,190	748	692	572
3.....	495	137	397	295	.....	48	74	759	1,190	754	692	615
4.....	490	499	397	302	.....	54	70	754	1,120	754	726	626
5.....	495	653	397	299	.....	56	74	742	1,080	754	742	632
6.....	509	659	392	306	.....	49	77	737	1,070	754	742	632
7.....	520	642	370	288	.....	56	83	709	1,020	748	742	632
8.....	535	631	340	242	.....	52	94	642	1,030	692	737	632
9.....	567	621	240	246	.....	54	104	637	1,090	670	731	626
10.....	583	605	236	363	.....	51	96	632	1,140	709	726	621
11.....	588	599	262	445	.....	48	90	632	1,120	714	726	626
12.....	588	621	332	424	51	56	94	648	1,070	714	720	626
13.....	437	.....	374	.....	51	49	157	659	1,070	709	720	626
14.....	386	.....	374	.....	51	46	219	681	1,070	703	720	621
15.....	386	.....	.....	278	51	52	225	742	1,100	686	714	621
16.....	386	.....	.....	.....	50	51	222	776	1,110	686	714	610
17.....	382	.....	310	.....	50	70	222	776	1,040	686	681	610
18.....	162	.....	325	.....	38	83	219	902	1,040	692	664	610
19.....	98	577	363	.....	46	76	214	1,130	1,020	698	621	595
20.....	92	577	367	.....	43	72	249	1,160	1,000	703	621	583
21.....	88	621	306	.....	48	77	271	1,180	990	703	621	583
22.....	86	631	329	.....	51	74	282	1,160	972	709	621	583
23.....	83	615	359	.....	53	74	288	1,160	810	709	621	578
24.....	83	588	262	.....	67	72	216	1,160	737	709	621	578
25.....	83	583	367	.....	77	72	329	1,160	714	709	615	578
26.....	83	599	.....	.....	70	70	420	1,150	759	714	610	572
27.....	83	567	.....	.....	59	83	405	1,150	770	714	599	567
28.....	83	540	.....	.....	49	94	481	1,160	793	731	588	588
29.....	86	472	.....	.....	.....	104	632	1,170	788	742	588	594
30.....	86	389	.....	.....	.....	94	731	1,190	759	742	588	504
31.....	86	.....	275	.....	.....	81	.....	1,220	.....	714	583	.....

NOTE.—After Nov. 15, discharge includes that of Clear Creek. Discharge estimated because of ice, Nov. 13-18, 610 second-feet; Dec. 7-9, as in table; Dec. 15-16, 370 second-feet; Dec. 26-30, 320 second-feet; Jan. 13-14, 295 second-feet; Jan. 16-22, 254 second-feet; Jan. 23 to Feb. 11, 50 second-feet.

*Monthly discharge of Sevier River at Sevier, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	588	83	311	19,100
November.....	659	86	543	32,300
December.....	429	240	340	20,900
January.....	445	.....	222	13,600
February.....	.....	.....	52.1	2,890
March.....	104	43	64.8	3,980
April.....	731	70	226	13,400
May.....	1,220	632	905	55,600
June.....	1,210	714	995	59,200
July.....	754	686	717	44,100
August.....	742	583	670	41,200
September.....	632	504	601	35,800
The year.....	1,220	.....	473	342,000



## SEVIER RIVER NEAR RICHFIELD, UTAH.

LOCATION.—In sec. 32, T. 23 S., R. 2 W., about 150 feet below Vermilion canal dam and 2 miles east of Richfield, Sevier County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 22 to September 30, 1916; April 21 to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on left bank, with inside and outside staff gages; datum raised 3 feet on May 12, 1917.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; subject to change during high stages.

EXTREMES OF DISCHARGE.—Not determined.

ICE.—Records discontinued during winter.

DIVERSIONS.—Many irrigation canals divert from river above station.

REGULATION.—Flow controlled by reservoirs upstream.

ACCURACY.—Stage-discharge relation changed June 1. Rating curve for period April 21 to May 31 fairly well defined; curve for period June 1 to September 30 well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

*Discharge measurements of Sevier River near Richfield, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	2.51	109	July 30	W. B. Maughan.....	1.30	48.1
Apr. 21	.....do.....	1.40	46.0	Aug. 1	.....do.....	1.35	55
May 12	.....do.....	2.25	151	Sept. 27	J. J. Sanford.....	1.00	32.3
July 11	W. B. Maughan.....	.55	6.8	Sept. 10	.....do.....	.88	26.2

<sup>a</sup> New gage; old gage read 5.25 feet.

*Daily discharge, in second-feet, of Sevier River near Richfield, Utah, for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1. ....		558	620	.....	51	20	16. ....		185	344	7	109	27
2. ....		572	641	.....	46	18	17. ....		179	328	7	131	26
3. ....		601	641	.....	40	18	18. ....		217	272	6	108	26
4. ....		584	620	9	50	18	19. ....		403	258	6	85	27
5. ....		579	541	14	63	18	20. ....		443	239	5	63	27
6. ....		579	467	15	46	18	21. ....	47	478	221	5	52	24
7. ....		555	408	18	44	23	22. ....	54	434	219	7	67	31
8. ....		500	344	26	52	22	23. ....	63	430	190	14	72	56
9. ....		434	377	27	69	18	24. ....	36	414	138	18	28	78
10. ....		325	423	18	81	22	25. ....	29	419	.....	18	32	61
11. ....		281	438	10	79	24	26. ....	37	421	.....	20	33	64
12. ....		199	372	9	80	25	27. ....	59	430	.....	25	29	99
13. ....		147	332	9	105	26	28. ....	116	445	.....	35	29	127
14. ....		166	316	9	124	26	29. ....	177	452	.....	37	26	174
15. ....		158	334	7	118	27	30. ....	430	496	.....	58	28	176
							31. ....		565	.....	60	25	.....

NOTE.—No gage-height record. Discharge estimated, June 25-30, 80 second-feet; and July 1-3, 20 second-feet.

*Monthly discharge of Sevier River near Richfield, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 21-30.....	430	29	105	2,080
May.....	601	147	408	25,100
June.....	641	.....	319	19,000
July.....	60	5	18.0	1,110
August.....	131	25	63.4	3,900
September.....	176	18	44.9	2,670
The period.....	.....	.....	.....	64,300

#### SEVIER RIVER NEAR VERMILION, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 19, T. 22 S., R. 1 W., at highway bridge half a mile below Rockyford dam, 2 miles below Vermilion, Sevier County, and 4 miles above mouth of Lost Creek.

**DRAINAGE AREA.**—3,340 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 15 to September 23, 1912; July 31, 1914, to September 30, 1917.

**GAGE.**—Stevens water-stage recorder on right bank April 20 to September 30, 1917; inspected by Mrs. Will Barron. Vertical staff on right bank, July 31, 1914, to April 19, 1917; original gage used in 1912, a quarter of a mile below.

**DISCHARGE MEASUREMENTS.**—Made by wading or from highway bridge.

**CHANNEL AND CONTROL.**—Fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6 feet at 4 p. m. November 25 (discharge, 941 second-feet); minimum stage from water-stage recorder, 3.30 feet at 2 p. m. July 24 (discharge, 5 second-feet).

1912, 1914-1917: Maximum discharge recorded November 25, 1916; minimum stage recorded, 3.10 feet July 9, 10, 28, 31, and August 1, 1915 (discharge, 2 second-feet).

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

**DIVERSIONS.**—Entire flow diverted above station during low-water season; flow past station at such times represents seepage and return flow from canals.

**REGULATION.**—Flow regulated to a large extent by dams and reservoirs above.

**ACCURACY.**—Stage-discharge relation fairly permanent; rating curve well defined. Staff gage read morning and evening of each day during irrigation season and three or four times a week during remainder of year until April 20, when water-stage recorder was installed, the operation of which was fairly satisfactory. For period of use of recorder, mean daily gage height determined by inspecting recorder graph. Daily discharge ascertained by applying mean daily gage height to rating table; shifting-control method used July 12 to August 15; discharge interpolated for days on which no gage-height record was obtained. Records for irrigation season good; others fair.

*Discharge measurements of Sevier River near Vermilion, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	4.53	200	July 13	W. B. Maughan.....	3.39	10.2
Jan. 17	.....do.....	4.86	329	Aug. 1	.....do.....	4.22	128
Mar. 12	L. W. Jordan.....	4.43	168	15	J. J. Sanford.....	4.38	150
Apr. 20	J. J. Sanford.....	4.27	123	28	.....do.....	4.00	76
May 11	.....do.....	5.12	421				

*Daily discharge, in second-feet, of Sevier River near Vermilion, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	159	423	670	423	160	258	132	539	624	10	137	67
2.....	190	378	522	423	132	258	132	666	719	12	132	53
3.....	190	378	522	423	132	258	105	707	737	14	112	40
4.....	190	378	522	423	132	225	76	695	707	16	105	34
5.....	223	378	522	423	125	190	76	655	660	15	105	34
6.....	223	505	522	423	117	190	76	620	556	14	78	31
7.....	223	630	522	423	110	180	115	580	486	22	89	29
8.....	607	755	522	422	110	190	150	540	405	61	89	32
9.....	522	735	522	423	110	159	190	500	299	110	90	36
10.....	522	715	522	423	110	159	190	460	303	76	119	38
11.....	496	695	505	423	132	159	161	423	331	17	121	43
12.....	470	695	485	423	150	145	132	348	361	16	123	47
13.....	470	710	470	423	170	132	132	288	339	12	133	57
14.....	470	725	470	378	190	132	132	276	315	10	143	68
15.....	470	740	470	365	190	132	190	237	223	10	154	73
16.....	470	755	470	355	190	132	110	273	216	10	146	84
17.....	470	755	470	345	190	132	110	291	210	11	137	84
18.....	335	755	470	335	190	132	110	280	200	10	140	87
19.....	315	755	470	335	210	132	110	369	190	8	132	96
20.....	295	755	483	335	235	132	132	447	180	8	119	101
21.....	295	755	496	335	258	132	137	480	170	8	101	105
22.....	276	800	509	335	258	132	132	506	159	9	90	112
23.....	241	845	522	315	258	132	137	501	171	7	75	123
24.....	174	893	470	295	258	132	132	491	123	7	61	146
25.....	159	941	455	282	295	132	105	486	48	7	64	162
26.....	159	880	440	270	335	142	112	486	8	10	73	159
27.....	159	816	423	258	310	155	165	486	8	14	74	168
28.....	159	816	423	258	285	159	187	491	10	52	74	216
29.....	159	816	423	235	.....	159	216	496	10	57	72	288
30.....	159	816	423	210	.....	159	361	496	10	60	70	315
31.....	159	.....	423	190	.....	159	.....	550	.....	106	68	.....

*Monthly discharge of Sevier River near Vermilion, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	607	159	304	18,700
November.....	941	378	700	41,700
December.....	670	423	488	30,000
January.....	423	190	353	21,700
February.....	335	110	191	10,600
March.....	258	132	162	9,960
April.....	361	76	142	8,450
May.....	707	237	473	29,100
June.....	737	8	293	17,400
July.....	110	7	25.8	1,590
August.....	154	61	104	6,400
September.....	315	29	97.6	5,310
The year.....	941	7	278	201,000

## SEVIER RIVER NEAR GUNNISON, UTAH.

**LOCATION.**—About 60 rods west of southeast corner of sec. 14, T. 19 S., R. 1 W., near bridge on county road from Gunnison to West View precinct, about 3 miles west of Gunnison, Sanpete County. San Pitch River enters from east about half a mile below station.

**DRAINAGE AREA.**—3,990 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 29, 1900, to September 30, 1917.

**GAGE.**—Stevens water-stage recorder on right bank 200 feet below bridge May 19, 1914, to September 30, 1917; inspected by Malcome Orr. Vertical staff on right bridge abutment, June 29, 1900, to May 18, 1914; datum lowered 1 foot in September, 1910.

**DISCHARGE MEASUREMENTS.**—Made from cable about 450 feet above gage or by wading.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed is composed of fine sand and gravel; shifts at high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 5.49 feet at 4 a. m. May 31 (discharge estimated, 980 second-feet—stage-discharge relation affected by backwater from San Pitch River); minimum stage, 2.25 feet at 7 p. m. July 22 to noon July 23 (discharge, 83 second-feet).

1900–1917: Maximum stage recorded, 6.34 feet May 28, 1906 (discharge, 2,240 second-feet); stream dry April 30, 1911.

**ICE.**—Stage-discharge relation seriously affected by ice during January and February.

**DIVERSIONS.**—During irrigation season, greater part of flow is diverted above station.

**REGULATION.**—Flow at gage is affected by operation of reservoirs and numerous irrigation diversions above.

**ACCURACY.**—Stage-discharge relation not permanent; affected by ice and by backwater from San Pitch River during winter and spring. Standard rating curve fairly well defined; frequent discharge measurements determine changes with fair degree of accuracy. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph; shifting-control method and parallel rating curves used for various periods. Records fair.

*Discharge measurements of Sevier River near Gunnison, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9	E. A. Porter.....	4.00	684	June 1	E. A. Porter.....	5.30	932
24	.....do.....	3.00	375	11	.....do.....	5.15	895
Nov. 21	.....do.....	4.20	774	18	.....do.....	4.75	540
Dec. 5	.....do.....	3.82	624	23	.....do.....	3.96	374
Jan. 16	J. J. Sanford.....	<sup>a</sup> 5.30	446	29	.....do.....	2.73	152
Feb. 16	E. A. Porter.....	2.92	320	July 11	.....do.....	2.66	152
Mar. 26	.....do.....	2.87	301	16	.....do.....	2.26	84
Apr. 1	.....do.....	<sup>b</sup> 4.40	341	31	.....do.....	2.65	147
9	.....do.....	3.89	351	Aug. 6	.....do.....	2.76	174
22	.....do.....	3.08	268	20	.....do.....	3.11	248
May 1	.....do.....	4.08	537	28	.....do.....	2.62	140
7	.....do.....	4.48	707	Sept. 13	.....do.....	2.97	235
15	.....do.....	5.08	789	21	.....do.....	2.93	210
24	.....do.....	4.28	715				

<sup>a</sup>Stage-discharge relation affected by ice.

<sup>b</sup>Stage-discharge relation affected by backwater from San Pitch River.

*Daily discharge, in second-feet, of Sevier River near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	277	325	694	.....	.....	395	342	520	940	112	168	140
2.....	364	322	665	.....	.....	340	356	629	920	110	204	138
3.....	343	322	646	.....	.....	302	356	722	920	109	194	136
4.....	349	325	643	.....	.....	302	386	722	940	104	179	133
5.....	392	337	632	.....	.....	316	371	722	980	104	181	129
6.....	447	484	628	.....	.....	313	356	722	940	100	179	129
7.....	561	598	606	.....	.....	299	356	684	900	101	181	125
8.....	628	639	570	.....	.....	299	356	666	860	98	171	125
9.....	672	698	533	.....	.....	288	356	629	940	100	215	125
10.....	665	735	496	.....	.....	316	386	610	900	138	299	129
11.....	672	773	460	.....	.....	310	418	592	900	148	227	152
12.....	691	772	484	.....	.....	305	386	556	820	125	218	168
13.....	687	771	502	.....	.....	296	327	538	703	100	229	200
14.....	706	770	513	.....	.....	299	286	629	648	82	262	206
15.....	716	769	524	.....	.....	285	286	780	740	82	277	227
16.....	672	768	532	446	319	277	299	780	666	90	256	222
17.....	646	767	561	.....	322	285	327	800	666	91	246	229
18.....	606	766	558	.....	322	282	402	740	538	93	249	229
19.....	643	766	561	.....	322	288	356	666	556	96	246	224
20.....	558	766	561	.....	324	299	327	666	556	94	246	215
21.....	457	766	572	.....	325	296	299	703	485	90	229	209
22.....	436	743	583	.....	358	302	272	703	418	89	218	215
23.....	411	747	565	.....	.....	290	272	703	371	86	200	224
24.....	382	762	558	.....	.....	296	299	703	356	98	190	239
25.....	376	762	543	.....	.....	310	299	703	356	164	194	256
26.....	364	754	524	.....	.....	299	327	722	356	120	177	259
27.....	352	747	.....	.....	.....	305	418	760	294	107	154	259
28.....	346	743	.....	.....	.....	267	451	740	198	146	144	286
29.....	343	728	.....	.....	.....	272	502	780	162	140	144	307
30.....	334	717	.....	.....	.....	299	520	900	114	204	144	356
31.....	328	.....	.....	.....	.....	313	.....	980	.....	166	144	.....

NOTE.—Stage-discharge relation affected by ice, discharge estimated: Dec. 27-31, 520 second-feet; Jan. 1-15, 480 second-feet; Jan. 17 to Feb. 15, 320 second-feet; Feb. 23-28, 376 second-feet. Discharge interpolated because of missing gage heights, Nov. 12-19, and Dec. 8-10.

*Monthly discharge of Sevier River near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	716	277	498	30,600
November.....	773	322	665	39,600
December.....	694	460	559	34,400
January.....	.....	.....	400	24,600
February.....	.....	.....	330	18,300
March.....	395	267	301	18,500
April.....	520	272	356	21,200
May.....	980	520	702	43,200
June.....	980	114	638	38,000
July.....	204	86	112	6,890
August.....	299	144	205	12,600
September.....	356	125	200	11,900
The year.....	980	86	414	300,000

#### SEVIER BRIDGE RESERVOIR NEAR JUAB, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 1, T. 17 S., R. 2 W., at dam of Consolidated Sevier Bridge Reservoir Co., about 13 miles southwest of Juab, Juab County.

RECORDS AVAILABLE.—January 1, 1914, to September 30, 1917.

**GAGE.**—Inclined staff gage about 100 feet upstream from south end of dam, since April 26, 1914. January 1 to April 25, 1914, elevations of water surface ascertained by measuring depth of water with a rule at a series of bench marks; these readings were checked at intervals with a wye level.

**COOPERATION.**—Gage-height record furnished by Consolidated Sevier Bridge Reservoir Co.

*Daily gage height, in feet, of Sevier Bridge reservoir near Juab, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	12.9			58.9	64.4	67.7	70.2	72.7	72.7	73.0	66.5	62.0
2.				59.1	64.5	67.8	70.4	72.8	72.9	72.9	66.3	61.7
3.			49.6	59.3	64.6	67.9	70.6	72.9	73.0	72.8	66.2	61.4
4.				59.5	64.7	67.9	70.8	72.9	73.2	72.7	66.2	61.1
5.		34.6		59.7	64.7	68.0	71.0	73.0	73.3	72.6	65.9	60.8
6.				60.0	64.8	68.0	71.0	73.1	73.5	72.5	66.0	60.5
7.				60.3	64.9	68.2	71.1	73.2	73.6	72.3	65.5	60.2
8.	19.4			60.5	65.0	68.3	71.2	73.2	73.7	72.1	65.7	60.0
9.				60.7	65.2	68.4	71.3	73.2	73.8	71.9	65.6	59.7
10.			52.6	60.9	65.3	68.4	71.4	73.2	73.9	71.6	65.4	59.4
11.				61.1	65.4	68.5	71.5	73.1	74.0	71.4	65.4	59.1
12.		38.1		61.4	65.5	68.6	71.6	73.1	74.0	71.1	65.3	58.8
13.				61.5	65.6	68.6	71.7	72.9	74.0	70.9	65.1	58.6
14.				61.7	65.7	68.7	71.9	72.8	74.0	70.7	65.0	58.4
15.	25.6			61.9	65.8	68.8	72.0	72.8	73.9	70.5	65.0	58.2
16.				62.0	65.9	68.9	72.0	72.8	73.9	70.0	65.0	58.1
17.			54.7	62.2	66.0	69.0	72.0	72.8	73.9	69.9	64.9	57.9
18.				62.4	61.1	69.0	72.1	72.7	73.9	69.6	64.8	57.7
19.		42.1		62.6	66.2	69.0	72.2	72.6	73.9	69.3	64.7	57.5
20.				62.8	66.4	69.1	72.3	72.5	73.9	69.0	64.6	57.4
21.				62.9	66.6	69.2	72.4	72.3	73.9	68.7	64.4	57.3
22.	30.4			63.0	66.7	69.2	72.4	72.2	73.9	68.6	64.3	57.1
23.				63.1	66.8	69.3	72.4	72.1	73.8	68.3	64.1	56.9
24.			57.1	63.4	66.9	69.4	72.4	72.0	73.8	68.0	63.9	56.7
25.				63.5	67.0	69.4	72.4	72.0	73.7	67.8	63.7	56.5
26.		46.0		63.6	67.3	69.5	72.5	72.0	73.6	67.5	63.5	56.3
27.				63.8	67.5	69.6	72.5	72.1	73.5	67.5	63.2	56.2
28.				64.0	67.6	69.7	72.5	72.1	73.4	67.1	62.9	56.1
29.	32.8			64.1		69.8	72.5	72.1	73.3	67.0	62.6	55.0
30.				64.2		69.9	72.7	72.2	73.1	66.8	62.5	55.0
31.			58.7	64.3		70.0		72.4		66.6	62.3	

NOTE.—Estimated storage in reservoir, 4,790 acre-feet on Oct. 1.

#### SEVIER RIVER NEAR JUAB, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 2, T. 17 S., R. 2 W., about 1,600 feet downstream from Sevier Bridge dam and 14 miles southwest of Juab, Juab County.

**DRAINAGE AREA.**—5,120 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—September 23, 1911, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on left bank, 500 feet below old gage since April 16, 1914; inclined staff about 1,000 feet below Sevier Bridge dam, on right bank, September 23, 1911, to April 15, 1914.

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

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of sand, clay, and fine gravel. Artificial control of rocks about 40 feet below gage; permanent except during very high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 5.83 feet at 10 p. m. May 21 (discharge, 1,230 second-feet); minimum stage, 1.23 feet January 25–28 (discharge, 4 second-feet.)

1911–1917: Maximum stage recorded, 7.8 feet May 28, 29, and June 4–12, 1914 (discharge, 2,030 second-feet); minimum discharge, 0.5 second-foot October 14, 1911.

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

DIVERSIONS.—None between this station and that near Gunnison.

REGULATION.—Flow controlled by gates in dam just above station.

ACCURACY.—Stage-discharge relation changed slightly in November, and again in May when a large volume of flow was released from the reservoir. Three well defined rating curves used, applicable October 1 to November 3, November 11 to May 19, and May 20 to September 30; shifting-control method used November 4-10. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records excellent.

COOPERATION.—Gage-height record and discharge measurements furnished by Lower Sevier River Water Users.

*Discharge measurements of Sevier River near Juab, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	Feet.	Sec.-ft.		Feet.	Sec.-ft.		Feet.	Sec.-ft.
Oct. 8.....	2.15	172	Apr. 25.....	2.68	274	July 13.....	5.02	913
Oct. 25.....	1.64	61	May 19.....	5.55	1,110	Aug. 2.....	3.50	450
Nov. 22.....	1.82	91	June 8.....	4.19	654	Sept. 4.....	4.38	712
Feb. 15.....	1.33	13.2	June 15.....	5.08	969	Sept. 27.....	3.78	517

*Daily discharge, in second-feet, of Sevier River near Juab, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	186	83	10	9	7	18	28	486	564	522	456	741
2.....	165	85	9	9	8	18	28	545	507	522	475	725
3.....	29	85	9	9	8	18	28	548	513	513	490	719
4.....	18	98	7	10	9	18	28	592	513	510	450	716
5.....	10	110	7	10	9	18	27	609	546	552	439	716
6.....	6	110	7	9	9	19	27	626	555	676	433	713
7.....	6	122	7	9	9	19	27	680	579	792	478	706
8.....	120	132	7	9	9	19	26	728	617	861	495	697
9.....	220	130	7	9	9	22	26	728	734	868	537	694
10.....	204	114	8	9	9	26	27	758	795	892	507	694
11.....	197	95	8	8	8	26	27	854	868	906	498	685
12.....	206	86	8	8	9	26	27	952	955	920	490	666
13.....	200	86	8	10	8	27	27	956	920	927	484	607
14.....	195	86	8	9	11	27	27	986	910	962	472	540
15.....	197	86	8	8	21	27	27	1,024	948	986	484	558
16.....	74	86	8	8	33	28	27	1,036	969	976	501	558
17.....	90	88	8	7	33	28	28	1,015	1,015	980	507	558
18.....	92	88	8	8	27	30	28	1,055	1,015	972	531	555
19.....	92	88	8	7	18	30	30	1,086	969	969	579	555
20.....	88	88	8	6	18	30	30	1,200	906	948	555	555
21.....	83	88	9	7	18	30	56	1,225	910	927	537	555
22.....	83	88	9	8	18	31	156	1,150	882	906	552	555
23.....	71	88	9	4	18	31	156	1,085	858	882	685	558
24.....	63	88	9	7	19	31	231	1,025	858	861	731	555
25.....	63	88	9	4	18	31	275	1,015	855	854	706	555
26.....	63	90	9	4	18	31	285	722	821	828	685	537
27.....	63	79	9	4	18	30	290	531	589	802	650	534
28.....	74	28	9	4	18	30	313	567	582	782	691	461
29.....	83	11	9	5	28	379	620	579	741	741	644	343
30.....	83	11	9	6	28	422	629	573	713	713	738	436
31.....	83	.....	9	6	28	.....	610	.....	644	644	769	.....

*Monthly discharge of Sevier River near Juab, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	220	6	103	6,330
November.....	132	11	86.8	5,160
December.....	10	7	8.3	510
January.....	10	4	7.4	460
February.....	33	7	14.9	830
March.....	31	18	25.9	1,590
April.....	422	26	104	6,180
May.....	1,225	486	828	50,900
June.....	1,015	507	764	45,500
July.....	986	510	813	50,000
August.....	769	433	556	34,200
September.....	741	343	602	35,800
The year.....	1,225	4	328	237,000

#### SEVIER RIVER NEAR MILLS, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 36, T. 14 S., R. 3 W., opposite milepost 682 on Los Angeles & Salt Lake Railroad (Lynndyl cut-off) and 7 miles below Mills post office, Juab County.

**DRAINAGE AREA.**—5,800 square miles.

**RECORDS AVAILABLE.**—April 22, 1914, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder, with outside and inside staff gages on left bank 500 feet above railroad bridge.

**DISCHARGE MEASUREMENTS.**—Made from cable 100 feet above gage or by wading.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed is composed of heavy gravel and rock; permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 5.94 feet at 10 p. m. May 21 (discharge, 1,230 second-feet); minimum discharge, estimated 50 second-feet January 15–31 (stage-discharge relation affected by ice).

1914–1917: Maximum stage recorded, 6.71 feet at 7 p. m. May 27, 1914 (discharge, 1,910 second-feet); minimum stage, 3.14 feet at 2 p. m. January 12, 1916 (discharge, 36 second-feet).

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

**REGULATION.**—Flow affected by operation of several dams and irrigation diversions above.

**ACCURACY.**—Stage-discharge relation permanent except as affected by ice during January and February. Rating curve well defined. Gage-height record from water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph except for periods when stage-discharge relation was affected by ice for which it was estimated by a comparison with the flow of Sevier River near Juab. Records excellent.

**COOPERATION.**—Gage-height record and discharge measurements furnished by Lower Sevier River Water Users.

*Discharge measurements of Sevier River near Mills, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 7	E. A. Porter.....	3.52	64	Aug. 10	Porter and Jacob.....	4.97	522
31	Porter and Price.....	3.88	114	Sept. 6	E. A. Porter.....	5.30	739
June 8	E. A. Porter.....	5.00	591				



*Daily discharge, in second-feet, of Sevier River near Mills, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	342	118	95	.....	72	73	430	651	575	609	790
2.....	246	118	59	.....	71	73	515	581	542	515	762
3.....	222	120	60	.....	80	73	542	521	548	521	748
4.....	90	120	61	.....	72	73	564	515	548	515	741
5.....	75	138	62	.....	67	72	580	521	548	488	741
6.....	68	156	63	.....	66	71	609	542	609	478	748
7.....	66	156	57	.....	66	70	632	575	708	488	741
8.....	65	172	63	.....	65	70	702	564	825	510	728
9.....	205	179	63	.....	66	67	735	651	853	559	722
10.....	265	182	63	.....	67	70	741	728	860	564	722
11.....	257	158	61	.....	70	71	797	776	874	542	722
12.....	249	140	63	.....	67	71	910	860	895	532	708
13.....	257	138	62	.....	67	71	947	874	910	521	702
14.....	253	150	60	.....	66	70	947	853	903	510	603
15.....	253	161	57	.....	66	70	1,000	853	932	505	598
16.....	218	136	56	.....	66	71	1,000	874	940	526	603
17.....	120	134	64	.....	65	74	1,017	910	925	575	603
18.....	131	134	59	.....	65	73	1,032	955	910	553	603
19.....	127	136	60	.....	66	73	1,032	947	918	620	603
20.....	103	136	60	.....	67	74	1,104	888	903	620	603
21.....	103	136	57	.....	69	73	1,208	860	888	603	603
22.....	103	136	62	.....	71	111	1,216	860	874	586	603
23.....	105	136	60	.....	71	205	1,168	846	853	626	603
24.....	112	136	57	98	72	205	1,088	867	825	741	603
25.....	122	136	57	107	72	296	1,048	867	839	741	603
26.....	122	136	50	124	72	329	1,024	867	839	728	603
27.....	118	138	70	95	73	334	639	722	818	702	586
28.....	118	138	55	75	74	334	609	620	804	670	586
29.....	118	138	54	.....	75	364	632	614	804	702	488
30.....	118	138	53	.....	74	410	689	603	755	708	420
31.....	118	.....	53	.....	73	.....	670	.....	729	797	.....

NOTE.—Stage-discharge relation affected by ice, discharge estimated by comparison with Sevier River near Juab: Dec. 28-30, as in table; Jan. 1-31, 51.5 second-feet; Feb. 1-23, 57.5 second-feet. Discharge interpolated Oct. 27-31.

*Monthly discharge of Sevier River near Mills, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	342	65	157	9,650
November.....	182	118	142	8,450
December.....	95	53	60.5	3,720
January.....	.....	.....	51.5	3,160
February.....	.....	.....	65.0	3,610
March.....	80	65	69.5	4,270
April.....	410	70	136	8,100
May.....	1,216	430	834	51,300
June.....	955	515	745	44,300
July.....	940	542	798	49,100
August.....	797	478	592	36,400
September.....	790	420	650	38,700
The year.....	1,216	50	358	261,000

## SEVIER RIVER NEAR LYNNDYL, UTAH.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 27, T. 15 S., R. 5 W., at homestead of P. J. Flahive,  $3\frac{1}{2}$  miles southwest of Lynndyl, Millard County.

**DRAINAGE AREA.**—6,270 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—April 25, 1914, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on right bank, with inside and outside staff gages,  $1\frac{1}{2}$  miles below highway bridge.

**DISCHARGE MEASUREMENTS.**—Made by wading or from cable a quarter of a mile above gage.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of fine gravel. Control permanent except for very high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 5.85 feet from 3 to 9 a. m. May 23 (discharge, 1,080 second-feet); minimum occurred during period when stage-discharge relation was affected by ice; mean flow estimated January 1-31, 64 second-feet.

1914-1917: Maximum discharge recorded June 9, 1914 (flow estimated 1,820 second-feet); minimum stage, 1.55 feet at 6 a. m. January 6, 1916 (discharge, 21 second-feet).

**ICE.**—Stage-discharge relation seriously affected by ice December to February.

**DIVERSIONS.**—Numerous diversions above station.

**REGULATION.**—Flow affected by storage and irrigation diversions above station.

**ACCURACY.**—Stage-discharge relation changed slightly in April; affected by ice December 9 to February 28. Two well defined rating curves used, applicable October 1 to April 22, and April 23 to September 30. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection, except as noted in footnote to table of daily discharge. Records excellent except for period of ice effect, for which they are only fair.

**COOPERATION.**—Gage-height record and discharge measurements furnished by Lower Sevier River Water Users.

*Discharge measurements of Sevier River near Lynndyl, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Dis. charge.	Date.	Gage height.	Dis. charge.	Date.	Gage height.	Dis. charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 31.....	2.21	101	May 17.....	5.14	851	June 7.....	3.94	485
Nov. 24.....	2.55	162	19.....	5.32	892	Sept. 6.....	4.04	497
Mar. 25.....	2.05	81						

*Daily discharge, in second-feet, of Sevier River near Lynndyl, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	309	106	82	106	73	357	535	391	564	558
2.....	233	106	76	96	74	396	509	365	454	543
3.....	193	106	74	100	76	462	443	350	473	520
4.....	179	106	74	92	76	452	433	345	495	503
5.....	127	107	74	94	77	476	433	342	473	500
6.....	107	125	74	85	76	498	433	342	457	503
7.....	92	136	74	77	74	529	473	433	449	520
8.....	80	141	74	81	74	558	449	549	399	512
9.....	72	171	.....	80	74	640	465	686	333	498
10.....	197	173	.....	78	80	646	552	693	360	492
11.....	193	.....	.....	77	78	662	634	705	345	552
12.....	193	.....	.....	78	77	748	680	727	333	585
13.....	193	.....	.....	78	74	844	755	705	318	558
14.....	193	.....	.....	82	74	873	755	708	311	476
15.....	193	.....	.....	87	74	880	736	733	323	391
16.....	189	.....	.....	81	74	860	745	764	381	370
17.....	189	.....	.....	78	77	840	783	764	415	373
18.....	128	.....	.....	81	77	863	801	745	443	368
19.....	106	.....	.....	80	77	896	811	739	386	412
20.....	106	.....	.....	78	66	913	900	745	425	376
21.....	106	.....	.....	80	73	1,000	801	752	438	360
22.....	110	.....	.....	82	76	1,070	755	733	443	368
23.....	114	.....	.....	81	110	1,070	729	727	435	378
24.....	110	158	.....	80	141	1,010	703	727	495	457
25.....	100	153	.....	81	177	919	677	708	576	484
26.....	92	150	.....	80	254	906	677	702	561	391
27.....	89	153	.....	78	275	764	640	690	582	381
28.....	85	150	.....	77	280	495	465	674	492	363
29.....	84	136	.....	78	289	517	425	652	468	345
30.....	85	102	.....	77	321	532	396	656	478	275
31.....	91	.....	.....	76	.....	567	.....	591	492	.....

NOTE.—Stage-discharge relation affected by ice, discharge estimated: Dec. 9-31, 68 second-feet; Jan. 1-31, 64 second-feet; Feb. 1-28, 100 second-feet. No gage-height record, discharge estimated: Nov. 11-23, 167 second-feet; interpolated, Oct. 10-16, and June 23-24.

*Monthly discharge of Sevier River near Lynndyl, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	309	72	140	8,610
November.....	.....	.....	148	8,810
December.....	.....	.....	70	4,300
January.....	.....	.....	64	3,940
February.....	.....	.....	100	5,550
March.....	106	76	82.5	5,070
April.....	321	66	117	6,960
May.....	1,070	357	718	44,100
June.....	900	396	620	36,900
July.....	764	342	627	38,600
August.....	582	311	439	27,000
September.....	585	275	447	26,600
The year.....	1,070	.....	299	216,000

#### DELTA AND MELVILLE RESERVOIR NEAR DELTA, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 26, T. 16 S., R. 6 W., at south end of diversion dam at head of canal A, about 8 miles northeast of Delta, Millard County.

RECORDS AVAILABLE.—Irrigation seasons of 1914 to 1917.

GAGE.—Inclined staff. Zero of gage is level with bottom of head gates in canal A.

*Daily gage height of Delta and Melville reservoir near Delta, Utah, for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		3.20	6.13	2.84	6.15	2.15	16.....		3.60	4.20	3.69	6.24	5.83
2.....		3.18	6.12	3.08	6.27	2.25	17.....		3.60	4.08	4.63	6.33	5.66
3.....		3.33	6.02	3.60	6.10	2.58	18.....	4.78	3.56	3.96	4.25	6.08	5.62
4.....		3.52	5.92	4.00	6.12	2.93	19.....	4.83	3.60	4.00	4.20	5.92	5.50
5.....		3.42	5.87	4.43	6.22	3.22	20.....	4.82	3.77	4.12	4.19	5.54	5.44
6.....		3.22	5.75	4.60	6.18	3.53	21.....	4.72	4.00	4.50	4.24	5.00	5.30
7.....		3.00	5.67	4.62	6.14	3.94	22.....	4.63	4.40	4.55	4.36	4.55	5.12
8.....		2.78	5.57	4.98	6.03	4.34	23.....	4.58	4.98	4.90	4.46	3.80	5.00
9.....		2.50	5.20	5.28	5.69	4.75	24.....	4.43	5.55	5.00	4.63	3.16	4.98
10.....		2.60	5.00	5.22	5.12	5.26	25.....	4.15	5.96	5.07	4.91	2.90	5.18
11.....		2.48	4.98	5.03	5.10	5.68	26.....	3.92	6.06	5.04	5.15	2.89	5.48
12.....		2.48	4.80	4.77	5.32	6.17	27.....	3.80	6.12	5.00	5.40	2.71	5.55
13.....		2.78	4.56	4.48	5.75	6.00	28.....	3.65	5.71	4.70	5.63	2.57	5.60
14.....		3.28	4.50	4.15	6.10	6.11	29.....	3.52	5.59	3.92	5.68	2.26	5.62
15.....		3.33	4.41	3.85	6.22	6.04	30.....	3.27	5.67	3.20	5.76	2.05	5.62
							31.....		6.00		5.80	2.03	5.57

#### SEVIER RIVER NEAR DELTA, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 27, T. 16 S., R. 6 W.,  $1\frac{1}{2}$  miles below Delta spillway and  $6\frac{1}{2}$  miles northeast of Delta, Millard County.

DRAINAGE AREA.—7,380 square miles.

RECORDS AVAILABLE.—May 16 to September 24, 1912; March 1, 1913, to September 30, 1917.

GAGE.—Gurley water-stage recorder on left bank at same datum as inclined staff gage used prior to March 1, 1913.

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

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of firm clay and hardpan. Right bank may be overflowed at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.97 feet at 1 p. m. May 27 (discharge, 504 second-feet), minimum stage, 0.38 foot at 2 p. m. November 1 (discharge, 15 second-feet).

1912-1917: Maximum stage recorded, 6.82 feet May 31, 1914 (discharge, 1,470 second-feet); minimum discharge, 15 second-feet July 26, 1914, and November 1, 1916.

ICE.—Stage-discharge relation at times affected by ice.

DIVERSION.—Canal A of the Delta project takes out water  $1\frac{1}{2}$  miles above station.

REGULATION.—Flow at station controlled by regulation of Delta spillway and Sevier Bridge reservoir.

ACCURACY.—Stage-discharge relation not permanent; not affected by ice during the year. Standard rating curve well defined. Operation of water-stage recorder satisfactory except for a few breaks in record. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; shifting-control method and parallel rating curves used for several periods. Records good.

COOPERATION.—Gage-height record and discharge measurements furnished by Lower Sevier River Water Users.

*Discharge measurements of Sevier River near Delta, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 17	E. A. Porter.....	0.53	23.3	June 13	E. A. Porter.....	2.10	284
27	Porter and Works.....	.47	20.1	July 1	W. L. Lackyard.....	1.68	191
30	Porter and Thurston...	.42	16.7	15	.....do.....	2.10	284
Nov. 17	E. A. Porter.....	.77	43.5	29	.....do.....	2.37	350
Mar. 24	Porter and Thurston...	1.00	77	Aug. 12	.....do.....	1.18	113
April 15	W. L. Lackyard.....	.89	73	15	E. A. Porter.....	1.66	184
May 1	.....do.....	1.41	162	Sept. 2	W. L. Lackyard.....	1.95	258
9	Porter and Lackyard...	2.07	283	16	.....do.....	1.84	232
25	W. L. Lackyard.....	2.80	462	23	.....do.....	1.52	174
June 3	.....do.....	1.98	262	30	.....do.....	1.44	144

*Daily discharge, in second-feet, of Sevier River near Delta, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	91	18	45	41	50	152	.....	164	280	183	238	240
2.....	38	21	43	41	51	128	.....	168	283	183	262	236
3.....	30	20	43	42	52	106	.....	158	260	179	225	168
4.....	27	27	43	42	57	98	.....	187	195	141	179	162
5.....	27	34	43	43	57	99	60	229	148	191	162	158
6.....	27	42	46	45	52	91	54	227	135	249	152	147
7.....	27	54	97	45	52	85	59	267	116	249	134	143
8.....	27	54	116	44	52	79	58	269	128	253	128	135
9.....	27	57	112	43	53	78	65	283	125	267	123	125
10.....	26	57	111	43	55	79	72	280	132	278	116	125
11.....	26	49	91	.....	57	79	76	334	199	267	114	128
12.....	26	45	69	.....	52	78	79	342	264	271	114	240
13.....	26	45	42	.....	53	74	76	339	287	289	121	267
14.....	26	43	43	.....	54	76	75	339	280	278	141	253
15.....	25	43	43	.....	60	.....	74	342	308	274	210	193
16.....	25	46	41	.....	60	.....	62	342	308	280	258	242
17.....	24	46	41	.....	69	.....	49	337	310	280	310	187
18.....	23	42	42	.....	62	.....	46	349	325	274	240	193
19.....	23	43	44	.....	62	.....	46	349	318	258	171	195
20.....	23	34	47	.....	73	.....	47	349	327	269	179	195
21.....	23	27	48	.....	70	.....	43	361	320	271	183	189
22.....	22	28	49	.....	73	.....	40	424	262	269	185	187
23.....	22	40	51	.....	84	79	35	388	249	274	181	175
24.....	22	47	51	.....	104	78	86	394	220	274	183	179
25.....	21	37	54	.....	132	80	154	458	214	274	187	179
26.....	20	38	51	.....	160	79	158	482	212	278	225	148
27.....	20	40	54	.....	191	79	158	488	212	271	258	150
28.....	19	43	.....	.....	183	76	154	327	210	296	258	150
29.....	18	49	.....	.....	.....	69	156	168	168	337	251	150
30.....	17	53	.....	.....	.....	78	156	143	154	364	231	135
31.....	16	.....	.....	.....	.....	78	.....	171	.....	313	203	.....

NOTE.—Discharge estimated because of broken gage-height record. Dec. 28-31, 47 second-feet; Jan. 11-31, 45 second-feet; Mar. 15-22, 78 second-feet; Apr. 1-4, 69 second-feet.

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*Monthly discharge of Sevier River near Delta, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	91	16	26.3	1,620
November.....	57	18	40.7	2,420
December.....	116	41	56.4	3,470
January.....	-----	-----	44.3	2,720
February.....	191	-----	76.1	4,230
March.....	152	74	84.6	5,200
April.....	158	35	80.5	4,790
May.....	488	143	305	18,800
June.....	327	116	232	13,800
July.....	364	141	262	16,100
August.....	310	114	191	11,700
September.....	267	125	179	10,600
The year.....	488	-----	132	95,450

#### GUNNISON BEND RESERVOIR NEAR DELTA, UTAH.

LOCATION.—In sec. 15, T. 17 S., R. 7 W., at south corner of reservoir, at head of Deseret canal, 2 miles west of Delta, Millard County.

RECORDS AVAILABLE.—Irrigation seasons of 1914 to 1917.

GAGE.—Chain gage established June 19, 1914; readings represent depth of water on gate sill. Depths were measured directly with graduated pole prior to June 19, 1914.

*Daily gage height, in feet, of Gunnison Bend reservoir near Delta, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	12.37	9.02	-----	10.65	-----	-----	11.55	12.17	12.40	11.50	12.55	11.45
2.....	12.36	8.78	-----	-----	-----	-----	-----	11.95	12.70	11.40	12.65	11.62
3.....	12.22	-----	-----	-----	-----	-----	11.70	11.75	12.67	11.25	12.72	11.72
4.....	12.10	-----	-----	-----	-----	11.60	-----	11.50	12.65	11.08	12.72	11.70
5.....	12.00	-----	-----	-----	-----	-----	-----	-----	12.60	11.10	12.70	11.63
6.....	11.80	-----	-----	-----	14.35	-----	-----	11.20	12.42	11.10	12.68	11.68
7.....	11.80	7.90	7.90	-----	-----	-----	-----	11.00	12.20	11.20	12.58	11.65
8.....	11.75	-----	-----	10.95	-----	-----	-----	10.85	11.85	11.25	12.45	11.55
9.....	-----	-----	-----	-----	-----	-----	11.85	10.78	11.45	11.30	12.25	11.53
10.....	11.60	-----	9.00	-----	-----	-----	11.84	10.77	-----	11.20	12.10	11.45
11.....	-----	7.95	-----	-----	-----	-----	11.87	10.76	10.70	11.00	11.80	11.42
12.....	-----	7.95	9.45	-----	-----	-----	-----	10.92	-----	10.85	11.62	11.35
13.....	11.03	-----	-----	-----	-----	-----	12.05	11.01	10.42	10.90	11.52	11.60
14.....	11.25	7.65	-----	-----	11.40	-----	-----	11.18	10.47	11.10	11.40	11.80
15.....	-----	-----	9.70	11.20	-----	-----	12.12	11.30	10.50	11.20	11.25	12.00
16.....	11.20	-----	-----	-----	-----	-----	-----	11.18	10.60	11.30	11.25	12.05
17.....	-----	-----	-----	-----	-----	-----	-----	11.50	10.75	11.42	11.38	12.28
18.....	-----	7.87	-----	-----	-----	-----	12.15	11.50	10.90	11.30	11.62	12.40
19.....	11.03	-----	-----	-----	-----	-----	12.15	11.45	11.15	11.12	11.70	12.48
20.....	10.98	8.10	-----	-----	11.60	-----	12.15	-----	11.35	10.92	11.60	12.50
21.....	-----	-----	-----	-----	-----	-----	12.20	11.40	11.50	10.75	11.58	12.50
22.....	-----	-----	-----	-----	-----	-----	12.20	11.45	11.62	10.60	11.52	12.50
23.....	-----	8.00	-----	-----	-----	-----	12.20	11.61	11.70	10.58	11.32	12.50
24.....	10.50	-----	-----	11.30	-----	-----	12.10	11.73	11.78	10.63	11.10	12.50
25.....	-----	-----	-----	-----	-----	-----	12.12	11.95	11.80	10.70	10.92	12.52
26.....	10.28	7.85	10.20	-----	12.50	11.60	12.15	12.03	11.80	10.80	10.75	12.53
27.....	-----	-----	-----	-----	-----	11.57	12.15	12.32	11.75	10.98	10.71	12.50
28.....	-----	-----	-----	-----	-----	11.55	12.30	12.45	11.80	11.18	10.72	12.45
29.....	9.07	-----	-----	-----	-----	-----	12.30	12.67	11.75	11.52	10.78	12.40
30.....	9.55	-----	-----	11.35	-----	-----	12.30	12.55	11.60	12.08	11.02	12.42
31.....	-----	-----	10.60	-----	-----	11.55	-----	-----	-----	12.58	11.18	-----

## SEVIER RIVER AT OASIS, UTAH.

**LOCATION.**—In E.  $\frac{1}{4}$  sec. 33, T. 17 S., R. 7 W., three-quarters of a mile northwest of Oasis, Millard County, and  $1\frac{1}{2}$  miles below county bridge locally known as Hinckley Bridge.

**DRAINAGE AREA.**—8,080 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—April 13, 1912, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on left bank, April 24, 1914, to September 30, 1917; inspected by E. F. Sanders. Vertical staff on county bridge, in SW.  $\frac{1}{4}$  sec. 22, T. 17 S., R. 7 W., April 13, 1913, to April 23, 1914; datum of vertical staff raised 0.15 foot December 19, 1913.

**DISCHARGE MEASUREMENTS.**—Made from county bridge or by wading.

**CHANNEL AND CONTROL.**—Two channels at extremely high water, one channel at low and medium stages. Bed composed of sand with slight vegetable growth. Control is ordinarily permanent during irrigation season.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.67 feet at 4 a. m. February 27 (discharge, 314 second-feet); minimum stage, 1.49 feet April 24–29 (discharge, 11 second-feet).

1912–1917: Maximum stage recorded, 9.45 feet June 12, 1914 (discharge, 1,580 second-feet); minimum stage, 2.0 feet May 13–19, 1912 (discharge, 0.5 second-foot).

**ICE.**—Stage-discharge relation at times affected by ice.

**DIVERSIONS.**—Numerous diversions above station take practically entire flow during irrigation season; water passing gage at such times is largely seepage or return water entering below Gunnison Bend reservoir.

**REGULATION.**—Flow controlled by storage reservoirs and diversion dams above station.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory. No record secured during January. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

**COOPERATION.**—Discharge measurements furnished by engineers of Lower Sevier River Water Users.

*Discharge measurements of Sevier River at Oasis, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 20	E. A. Porter.....	1.94	30.0	June 12	E. A. Porter.....	1.65	16.0
Apr. 15	W. L. Lackyard.....	2.36	51	July 1	W. L. Lackyard.....	1.72	19.4
May 6	.....do.....	1.53	12.7	July 15	.....do.....	1.73	22.0
May 9	Porter and Lackyard...	1.55	11.9	Sept. 29	.....do.....	1.86	24.2
May 28	W. L. Lackyard.....	4.27	257	Sept. 2	.....do.....	1.75	23.6
June 3	.....do.....	2.86	94				

*Daily discharge, in second-feet, of Sevier River at Oasis, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	21	26	18	55	228	61	12	22	19	100	20
2.....	23	26	26	55	190	43	12	76	18	45	20
3.....	27	26	26	57	160	42	11	106	19	118	22
4.....	27	26	26	49	122	32	12	60	20	56	22
5.....	27	21	24	49	107	35	12	22	20	32	22
6.....	27	26	25	51	106	53	12	20	20	22	22
7.....	26	26	28	52	108	50	12	20	19	17	24
8.....	20	26	.....	54	105	47	13	18	18	16	23
9.....	26	.....	.....	55	104	48	13	18	18	16	21
10.....	26	.....	.....	59	100	51	13	18	18	16	23
11.....	25	.....	.....	57	100	51	13	18	18	16	23
12.....	25	.....	32	55	97	40	13	16	20	16	22
13.....	25	.....	32	56	96	41	14	17	20	16	24
14.....	30	.....	.....	57	94	47	15	18	20	16	22
15.....	20	.....	.....	58	94	52	16	18	20	17	22
16.....	23	.....	.....	59	93	50	15	18	22	18	21
17.....	29	.....	30	60	96	49	14	17	24	18	24
18.....	29	24	31	60	92	47	14	18	22	19	34
19.....	28	20	30	62	92	30	14	20	21	19	42
20.....	28	25	31	63	92	30	15	22	21	20	47
21.....	29	26	32	63	92	30	14	20	21	20	52
22.....	25	27	32	66	94	21	15	20	21	21	53
23.....	29	26	33	69	91	14	15	20	22	20	55
24.....	30	27	37	70	91	11	15	21	24	20	55
25.....	30	27	35	74	92	11	14	21	21	20	55
26.....	29	27	.....	90	86	11	117	20	22	20	54
27.....	28	27	.....	304	90	11	248	19	19	20	52
28.....	28	26	.....	262	84	11	162	19	20	19	40
29.....	20	26	.....	.....	78	11	54	20	21	19	40
30.....	19	17	.....	.....	81	12	33	19	23	20	40
31.....	26	.....	.....	.....	77	.....	25	.....	67	20	.....

NOTE.—No record for January. Discharge estimated because of no gage heights; Nov. 9-17, 25 second-feet; Dec. 8-11, 30 second-feet; Dec. 14-16, 31 second-feet; Dec. 26-31, 35 second-feet; Feb. 1-2, 55 second-feet.

*Monthly discharge of Sevier River at Oasis, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	30	19	26.0	1,600
November.....	27	17	25.1	1,490
December.....	37	18	30.7	1,890
February.....	304	49	75.8	4,210
March.....	228	77	104	6,400
April.....	61	11	34.7	2,060
May.....	248	11	31.5	1,940
June.....	106	16	25.4	1,510
July.....	67	18	21.9	1,350
August.....	118	16	26.8	1,650
September.....	55	20	33.2	1,980

#### HATCH BENCH CANAL NEAR HATCH, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 1, T. 37 S., R. 6 W., half a mile below head of canal and  $3\frac{1}{2}$  miles southwest of Hatch, Garfield County, on road to sawmill.

RECORDS AVAILABLE.—May 15, 1914, to September 30, 1917; irrigation seasons only. Discharge measurements only in 1915.

GAGE.—Stevens water-stage recorder August 7 to September 30, 1917. Original gage was vertical staff nailed to side of wooden flume just below waste gate. Water-stage recorder installed at same location and datum.



**DISCHARGE MEASUREMENTS.**—Made by wading about 100 feet below gage.

**CHANNEL AND CONTROL.**—Channel is rectangular flume section, 4 feet wide at gage.

Permanent control is afforded by free fall at lower end of flume.

**DIVERSIONS.**—None; this is the only important diversion from Mammoth Creek above the gaging station, except the one at Panguitch Lake.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent for period of record. Rating curve well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

Canal diverts water from Mammoth Creek, probably in sec. 3, T. 37 S., R. 6 W. The water is used for irrigation around Hatch.

*Discharge measurements of Hatch Bench canal near Hatch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
June 14.	C. C. Jacob.....	1.06	21.4	Aug. 23.	J. J. Sanford.....	0.86	9.9
July 18.	W. B. Maughan.....	1.32	21.7	Sept. 14.	.....do.....	0.50	3.6

*Daily discharge, in second-feet, of Hatch Bench canal near Hatch, Utah, for the year ending Sept. 30, 1917.*

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

*Monthly discharge of Hatch Bench canal near Hatch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet	Run-off in acre feet.
August 7-31.....	12.8	630
September.....	4.6	280
The period.....		910

#### STATE CANAL NEAR PANGUITCH, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 2, T. 35 S., R. 5 W., three-quarters of a mile below head of canal and  $3\frac{1}{2}$  miles southeast of Panguitch, Garfield County.

**RECORDS AVAILABLE.**—May 3, 1913, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens continuous water-stage recorder on right bank at upper end of flume.

Gage used May 3 to September 30, 1913, was a vertical staff nailed to right side of flume 15 feet from north or lower end. Zero of gage is grade of flume.

DISCHARGE MEASUREMENTS.—Made from plank across flume or by wading.

CHANNEL AND CONTROL.—Wooden flume section; canal bed above and below flume composed of clean gravel; grade of flume about 0.4 foot below that of canal. Concrete cut-off wall at head of flume serves as control.

DIVERSIONS.—None above station.

REGULATION.—Flow controlled by head gates above.

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

Records indicate amount of water diverted from Sevier River for the Hatchtown project of the Utah State Land Board. Canal diverts water from Sevier River in sec. 14, T. 35 S., R. 5 W. The water is used for irrigation around Panguitch.

*Discharge measurements of State canal near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
June 14..	C. C. Jacob.....	<i>Feet.</i> 0.98	<i>Sec.-ft.</i> 40.9	Aug. 23	J. J. Sanford.....	<i>Feet.</i> 0.83	<i>Sec.-ft.</i> 36.6
July 18..	W. B. Maughan.....	1.66	80	31	.....do.....	0.68	26.7
Aug. 7..	.....do.....	1.16	58	Sept. 14.	.....do.....	0.68	27.9

*Daily discharge, in second-feet, of State canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	44	.....	18	65	40	27	16.....	.....	.....	45	62	34	28
2.....	50	.....	18	68	39	26	17.....	.....	9	42	66	31	29
3.....	48	.....	18	76	37	26	18.....	.....	9	39	74	31	31
4.....	26	.....	18	77	36	26	19.....	.....	7	36	86	31	32
5.....	22	.....	18	77	36	26	20.....	.....	6	49	89	34	32
6.....	38	.....	20	78	36	26	21.....	.....	5	51	80	34	32
7.....	44	.....	18	73	44	26	22.....	.....	6	52	77	34	32
8.....	8	.....	18	74	48	26	23.....	.....	5	57	75	34	32
9.....	7	.....	23	67	38	26	24.....	.....	10	57	72	31	31
10.....	6	.....	31	70	43	27	25.....	.....	9	55	61	32	30
11.....	6	.....	34	70	30	29	26.....	.....	7	55	50	32	30
12.....	.....	.....	36	70	26	27	27.....	.....	14	62	48	32	30
13.....	.....	.....	32	70	48	27	28.....	.....	13	66	53	30	30
14.....	.....	.....	39	74	44	27	29.....	.....	18	68	46	29	30
15.....	.....	.....	44	68	36	28	30.....	.....	18	68	40	27	32
							31.....	.....	18	.....	40	27	.....

*Monthly discharge of State canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet	Run-off in acre-feet.	Month.	Mean discharge in second-feet	Run-off in acre-feet.
October 1-11.....	27.2	590	July.....	67.6	4,160
May 17-31.....	10.3	300	August.....	35.0	2,150
June.....	39.6	2,350	September.....	28.7	1,710

## LONG CANAL NEAR PANGUITCH, UTAH.

**LOCATION.**—In W.  $\frac{1}{2}$  sec. 2, T. 35 S., R. 5 W.,  $1\frac{1}{4}$  miles below head of canal and  $3\frac{1}{4}$  miles southeast of Panguitch, Garfield County, on road to Hillsdale.

**RECORDS AVAILABLE.**—May 8, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-gage recorder with outside and inside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Earth and gravel section. A permanent control is afforded by a wooden flume and diversion box just below gage.

**DIVERSIONS.**—East Bench canal diverts water a few feet below gage.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined. Operation of water-gage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspection of recorder graph. Records excellent.

Canal diverts water from Sevier River in sec. 11, T. 35 S., R. 5 W. The water is used for irrigation around Panguitch.

*Discharge measurements of Long canal near Panguitch, Utah, during year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	Sec.-ft.			Feet.	Sec.-ft.
June 14	C. C. Jacob.....	1.60	77	Aug. 23	J. J. Sanford.....	1.40	65
July 18	W. B. Maughan.....	1.62	83	Sept. 14	.....do.....	.90	25.3

*Daily discharge, in second-feet, of Long canal near Panguitch, Utah, for year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	22		24	87		58	16.....			6	53	61	26
2.....	29		24	82		57	17.....			8	82	61	26
3.....	30		26	76		58	18.....		1	23	83	60	26
4.....	26		31	83		57	19.....		8	81	86	60	26
5.....	24		43	89		56	20.....		6	82	28	64	26
6.....	35		50	86		55	21.....		8	80	67	65	26
7.....	24		37	89		54	22.....		18	76	83	64	27
8.....	9		40	86		52	23.....		16	73	78	64	27
9.....	8		53	85		51	24.....		16	87	81	57	26
10.....	4		62	88	14	53	25.....		21	89	84	58	25
11.....			64	89	68	62	26.....		16	84	98	58	25
12.....			67	87	50	66	27.....		13	86	82	58	24
13.....			70	86	57	64	28.....		14	89	81	58	24
14.....			80	83	68	29	29.....		24	88	38	58	24
15.....			42	55	64	26	30.....		42	82	38	58	24
							31.....		36		32	58	

*Monthly discharge of Long canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-9.....	19.3	420	July.....	75.6	4,650
May 18-31.....	17.0	470	August.....	41.4	2,550
June.....	58.2	3,460	September.....	39.3	2,340

## EAST PANGUITCH CANAL NEAR PANGUITCH, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 34, T. 34 S., R. 5 W., 200 yards below head of canal and  $1\frac{1}{2}$  miles southeast of Panguitch, Garfield County.

**RECORDS AVAILABLE.**—May 9, 1914, to September 14, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on right bank, with inside and outside gages.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—Earth section. Concrete weir 15 feet below gage serves as control.

**DIVERSIONS.**—None above gage.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder unsatisfactory because of frequent stopping of clock.

Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; discharge not determined for days when recorder was not in operation. Records fair.

Canal diverts water from Sevier River in sec. 34, T. 34 S., R. 5 W. The water is used for irrigation around Panguitch.

*Discharge measurements of East Panguitch canal near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
July 18	W. B. Maughan.....	1.09	46.9	Aug. 31	J. J. Sanford.....	1.01	32.3
Aug. 23	Sanford and Jacob.....	0.78	23.7	Sept. 14	.....do.....	1.18	43.1

*Daily discharge, in second-feet, of East Panguitch canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	10		11			30	16.....					25	
2.....	9		12			28	17.....				46	24	
3.....	8		13	66		27	18.....		10		35	23	
4.....	6		14			26	19.....		10	54	32	21	
5.....	6		15			24	20.....		9			21	
6.....	7		16			25	21.....		9			22	
7.....	4		15		21	26	22.....		10			24	
8.....	4		17		30	27	23.....		10			26	
9.....	4		20		35	28	24.....		10			31	
10.....	4		21	60	8	33	25.....		10		26	33	
11.....	3		22		8	47	26.....		10			31	
12.....			30		8	41	27.....		9	60		32	
13.....			39		8	38	28.....		9			34	
14.....			48		14	31	29.....		9			52	
15.....					28		30.....		10			35	
							31.....		10		7	33	

NOTE.—No flow Oct. 12 to May 18, nor after Sept. 14.

*Monthly discharge of East Panguitch canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-11.....	6.1	130	August.....	<sup>a</sup> 23	1,410
May 18-31.....	9.6	270	September 1-14.....	31	850
June.....	<sup>a</sup> 40	2,360	The period.....		7,650
July.....	<sup>a</sup> 43	2,630			

<sup>a</sup> Estimated.

#### PANGUITCH CREEK ABOVE CANALS, NEAR PANGUITCH, UTAH.

**LOCATION.**--In SW.  $\frac{1}{4}$  sec. 36, T. 34 S., R. 6 W., above all diversions and 3 miles southwest of Panguitch, Garfield County.

**DRAINAGE AREA.**--Not measured.

**RECORDS AVAILABLE.**--October 20, 1915, to September 30, 1917.

**GAGE.**--Stevens continuous water-stage recorder on right bank with inside and outside staff gages; observer, Omer Reid.

**DISCHARGE MEASUREMENTS.**--Made by wading near gage or from pole bridge 400 feet below gage.

**CHANNEL AND CONTROL.**--One channel at all stages. Control fairly permanent, except during high stages.

**EXTREMES OF DISCHARGE.**--Maximum stage during year from water-stage recorder, 3.75 feet at 10 a. m. June 17 (discharge estimated by extending rating curve, 300 second-feet); minimum stage recorded, 0.60 foot at 9 a. m. March 13 (discharge, 2.5 second-feet).

1916-1917: Maximum and minimum flow occurred in 1917.

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

**DIVERSIONS.**--Above all diversions.

**REGULATION.**--Flow regulated by storage in Panguitch Lake.

**ACCURACY.**--Stage-discharge relation not permanent; affected by ice during winter.

Two fairly well defined rating curves used with shifts to parallel curves. Frequent discharge measurements determine changes fairly well. Operation of water-stage recorder satisfactory March to July; unsatisfactory for remainder of year because of frequent stopping of clock. Daily discharge ascertained by applying to rating table, either directly or by shifting-control method, the mean daily gage height determined by inspecting recorder graph; discharge interpolated for days when recorder was not in operation. Records fair.

*Discharge measurements of Panguitch Creek above canals, near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by--	Gage height.	Discharge.	Date.	Made by--	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	1.04	23.0	June 13	C. C. Jacob.....	2.45	123
Jan. 11	.....do.....	1.50	9.9	July 18	W. B. Maughan.....	1.98	128
Mar. 9	L. W. Jordan.....	.88	11.3	Aug. 22	J. J. Sanford.....	1.36	49.1
Apr. 7	J. J. Sanford.....	1.54	49.5	31	.....do.....	1.57	64
May 2	.....do.....	1.36	41.7	Sept. 14	.....do.....	1.02	28.8
17	.....do.....	2.42	130				

*Daily discharge, in second-feet, of Panguitch Creek above canals, near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	39	17	-----	16	43	134	128	89	61
2.	25	18	-----	16	40	136	128	90	61
3.	24	18	-----	25	54	136	128	88	62
4.	30	18	-----	32	60	134	128	86	63
5.	38	18	-----	40	43	136	132	84	64
6.	46	18	-----	45	46	133	136	81	65
7.	40	18	-----	52	50	130	133	84	66
8.	33	17	-----	66	43	128	128	81	67
9.	27	16	11	48	44	132	128	79	68
10.	21	16	11	43	51	131	128	82	61
11.	21	16	11	47	57	128	126	84	47
12.	22	10	53	64	127	127	127	86	40
13.	20	-----	10	56	76	128	130	86	35
14.	20	-----	11	52	93	131	127	84	29
15.	20	-----	10	40	100	132	126	82	30
16.	19	-----	12	32	93	132	125	80	28
17.	19	-----	14	26	114	235	128	76	28
18.	19	-----	14	26	136	193	128	74	28
19.	18	-----	20	24	136	155	126	72	29
20.	18	-----	25	24	137	136	126	58	29
21.	18	-----	30	36	135	124	121	51	30
22.	18	-----	22	66	128	112	115	51	30
23.	17	-----	19	89	128	101	118	50	30
24.	16	-----	25	96	123	102	117	50	30
25.	16	-----	32	78	118	110	115	55	30
26.	16	-----	18	55	109	121	112	61	31
27.	16	-----	29	43	109	133	109	61	31
28.	15	-----	50	41	112	132	106	62	32
29.	16	-----	64	38	107	125	103	62	32
30.	16	-----	32	39	123	124	99	63	32
31.	17	-----	20	-----	139	-----	94	61	-----

NOTE.—Discharge estimated because of ice: Nov. 12-30, 16 second-feet; Dec. 1-31, 13 second-feet; Jan. 1 to Mar. 8, 10 second-feet.

*Monthly discharge of Panguitch Creek above canals, near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	46	15	22.6	1,390
November.....	18	-----	16.5	982
December.....	-----	-----	a13.0	799
January.....	-----	-----	a10.0	615
February.....	-----	-----	a10.0	555
March.....	64	-----	18.7	1,150
April.....	96	16	44.8	2,670
May.....	139	43	90.7	5,580
June.....	235	101	134	7,970
July.....	136	94	122	7,500
August.....	90	50	72.6	4,460
September.....	68	28	42.3	2,520
The year.....	235	-----	49.9	36,200

a Estimated.

#### PANGUITCH CREEK BELOW CANALS, AT PANGUITCH, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 20, T. 34 S., R. 5 W., by fair-grounds fence at Panguitch, Garfield County, directly east of first house north of bridge at edge of town on road to Circleville.

RECORDS AVAILABLE.—May and June, 1915; May to September, 1917.

**GAGE.**—Vertical staff nailed to fair-grounds fence post about 200 feet below bridge on road to Circleville.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand; shifting.

**DIVERSIONS.**—Below all diversions.

**REGULATION.**—Flow regulated by operation of Panguitch Lake reservoir and irrigation diversions.

**ACCURACY.**—Stage-discharge relation changes frequently. Rating curves poorly defined. Staff gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records fair.

*Discharge measurements of Panguitch Creek below canals, at Panguitch, Utah, during years ending Sept. 30, 1915 and 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
1915.		<i>Feet.</i>	<i>Sec.-ft.</i>	1917.		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 16	J. J. Sanford.....	1.40	16.1	May 2	J. J. Sanford.....	1.14	36.8
May 3	.....do.....	1.01	25.6	17	.....do.....	1.36	103
19	.....do.....	.75	3.0	June 16	.....do.....	.34	.0
29	.....do.....	1.10	30.0	Aug. 22 <sup>a</sup>	Sanford and Jacob.....	.32	1.5
				31	J. J. Sanford.....	.42	3.0
				Sept. 13	.....do.....	.46	4.0

<sup>a</sup> Gage datum lowered 0.50 foot.  
Estimated.

*Daily discharge, in second-feet, of Panguitch Creek below canals, at Panguitch, Utah, for the years ending Sept. 30, 1915 and 1917.*

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1915.			1915.			1915.		
1.....		32	11.....	30	21.....	25		
2.....		16	12.....	30	22.....	56		
3.....		20	13.....	38	23.....	59		
4.....		25	14.....	30	24.....	62		
5.....		29	15.....	25	25.....	66		
6.....		20	16.....	23	26.....	74		
7.....		15	17.....	20	27.....	66		
8.....		8	18.....	18	28.....	54		
9.....	38	3	19.....	5	29.....	52		
10.....	40		20.....	2	30.....	48		
					31.....	44		

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1917.						1917.					
1.....		44		1	0	16.....				2	3
2.....		46			5	17.....	114			10	3
3.....		52			4	18.....	106			5	3
4.....		56			6	19.....	98			4	3
5.....		50			3	20.....	100			3	3
6.....		46			4	21.....	75			2	3
7.....		40			4	22.....	56		1	2	3
8.....	37	36			3	23.....	56		1	2	3
9.....		42			3	24.....	61		2	2	3
10.....		36			3	25.....	50		2	2	3
11.....		26			1	26.....	48		6	2	3
12.....		20		1	2	27.....	52		19	3	3
13.....		46		1	2	28.....	18		10	3	3
14.....		10		1	4	29.....	13		4	3	3
15.....				2	4	30.....	20		3	3	3
						31.....	30		1	3	

**NOTE.**—1915: Gage not read May 1-8; discharge estimated 30 second-feet. No flow after June 9.  
1917: Gage not read May 1-16 and Aug. 19-30. No flow June 15 to July 21 and Aug. 2-11.

*Monthly discharge of Panguitch Creek below canals, at Panguitch, Utah, for the years ending Sept. 30, 1915 and 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
1915.			1917.		
May.....	36.9	2,270	June.....	18.3	1,090
June.....	5.6	330	July.....	1.6	100
			August.....	1.8	110
1917.			September.....	3.1	180
May.....	<sup>a</sup> 52.2	3,220			

<sup>a</sup> Estimated.

#### BARTON AND LE FEVRE CANAL NEAR PANGUITCH, UTAH.

**LOCATION.**—In sec. 9, T. 34 S., R. 5 W., 400 feet below head of canal, just below mouth of Threemile Creek, and  $3\frac{1}{2}$  miles north of Panguitch, Garfield County.

**RECORDS AVAILABLE.**—May 16, 1915, to September 30, 1917; irrigation seasons only; miscellaneous measurements during 1914.

**GAGE.**—Vertical staff on left bank; read by Zera Church.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—Dirt section; shifting control.

**ACCURACY.**—Stage-discharge relation changes frequently due to silting and scouring of canal bed. Rating curves poorly defined. Staff gage read to hundredths once daily. Records only fair.

This canal diverts from Sevier River on left side, in sec. 9, T. 34 S., R. 5 W. Water used for irrigation in valley below.

*Discharge measurements of Barton and Le Fevre canal near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
June 13	Jacob and Jones.....	0.60	2.1	Aug. 22	Sanford and Jacob.....	.40	1.4
July 19	Maughan and Jones.....	.58	2.5	Sept. 13	J. J. Sanford.....	.42	1.0
Aug. 6	W. B. Maughan.....	1.08	8.9				

*Daily discharge, in second-feet, of Barton and Le Fevre canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1.....		9	9.5	1	16.....	7.5	7.5	4	0.5
2.....		9	9.5	1	17.....		5	3	.5
3.....		9	9.5	1	18.....	5	5	2	.5
4.....		9	9.5	1	19.....	4	5	3	.5
5.....		9	9.5	1	20.....	4	5	2	.5
6.....		9.5	9	1	21.....	4	5	2	.5
7.....		9.5	9	1	22.....	4	6.5	2	.5
8.....		7.5	9	.5	23.....	4	7	1.5	.5
9.....		6.5	9	.5	24.....	4	9	1.5	.5
10.....	7.5	6.5	7.5	.5	25.....	4	9.5	1.5	.5
11.....	4	9.5	7.5	.5	26.....	5	9.5	1	.5
12.....	4	9.5	5	.5	27.....	5	9.5	1	.5
13.....	4	9.5	4	.5	28.....	5	9.5	1	.5
14.....	7.5	7.5	4	.5	29.....	5	9.5	1	.5
15.....	8	9.5	4	.5	30.....	5	9.5	1	.5
					31.....		9.5	1	

NOTE.—Discharge estimated June 1-9, 7.5 second-feet.



*Monthly discharge of Barton and Le Fevre canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
June.....	5.8	350	September.....	0.6	35
July.....	8.1	500	The period.....		1,175
August.....	4.6	290			

#### McEWEN CANAL NEAR PANGUITCH, UTAH.

**LOCATION.**—Near line between secs. 4 and 9, T. 34 S., R. 5 W., 100 feet below head of canal, just below mouth of Threemile Creek, and  $3\frac{1}{2}$  miles north of Panguitch, Garfield County.

**RECORDS AVAILABLE.**—May 9, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder, with outside and inside staff gages, May 9 to May 25, 1914, when it was washed out by flood from Hatchtown reservoir; temporary vertical staff on left bank, 100 feet from head of canal, was installed July 2, 1914; replaced by Stevens water-stage recorder at original site May 19, 1915. Datum lowered 1 foot.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of clay; fairly permanent.

**DIVERSIONS.**—None above gage.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation not permanent. Rating curves poorly defined. Operation of water-stage recorder unsatisfactory at times. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except as noted in footnote to table of daily discharge. Records fair.

Canal diverts water from Sevier River, in NW  $\frac{1}{4}$  sec. 9, T. 34 S., R. 5 W. Water is used for irrigation below Panguitch, on ranch of A. A. Church.

*Discharge measurements of McEwen canal near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	1.70	21.4	Aug. 22	Sanford and Jacob.....	1.35	20.1
May 16	do.....	2.14	34.6	Aug. 31	J. J. Sanford.....	1.37	22.4
July 19	W. B. Maughan.....	1.30	16.5	Sept. 13	do.....	1.30	19.8
Aug. 6	do.....	1.68	32.3				

*Daily discharge, in second-feet, of McEwen canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....		26	26	32	22	16.....	35	38	15	13	18
2.....		24	29	32	22	17.....	35	36	15	13	18
3.....		24	28	32	22	18.....	38	34	15	15	17
4.....		24	27	32	20	19.....	38	32	16	23	17
5.....		24	24	32	20	20.....	38	30	29	22	17
6.....		24	24	32	20	21.....	36	29	25	22	17
7.....		24	26	31	18	22.....	35	28	20	21	17
8.....		24	26	28	18	23.....	32	27	24	22	17
9.....		22	20	29	18	24.....	32	32	21	22	16
10.....		22	15	22	19	25.....	29	32	18	22	16
11.....		23	15	14	20	26.....	28	30	6	22	16
12.....		23	15	13	20	27.....	27	27	6	22	16
13.....		32	15	13	18	28.....	27	26	7	22	16
14.....		40	15	13	18	29.....	27	25	6	22	15
15.....		39	15	13	19	30.....	26	24	6	22	16
						31.....	26		6	22	

NOTE.—No gage-height record, discharge interpolated, June 2-8, 15, 17-22, 28-29, July 11-18; estimated July 30 to Aug. 4.

*Monthly discharge of McEwen canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
May 16-31.....	31.8	1,010	September.....	18.1	1,080
June.....	28.2	1,680			
July.....	17.9	1,100	The year.....		6,250
August.....	22.4	1,380			

#### OLD HOUSTON CANAL NEAR PANGUITCH, UTAH.

LOCATION.—In SW.  $\frac{1}{4}$  sec. 4, T. 34 S., R. 5 W., at Church ranch, half a mile below mouth of Threemile Creek and  $3\frac{1}{2}$  miles southeast of Panguitch, Garfield County.

RECORDS AVAILABLE.—June 1, 1915, to September 30, 1917; irrigation seasons only; some miscellaneous measurements during 1914.

GAGE.—Vertical staff; read by Zera Church.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Shifting gravel and clay.

ACCURACY.—Stage-discharge relation not permanent. Rating curve poorly defined. Gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records only fair because discharge measurements were not sufficient to define rating curve.

Canal diverts water from Sevier River for irrigation.

*Discharge measurements of Old Houston canal near Panguitch, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
June 13	C. C. Jacob.....	Feet.	Sec.-ft.
July 19	W. B. Maughan.....	1.74	7.8
Aug. 6	do.....	(a)	1.6
		2.14	15.3

<sup>a</sup> Gage not read.

*Daily discharge, in second-feet, of Old Houston canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Day.	May.	June.	July.	Aug.	Day.	May.	June.	July.	Aug.
1.....		9	8	15.5	16.....		14	1	
2.....		10	7	14.5	17.....		9	0	
3.....		12.5	7	12.5	18.....		5.5	0	
4.....		11	6.5	12.5	19.....		3	1.5	
5.....		11	5	14.5	20.....		0	0	
6.....		8	4	14.5	21.....		0	0	
7.....		8	4	14.5	22.....		0	0	
8.....		7.5	0	14.5	23.....		0	0	
9.....		7	0	14.5	24.....		0	0	
10.....		11	0	12.5	25.....		0	4	
11.....		14.5	0	12.5	26.....		0	4	
12.....		14.5	4		27.....		1	12.5	
13.....		14.5	2.5		28.....		3	14.5	
14.....		12.5	2		29.....	12.5	3	16.5	
15.....		14	2		30.....	12	11.5	16.5	
					31.....	11		16	

NOTE.—No flow after Aug. 11.

*Monthly discharge of Old Houston canal near Panguitch, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
May 29-31.....	11.6	70	August 1-11.....	13.9	305
June.....	7.1	425			
July.....	4.5	275	The period.....		1,075

#### FOX CANAL NEAR CIRCLEVILLE, UTAH.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 3, T. 31 S., R. 4 W., 300 feet below head of canal and  $3\frac{1}{2}$  miles southwest of Fullmer store in Circleville, Piute County.

**RECORDS AVAILABLE.**—May 14, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on left bank, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Earth section. Wooden flume with removable crest board just below gage forms control.

**DIVERSIONS.**—None from canal above gage.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation remained unchanged until the middle of August when accumulation of sand at control caused slight change. Rating curve for period prior to August 16, well defined; after that date parallel curves and shifting-control method were used. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records excellent.

Canal diverts water from right bank of Sevier River, in sec. 3, T. 31 S., R. 4 W. Water is used for irrigation around Circleville.

*Discharge measurements of Fox canal near Circleville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	0.76	11.4	July 6	W. B. Maughan.....	1.09	22.6
26	do.....	.26	3.8	19	do.....	.70	9.1
Apr. 25	do.....	.70	9.7	Aug. 10	do.....	1.32	31.2
30	do.....	.38	4.0	17	J. J. Sanford.....	1.08	20.1
May 3	do.....	.38	4.0	29	do.....	.97	16.2
10	do.....	1.08	21.6	Sept. 13	do.....	1.36	31.0
15	do.....	1.28	31.2	22	do.....	1.56	35.0
June 15	C. C. Jacob.....	2.00	59				

*Daily discharge, in second-feet, of Fox canal near Circleville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	20	.....	5	15	28	10	14
2.....	23	.....	4	13	26	10	14
3.....	27	.....	4	12	24	10	14
4.....	25	.....	8	16	24	16	15
5.....	20	.....	24	30	23	23	17
6.....	28	.....	23	42	24	23	18
7.....	20	.....	24	43	29	22	18
8.....	11	.....	24	47	32	18	18
9.....	11	.....	24	48	25	20	18
10.....	11	.....	23	51	20	30	20
11.....	10	.....	23	42	16	27	31
12.....	10	.....	24	22	12	28	30
13.....	9	.....	25	12	10	28	29
14.....	8	.....	28	52	8	25	30
15.....	8	.....	28	59	10	21	32
16.....	8	.....	26	57	18	19	33
17.....	8	.....	16	57	14	22	33
18.....	8	.....	17	59	12	23	35
19.....	8	.....	18	54	10	20	35
20.....	8	.....	12	51	13	17	34
21.....	7	.....	15	48	15	14	34
22.....	7	.....	44	48	13	12	34
23.....	5	.....	44	45	14	11	37
24.....	4	.....	43	38	14	11	36
25.....	4	10	42	37	14	11	35
26.....	4	8	41	44	18	12	38
27.....	.....	7	40	56	18	16	36
28.....	.....	6	39	45	20	15	37
29.....	.....	5	40	33	26	16	35
30.....	.....	4	39	28	26	17	35
31.....	.....	.....	29	.....	10	16	.....

*Monthly discharge of Fox canal near Circleville, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-26.....	12.0	620	July.....	18.2	1,120
April 25-30.....	6.7	80	August.....	18.2	1,120
May.....	25.7	1,580	September.....	28.2	1,680
June.....	40.1	2,390			

## CIRCLEVILLE CANAL NEAR CIRCLEVILLE, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 3, T. 31 S., R. 4 W., three-quarters of a mile below head of canal and 3 miles southwest of Fullmer store in Circleville, Piute County.

**RECORDS AVAILABLE.**—May 14, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder, with inside and outside vertical staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Earth section. Wooden weir 3 feet below gage serves as control.

**DIVERSIONS.**—Above all diversions from the canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent during 1917. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

Canal diverts water from left bank of Sevier River in sec. 3, T. 31 S., R. 4 W., a short distance below head of Fox canal. Water is used for irrigation around Circleville.

*Discharge measurements of Circleville canal near Circleville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	0.82	36.2	July 6	Maughan and Jacob....	2.02	41.9
Apr. 25	.....do.....	.95	41.7	July 19	Maughan and Jones....	1.84	36.3
May 10	.....do.....	.38	8.6	Aug. 17	J. J. Sanford.....	1.90	39.5
16	.....do.....	1.76	36.1	29	.....do.....	1.19	12.6
June 15	Jacob and Jones.....	2.10	41.8	Sept. 13	.....do.....	1.72	28.8

*Daily discharge, in second-feet, of Circleville canal near Circleville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	41	.....	37	39	32	24	16.....	32	32	49	46	30	33
2.....	40	.....	33	39	38	24	17.....	32	33	52	40	39	34
3.....	40	.....	35	42	36	24	18.....	30	32	55	38	32	34
4.....	39	.....	32	42	38	25	19.....	30	33	55	36	26	34
5.....	38	6	32	41	36	25	20.....	29	26	56	37	27	33
6.....	38	11	34	41	34	26	21.....	27	20	54	37	27	33
7.....	37	11	42	45	32	27	22.....	27	21	44	34	28	33
8.....	36	11	48	46	30	28	23.....	26	25	44	36	28	34
9.....	36	11	40	43	26	28	24.....	25	29	45	37	30	34
10.....	35	22	38	40	36	28	25.....	24	35	48	38	30	28
11.....	35	29	48	37	34	30	26.....	24	31	52	44	31	28
12.....	34	30	44	34	34	30	27.....	.....	31	50	43	36	27
13.....	33	26	46	30	36	31	28.....	.....	36	45	44	25	20
14.....	43	21	50	25	33	32	29.....	.....	37	36	34	14	17
15.....	32	32	48	28	29	32	30.....	.....	35	34	28	14	14
							31.....	.....	33	.....	23	20	.....

NOTE.—Discharge interpolated Oct. 2-9.

*Monthly discharge of Circleville canal near Circleville, Utah, for the year ending Sept 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-26.....	32.8	1,690	July.....	37.6	2,310
May 5-31.....	22.5	1,390	August.....	30.4	1,870
June.....	44.2	2,630	September.....	28.3	1,690

## OLD KINGSTON CANAL NEAR CIRCLEVILLE, UTAH.

LOCATION.—In SW.  $\frac{1}{4}$  sec. 35, T. 30 S., R. 4 W., 200 yards below head of canal and 2 miles southwest of Fullmer store in Circleville, Piute County.

RECORDS AVAILABLE.—May 14, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on left bank with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 50 feet above gage.

CHANNEL AND CONTROL.—Earth section. Crest of wooden weir just below gage serves as control.

DIVERSIONS.—Above all diversions.

REGULATION.—Flow controlled by head gates.

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

Canal diverts water from right bank of Sevier River in SW.  $\frac{1}{4}$  sec. 35, T. 30 S., R. 4 W. Water is used for irrigation around Circleville.

*Discharge measurements of Old Kingston canal near Circleville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	0.54	9.2	Aug. 9	W. B. Maughan.....	1.30	47.2
Apr. 25	.....do.....	1.12	39.2	17	J. J. Sanford.....	1.05	30.6
May 16	.....do.....	1.22	44.9	29	.....do.....	1.03	30.9
June 15	C. C. Jacob.....	1.68	71.6	Sept. 13	.....do.....	1.25	48.7
July 6	Maughan and Jacob....	.94	28.3				

*Daily discharge, in second-feet, of Old Kingston canal near Circleville, Utah, for the year ending September 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	38	.....	33	53	45	33	30
2.....	40	.....	34	50	42	31	30
3.....	43	.....	34	48	39	30	20
4.....	39	.....	34	49	36	34	7
5.....	26	.....	34	47	33	41	4
6.....	32	.....	32	48	31	42	4
7.....	51	.....	30	49	35	40	7
8.....	34	.....	32	50	35	31	7
9.....	21	.....	32	58	32	51	7
10.....	10	.....	31	67	29	75	25
11.....	9	.....	31	72	28	60	46
12.....	8	.....	32	52	26	39	48
13.....	8	.....	34	81	24	38	45
14.....	8	.....	38	74	25	37	46
15.....	8	.....	44	84	30	31	50
16.....	8	.....	47	94	43	34	52
17.....	8	.....	50	91	35	34	52
18.....	7	4	50	96	30	35	52
19.....	6	16	49	84	24	35	52
20.....	6	35	41	64	23	34	51
21.....	6	34	34	19	32	32	52
22.....	6	35	29	19	28	30	52
23.....	6	39	30	48	34	28	54
24.....	6	35	28	67	33	28	54
25.....	6	37	.....	62	28	28	53
26.....	6	39	.....	62	41	29	51
27.....	.....	43	.....	59	45	30	30
28.....	.....	40	.....	53	57	30	12
29.....	.....	36	.....	47	80	32	8
30.....	.....	32	.....	48	75	32	11
31.....	.....	.....	55	.....	36	32	.....

NOTE.—Discharge estimated May 25-30, 42 second-feet.

*Monthly discharge of Old Kingston canal near Circleville, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-26.....	17.2	885	July.....	36.6	2,250
Apr. 18-30.....	14.1	840	August.....	36.0	2,210
May.....	37.8	2,320	September.....	33.7	2,010
June.....	59.8	3,590			

**DALTON CANAL AT CIRCLEVILLE, UTAH.**

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 25, T. 30 S., R. 4 W., 800 feet below canal heading and a quarter of a mile southeast of Fullmer store in Circleville, Piute County.

**RECORDS AVAILABLE.**—July 1, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Vertical staff on right bank 100 feet below spillway; read by J. P. Meeks.

**DISCHARGE MEASUREMENTS.**—Made by wading or from pole bridge.

**CHANNEL AND CONTROL.**—Earth section. Row of stakes driven into canal bed just below gage serves as control at low stages.

**DIVERSIONS.**—None above gage.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation changed frequently. Rating curves fairly well defined. Staff gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

Canal diverts water from left bank of Sevier River in sec. 35, T. 30, S., R. 4 W. Water is used for irrigation in and below Circleville.

*Discharge measurements of Dalton canal at Circleville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10	J. J. Sanford.....	3.95	1.1	Aug. 10	W. B. Maughan.....	4.99	28.7
Apr. 30	do.....	3.90	3.7	17	J. J. Sanford.....	3.84	7.0
June 15	C. C. Jacob.....	4.74	16.8	29	do.....	3.34	1.4
July 6	Jacob and Maughan....	4.25	13.4	Sept. 13	do.....	4.30	4.6

*Daily discharge, in second-feet, of Dalton canal at Circleville, Utah, for the year ending Sept. 30, 1917.*

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....	0.5	5	7	15	5	16.....	10	14	28	18	0
2.....	.5	5	4	12	6	17.....	10	11	9	8	0
3.....	4	5	4	11	5	18.....	10	13	10	6	0
4.....	4	5	2	9	21	19.....	10	10	10	1	3
5.....	3	5	7	6	7	20.....	19	8	8	6	3
6.....	3	16	8	15	8	21.....	16	12	24	3	3
7.....	6	14	2	10	20	22.....	18	10	8	2	0
8.....	7	14	9	5	20	23.....	17	9	10	2	1
9.....	4	15	2	3	4	24.....	18	15	11	2	1
10.....	3	17	2	24	2	25.....	17	17	10	4	0
11.....	3	17	10	2	9	26.....	18	3	7	4	0
12.....	6	20	1	6	13	27.....	16	4	17	8	2
13.....	7	20	12	8	8	28.....	15	18	19	3	2
14.....	8	17	9	6	2	29.....	12	16	17	2	8
15.....	9	17	6	18	2	30.....	9	15	7	2	0
						31.....	10		23	5	

*Monthly discharge of Dalton canal at Circleville, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
May.....	9.4	580	September.....	5.2	310
June.....	12.2	730	The period.....		2,670
July.....	9.8	600			
August.....	7.3	450			

#### MITCHELL SLOUGH CANAL NEAR JUNCTION, UTAH.

LOCATION.—In NE.  $\frac{1}{4}$  sec. 17, T. 30 S., R. 3 W., several miles below head of canal and  $2\frac{1}{2}$  miles south of Junction, Piute County.

RECORDS AVAILABLE.—May 15, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder, with outside and inside gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Concrete weir just below gage serves as control.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent, because of accumulation of moss and silt at control. Standard rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; shifting-control method used for greater part of the time. Records good.

Canal diverts water from Mitchell Slough, probably in sec. 19, T. 30 S., R. 3 W. Water is used for irrigation above Junction.

*Discharge measurements of Mitchell Slough canal near Junction, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9	J. J. Sanford.....	0.86	21.1	July 19	W. B. Maughan.....	0.52	7.2
26	.....do.....	.56	8.0	Aug. 9	.....do.....	.98	15.1
May 4	.....do.....	.64	10.3	16	J. J. Sanford.....	.82	11.6
18	.....do.....	.76	18.8	29	.....do.....	.43	4.1
June 15	C. C. Jacob.....	.76	18.5	Sept. 13	.....do.....	.72	13.6
July 6	Jacob and Maughan....	.65	11.9				



*Daily discharge, in second-feet, of Mitchell Slough canal near Junction, Utah, for the year ending Sept. 30, 1917.*

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

NOTE.—Discharge interpolated, Oct. 6-8, and June 11-14.

*Monthly discharge of Mitchell Slough canal near Junction, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-26.....	17.5	902	July.....	8.6	526
April 5-30.....	7.6	392	August.....	9.1	557
May.....	15.2	935	September.....	13.3	791
June.....	16.5	982			

#### JUNCTION MIDDLE CANAL NEAR JUNCTION, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 16, T. 30 S., R. 3 W., 1,000 feet due east of Piute County cheese factory and 800 feet below head of canal that diverts from Sevier River  $2\frac{1}{2}$  miles southeast of Junction, Piute County.

**RECORDS AVAILABLE.**—May 17, 1915, to September 30, 1917; irrigation seasons only; some miscellaneous measurements during 1914.

**GAGE.**—Vertical enamel gage nailed to upstream wing of old wooden flume; read by Andrew Barnson.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—Dirt section. No permanent control. The Barnson spring flows into canal about 150 feet below gage and at times a diversion dam is placed across canal just below spring.

**DIVERSIONS.**—Above all diversions from canal.

**ACCURACY.**—Stage-discharge relation not permanent, because of accumulation of silt and vegetation in channel below gage. Standard rating curve fairly well defined. Gage read to tenths once daily. Daily discharge determined by applying daily gage height to rating table, principally by shifting-control method. Records fair.

*Discharge measurements of Junction Middle canal near Junction, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 4	J. J. Sanford	4.02	6.3	Aug. 9	W. B. Maughan	4.58	17.3
18	do.	4.14	9.8	16	J. J. Sanford	3.88	5.6
June 15	C. C. Jacob	4.10	3.4	29	do.	3.56	3.2
July 6	Maughan and Jacob	3.83	5.2	Sept. 13	do.	3.90	2.5
19	W. B. Maughan	4.12	8.8				

*Daily discharge, in second-feet, of Junction Middle canal near Junction, Utah, for the year ending Sept. 30, 1919.*

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1		10	7	16	4	16	7	3	6	10	4
2		9	8	14	4	17	8	3	0	13	4
3		8	6	14	4	18	8	3	0	12	4
4		10	6	16	4	19	12	3	9	8	4
5		9	7	14	4	20	12	3	10	21	3
6		8	6	10	4	21	7	3	12	14	3
7		8	7	14	5	22	13	3	14	8	3
8		7	7	16	6	23	13	3	13	7	3
9		6	6	11	5	24	12	0	12	7	3
10		5	6	14	4	25	10	0	12	7	3
11		4	6	16	4	26	9	0	10	7	3
12		4	6	16	3	27	8	0	12	6	3
13		4	6	16	3	28	5	5	12	6	3
14		4	6	15	3	29	6	5	12	4	3
15	6	4	6	15	3	30	7	7	12	16	3
						31	10		16	6	

*Monthly discharge of Junction Middle canal near Junction, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
May 15-31	9.0	310	September	3.6	216
June	4.7	280			
July	8.3	512	The period		2,050
August	11.9	732			

#### EAST FORK OF SEVIER RIVER AT COYOTO, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 15, T. 31 S., R. 2 W., immediately below mouth of Coyoto Creek, half a mile below diversion to Otto Creek reservoir, and half a mile southeast of schoolhouse at Coyoto, Garfield County.

**RECORDS AVAILABLE.**—December 7, 1914, to August 15, 1915; August 1, 1916, to September 30, 1917. October 28, 1915, to August 31, 1916, a station was maintained about 4 miles below but the flow is not comparable at these two points due to return flow between stations.

**GAGE.**—Vertical staff fastened to post on right bank July 15 to September 30, 1917; read by Mazle King. Vertical staff on right bank 150 feet above present gage March 12 to August 15, 1915; and July 30, 1916, to May 12, 1917. Original gage vertical staff on left bank fastened to old bridge abutment just above present gage, at different datum.

**DISCHARGE MEASUREMENTS.**—Made by wading near station.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of sand and gravel; shifting at high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage in 1917 not determined because of fragmentary record; minimum stage recorded, 0.40 foot February 23 and 24 (discharge, 1 second-foot).

1915-1917: Maximum and minimum same as in 1917.

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

**DIVERSIONS.**—Canals divert for irrigation and storage above station.

**REGULATION.**—None other than that caused by diversions mentioned above.

**ACCURACY.**—Stage-discharge relation unchanged until May 12, when high water washed in sand bar at gage; permanent thereafter. Rating curve used prior to May 12 fairly well defined. No gage readings May 12 to July 16. Rating curve used subsequent to July 16 well defined below 40 second-feet. Staff gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of East Fork of Sevier River at Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	J. J. Sanford	0.80	9.7	July 16	W. B. Maughan	0.54	5.0
Jan. 12	do	.54	4.3	Aug. 9	do	.89	25.6
Mar. 7	L. W. Jordan	.49	2.7	Sept. 17	J. J. Sanford	.92	29.1
Apr. 6	J. J. Sanford	1.72	94	Sept. 1	do	.84	21.0
May 4	do	2.25	238	Sept. 15	do	.78	16.0

<sup>a</sup> Gage relocated.

*Daily discharge, in second-feet, of East Fork of Sevier River at Coyoto, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	July.	Aug.	Sept.
1.	10	10	7	8	7	3	80	270	18	26	
2.	10	10	7	8	7	3	80	270	18	22	
3.	13	10	7	7	7	3	80	240	12	18	
4.	10	10	7	8	7	3	80	240	12	18	
5.	13	10	7	8	7	3	80	240	18	18	
6.	52	10	7	7	7	3	98	240	26	18	
7.	41	7	7	6	4	3	98	240	26	18	
8.	10	7	7	6	4	3	160	240	26	18	
9.	10	7	7	6	4	3	160	240	26	18	
10.	10	7	7	6	3	3	186	213	26	12	
11.	10	7	7	4	3	3	160	213	26	12	
12.	10	7	7	4	3	3	160	213	26	12	
13.	7	7	7	4	3	3	160	213	27	12	
14.	7	7	10	4	3	3	160	213	15	12	
15.	7	7	10	4	3	3	186	213	18	12	
16.	7	7	10	4	3	3	186	213	18	12	
17.	7	10	7	4	3	3	186	213	22	16	
18.	7	10	7	4	3	4	186	213	22	18	
19.	7	10	7	4	3	4	186	213	27	18	
20.	7	10	7	4	3	4	213	213	27	18	
21.	10	10	7	7	3	4	213	213	22	18	
22.	7	10	7	7	3	4	240	213	22	18	
23.	7	10	7	7	1	4	240	213	8	27	
24.	7	10	7	7	1	4	300	213	8	27	
25.	7	10	7	7	3	4	330	213	8	38	
26.	7	10	7	7	3	7	362	213	8	38	16
27.	4	10	7	7	3	10	330	213	12	18	16
28.	4	10	7	7	3	32	300	213	8	18	15
29.	10	7	7	7	7	65	270	213	8	18	15
30.	10	7	7	7	7	160	270	213	18	18	12
31.	10	7	8	7	7	80	270	213	18	22	12

NOTE.—No record May 13 to July 22.

*Monthly discharge of East Fork of Sevier River at Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	52	4	10.9	670
November.....	10	7	8.8	524
December.....	10	7	7.3	450
January.....	8	6	6.0	371
February.....	7	1	3.8	212
March.....	160	3	14.1	867
April.....	362	80	191	11,400
May 1-12.....			238	5,660
July 23-31.....			10.7	191
August.....	38	12	22.5	1,380
September.....	27	12	16.6	988

#### EAST FORK OF SEVIER RIVER NEAR KINGSTON, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 13, T. 30 S., R. 3 W., 1 mile below highway bridge and 2 miles east of Kingston, Piute County.

**DRAINAGE AREA.**—1,260 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—April 29, 1914, to September 30, 1917. Records obtained about  $1\frac{1}{2}$  miles above Rockyford bridge, in SW.  $\frac{1}{4}$  sec. 16, T. 30 S., R. 2 $\frac{1}{2}$  W., March 27, 1913, to April 28, 1914; also at gage three-fourths of a mile north of Kingston, in NE.  $\frac{1}{4}$  sec. 10, T. 30 S., R. 3 W., May 11 to September 20, 1912.

**GAGE.**—Stevens continuous water-stage recorder on right bank, 1 mile below highway bridge, April 24, 1914, to September 30, 1917; inspected by W. S. Price. Vertical staff  $1\frac{1}{2}$  miles above bridge March 27, 1913, to April 28, 1914.

**DISCHARGE MEASUREMENTS.**—Made from cable, highway bridge, or by wading.

**CHANNEL AND CONTROL.**—One channel at medium and low stages. Right bank is overflowed during high water. Bed composed of gravel; shifts during floods.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.46 feet at 3 p. m. May 18 (discharge, 946 second-feet); minimum stage recorded 2.17 feet on February 22 during frozen period (discharge from open-water rating table 16 second-feet; stage-discharge relation possibly affected by ice).

1913-1917: Maximum occurred in 1917, minimum stage recorded, 1.00 foot September 19, 20, and 21, 1913 (discharge, 8 second-feet).

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

**DIVERSIONS.**—Above all diversions in vicinity of Kingston.

**REGULATION.**—Flow affected by operation of gates in Otter Creek reservoir dam 8 miles above.

**ACCURACY.**—Stage-discharge relation changed by high water on May 15; two fairly well defined rating curves applicable, respectively, before and after that date. Operation of water-stage recorder satisfactory except for several short periods of break in record. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for periods noted in footnote to table of daily discharge. Records good.

*Discharge measurements of East Fork of Sevier River near Kingston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	J. J. Sanford.....	2.34	25.7	July 17	W. B. Maughan.....	3.29	371
Jan. 12	.....do.....	3.21	21.1	Aug. 9	.....do.....	3.28	379
Mar. 7	L. W. Jordan.....	2.29	21.0	17	J. J. Sanford.....	3.30	394
Apr. 5	J. J. Sanford.....	2.86	75	Sept. 1	.....do.....	3.00	268
May 4	.....do.....	3.84	355	15	.....do.....	2.97	265
9	.....do.....	3.58	252	21	.....do.....	2.73	213
July 7	Jacob and Maughan....	3.15	299				

*Daily discharge, in second-feet, of East Fork of Sevier River near Kingston, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	257	25	44	23	89	380	340	169	409	277
2	257	25	44	22	63	358	310	272	386	274
3	257	25	45	22	66	358	320	286	372	277
4	237	24	46	25	61	358	413	301	364	283
5	128	24	45	23	68	337	476	324	361	286
6	132	24	44	24	100	316	434	333	368	283
7	225	26	34	24	168	277	413	324	364	283
8	241	26	35	23	202	277	429	333	368	286
9	154	26	45	23	224	258	454	324	368	283
10	138	26	-----	25	241	241	476	327	370	283
11	138	26	-----	24	185	241	454	364	370	286
12	68	26	-----	23	182	277	383	383	375	283
13	40	24	-----	23	199	380	340	402	370	280
14	48	38	-----	23	199	471	292	405	370	274
15	46	98	-----	23	182	620	253	398	370	258
16	40	120	-----	24	162	796	220	383	370	225
17	36	120	-----	23	158	852	201	364	368	220
18	32	44	-----	22	148	910	181	364	310	218
19	30	45	-----	24	145	796	171	375	295	213
20	27	46	-----	27	142	614	150	379	289	211
21	29	46	-----	30	138	542	130	375	286	211
22	32	42	-----	33	173	542	110	375	283	213
23	28	44	-----	36	224	520	95	375	286	213
24	27	45	-----	39	277	497	78	372	292	218
25	26	42	-----	41	337	413	75	368	298	220
26	26	46	-----	43	425	340	71	368	283	218
27	25	48	-----	39	518	286	86	379	280	215
28	25	50	-----	48	448	283	91	372	280	213
29	25	48	-----	98	448	307	106	390	280	171
30	25	44	-----	165	402	330	148	413	280	100
31	25	-----	-----	129	-----	337	-----	413	280	-----

NOTE.—Stage-discharge relation affected by ice Dec. 10 to Feb. 28; daily discharge not determined. No gage-height record Mar. 20-24, June 20-23, Aug. 10-11, 13-16, 27-31; discharge interpolated.

*Monthly discharge of East Fork of Sevier River near Kingston, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	257	25	91.1	5,600
November	120	24	43.1	2,560
December	-----	-----	<sup>a</sup> 35.7	2,200
January	-----	-----	<sup>a</sup> 21.0	1,280
February	-----	-----	<sup>a</sup> 21.0	1,170
March	165	22	37.8	2,320
April	518	61	212	12,600
May	910	241	432	26,800
June	476	71	257	15,300
July	413	169	255	21,800
August	409	-----	334	20,500
September	286	100	242	14,400
The year	910	-----	178	127,000

<sup>a</sup> Discharge estimated because of ice.

#### COYOTO CANAL NEAR COYOTO, UTAH.

LOCATION.—Half a mile west of Riddle ranch house, half a mile south of mouth of Antimony Creek, and 3 miles south of Coyoto, Garfield County.

RECORDS AVAILABLE.—July 30 to September 30, 1916; June to August, 1917.

GAGE.—Vertical staff on left bank; read by J. W. Larson.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Earth channel; fairly permanent.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed frequently due to beaver dams below gage, cleaning of canal, etc. Rating curve not fully determined. Staff gage read to half-tenths once daily. Daily discharge determined by applying daily gage height to rating table. Records poor.

*Discharge measurements of Coyoto canal near Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 4	J. J. Sanford.....	4.60	12.6	Aug. 17	J. J. Sanford.....	5.20	13.2
July 17	W. B. Maughan.....	5.32	20.5	Sept. 1	.....do.....	5.55	14.7
Aug. 9	.....do.....	5.23	16.0	Sept. 15	.....do.....	5.20	9.3

*Daily discharge, in second-feet, of Coyoto canal near Coyoto, Utah, for the year ending Sept. 30, 1917.*

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

NOTE.—No flow June 1-21.

*Monthly discharge of Coyoto canal near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.
June.....	4.87	290
July.....	21.5	1,320
August 1-17.....	16.2	996

#### OTTER CREEK ABOVE RESERVOIR, NEAR COYOTO, UTAH.

LOCATION.—In sec. 25, T. 29 S., R. 2 W., three-quarters of a mile above Otter Creek reservoir and 10 miles north of Coyoto, Garfield County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to August 10, 1915; October 1, 1915, to September 30, 1917.

GAGE.—Vertical staff on right bank; read by Nelo Brindley.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded, 3.80 feet March 27 (discharge, 84 second-feet); stream practically dry June 8 to September 19.

1915-1917: Maximum stage retorded, 4.08 feet March 12, 1916 (discharge, 87 second-feet); no flow August 10, 1915.

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

**DIVERSIONS.**—Canals take out for irrigation upstream.

**REGULATION.**—One reservoir storing water for irrigation upstream; capacity unknown.

**ACCURACY.**—Stage-discharge relation not permanent. Standard rating curve well defined. Staff gage read to hundredths twice daily except during June, July, and August, when stream was practically dry. Daily discharge determined by applying mean daily gage height to rating table; shifting-control method used throughout most of year; stream frozen over from November 10 to March 17; discharge estimated. Records poor, except for October, April, and May, which are fair.

*Discharge measurements of Otter Creek above reservoir, near Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
Oct. 27	J. J. Sanford.....	<i>Feet.</i> 1.72	<i>Sec.-ft.</i> 21.1	Apr. 6	Manning and Sanford..	<i>Feet.</i> 2.74	<i>Sec.-ft.</i> 60
Jan. 12	.....do.....	<i>a</i> 2.80	13.6	Aug. 25	J. J. Sanford.....	— .50	<i>b</i> 0.1
Mar. 8	L. W. Jordan.....	<i>a</i> 1.76	21.8				

*a* Stage-discharge relation affected by ice.

*b* Discharge estimated.

*Daily discharge, in second-feet, of Otter Creek above reservoir, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	Sept.
1.....	7	22	.....	48	62	50	.....
2.....	17	22	.....	50	62	50	.....
3.....	16	22	.....	49	62	50	.....
4.....	19	22	.....	34	64	21	.....
5.....	17	21	.....	50	66	21	.....
6.....	20	29	.....	58	64	21	.....
7.....	21	31	.....	58	66	1	.....
8.....	17	22	22	66	64	.....	.....
9.....	17	22	.....	68	64	.....	.....
10.....	17	.....	.....	64	63	.....	.....
11.....	17	.....	.....	74	62	.....	.....
12.....	17	.....	.....	64	62	.....	.....
13.....	17	.....	.....	66	64	.....	.....
14.....	17	.....	.....	68	64	.....	.....
15.....	17	.....	.....	66	63	.....	.....
16.....	17	.....	.....	66	65	.....	.....
17.....	17	.....	.....	62	62	.....	.....
18.....	17	.....	30	56	56	.....	.....
19.....	17	.....	42	58	56	.....	.....
20.....	17	.....	40	58	50	.....	4
21.....	17	.....	57	72	50	.....	4
22.....	19	.....	58	66	39	.....	4
23.....	20	.....	51	66	32	.....	4
24.....	21	.....	44	68	32	.....	4
25.....	21	.....	68	63	24	.....	.....
26.....	21	.....	64	62	27	.....	4
27.....	22	.....	84	64	24	.....	4
28.....	20	.....	64	66	42	.....	4
29.....	22	.....	78	63	44	.....	4
30.....	22	.....	65	64	44	.....	4
31.....	22	.....	66	.....	49	.....	.....

NOTE.—Stage-discharge relation affected by ice, Nov. 10 to Mar. 17; daily discharge not determined Creek practically dry June 8 to Sept. 19.

*Monthly discharge of Otter Creek above reservoir, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	18.2	1,120	May.....	53.2	3,270
November.....	21.1	1,260	June.....	7.7	466
December.....	17.0	1,050	July.....	.5	31
January.....	14.4	885	August.....	.2	14
February.....	15.0	833	September.....	.2	12
March.....	38.7	2,380	The year.....		15,000
April.....	61.2	3,640			

NOTE.—Discharge estimated November to March and June to September.

#### OTTER CREEK NEAR COYOTO, UTAH.

LOCATION.—In W.  $\frac{1}{2}$  sec. 28, T. 30 S., R. 2 W., just below outlet of Otter Creek reservoir, 5 miles northwest of Coyoto, and 12 miles east of Kingston, Piute County.

DRAINAGE AREA.—Indeterminate; 400 square miles of Otter Creek basin are tributary to reservoir; the reservoir receives also water from East Fork of Sevier River.

RECORDS AVAILABLE.—June 21, 1913, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on left bank, with outside staff gage.

DISCHARGE MEASUREMENTS.—Made by wading just below gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of gravel. Broad-crested concrete weir just below gage serves as permanent control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.74 feet at 4 p. m., July 19 (discharge, 400 second-feet); minimum occurs while outlet gates are closed during nonirrigation season when a flow of 1 to 2 second-feet is maintained by seepage.

1913-1917: Maximum occurred in 1917.

DIVERSIONS.—Some diversions for irrigation above reservoir.

REGULATION.—Flow past station controlled by operation of outlet gates of reservoir just above.

ACCURACY.—Stage-discharge relation permanent until July 19 when heavy growth of moss started which continued until about August 1. Well defined rating curve applicable until July 19; shifting-control method July 19-31; fairly well-defined curve parallel to former curve applicable August 1 to September 30. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records prior to July 19 excellent; others fair.

*Discharge measurements of Otter Creek near Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 4	J. J. Sanford.....	1.21	96	Sept. 1	J. J. Sanford.....	2.25	270
Aug. 17	.....do.....	2.68	354	15	.....do.....	2.22	263
25	Jacob and Sanford.....	2.24	272	21	.....do.....	1.92	204



*Daily discharge, in second-feet, of Otter Creek near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	246	-----	105	60	214	366	270
2.....	244	-----	103	63	294	366	270
3.....	244	-----	99	69	282	362	274
4.....	174	-----	97	99	305	360	276
5.....	107	16	96	105	305	362	274
6.....	103	18	71	102	299	362	272
7.....	102	36	60	102	303	360	272
8.....	102	37	60	100	299	362	280
9.....	102	37	60	97	303	364	276
10.....	102	38	60	94	339	360	272
11.....	47	38	60	91	354	360	270
12.....	5	38	63	57	384	362	272
13.....	4	39	64	52	389	362	270
14.....	5	39	64	52	387	358	268
15.....	4	40	64	52	382	360	236
16.....	5	41	64	52	380	362	204
17.....	5	41	64	52	378	326	204
18.....	5	42	68	32	387	280	202
19.....	5	43	70	21	398	278	200
20.....	5	43	73	20	393	276	204
21.....	5	44	62	19	389	274	204
22.....	5	45	30	19	387	274	202
23.....	5	50	29	19	384	274	200
24.....	5	58	32	19	380	270	206
25.....	5	65	35	20	373	268	210
26.....	5	76	38	19	376	266	208
27.....	5	94	41	19	376	268	204
28.....	5	102	41	19	373	278	204
29.....	5	110	43	94	369	278	89
30.....	5	107	48	134	367	274	46
31.....	5	-----	56	-----	365	274	-----

NOTE.—No record Nov. 1, to Apr. 4.

*Monthly discharge of Otter Creek near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	246	5	53.9	5,110
April 5-30.....	110	-----	51.4	2,650
May.....	105	29	61.9	3,810
June.....	134	19	58.4	3,480
July.....	398	214	352	21,600
August.....	366	266	321	19,700
September.....	280	46	228	13,600

#### OTTER CREEK RESERVOIR FEEDER CANAL AT HEAD, NEAR COYOTO, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 15, T. 31 S., R. 2 W., just below crossing of unnamed wash over canal and half a mile southwest of schoolhouse at Coyoto, Garfield County.

RECORDS AVAILABLE.—December 8, 1914, to July 29, 1915; August 1, 1916, to September 30, 1917.

GAGE.—Vertical staff on right bank fastened to old bridge abutment August 1, 1916, to September 30, 1917; read by Mazle King. Original gage, vertical staff fastened to left abutment of same bridge.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across flume.

CHANNEL AND CONTROL.—One channel at all stages. Control practically permanent; affected slightly by moss growth in summer.

ICE.—None.

DIVERSIONS.—None above station.

REGULATION.—Flow in canal regulated by head gates.

ACCURACY.—Stage-discharge relation not permanent; affected by moss growth. Well-defined rating curve applicable October 1 to April 6 and June 15 to September 1; for remainder of year, several shifts to parallel curves. Gage read once daily to tenths. Daily discharge determined by applying daily gage height to rating table; shifting-control method used for periods of change in rating. Records good.

Canal diverts water from East Fork of Sevier River in SW.  $\frac{1}{4}$  sec. 15, T. 31 S., R. 2 W., for storage in Otter Creek reservoir.

*Discharge measurements of Otter Creek reservoir feeder canal at head, near Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	J. J. Sanford.....	2.44	83	July 16	W. B. Maughan.....	1.73	23.8
Jan. 12	.....do.....	2.18	58	Aug. 9	.....do.....	1.45	7.4
Mar. 7	L. W. Jordan.....	2.30	66	Sept. 17	J. J. Sanford.....	1.70	21.2
Apr. 6	J. J. Sanford.....	2.80	136	Sept. 1	.....do.....	1.36	31.8
May 4	.....do.....	1.87	45.0	Sept. 15	.....do.....	2.04	47.5
June 15	C. C. Jacob.....	2.18	56				

*Daily discharge, in second-feet, of Otter Creek reservoir feeder canal at head, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	90	77	57	62	48	66	120	55	150	34	28	22
2.....	90	77	57	62	48	66	120	55	150	34	28	32
3.....	90	77	57	57	48	66	120	47	148	34	22	58
4.....	104	77	57	62	44	66	104	47	148	28	22	58
5.....	137	77	57	62	44	66	120	47	146	28	28	59
6.....	175	77	57	57	41	66	137	47	146	22	5	50
7.....	156	66	57	62	41	66	137	46	145	22	5	69
8.....	41	66	57	62	41	66	120	46	145	22	10	60
9.....	41	66	57	62	41	66	137	54	162	22	10	61
10.....	41	77	57	57	41	66	175	85	109	22	10	44
11.....	44	77	57	57	41	66	177	85	107	22	10	44
12.....	41	77	57	57	41	66	123	114	93	22	10	44
13.....	34	77	57	57	41	66	125	320	78	22	5	45
14.....	34	77	57	57	41	66	127	346	58	22	25	45
15.....	34	77	57	57	41	66	72	368	57	34	28	46
16.....	34	77	57	57	41	66	73	318	48	34	28	46
17.....	34	77	57	57	41	66	74	270	57	34	28	51
18.....	34	77	57	57	41	66	75	224	57	34	22	54
19.....	41	77	57	57	41	66	76	162	48	34	34	54
20.....	41	66	57	57	41	66	77	181	48	34	34	54
21.....	41	66	57	57	41	66	91	179	48	34	28	54
22.....	34	66	57	57	48	66	93	179	48	28	16	54
23.....	41	66	57	57	48	66	94	158	41	28	16	63
24.....	41	66	66	57	48	66	110	158	41	28	16	54
25.....	41	66	66	66	66	66	112	156	41	31	10	54
26.....	41	66	66	66	66	77	114	156	41	66	10	54
27.....	34	66	57	66	66	90	132	135	34	41	28	54
28.....	34	66	57	66	66	120	101	135	34	48	31	54
29.....	77	57	57	66	.....	137	55	134	34	28	28	54
30.....	77	57	57	66	.....	175	55	152	34	28	28	54
31.....	77	.....	62	66	.....	120	.....	150	.....	28	22	.....

*Monthly discharge of Otter Creek reservoir feeder canal at head, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	175	34	60.4	3,710
November.....	77	57	71.3	4,240
December.....	66	57	58.0	3,570
January.....	66	57	60.2	3,700
February.....	66	41	46.3	2,570
March.....	175	66	76.4	4,700
April.....	175	55	108	6,430
May.....	368	46	149	9,160
June.....	162	34	83.2	4,950
July.....	66	22	30.6	1,880
August.....	34	5	20.2	1,240
September.....	63	22	51.5	3,060
The year.....	368	5	68.0	49,200

#### OTTER CREEK RESERVOIR FEEDER CANAL AT MOUTH, NEAR COYOTO, UTAH.

**LOCATION.**—In sec. 22, T. 30 S., R. 2 W., just above point where canal discharges into reservoir and 4 miles north of Coyoto, Garfield County.

**RECORDS AVAILABLE.**—July 29 to August 15, 1915; and November 12, 1915, to September 30, 1917.

**GAGE.**—Vertical staff fastened to right side of rating flume; read by Delbert Moore.

**DISCHARGE MEASUREMENTS.**—Made from plank across flume.

**CHANNEL AND CONTROL.**—Artificial earth channel. Rating flume forms a permanent control.

**ICE.**—None.

**DIVERSIONS.**—Some water diverted from this canal in vicinity of Coyoto for irrigation.

**REGULATION.**—Flow in canal regulated by head gates.

**ACCURACY.**—Stage-discharge relation not permanent; affected by accumulation of moss and débris in flume. Standard rating curve well defined; directly applicable October to March, with shifts to parallel curves for remainder of year. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used for periods of change in rating. Records fair.

This canal diverts water from East Fork of Sevier River in SW.  $\frac{1}{4}$  sec. 15, T. 31 S., R. 2 W., near Coyoto for storage in Otter Creek reservoir.

*Discharge measurements of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	J. J. Sanford.....	1.88	84	June 15	C. C. Jacob.....	1.56	44.9
Jan. 11	.....do.....	1.76	67	July 16	W. B. Maughan.....	.98	10.9
Mar. 7	L. W. Jordan.....	1.70	65	Aug. 9	.....do.....	.80	3.8
Apr. 6	Manning and Sanford..	2.30	135	Sept. 17	J. J. Sanford.....	1.14	20.8
May 4	J. J. Sanford.....	1.28	32.5	Sept. 15	.....do.....	1.44	45.0

*Daily discharge, in second-feet, of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	28	79	75	128	43	52	79	37	83	3	5	30
2.....	34	73	75	73	43	52	62	34	89	3	25	30
3.....	34	73	73	109	48	57	57	34	87	3	22	30
4.....	34	73	68	73	52	57	57	34	87	3	22	30
5.....	35	73	39	73	52	62	79	34	87	3	17	30
6.....	97	73	39	73	52	62	97	34	81	3	12	30
7.....	148	73	35	85	52	62	161	38	74	5	10	34
8.....	142	73	32	73	48	62	85	38	69	25	7	34
9.....	109	73	28	85	43	62	92	37	69	25	5	38
10.....	97	68	22	109	43	57	74	37	63	22	5	38
11.....	97	68	28	68	48	52	86	41	62	20	5	38
12.....	97	68	35	97	52	52	81	41	57	17	7	38
13.....	85	73	52	103	52	52	81	50	57	14	7	38
14.....	85	73	52	109	52	52	93	203	52	14	7	38
15.....	97	73	52	116	52	52	50	81	35	12	7	43
16.....	97	79	62	122	48	52	50	81	52	12	10	43
17.....	97	79	57	135	43	52	55	87	52	12	10	48
18.....	97	79	62	148	48	57	56	92	43	12	12	48
19.....	91	73	68	161	52	57	56	117	43	12	12	48
20.....	91	73	73	174	52	57	56	117	39	14	17	48
21.....	85	71	73	174	52	57	57	0	39	17	17	48
22.....	91	71	57	52	52	52	48	0	39	17	20	48
23.....	91	73	57	52	52	57	43	57	35	17	20	51
24.....	97	73	52	52	52	57	40	57	35	14	17	51
25.....	97	73	52	52	52	57	40	57	25	14	30	53
26.....	85	73	52	48	52	57	40	56	14	52	30	53
27.....	85	73	62	48	52	62	41	56	12	43	30	53
28.....	85	73	73	43	52	109	41	61	7	20	30	53
29.....	85	75	91	43	.....	122	41	61	10	17	32	58
30.....	79	75	97	48	.....	148	42	65	3	12	30	58
31.....	79	.....	109	43	.....	97	.....	65	.....	7	30	.....

*Monthly discharge of Otter Creek reservoir feeder canal at mouth, near Coyoto, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	148	28	85.5	5,260
November.....	79	68	73.3	4,360
December.....	109	22	58.1	3,570
January.....	148	43	89.3	5,490
February.....	52	43	49.7	2,780
March.....	148	52	64.4	3,960
April.....	161	40	64.7	3,850
May.....	203	0	58.1	3,570
June.....	89	3	50.0	2,980
July.....	52	3	15.0	922
August.....	32	5	17.0	1,050
September.....	58	30	42.7	2,540
The year.....	203	0	55.6	40,300

#### KINGSTON CANAL AT KINGSTON, UTAH.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 15, T. 30 S., R. 3 W., 300 feet below head of canal, at east edge of town of Kingston, Piute County, on road to Coyoto.

**RECORDS AVAILABLE.**—May 15, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading 75 feet above gage.

**CHANNEL AND CONTROL.**—Bed composed of gravel. Crest of a combination concrete weir dividing box in canal just below gage serves as permanent control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent throughout the season. Rating Curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records excellent.

Canal diverts water from left side of East Fork of Sevier River in NW.  $\frac{1}{4}$  sec. 14, T. 30 S., R. 3 W., for irrigation near Kingston.

*Discharge measurements of Kingston canal at Kingston, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9	J. J. Sanford.....	1.04	16.4	Aug. 9	W. B. Maughan.....	1.17	23.0
May 4	do.....	1.06	20.8	16	J. J. Sanford.....	.94	14.4
June 15	C. C. Jacob.....	1.25	26.8	Sept. 1	do.....	.52	1.5
July 7	Maughan and Jacob....	.96	14.4	15	do.....	.68	6.3

*Daily discharge, in second-feet, of Kingston canal at Kingston, Utah, for the year ending Sept. 30, 1917.*

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

NOTE.—Discharge interpolated, July 29 to Aug. 2.

*Monthly discharge of Kingston canal at Kingston, Utah, for the year ending Sept. 30, 1917.*

Month	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
April 19-30.....	9.2	218	August.....	14.6	898
May.....	21.3	1,310	September.....	7.0	418
June.....	24.4	1,450	The period.....		5,420
July.....	18.4	1,130			

## CLEAR CREEK AT SEVIER, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 32, T. 25 S., R. 4 W., at Sevier, Sevier County, about 100 yards above confluence of stream with Sevier River. Dry Creek enters from right  $2\frac{1}{2}$  miles above and Mill Creek 8 miles above station.

DRAINAGE AREA.—150 square miles (measured on topographic maps).

RECORDS AVAILABLE.—February 23, 1912, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on right bank, April 4, 1914, to September 30, 1917; vertical staff at same site February 23, 1912, to April 3, 1914; both gages at same datum.

DISCHARGE MEASUREMENTS.—Made by wading or from log bridge just above gage.

CHANNEL AND CONTROL.—One channel at all stages. Bed composed of sand and gravel. Concrete cut-off wall, installed just below gage August 31, 1914, serves as permanent control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 2.74 feet at 10 a. m. June 11 (discharge, 181 second-feet); minimum stage, 0.87 foot several days in September (discharge, 2.0 second-feet).

1912-1917: Maximum stage recorded, 3.15 feet May 24, 1914 (discharge, 240 second-feet); stream dry August 26, 1913.

ICE.—Stage-discharge relation not affected by ice except occasionally for short periods.

DIVERSIONS.—Cove canal diverts about three-fourths of a mile above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent until November 15, after which it was affected by changes in channel below the station caused by highway construction; not affected by ice during the year. Well-defined rating curve applicable until November 15, and used as standard curve for remainder of year; several shifts to parallel curves for latter period. Operation of water-stage recorder satisfactory except for several short periods of break in record. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection, except as noted in footnote to table of daily discharge; shifting-control method used for periods of change in rating. Records good.

*Discharge measurements of Clear Creek at Sevier, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	1.14	18.6	May 7	J. J. Sanford.....	1.70	33.7
Jan. 15	do.....	1.42	15.9	July 9	W. B. Maughan.....	1.47	28.0
Mar. 13	L. W. Jordan.....	1.16	7.7	Aug. 2	do.....	1.15	11.0
Apr. 4	J. J. Sanford.....	1.32	9.7	Sept. 21	J. J. Sanford.....	.96	4.2
12	do.....	1.88	44.9				
23	do.....	1.68	30.9	Sept. 6	do.....	.90	2.9

*Daily discharge, in second-feet, of Clear Creek at Sevier, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	10	11	22	12	10	16	23	31	109	58	11	3
2.....	12	12	21	14	15	16	26	31	108	55	10	3
3.....	17	12	18	15	18	18	31	42	111	48	9	3
4.....	13	10	18	16	18	14	25	36	117	40	8	3
5.....	12	10	18	16	18	16	34	35	125	40	8	3
6.....	20	10	18	16	18	14	50	32	125	40	8	3
7.....	22	12	7	16	17	14	59	33	124	30	8	4
8.....	17	11	6	16	16	16	92	35	124	29	7	4
9.....	16	10	8	16	18	18	91	36	132	28	9	3
10.....	16	12	12	16	18	16	45	36	161	25	8	3
11.....	19	19	14	16	18	17	33	38	181	25	8	2
12.....	27	19	17	16	17	15	43	52	169	25	8	2
13.....	26	11	21	16	17	11	50	65	155	25	6	2
14.....	28	14	15	16	16	18	50	91	144	25	6	2
15.....	27	14	9	15	16	16	49	129	141	22	6	4
16.....	27	12	9	12	17	11	45	142	141	21	6	3
17.....	25	16	14	15	16	12	42	145	142	18	6	3
18.....	24	18	14	15	16	16	39	134	144	16	6	3
19.....	23	19	17	15	16	16	33	125	145	14	5	3
20.....	21	20	20	15	15	14	23	111	144	14	5	2
21.....	20	18	13	15	16	19	21	90	135	13	5	2
22.....	19	14	20	15	16	16	21	90	131	12	5	3
23.....	17	18	18	15	17	8	32	90	124	13	5	4
24.....	17	18	18	16	18	14	34	90	117	11	5	6
25.....	17	14	20	16	24	23	48	90	110	10	5	6
26.....	17	21	11	14	22	18	54	90	105	12	8	4
27.....	17	18	10	15	20	21	50	65	94	15	7	4
28.....	17	22	14	17	16	39	42	61	84	15	7	4
29.....	16	17	14	18	.....	43	38	61	75	18	7	4
30.....	14	17	15	16	.....	56	32	77	61	17	6	4
31.....	11	.....	16	11	.....	41	.....	100	.....	14	4	.....

NOTE.—No gage-height record; discharge estimated: May 21-26; July 4-6, 10-14, 21-22, 27-28; Aug. 13-18, 20, 22-24.

*Monthly discharge of Clear Creek at Sevier, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	28	10.5	18.8	1,160
November.....	22	10.0	15.0	890
December.....	22	6	15.1	930
January.....	16	11	15.2	930
February.....	24	10	17.1	950
March.....	56	11	19.4	1,190
April.....	92	21	41.8	2,490
May.....	145	31	73.7	4,530
June.....	181	61	126	7,500
July.....	58	10	24.1	1,480
August.....	11	4	6.8	420
September.....	6	2	3.3	195
The year.....	181	2	31.3	22,700

#### COVE CANAL AT SEVIER, UTAH.

LOCATION.—In sec. 32, T. 25 S., R. 4 W., 90 feet below head of canal and three-quarters of a mile west of post office at Sevier, Sevier County.

RECORDS AVAILABLE.—May 29, 1914, to September 30, 1917, irrigation seasons only.

GAGE.—Stevens water-stage recorder with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Earth section. Wooden weir just below gage serves as permanent control. New control installed before irrigation season of 1917.

DIVERSION.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1917. Rating curve well defined; former rating used for October, 1916. Operation of water-stage recorder satisfactory, except for one short period in May. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorded graph, except for period May 26 to June 2, for which it was ascertained by interpolation. Records good.

Canal diverts water from left bank of Clear Creek in NW.  $\frac{1}{4}$  sec. 32, T. 25 S., R. 4 W. Water used for irrigation between Sevier and Joseph.

*Discharge measurements of Cove canal at Sevier, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	0.60	4.6	Aug. 13	W. B. Maughan.....	1.36	14.8
May 7	do.....	1.46	16.0	21	J. J. Sanford.....	1.16	10.6
July 9	W. B. Maughan.....	1.94	32.0	Sept. 20	do.....	1.10	9.4
Aug. 2	do.....	1.47	16.5				

*Daily discharge, in second-feet, of Cove canal at Sevier, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.	15.5	-----	15	23	32	17	11
2.	13.5	-----	15	23	30	15	11
3.	15.5	-----	16	23	27	15	10
4.	14	-----	17	23	26	14	10
5.	13	-----	17	23	25	13	10
6.	15.5	-----	16	22	29	14	10
7.	16.5	-----	16	21	31	13	9
8.	15	-----	15	21	30	14	8
9.	14.5	-----	15	15	29	15	8
10.	14	-----	15	8	25	14	8
11.	11	-----	15	22	21	14	10
12.	8	-----	17	27	16	14	10
13.	7.5	-----	17	29	15	14	10
14.	7	-----	16	30	15	15	10
15.	7	-----	23	33	15	14	10
16.	7	-----	30	33	15	14	11
17.	7	-----	27	34	15	12	11
18.	6.5	-----	28	36	14	12	10
19.	6.5	-----	26	34	14	11	10
20.	6.0	-----	21	32	14	10	10
21.	6.0	-----	21	32	16	10	10
22.	5.5	-----	23	31	17	10	11
23.	-----	4	23	32	18	10	12
24.	-----	10	24	36	18	10	11
25.	-----	10	23	38	16	10	11
26.	-----	12	23	37	18	15	11
27.	-----	16	23	36	17	13	11
28.	-----	15	23	36	20	12	11
29.	-----	15	23	36	19	12	11
30.	-----	15	23	34	22	12	11
31.	-----	-----	23	-----	20	12	-----

NOTE.—Discharge interpolated May 26 to June 2.



*Monthly discharge of Cove canal at Sevier, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-22.....	10.5	460	July.....	20.6	1,270
April 23-30.....	12.1	190	August.....	12.9	790
May.....	20.3	1,250	September.....	10.2	610
June.....	28.7	1,710			

**MONROE-SOUTH BEND CANAL NEAR JOSEPH, UTAH.**

**LOCATION.**—In sec. 27, T. 25 S., R. 4 W., 200 feet below head of canal and 2 miles south of Joseph, Sevier County.

**RECORDS AVAILABLE.**—April 18, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on left bank, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge half a mile below gage.

**CHANNEL AND CONTROL.**—Earth section. Bed composed of sandy loam. Wooden weir 40 feet below gage serves as permanent control.

**DIVERSIONS.**—Above all diversions from canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation changed slightly during winter. Rating curves well defined; 1916 rating used for October. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph except for period August 24 to 27, for which it was ascertained by interpolation. Records excellent.

Canal diverts water from right bank of Sevier River in NW.  $\frac{1}{4}$  sec. 27, T. 25 S., R. 4 W. Water used for irrigation southeast of Joseph.

*Discharge measurements of Monroe-South Bend canal near Joseph, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	0.46	7.2	Aug. 20	J. J. Sanford.....	1.65	78
May 7	.....do.....	1.60	71	Sept. 6	.....do.....	1.64	77
July 12	W. B. Maughan.....	1.83	94	20	.....do.....	1.58	73
Aug. 20	.....do.....	1.74	83				

*Daily discharge, in second-feet, of Monroe-South Bend canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	74	.....	73	109	105	85	74
2.....	74	.....	82	109	103	85	75
3.....	74	.....	91	109	107	85	76
4.....	74	.....	89	110	110	85	76
5.....	69	.....	86	111	110	86	77
6.....	56	.....	80	112	111	86	77
7.....	45	.....	73	111	72	86	77
8.....	45	.....	79	114	23	86	76
9.....	45	.....	89	118	33	85	75
10.....	45	.....	88	120	96	85	74
11.....	45	.....	88	112	93	85	73
12.....	44	14	90	110	94	85	73
13.....	39	13	90	114	94	90	73
14.....	35	9	92	118	87	90	72
15.....	32	18	91	115	83	90	72
16.....	29	32	86	112	83	90	72
17.....	28	32	86	111	83	87	72
18.....	15	32	100	110	86	83	72
19.....	12	32	101	111	87	80	72
20.....	10	37	111	111	87	78	72
21.....	8	42	114	113	87	78	72
22.....	7	48	113	112	89	78	72
23.....	7	50	111	104	88	78	71
24.....	.....	62	111	102	87	77	70
25.....	.....	60	111	101	87	77	70
26.....	.....	57	110	107	87	77	69
27.....	.....	54	110	106	87	77	69
28.....	.....	56	111	109	89	77	64
29.....	.....	54	112	107	90	77	42
30.....	.....	59	113	106	91	75	59
31.....	.....	.....	112	.....	88	75	.....

NOTE.—Discharge interpolated Aug. 24 to 27.

*Monthly discharge of Monroe-South Bend canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	39.6	1,810	July.....	87.6	5,390
April 12-30.....	40	1,520	August.....	82.5	5,070
May.....	96.5	5,930	September.....	71.3	4,240
June.....	110	6,540			

#### SEVIER VALLEY CANAL NEAR JOSEPH, UTAH.

LOCATION.—Near line between secs. 22 and 27, T. 25 S., R. 4 W., at station 20 on canal,  $1\frac{1}{2}$  miles south of Joseph, Sevier County.

RECORDS AVAILABLE.—May 18, 1912, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on left bank since May 13, 1913. Original gage, used May 18, 1912, to May 12, 1913, was a vertical staff 10 feet above State weir, in SE.  $\frac{1}{4}$  sec. 15, T. 25 S., R. 4 W.

DISCHARGE MEASUREMENTS.—Made from bridge 600 feet downstream or by wading.

CHANNEL AND CONTROL.—Earth section. Concrete weir 20 feet below gage serves as permanent control.

DIVERSIONS.—Joseph canal diverts from right bank of Sevier Valley canal just above gage.

REGULATION.—Flow controlled by head gates.

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

Canal diverts from left bank of Sevier River about  $1\frac{1}{2}$  miles south of Joseph, in NW.  $\frac{1}{4}$  sec. 27, T. 25 S., R. 4 W. Water used for irrigation in Sevier Valley as far north as Redmond.

*Discharge measurements of Sevier Valley canal near Joseph, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Fert.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	(a)	65	July 9	W. B. Maughan.....	4.22	312
Apr. 12	.....do.....	0.53	27.3	Aug. 21	J. J. Sanford.....	4.26	315
23	.....do.....	2.22	136	Sept. 6	.....do.....	4.12	297
May 7	.....do.....	1.75	96	20	.....do.....	3.97	283

a Gage height with check boards in, 1.60. Gage height with check boards out, 0.80.

*Daily discharge, in second-feet, of Sevier Valley canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	260	69	150	284	310	314	301
2.....	217	69	126	282	310	317	302
3.....	201	69	112	288	314	318	309
4.....	201	69	110	292	311	322	305
5.....	201	69	108	298	309	321	298
6.....	205	71	103	298	310	318	298
7.....	226	72	100	290	308	318	290
8.....	273	72	112	293	310	318	292
9.....	278	34	140	298	308	317	292
10.....	281	12	162	296	308	316	292
11.....	282	12	172	297	319	315	282
12.....	280	15	181	290	316	314	281
13.....	250	42	180	284	309	314	283
14.....	237	58	185	285	308	314	285
15.....	236	60	204	292	307	312	286
16.....	236	59	219	297	306	312	286
17.....	240	74	230	287	306	306	288
18.....	152	84	241	283	306	301	288
19.....	95	98	247	279	307	308	286
20.....	65	107	262	268	307	316	284
21.....	65	117	272	264	310	310	281
22.....	65	118	280	261	309	299	282
23.....	65	126	276	239	308	293	283
24.....		164	278	273	308	303	283
25.....		180	278	285	306	304	283
26.....		192	278	304	306	306	271
27.....		190	280	308	308	303	280
28.....		191	287	309	310	301	287
29.....		170	292	304	312	301	241
30.....		169	284	309	314	300	210
31.....			285		311	302	

*Monthly discharge of Sevier Valley canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	200	9,130	July.....	309	19,000
April.....	94.4	5,620	August.....	310	19,100
May.....	208	12,800	September.....	279	16,600
June.....	288	17,100			

#### SEVIER VALLEY CANAL NEAR RICHFIELD, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 8, T. 23 S., R. 2 W., at State weir, or head of State extension canal, 100 feet below bridge on county road from Richfield to Aurora and  $3\frac{1}{2}$  miles northeast of Richfield, Sevier County.

**RECORDS AVAILABLE.**—May 21, 1912, to September 30, 1917; irrigation seasons only.

**GAGE.**—Friez water-stage recorder on left bank at the weir, about station 815 on the canal, until May 5, 1917, when replaced by Stevens water-stage recorder.

**DISCHARGE MEASUREMENTS.**—Made from a bridge about 200 feet below gage, or by wading.

**CHANNEL AND CONTROL.**—Channel in gravel and sandy loam. Wooden weir just below gage forms permanent control.

**DIVERSIONS.**—A great number of laterals divert water above station; water passing station is available for State Piute project.

**REGULATION.**—Flow controlled by head gates and numerous diversions above.

**ACCURACY.**—Stage-discharge relation permanent during 1917; changed slightly during winter; 1916 rating used for October. Rating curve well defined. Water-stage recorder operated satisfactorily. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph except as noted in footnote to table of daily discharge. Records excellent.

*Discharge measurements of Sevier Valley canal near Richfield, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	1.34	56	Aug. 15	J. J. Sanford.....	2.84	190
Apr. 21	do.....	1.32	60	Sept. 10	do.....	1.94	107
May 12	do.....	1.72	88	24	do.....	3.02	213
July 11	W. B. Maughan.....	2.72	182				

*Daily discharge, in second-feet, of Sevier Valley canal near Richfield, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	212		152	190	194	158	16.....		104	144	161	182	189
2.....	192		157	197	203	172	17.....		95	144	174	184	195
3.....	176		166	188	202	178	18.....		91	152	166	181	197
4.....	174		172	168	204	180	19.....		92	157	156	184	214
5.....	175		172	180	204	166	20.....		123	156	154	182	218
6.....	180		164	186	204	166	21.....		142	148	158	156	219
7.....	172		164	183	190	176	22.....		151	140	178	140	220
8.....	169		162	180	190	165	23.....		151	124	172	146	212
9.....	171		158	176	184	164	24.....		147	127	170	196	216
10.....	164		155	166	190	110	25.....		132	159	183	184	240
11.....	133		163	178	191	167	26.....		132	178	178	188	252
12.....	132		164	162	202	166	27.....		160	172	188	202	196
13.....		87	156	155	204	178	28.....		170	170	186	195	150
14.....		87	149	164	214	200	29.....		162	177	198	158	154
15.....		98	152	166	196	192	30.....		156	190	203	144	138
							31.....		159		201	148	

NOTE.—Discharge estimated: Oct. 13-19, 125 second-feet; Oct. 20-24, 57 second-feet.

*Monthly discharge of Sevier Valley canal near Richfield, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-24.....	134	6,380	July.....	176	10,840
May 12-31.....	126	5,020	August.....	185	11,380
June.....	158	9,400	September.....	185	11,000

#### STATE CANAL NEAR REDMOND, UTAH.

**LOCATION.**—In W.  $\frac{1}{4}$  sec. 14, T. 20 S., R. 1. W., at station 1,304 of canal survey, 5 miles north of Redmond, Sevier County.

**RECORDS AVAILABLE.**—May 10, 1913, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens continuous water-stage recorder on right bank August 6, 1915, to September 30, 1916; May 10, 1913, to August 5, 1915, vertical staff on right bank.

**DISCHARGE MEASUREMENTS.**—Made from bridge 10 feet upstream from gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and hardpan; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.30 feet at 2 a. m. October 8 (discharge, 155 second-feet).

1913-1917: Maximum stage occurred in 1917.

**DIVERSION.**—Numerous diversions above gage.

**REGULATION.**—Flow controlled by head gates and by diversions above.

**ACCURACY.**—Stage-discharge relation changed during winter. Rating curves fairly well defined between 5 and 90 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except days when considerable fluctuation occurred when it was obtained by averaging results obtained by applying hourly gage height to rating table. Records good.

State canal is an extension of the Sevier Valley canal. See "Sevier Valley canal near Joseph" for point of diversion from Sevier River.

*Discharge measurements of State canal near Redmond, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	1.05	7.6
Aug. 3	W. B. Maughan.....	3.10	82
Sept. 5	J. J. Sanford.....	3.16	80

*Daily discharge, in second-feet, of State canal near Redmond, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	0.5		88				16.....	17		15			
2.....	32		72	24	14		17.....	14		8.3			
3.....	37		64	84	84	7.5	18.....	17	21	50	8.5	23	
4.....	30		72	76	79	73	19.....	20	16	69	77	83	
5.....	42		74	74	84	82	20.....	14	26	68	72	86	
6.....	110		75	81	81	86	21.....	2.4	34	72	68	79	
7.....	151		28	81	80	80	22.....	4	54	70	77	74	
8.....	130			75	77	80	23.....	6	22	66	77	62	
9.....	108			23	36	80	24.....	8		12	78	72	
10.....	114					58	25.....				25	78	14
11.....	56					77	26.....					31	58
12.....	31					80	27.....						28
13.....	16					32	28.....						66
14.....	13						29.....						62
15.....	12		1.6				30.....						60
							31.....		28				

NOTE.—Water-stage recorder not in operation Oct. 25 to May 8; canal not in use. Canal dry May 8-16, 24-30, June 8-14, June 25 to July 1, July 10-17, July 26 to Aug. 1, Aug. 10-17, Aug. 27 to Sept. 2, and Sept. 14-24.

*Monthly discharge of State canal near Redmond, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October 1-24.....	151	0	41.0	1,950
May 17-31.....	54	0	13.5	402
June.....	88	0	30.2	1,800
July.....	84	0	32.3	1,990
August.....	86	0	36.2	2,230
September.....	86	0	34.1	2,030

#### JOSEPH CANAL NEAR JOSEPH, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 22, T. 25 S., R. 4 W., 100 yards below head of canal and  $1\frac{1}{2}$  miles south of Joseph, Sevier County, on road to Marysville.

RECORDS AVAILABLE.—April 6, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder, with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Gravel section. Concrete weir 20 feet below gage serves as permanent control.

DIVERSIONS.—Above all diversions.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation permanent during 1917; changed somewhat during preceding winter; rating of 1916 used for October. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records good.

Canal diverts water from right bank of Sevier Valley canal in SE.  $\frac{1}{4}$  sec. 22, T. 25 S., R. 4 W. Water used for irrigation in and around Joseph.

DISCHARGE MEASUREMENTS.—Made from bridge across flume 20 feet above gage.

CHANNEL AND CONTROL.—Wooden flume about  $4\frac{1}{2}$  feet wide. Permanent control is afforded by plank across flume 10 feet below gage.

DIVERSIONS.—None above station.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed during summer by growth of moss in flume. Two well-defined rating curves applicable, respectively, April to July 16, and August 2 to end of season; shifting-control method used for period July 17 to August 1; 1916 rating used for October. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records excellent.

Canal diverts water from right side of Sevier River in NE.  $\frac{1}{4}$  sec. 27, T. 25 S., R. 4 W., for irrigation near Joseph.

*Discharge measurements of Wells canal near Joseph, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	1.04	8.7	Aug. 20	J. J. Sanford.....	1.30	12.4
May 7	do.....	1.70	23.2	Sept. 6	do.....	1.54	16.7
July 9	W. B. Maughan.....	2.34	41.4	20	do.....	1.75	20.5
Aug. 2	do.....	.96	6.3				

*Daily discharge, in second feet, of Wells canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	12.5	.....	22	31	22	13	12
2.....	12.5	.....	22	30	21	5	11
3.....	13.5	.....	22	30	25	6	19
4.....	13.5	.....	22	30	32	8	17
5.....	13.5	0	22	30	32	13	16
6.....	14.0	1	23	30	32	13	17
7.....	14.5	1	23	30	34	13	17
8.....	14.5	1	22	29	42	13	17
9.....	14.5	2	22	31	34	13	17
10.....	16.0	2	23	32	25	13	17
11.....	25.0	1	27	32	25	13	18
12.....	27.5	1	28	31	25	15	18
13.....	23.5	3	28	31	24	17	19
14.....	22.0	10	28	31	24	17	19
15.....	21.5	8	29	32	23	17	20
16.....	21.0	4	29	32	23	17	20
17.....	20.5	3	30	33	21	15	21
18.....	8.0	2	34	40	18	15	21
19.....	10.0	2	36	42	17	13	21
20.....	17.5	4	35	42	18	12	21
21.....	14.0	9	34	43	18	13	21
22.....	10.0	12	34	41	18	13	21
23.....	8.5	13	34	35	17	13	21
24.....	.....	18	34	30	17	13	21
25.....	.....	20	33	29	17	13	21
26.....	.....	21	33	26	17	14	21
27.....	.....	22	32	25	16	13	19
28.....	.....	24	31	25	17	13	21
29.....	.....	24	31	25	17	13	26
30.....	.....	23	31	24	17	12	19
31.....	.....	.....	31	.....	16	12	.....

*Discharge measurements of Joseph canal near Joseph, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
May 7	J. J. Sanford.....	<i>Feet.</i> 1.02	<i>Sec.-ft.</i> 17.0	Aug. 21	J. J. Sanford.....	<i>Feet.</i> 1.65	<i>Sec.-ft.</i> 39.5
July 9	W. B. Maughan.....	1.99	54.6	Sept. 6	.....do.....	1.78	41.6
Aug. 2	.....do.....	1.78	42.8	20	.....do.....	1.51	30.1

*Daily discharge, in second-feet, of Joseph canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	26.5	4	22	20	62	46	51
2.....	26.5	4	18	13	61	46	55
3.....	27	4	17	26	62	46	68
4.....	27	4	15	38	60	51	68
5.....	27	4	10	40	55	52	44
6.....	29	4	14	40	55	53	43
7.....	21.5	4	15	34	55	53	44
8.....	9	4	17	36	55	50	38
9.....	14	2	29	42	53	47	38
10.....	13	0	39	52	54	47	44
11.....	9.5	0	44	51	49	46	42
12.....	9	0	46	53	39	46	41
13.....	7.5	0	46	54	33	48	36
14.....	7	0	48	55	32	50	33
15.....	6.5	0	55	56	33	50	33
16.....	6.5	0	47	56	35	48	33
17.....	6.5	0	36	48	31	38	32
18.....	4.5	4	40	48	29	33	32
19.....	3	9	46	46	29	36	31
20.....	5.5	15	53	43	30	38	31
21.....	5.5	20	55	42	31	36	31
22.....	5	20	55	41	32	27	32
23.....	4.5	22	50	38	31	26	33
24.....		31	50	52	28	32	33
25.....		36	50	55	27	37	33
26.....		42	51	70	28	39	28
27.....		41	53	70	27	41	16
28.....		41	45	68	35	40	17
29.....		31	37	63	41	40	22
30.....		28	30	62	46	44	16
31.....			25		46	47	

*Monthly discharge of Joseph canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	13.1	598	July.....	41.4	2,550
April.....	12.5	740	August.....	43.0	2,640
May.....	37.4	2,300	September.....	36.6	2,180
June.....	47.1	2,800			

#### WELLS CANAL NEAR JOSEPH, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 23, T. 25 S., R. 4 W., three-quarters of a mile below head of canal and 2 miles by wagon road south of Joseph, Sevier County.

**RECORDS AVAILABLE.**—April 7, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder with inside and outside staff gages.



*Daily discharge, in second-feet, of Monroe canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	66	19	29	82	87	62	65
2.....	70	19	26	86	90	62	65
3.....	52	19	16	86	92	62	60
4.....	36	19	24	87	92	61	59
5.....	36	19	26	85	92	63	60
6.....	34	19	34	82	93	66	60
7.....	28	20	43	86	92	69	60
8.....	20	20	38	89	94	69	61
9.....	20	34	39	90	93	70	64
10.....	21	35	39	93	90	70	65
11.....	20	13	49	94	80	69	64
12.....	20	1	62	94	72	70	63
13.....	19	1	60	97	73	69	63
14.....	18	2	63	99	74	69	63
15.....	18	3	67	100	74	68	63
16.....	18	1	69	102	72	63	63
17.....	17	0	73	102	70	62	63
18.....	12	2	77	102	70	61	62
19.....	8	1	81	101	70	58	62
20.....	9	1	80	102	70	56	63
21.....	8	4	77	102	68	63	65
22.....	6	10	81	102	64	69	68
23.....	6	11	87	99	64	67	69
24.....		11	87	90	63	66	69
25.....		19	90	90	63	66	69
26.....		46	86	89	63	65	69
27.....		50	80	85	63	65	66
28.....		52	80	85	63	65	68
29.....		46	80	86	64	65	69
30.....		40	77	87	62	65	65
31.....			77		62	65	

*Monthly discharge of Monroe canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	24.4	1,110	July.....	75.5	4,640
April.....	17.9	1,070	August.....	65.2	4,010
May.....	61.2	3,760	September.....	64.2	3,820
June.....	92.5	5,500			

#### ELSINORE CANAL NEAR ELSINORE, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 6, T. 25 S., R. 3 W., 300 yards below head of canal and 2 $\frac{1}{2}$  miles southwest of Elsinore, Sevier County.

**RECORDS AVAILABLE.**—April 11, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading near gage.

**CHANNEL AND CONTROL.**—Bed composed of gravel. Concrete weir 10 feet below gage serves as permanent control.

**DIVERSIONS.**—Above all diversions from canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation changed frequently during the season because of accumulation of moss in the channel. Fairly well-defined standard rating curve used, with shifts to parallel curves. Operation of water-stage recorder

*Monthly discharge of Wells canal near Joseph, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	16.0	730	July.....	22.7	1,400
April 5-30.....	8.9	460	August.....	13.0	799
May.....	28.6	1,760	September.....	19.0	1,130
June.....	31.7	1,890			

#### MONROE CANAL NEAR ELSINORE, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 6, T. 25 S., R. 3 W., 1 mile below head of canal and  $3\frac{1}{2}$  miles southwest of Elsinore, Sevier County.

**RECORDS AVAILABLE.**—April 4, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on left bank, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—One channel at all stages. Bed composed of gravel.

Concrete weir with 18-inch flashboards, 15 feet below gage, serves as control.

**DIVERSIONS.**—Above all diversions.

**REGULATION.**—Flow controlled by head gates.

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

Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph. Records excellent.

Canal diverts water from right bank of Sevier River in NW.  $\frac{1}{4}$  sec. 12, T. 25 S., R. 4 W. Water used for irrigation in and around Monroe.

*Discharge measurements of Monroe canal near Elsinore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 23	J. J. Sanford.....	0.56	10.7	Aug. 21	J. J. Sanford.....	1.47	67
May 12	do.....	1.40	66	Sept. 7	do.....	1.36	60
July 10	W. B. Maughan.....	1.77	92	20	do.....	1.40	63
Aug. 13	do.....	1.48	69				

satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph; shifting-control method used for periods of change. Records fair.

Canal diverts water from left bank of Sevier River just above Denver & Rio Grande Railroad bridge over the river south of Elsinore, in NW.  $\frac{1}{4}$  sec. 6, T. 25 S., R. 3 W. Water used for irrigation in and around Elsinore.

*Discharge measurements of Elsinore canal near Elsinore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 7	J. J. Sanford.....	0.90	6.2	Aug. 20	J. J. Sanford.....	1.68	27.6
23	do.....	.85	4.9	28	do.....	1.57	21.9
May 12	do.....	1.06	11.5	Sept. 7	do.....	1.62	21.2
July 10	W. B. Maughan.....	1.62	29.2	20	do.....	1.50	20.2
Aug. 4	do.....	1.54	24.9				

*Daily discharge, in second-feet, of Elsinore canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1	8		14	31	31	26	19
2	7		14	28	34	25	19
3	7		14	28	33	25	20
4	6		14	26	30	25	22
5	5		12	25	31	21	21
6	5		13	23	32	8	21
7	6		13	26	32	21	21
8	7		12	27	32	29	21
9	7		12	22	30	31	24
10	7		12	25	29	30	24
11	7		11	26	30	30	26
12	5		12	27	33	24	27
13	4		13	34	37	23	27
14	4		13	41	39	23	28
15	3		17	38	40	23	29
16	2		17	33	40	21	26
17	2		18	29	40	16	23
18	2		42	30	38	27	21
19	1		18	33	38	24	21
20	1		16	35	41	26	20
21	1		16	36	42	27	20
22	2		23	34	36	28	19
23	5		28	27	32	25	20
24			30	19	30	23	21
25		5	33	28	30	24	18
26		11	40	35	30	24	17
27		12	38	36	30	23	20
28		12	36	39	32	22	14
29		13	38	38	32	21	12
30		13	42	32	29	20	12
31			34		27	19	

*Monthly discharge of Elsinore canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	4.5	206	July.....	33.5	2,060
April 25-30.....	11.0	131	August.....	23.7	1,460
May.....	21.5	1,320	September.....	21.1	1,260
June.....	30.4	1,810			

#### BROOKLYN CANAL NEAR ELSINORE, UTAH.

**LOCATION.**—In sec. 6, T. 25 S., R. 3 W., a quarter of a mile below head of canal and 2½ miles southwest of Elsinore, Sevier County.

**RECORDS AVAILABLE.**—April 13, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on left bank, with outside and inside staff gages.

**DISCHARGE MEASUREMENTS.**—Made from bridge 75 feet above gage.

**CHANNEL AND CONTROL.**—Bed composed of gravel. Concrete weir with flashboard 200 feet below gage serves as permanent control.

**DIVERSIONS.**—Above all diversions from canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation changed by moss growth in canal during summer. Two well-defined rating curves applicable, respectively, October to July 10, and August 13 to end of season; shifting-control method, July 11 to August 12. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection, except as noted in footnote to table of daily discharge. Records good.

Canal diverts water from right bank of Sevier River near Denver & Rio Grande Railroad bridge over the river south of Elsinore, in sec. 6, T. 25 S., R. 3 W. Water used for irrigation east of Elsinore.

*Discharge measurements of Brooklyn canal near Elsinore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 23	J. J. Sanford.....	2.34	48.1	Aug. 28	J. J. Sanford.....	2.08	33.7
July 10	W. B. Maughan.....	2.41	53	Sept. 7	.....do.....	2.11	35.2
Aug. 4	.....do.....	2.28	40.6	Sept. 20	.....do.....	2.23	41.6
13	.....do.....	2.62	59				

*Daily discharge, in second-feet, of Brooklyn canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	38	12	50	84	57	41	32
2.....	41	12	50	84	57	41	32
3.....	42	12	50	83	56	41	33
4.....	26	12	50	80	58	48	34
5.....	15	12	50	78	58	60	36
6.....	13	12	49	77	60	61	36
7.....	11	8	48	80	61	60	36
8.....	11	4	46	86	60	59	36
9.....	11	3	43	87	57	60	49
10.....	11	3	47	90	52	58	58
11.....	10	7	58	88	51	60	54
12.....	7	6	68	86	50	60	48
13.....	6	6	77	86	51	60	46
14.....	6	17	76	87	50	60	45
15.....		26	78	88	50	60	45
16.....		31	82	90	50	60	45
17.....		36	80	86	49	59	44
18.....		44	84	86	46	53	44
19.....		45	80	90	43	50	42
20.....		50	68	91	42	48	41
21.....		52	76	91	41	46	41
22.....		50	78	91	39	35	41
23.....		49	78	80	39	33	40
24.....		55	78	67	40	34	39
25.....		57	80	58	41	35	38
26.....		58	80	57	41	35	37
27.....		58	80	57	41	35	36
28.....		73	80	57	41	34	35
29.....		62	81	57	41	34	34
30.....		49	82	57	41	33	33
31.....			84		41	33	

NOTE.—Discharge estimated Apr. 1-3, and Sept. 23-30.

*Monthly discharge of Brooklyn canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-14.....	17.7	492	July.....	48.5	2,980
April.....	30.7	1,830	August.....	47.9	2,950
May.....	68.1	4,190	September.....	40.3	2,400
June.....	79.3	4,720			

#### RICHFIELD CANAL NEAR ELSINORE, UTAH.

LOCATION.—In NE.  $\frac{1}{4}$  sec. 6, T. 25 S., R. 3 W., 200 feet below head of canal and 2 miles southwest of Elsinore, Sevier County.

RECORDS AVAILABLE.—April 11, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 75 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Concrete weir, with removable flashboards, 10 feet below gage, served as control until May 10, 1916, when permanent crest was installed.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

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

Canal diverts water from left bank of Sevier River a short distance below Denver & Rio Grande Railroad bridge south of Elsinore, in NW.  $\frac{1}{4}$  sec. 6, T. 25 S., R. 3 W. Water used for irrigation in Sevier Valley west of river, Elsinore and Richfield.

*Discharge measurements of Richfield canal near Elsinore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23	J. J. Sanford.....	1.40	21.2	Aug. 28	J. J. Sanford.....	1.96	70
Apr. 23	.....do.....	1.10	5.4	Sept. 7	.....do.....	2.08	81
May 12	.....do.....	1.80	54	.....do.....	.....do.....	1.97	72
July 10	W. B. Maughan.....	2.29	106				

*Daily discharge, in second-feet, of Richfield canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	75	.....	0	71	48	118	54
2.....	67	.....	0	58	114	117	53
3.....	50	.....	0	57	123	114	61
4.....	41	.....	21	57	131	88	68
5.....	13	.....	21	79	132	116	81
6.....	4	.....	21	94	126	117	81
7.....	10	.....	18	99	124	95	80
8.....	34	.....	14	105	116	93	79
9.....	35	.....	18	111	106	94	87
10.....	37	.....	31	119	100	93	84
11.....	38	.....	52	114	102	93	78
12.....	41	.....	50	102	108	85	80
13.....	37	.....	55	101	110	75	82
14.....	35	.....	74	100	110	79	79
15.....	35	.....	79	105	105	78	79
16.....	33	.....	85	117	102	72	78
17.....	33	.....	81	111	110	60	76
18.....	33	.....	57	107	116	57	74
19.....	33	.....	74	104	117	46	72
20.....	32	11	87	107	118	48	70
21.....	32	41	88	111	119	79	69
22.....	32	8	90	106	114	80	53
23.....	24	12	92	108	113	80	8
24.....	.....	59	94	104	112	78	8
25.....	.....	65	94	105	111	76	49
26.....	.....	66	94	114	112	76	8
27.....	.....	51	95	114	113	75	45
28.....	.....	52	95	126	118	70	47
29.....	.....	24	99	122	118	67	50
30.....	.....	0	101	124	118	62	38
31.....	.....	.....	95	.....	118	58	.....

*Monthly discharge of Richfield canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-23.....	34.9	1,590	July.....	112	6,890
April 20-30.....	35.4	770	August.....	81.9	5,040
May.....	60.5	3,720	September.....	62.4	3,710
June.....	102	6,070			

#### ANNABELLA CANAL AT ELSINORE, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 33, T. 24 S., R. 3 W., about 400 yards below head of canal and 1 mile southeast of Denver & Rio Grande Railroad station at Elsinore, Sevier County.

RECORDS AVAILABLE.—April 11, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder, with outside and inside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading 150 feet below gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. Concrete weir 10 feet below gage serves as permanent control.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

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

Operation of water-stage recorder satisfactory, except for period May 4-11 when clock stopped. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph except as noted in footnote to daily discharge table. Records excellent.

Canal diverts water from right bank of Sevier River in NW.  $\frac{1}{4}$  sec. 33, T. 25 S., R. 3 W. Water used for irrigation in Sevier Valley east of river and below Elsinore.

*Discharge measurements of Annabella canal near Elsinore, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
May 12	J. J. Sanford.....	0.86	17.2	Aug. 20	J. J. Sanford.....	0.88	18.1
July 10	W. B. Maughan.....	1.13	28.2	Sept. 7	.....do.....	.94	22.0
21	.....do.....	1.15	28.4				

*Daily discharge, in second-feet, of Annabella canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	18	.....	23	23	27	25	17
2.....	16	.....	19	19	23	25	15
3.....	12	.....	12	16	26	25	16
4.....	13	.....	12	15	27	28	17
5.....	12	.....	12	14	29	25	19
6.....	10	.....	13	14	38	24	22
7.....	10	.....	14	24	33	22	22
8.....	10	.....	15	32	32	22	20
9.....	10	.....	16	35	30	19	21
10.....	10	.....	17	35	27	19	23
11.....	10	.....	17	33	20	20	20
12.....	11	.....	17	36	15	20	20
13.....	7	.....	17	41	14	20	22
14.....	4	.....	16	43	16	20	21
15.....	4	.....	22	48	16	20	20
16.....	4	.....	27	50	15	20	20
17.....	4	.....	23	43	17	21	20
18.....	2	.....	30	41	20	20	19
19.....	2	.....	38	38	22	19	19
20.....	2	.....	36	35	21	20	19
21.....	1	2	34	32	20	19	19
22.....	1	12	31	32	14	20	20
23.....	.....	21	32	17	14	20	20
24.....	.....	15	37	18	14	20	19
25.....	.....	18	38	26	15	19	17
26.....	.....	24	40	17	15	23	20
27.....	.....	32	39	30	20	24	22
28.....	.....	30	37	30	24	22	24
29.....	.....	21	38	30	24	22	24
30.....	.....	22	39	30	24	21	24
31.....	.....	.....	31	.....	24	18	.....

NOTE.—Discharge interpolated, May 4-11.

*Monthly discharge of Annabella canal near Elsinore, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-22.....	7.9	345	July.....	21.8	1,340
April 21-30.....	19.7	391	August.....	21.3	1,310
May.....	25.5	1,570	September.....	20.0	1,190
June.....	29.9	1,780			

#### VERMILION CANAL NEAR RICHFIELD, UTAH.

LOCATION.—NW.  $\frac{1}{4}$  sec. 32, T. 23 S., R. 2 W., 500 feet below head-of canal and  $2\frac{1}{2}$  miles east of Richfield, Sevier County.

RECORDS AVAILABLE.—April 10, 1914, to September 30, 1917; during irrigation seasons only.

GAGE.—Stevens water-stage recorder on right bank, with inside and outside staff gages.

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

CHANNEL AND CONTROL.—Bed composed of sandy loam. Concrete weir 10 feet below gage serves as nominal control, but owing to the light grade of the canal, growth of moss and deposits of sand cause changes in the rating.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent; affected by growth of moss in canal. Fairly well defined rating curve directly applicable until June 6; used as standard curve with shifting-control method for remainder of the year. Operation of water-stage recorder satisfactory except for period August 8-13. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except as noted in footnote to daily discharge table. Records good.

Canal diverts water from left bank of Sevier River in NW.  $\frac{1}{4}$  sec. 32, T. 23 S., R. 4 W. Water use for irrigation in Sevier Valley west of river and northeast of Richfield, toward Vermilion.

*Discharge measurements of Vermilion canal near Richfield, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	0.37	13.8	Aug. 15	J. J. Sanford.....	2.05	66
Apr. 21	do.....	1.08	45.0	27	do.....	2.18	69
May 12	do.....	1.74	72	Sept. 10	do.....	2.40	75
July 11	W. B. Maughan.....	1.92	85	19	do.....	2.47	79
Aug. 1	do.....	2.34	88				



*Daily discharge, in second-feet, of Vermilion canal near Richfield, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	86	44	80	83	104	88	70
2.....	97	44	79	82	94	86	64
3.....	62	44	78	78	88	86	65
4.....	36	42	78	74	86	86	66
5.....	38	42	78	61	92	79	65
6.....	34	42	77	80	93	74	64
7.....	28	43	76	83	96	74	72
8.....	22	45	74	76	100	74	73
9.....	21	48	74	80	101	73	67
10.....	20	48	73	85	92	72	73
11.....	18	45	73	86	82	71	74
12.....	18	48	73	81	78	70	74
13.....	17	46	66	76	74	69	78
14.....	14	55	42	75	70	69	76
15.....	29	56	42	76	68	68	76
16.....	61	56	44	76	68	67	76
17.....	58	64	51	80	66	70	76
18.....	44	61	61	90	67	68	76
19.....	21	54	71	88	66	63	77
20.....	21	48	81	85	64	66	77
21.....	20	45	91	82	63	76	74
22.....	17	46	88	82	74	35	80
23.....	14	50	88	83	89	20	83
24.....	13	42	88	74	88	70	82
25.....		39	88	54	86	71	80
26.....		44	88	0	88	74	81
27.....		58	89	0	89	70	88
28.....		66	90	34	90	70	87
29.....		80	92	78	87	68	90
30.....		80	88	91	89	68	69
31.....			76		91	69	

NOTE.—Discharge estimated Apr. 1-2 and Aug. 8-13.

*Monthly discharge of Vermilion canal near Richfield, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October 1-24.....	33.7	1,600	July.....	83.3	5,120
April.....	50.8	3,020	August.....	69.8	4,290
May.....	75.4	4,640	September.....	75.1	4,470
June.....	72.4	4,310			

#### ROCKYFORD CANAL NEAR VERMILION, UTAH.

LOCATION.—In NE.  $\frac{1}{4}$  sec. 19, T. 22 S., R. 1 W., at highway bridge a quarter of a mile below head of canal and 2 miles northeast of Vermilion, Sevier County.

RECORDS AVAILABLE.—July 8, 1914, to September 30, 1917.

GAGE.—Vertical staff nailed to right bridge abutment; read by Mrs. Will Barron.

DISCHARGE MEASUREMENTS.—Made from highway bridge at gage, or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and clay; fairly permanent.

ICE.—No information.

DIVERSIONS.—Not known.

REGULATIONS.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent; affected by ice during January.

Rating curves poorly defined, but changes in rating fairly well determined by discharge measurements. Gage read to tenths twice daily during irrigation season and several times a week during remainder of year. Daily discharge ascertained by applying mean daily gage height to rating table, and interpolating for days when gage was not read; shifting-control method used for large part of the year.

Records fair.

Canal diverts water from Rockyford reservoir, a small reservoir on Sevier River at Vermilion, in sec. 19, T. 22 S., R. 2 W. Flow dependent on water stored in reservoir and seepage and return waters below Richfield. Water used for irrigation north of Vermilion.

*Discharge measurements of Rockyford canal near Vermilion, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	1.32	31.9	Aug. 1	W. B. Maughan.....	2.27	78
Jan. 17	do.....	a 1.20	9.3	15	J. J. Sanford.....	2.36	83
Mar. 12	L. W. Jordan.....	.73	11.4	28	do.....	2.20	74
Apr. 20	J. J. Sanford.....	1.50	41.9	Sept. 12	do.....	2.54	88
May 11	do.....	2.06	69	24	do.....	1.72	55
July 13	W. B. Maughan.....	2.34	85				

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Rockyford canal near Vermilion, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	50	34	a 23	a 9	9	16	69	74	96	85	100
2.....	41	30	23	9	a 9	16	a 66	74	97	85	100
3.....	41	30	23	a 9	9	a 14	64	80	a 92	a 85	100
4.....	41	30	a 22	9	a 10	12	a 60	a 80	a 87	85	100
5.....	45	30	20	a 9	12	12	55	80	82	85	100
6.....	45	a 32	19	a 9	12	12	55	80	82	a 85	100
7.....	56	a 35	a 19	9	a 12	a 12	a 55	a 80	82	85	99
8.....	69	38	a 19	a 9	a 12	a 12	55	80	82	85	99
9.....	69	a 38	19	a 9	12	a 0	a 56	80	98	a 85	98
10.....	69	a 38	19	9	a 12	a 0	a 58	80	a 98	85	98
11.....	69	38	a 18	9	12	a 0	59	a 82	99	85	98
12.....	69	38	a 17	a 8	12	46	12	85	a 99	85	97
13.....	69	a 34	16	a 7	30	46	12	91	100	a 85	98
14.....	69	a 30	a 16	6	a 30	46	a 18	91	106	85	99
15.....	69	a 26	a 16	a 4	a 30	a 0	23	a 93	106	85	62
16.....	69	23	16	3	a 30	35	64	96	a 105	a 85	54
17.....	69	a 23	16	a 3	30	a 45	a 72	96	105	85	46
18.....	38	23	a 16	3	a 30	55	80	96	99	85	46
19.....	39	23	16	a 4	30	38	80	a 96	a 98	85	47
20.....	39	a 23	a 15	a 5	a 30	42	80	96	98	85	48
21.....	38	23	a 14	6	a 30	38	80	96	98	a 85	48
22.....	38	a 23	a 13	a 6	30	38	a 80	96	98	85	49
23.....	30	a 23	12	a 6	a 30	50	80	96	a 98	85	50
24.....	30	a 23	12	6	30	a 50	80	96	98	a 85	50
25.....	30	23	a 12	a 6	30	50	80	96	a 97	85	52
26.....	30	a 23	a 12	6	a 0	50	a 80	a 96	97	85	54
27.....	30	23	12	a 7	a 0	a 59	80	96	81	85	54
28.....	30	a 23	a 12	a 8	16	69	80	96	80	74	5p
29.....	30	a 23	a 12	.....	16	69	80	a 96	a 80	85	57
30.....	30	23	12	.....	16	69	a 80	a 96	a 80	a 85	57
31.....	30	.....	12	.....	16	.....	80	.....	80	101	.....

<sup>a</sup> Interpolated.

*Monthly discharge of Rockyford canal near Vermilion, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	47.5	2,920	May.....	63.6	3,910
November.....	28.2	1,680	June.....	89.0	5,300
December.....	16.2	996	July.....	93.5	5,750
January.....	a 9.5	585	August.....	85.2	5,240
February.....	6.9	383	September.....	73.8	4,390
March.....	18.9	1,160	The year.....		34,300
April.....	33.1	1,970			

a Estimated because of ice.

#### SALINA CREEK AT SALINA, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 25, T. 21 S., R. 1 W., at bridge south of hotel at Salina, Sevier County, 1 mile above mouth of creek.

DRAINAGE AREA.—298 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 25, 1914, to September 30, 1917. July 1 to December 31, 1900, at vertical staff gage about 5 miles southeast of Salina.

GAGE.—March 23, 1915, to September 30, 1917, vertical staff gage nailed to right bridge abutment a quarter of a mile south of hotel; April 25, 1914, to March 22, 1915, a vertical staff nailed to right abutment of bridge on depot road in SE.  $\frac{1}{4}$  sec. 23.

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

CHANNEL AND CONTROL.—Bed composed of gravel; shifts during extremely high water.

EXTREMES OF DISCHARGE.—1914-1917: Maximum stage recorded, 5.20 feet May 22, 1914 (discharge, 270 second-feet); minimum stage, zero flow at times.

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

DIVERSIONS.—Below all diversions.

REGULATION.—None.

ACCURACY.—Owing to unreliability of gage-height record and instability of control, daily discharge was not determined.

*Discharge measurements of Salina Creek at Salina, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	J. J. Sanford.....	1.26	7.85	July 13	W. B. Maughan.....	1.01	0.66
Jan. 17	.....do.....	3.20	27.4	.....29	.....do.....	1.66	7.0
Mar. 12	L. W. Jordan.....	1.04	17.4	Sept. 4	J. J. Sanford.....	1.42	1.2
May. 8	J. J. Sanford.....	1.70	46.3				

#### WEST VIEW CANAL AT REDMOND, UTAH.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 7, T. 21 S., R. 1 E., 100 yards above bridge where depot road crosses canal, at southeast corner of Redmond, Sevier County, three-quarters of a mile below head of canal.

RECORDS AVAILABLE.—April 22, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on right bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading just below gage.

CHANNEL AND CONTROL.—Earth section. Wooden submerged weir at head of wooden flume 30 feet below gage acts as nominal control, though filling in of sand behind the weir causes changes in stage-discharge relation.

DIVERSIONS.—Above all diversions.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation considered permanent during 1917. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection, except as noted in footnote to daily-discharge table. Records good.

Canal diverts water from left bank of Sevier River in SW.  $\frac{1}{4}$  sec. 7, T. 21 S., R. 1 E. Water used for irrigation west of river and below Redmond.

*Discharge measurements of West View canal at Redmond, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 10.....	4.88	12.0	June 23.....	5.55	27.8	Aug. 1.....	5.46	26.8
23.....	4.69	7.4	30.....	5.92	37.0	13.....	5.47	27.4
Nov. 3.....	4.49	3.0	July 9.....	6.11	41.9	25.....	5.32	24.5
May 14.....	4.45	1.6	15.....	5.21	21.5	Sept. 13.....	5.25	22.7
28.....	5.23	20.6	18.....	4.94	14.8	29.....	5.75	31.0
June 2.....	5.41	23.8						

*Daily discharge, in second-feet, of West View canal at Redmond, Utah, for the year ending Sept. 30, 1917:*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	32	-----	25	27	19	18	16.....	2	31	0	16	25	26
2.....	22	-----	23	24	14	17	17.....	9	22	12	16	24	26
3.....	24	-----	21	29	15	16	18.....	16	16	12	14	25	22
4.....	27	-----	21	32	15	16	19.....	16	13	27	15	6	21
5.....	25	-----	19	34	19	21	20.....	8	22	22	14	0	22
6.....	19	-----	18	38	25	23	21.....	8	21	20	15	0	24
7.....	14	-----	17	34	25	19	22.....	9	19	19	18	10	24
8.....	14	-----	19	36	26	13	23.....	8	19	26	16	24	25
9.....	14	-----	19	32	27	18	24.....	21	25	22	25	26	26
10.....	11	-----	18	21	22	17	25.....	21	17	28	23	26	26
11.....	6	28	16	12	19	18	26.....	-----	19	28	17	24	26
12.....	6	28	13	14	22	19	27.....	-----	18	29	18	27	27
13.....	4	17	21	20	27	24	28.....	-----	20	28	15	28	29
14.....	3	3	33	20	29	21	29.....	-----	21	31	16	22	31
15.....	2	14	16	18	26	23	30.....	-----	25	33	21	17	32
							31.....	-----	25	-----	23	19	-----

NOTE.—Discharge estimated, Oct. 24-31, 5 second-feet. Discharge interpolated, Sept. 22-23. Daily discharge Aug. 19 and 22, is mean of hourly discharge.

*Monthly discharge of West View canal at Redmond, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	10.9	670	July.....	21.8	1,340
May 11-31.....	20.1	840	August.....	20.3	1,250
June.....	20.9	1,240	September.....	22.3	1,330

## FAYETTE CANAL NEAR CENTERFIELD, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 8, T. 20 S., R. 1 E., half a mile below head of canal, 2 miles northwest of Axtel depot, and 4 miles south of Centerfield, Sanpete County.

**RECORDS AVAILABLE.**—April 21, 1914, to September 30, 1917; irrigation seasons only.

**GAGE.**—Stevens water-stage recorder on right bank, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Earth section. Wooden flume with crest board at upper end, 50 feet below gage, serves as control.

**DIVERSIONS.**—Above all diversions from canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage discharge relation permanent; affected by backwater, June 19–24.

Rating curve fairly well defined. Control remained permanent during 1917 season. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph except as noted in footnote to daily-discharge table. Records good.

Canal diverts water from right side of Sevier River in NE.  $\frac{1}{4}$  sec. 18, T. 20 S., R. 1 E., for irrigation near Gunnison and Fayette.

*Discharge measurements of Fayette canal near Centerfield, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 23.....	2.15	21.3	July 6.....	2.44	33.7	Aug. 20.....	2.41	30.3
May 14.....	2.46	35.6	July 30.....	2.29	23.2	Sept. 13.....	2.24	21.7
June 23.....	2.62	36.3						

*Daily discharge, in second-feet, of Fayette canal near Centerfield, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	53	.....	28	41	23	28	16.....	29	21	53	26	34	20
2.....	51	.....	28	33	23	28	17.....	31	18	55	27	34	21
3.....	50	.....	32	28	24	26	18.....	27	26	46	21	30	20
4.....	50	.....	31	28	23	25	19.....	27	29	55	18	28	18
5.....	50	.....	30	28	24	27	20.....	25	31	60	18	31	18
6.....	48	.....	27	31	25	31	21.....	23	33	45	17	28	18
7.....	44	.....	21	30	25	32	22.....	23	31	40	18	28	18
8.....	44	.....	21	28	25	31	23.....	22	36	35	21	26	20
9.....	40	.....	18	35	24	31	24.....	.....	43	35	28	25	21
10.....	41	.....	15	46	26	32	25.....	.....	44	34	59	28	21
11.....	39	30	28	46	28	26	26.....	.....	38	28	52	32	21
12.....	40	30	28	30	28	16	27.....	.....	34	26	26	31	21
13.....	33	28	35	18	30	18	28.....	.....	43	17	29	31	24
14.....	32	33	46	15	30	21	29.....	.....	49	14	26	29	28
15.....	31	29	66	20	34	21	30.....	.....	52	23	26	29	23
							31.....	.....	37	.....	25	28	.....

NOTE.—Discharge estimated Oct. 24–31, 21 second-feet. Discharge estimated because of backwater, June 19–24.

*Monthly discharge of Fayette canal near Centerfield, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	32.9	2,020	July.....	28.8	1,770
May 11–31.....	34.0	1,420	August.....	27.9	1,720
June.....	34.2	2,040	September.....	23.5	1,400

## DOVER CANAL NEAR GUNNISON, UTAH.

LOCATION.—About on line between secs. 23 and 24, T. 19 S., R. 1 W., half a mile below head of canal and  $3\frac{1}{2}$  miles west of Gunnison, Sanpete County.

RECORDS AVAILABLE.—April 21, 1914, to September 30, 1917; irrigation seasons only.

GAGE.—Stevens water-stage recorder on left bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Earth section. Canal carries large quantities of silt and has very low grade. A submerged weir, 30 feet below gage, serves as control, but stage-discharge relation is at times affected by backwater from below the weir.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed several times due to manipulation of the flashboards below gage. Rating curves poorly defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except as noted in footnote to daily-discharge table; shifting-control method used for several periods. Records fair.

Canal diverts water from left bank of Sevier River in SW.  $\frac{1}{4}$  sec. 24, T. 19 S., R. 1 W., about  $1\frac{1}{2}$  miles above confluence of San Pitch and Sevier rivers. Water used for irrigation.

*Discharge measurements of Dover canal near Gunnison, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9.....	4.97	13.7	June 18.....	5.90	31.5	July 31.....	5.55	22.8
24.....	4.94	12.0	23.....	5.69	26.4	Aug. 22.....	5.88	38.3
May 24.....	6.02	44.7	July 9.....	5.72	28.8			

*Daily discharge, in second-feet, of Dover canal near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	54	.....	30	24	0	32	16.....	24	32	40	32	31	26
2.....	42	.....	30	23	0	31	17.....	13	30	38	28	28	28
3.....	31	.....	33	23	17	28	18.....	13	32	32	25	34	28
4.....	41	.....	40	22	50	26	19.....	12	33	32	23	43	27
5.....	41	.....	49	23	42	25	20.....	12	35	40	22	42	25
6.....	56	.....	48	25	38	25	21.....	12	38	34	22	39	24
7.....	49	.....	46	30	37	25	22.....	12	40	28	22	34	25
8.....	13	.....	42	29	30	24	23.....	12	42	26	22	26	26
9.....	9	.....	38	38	37	24	24.....	12	43	32	20	28	28
10.....	7	.....	26	36	49	27	25.....	.....	41	33	34	28	30
11.....	7	36	30	32	42	38	26.....	.....	38	18	32	20	26
12.....	6	34	34	24	41	45	27.....	.....	38	48	36	28	23
13.....	19	33	34	25	33	28	28.....	.....	37	38	32	39	27
14.....	26	36	34	38	30	24	29.....	.....	40	32	26	34	27
15.....	30	34	40	38	34	27	30.....	.....	44	30	43	34	25
							31.....	.....	36	.....	16	32	.....

NOTE.—Discharge estimated Oct. 25–31, 11 second-feet.

*Monthly discharge of Dover canal near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	20.0	1,230	July.....	27.9	1,720
May 11-31.....	36.8	1,530	August.....	32.3	1,990
June.....	35.2	2,090	September.....	27.4	1,630

**SAN PITCH RIVER NEAR GUNNISON, UTAH.**

**LOCATION.**—In NW.  $\frac{1}{4}$  SW.  $\frac{1}{4}$  sec. 13, T. 19 S., R. 1 W., one-fifth of a mile below a small diversion dam, half a mile above confluence with Sevier River, and 3 miles west of Gunnison, Sanpete County.

**DRAINAGE AREA.**—886 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—February 21, 1912, to September 30, 1917. June 30, 1900, to December 31, 1905, at a point about 4 miles northeast of Gunnison.

**GAGE.**—Stevens continuous water-stage recorder on right bank, at new datum, May 18, 1914, to September 30, 1917; vertical staff on left bank about one-fifth of a mile below small diversion dam, February 21, 1912, to May 17, 1914.

**DISCHARGE MEASUREMENTS.**—Made from cable about 10 feet below gage, from bridge just below gage, or by wading.

**CHANNEL AND CONTROL.**—Bed composed of sand and gravel; shifting. Right bank is high; left is low and subject to overflow.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 3.33 feet at 7 a. m., June 18 (discharge, 494 second-feet); stream dry September 19-24 (stage of 0 flow about 0.8 foot).

1912-1917: Maximum stage recorded, 3.85 feet at 4 a. m., March 22, 1915 (discharge, 608 second-feet); stream dry September 19-24, 1917.

**ICE.**—Stage-discharge relation seriously affected by ice; station discontinued temporarily during period December to March.

**DIVERSIONS.**—In years of normal flow practically all the water of this stream is used for irrigation in Sanpete Valley and in vicinity of Gunnison. Winter and spring run-off is stored in Gunnison reservoir, about 7 miles above Gunnison. At times part of water flowing past gage is waste from Kearns-Robbins (Fayette) canal (diverting from Sevier River), which crosses San Pitch River about half a mile above gage.

**REGULATION.**—Flow controlled by Gunnison reservoir. See "Diversions."

**ACCURACY.**—Stage-discharge relation changed by high water about June 1; affected by ice, December to March. Two well-defined rating curves applicable, respectively, October 1 to May 29 and June 4 to September 30; shifting-control method used for period, May 30 to June 3. Operation of water-stage recorder, in general, satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for periods noted in footnote to daily-discharge table. Records good.

*Discharge measurements of San Pitch River near Gunnison, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 9	E. A. Porter.....	1.30	2.4	May 1	E. A. Porter.....	2.34	123
24	do.....	1.38	4.0	28	do.....	2.18	84
Dec. 5	do.....	1.66	13.0	June 1	do.....	2.82	345
Jan. 16	J. J. Sanford.....	a 2.50	1.7	4	do.....	2.42	173
Feb. 16	E. A. Porter.....	(a)	3.5	22	do.....	2.94	329
Apr. 1	do.....	3.31	443	29	do.....	1.50	23.6
9	do.....	2.72	210	Sept. 15	do.....	1.08	2.8
23	do.....	1.91	41.2				

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of San Pitch River near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	0	2	16	.....	401	123	345	10	1	1
2.....	0	2	16	.....	341	117	261	10	1	1
3.....	0	3	14	.....	267	121	202	7	1	3
4.....	0	3	14	.....	225	94	165	4	1	2
5.....	0	2	14	.....	125	64	158	4	1	1
6.....	0	3	14	.....	114	58	163	5	1	4
7.....	0	5	16	.....	216	36	161	4	0	4
8.....	0	5	.....	.....	298	14	139	4	0	3
9.....	2	5	.....	.....	207	19	175	4	7	3
10.....	2	5	.....	.....	158	14	347	4	18	3
11.....	2	2	.....	.....	160	7	301	4	14	4
12.....	3	1	.....	.....	158	12	224	3	16	2
13.....	11	0	.....	.....	104	14	141	3	14	2
14.....	11	0	.....	.....	67	62	100	3	11	3
15.....	5	0	.....	.....	62	246	205	3	7	3
16.....	5	0	.....	.....	39	160	355	2	7	2
17.....	5	0	.....	.....	76	106	387	2	5	1
18.....	5	0	.....	.....	170	67	444	1	4	1
19.....	5	0	.....	.....	106	12	407	1	3	0
20.....	5	0	.....	.....	72	4	403	1	3	0
21.....	5	1	.....	.....	62	6	339	1	3	0
22.....	5	28	.....	.....	49	4	284	1	3	0
23.....	4	17	.....	.....	43	2	210	1	3	0
24.....	3	16	.....	.....	36	4	205	1	2	0
25.....	3	16	.....	.....	18	5	202	1	2	2
26.....	3	16	.....	17	29	29	224	1	2	1
27.....	3	16	.....	40	55	123	131	1	4	1
28.....	3	16	.....	110	58	106	46	2	4	3
29.....	3	16	.....	210	132	92	22	2	3	2
30.....	2	16	.....	377	160	277	6	2	2	7
31.....	2	.....	.....	496	.....	457	.....	2	2	.....

NOTE.—Stream frozen over Dec. 8 to Feb. 28. No flow Mar. 1-25.

*Monthly discharge of San Pitch River near Gunnison, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	14	0	3.2	200
November.....	28	0	6.5	390
December.....	.....	.....	6.0	370
January.....	.....	.....	2.0	120
February.....	.....	.....	2.0	110
March.....	.....	.....	40	2,460
April.....	401	18	134	7,970
May.....	457	2	79.2	4,870
June.....	444	6	225	13,400
July.....	10	1	3.0	190
August.....	18	1	4.7	290
September.....	4	0	2.0	120
The year.....	457	0	42.1	30,500

°Estimated.



## WELLINGTON CANAL NEAR MILLS, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 3, T. 16 S., R. 2 W., 300 feet below wasteway, 2 miles below canal heading, and 4 miles north of Mills post office, Juab County.

RECORDS AVAILABLE.—June 1, 1914, to September 30, 1917, irrigation seasons only; miscellaneous measurements in 1913.

GAGE.—Stevens water-stage recorder, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge 250 feet above gage.

CHANNEL AND CONTROL.—Bed composed of fine gravel and sand; growth of moss and weeds causes backwater at gage during part of irrigation season.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation subject to frequent changes due to backwater from moss growth below station, and to flat gradient of canal. Rating curves poorly defined. Water-stage recorder not operating at times due to clock stopping. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting from recorder graph; shifting-control method used for short periods; discharge estimated for periods when recorder was out of order. Records poor.

Canal diverts water from left bank of Sevier River in NE.  $\frac{1}{4}$  sec. 15, T. 16 S., R. 2 W. Water used for irrigation west of Sevier River, around Mills.

*Discharge measurements of Wellington canal near Mills, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
May 16.....	1.95	21.4	July 19.....	1.78	12.6	Sept. 4.....	1.86	18.8
June 6.....	1.63	15.6	Aug. 8.....	1.27	6.1	26.....	1.78	17.2
26.....	1.91	16.6						

*Daily discharge, in second-feet, of Wellington canal near Mills, Utah, for the year ending Sept. 30, 1917.*

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1.....	0	14	4	17	16.....	17	14	9	16
2.....	0	15	4	17	17.....	16	13	9	16
3.....	0	17	5	17	18.....	16	13	7	16
4.....	0	16	5	19	19.....	15	12	9	16
5.....	9	16	5	19	20.....	15	12	9	16
6.....	15	16	5	19	21.....	16	11	10	16
7.....	15	0	6	17	22.....	17	10	11	16
8.....	16	0	6	17	23.....	17	10	15	16
9.....	17	0	7	16	24.....	18	10	16	16
10.....	19	0	7	16	25.....	17	9	17	16
11.....	21	0	7	16	26.....	17	10	17	17
12.....	21	0	7	16	27.....	16	9	17	16
13.....	19	9	7	16	28.....	15	9	17	16
14.....	17	12	7	16	29.....	15	9	17	16
15.....	17	14	8	16	30.....	15	8	17	16
					31.....		8	17	.....

*Monthly discharge of Wellington canal near Mills, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
June.....	14.3	850	September.....	16.5	982
July.....	9.55	587	The period.....		3,020
August.....	9.81	603			

# **SEVIER RIVER LAND & WATER CO.'S CANAL NEAR LEAMINGTON, UTAH.**

**LOCATION.**—In sec. 28, T. 14 S., R. 3 W., 200 feet below head of canal, half a mile above old Parley siding on Los Angeles & Salt Lake Railroad, and 7 miles northeast of Leamington, Millard County.

**RECORDS AVAILABLE.**—April 21, 1914, to September 30, 1917.

**GAGE.**—Stevens water-stage recorder on left bank, 100 feet above second tunnel, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made from footbridge 400 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and clay. Sill of tunnel serves as control.

**ICE.**—Canal freezes over during winter when water is usually being diverted for storage in Fool Creek reservoir.

**DIVERSIONS.**—None above station from this canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent during 1917 season; changed during preceding winter by enlargement of canal. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for period November 14 to May 2, when the canal was dry. Records excellent.

Canal diverts water from left bank of Sevier River just below reservoir, in SE.  $\frac{1}{4}$  sec. 28, T. 14 S., R. 3 W. Water used for irrigation and for storage in Fool Creek reservoir.

*Discharge measurements of Sevier River Land & Water Co.'s canal near Leamington, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 7	E. A. Porter.....	1.18	22.5	June 7	E. A. Porter.....	2.84	102
31	.....do.....	.63	10.8	26	.....do.....	3.82	187
May 14	E. A. Jacob.....	1.17	25.9	Aug. 9	.....do.....	3.83	160
18	E. A. Porter.....	2.95	114	Sept. 6	.....do.....	4.38	208
18	.....do.....	2.42	83	27	.....do.....	4.42	205
18	.....do.....	1.66	45.5				

*Daily discharge, in second-feet, of Sevier River Land & Water Co.'s canal near Leamington, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	May.	June.	July.	Aug.	Sept.
1.....	124	11	.....	106	161	134	201
2.....	110	11	.....	103	156	0	201
3.....	112	11	12	101	158	0	202
4.....	34	11	23	102	161	0	209
5.....	28	11	23	102	163	0	209
6.....	24	11	23	104	175	0	206
7.....	22	11	23	104	181	37	206
8.....	20	11	23	104	186	131	204
9.....	23	11	23	109	177	168	204
10.....	28	11	24	115	175	180	176
11.....	28	11	24	118	165	182	127
12.....	28	11	24	126	166	182	126
13.....	28	8	24	138	166	187	160
14.....	28	.....	25	136	166	171	189
15.....	28	.....	64	141	168	124	187
16.....	28	.....	99	153	169	78	204
17.....	25	.....	106	154	170	94	206
18.....	28	.....	101	157	171	109	172
19.....	34	.....	102	118	172	144	172
20.....	34	.....	109	132	171	152	208
21.....	23	.....	115	132	170	111	207
22.....	16	.....	122	142	168	110	209
23.....	25	.....	124	148	157	111	150
24.....	33	.....	133	155	153	123	80
25.....	32	.....	138	161	152	142	174
26.....	30	.....	138	166	152	127	208
27.....	29	.....	114	168	150	149	208
28.....	29	.....	108	148	149	182	209
29.....	30	.....	104	161	150	186	198
30.....	22	.....	109	163	146	189	172
31.....	11	.....	108	.....	141	199	.....

NOTE.—No flow Nov. 14 to May 2.

*Monthly discharge of Sevier River Land & Water Co.'s canal near Leamington, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	35.3	2,170	August.....	119	7,320
November 1-13.....	10.8	278	September.....	186	11,100
May 3-31.....	75.9	4,290			
June.....	129	7,680	The year.....	.....	42,800
July.....	163	10,000			

#### MCINTYRE CANAL AT LEAMINGTON, UTAH.

LOCATION.—Below last spillway, 600 yards north of Neilson Hotel at Leamington Millard County. During irrigation seasons of 1914 to 1916 station was in NW.  $\frac{1}{4}$  sec. 32, T. 14 S., R. 3 W., 400 feet below canal intake.

RECORDS AVAILABLE.—May 5, 1914, to September 30, 1917; irrigation seasons only; miscellaneous measurements in 1913.

GAGE.—Staff gage on left bank, May 11 to September 30, 1917; read by Wells Neilson. Stevens water-stage recorder on right bank, with inside and outside staff gages operated during irrigation seasons 1914, 1915, and 1916.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Moss and weeds grow in canal during irrigation season.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation not permanent. Measuring section poor on account of flat gradient and vegetation. Rating curves poorly defined. Staff gage read three or four times a week. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used for periods of change; discharge interpolated for days when gage was not read. Records poor.

Canal diverts water from right bank of Sevier River in SE.  $\frac{1}{4}$  sec. 29, T. 14 S., R. 3 W. Water used for irrigation west of river, around Leamington.

*Discharge measurements of McIntyre canal at Leamington, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 7.....	1.47	9.1	May 17.....	1.30	7.7	July 19.....	2.36	27.4
27.....	1.44	14.8	17.....	1.14	5.0	Aug. 8.....	2.14	13.8
May 16.....	1.68	16.5	June 6.....	2.02	15.9	Sept. 6.....	3.00	28.1
17.....	1.54	12.6	26.....	2.46	24.7	26.....	2.78	11.0

*Daily discharge, in second-feet, of McIntyre canal at Leamington, Utah, for the year ending Sept. 30, 1917.*

Day	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	12		13	$\alpha$ 26	18	26	16.....	18	16	22	31	21	$\alpha$ 20
2.....	9		11	$\alpha$ 27	$\alpha$ 17	$\alpha$ 26	17.....	17	12	$\alpha$ 22	$\alpha$ 30	$\alpha$ 21	19
3.....	15		$\alpha$ 10	28	16	26	18.....	16	15	22	28	21	$\alpha$ 19
4.....	14		8	$\alpha$ 28	15	26	19.....	16	15	$\alpha$ 22	27	$\alpha$ 21	19
5.....	11		$\alpha$ 12	28	$\alpha$ 15	26	20.....	16	$\alpha$ 18	$\alpha$ 23	$\alpha$ 27	21	$\alpha$ 18
6.....	11		16	$\alpha$ 29	$\alpha$ 15	28	21.....	16	22	23	27	$\alpha$ 21	17
7.....	15		$\alpha$ 18	30	15	$\alpha$ 27	22.....	17	$\alpha$ 12	$\alpha$ 23	$\alpha$ 27	$\alpha$ 21	16
8.....	11		20	15	14	26	23.....	16	2	23	28	21	$\alpha$ 15
9.....	12		21	0	17	$\alpha$ 26	24.....	17	$\alpha$ 12	$\alpha$ 23	$\alpha$ 27	$\alpha$ 23	$\alpha$ 14
10.....	16		$\alpha$ 21	0	$\alpha$ 17	27	25.....	16	21	24	26	25	13
11.....	18	19	$\alpha$ 21	$\alpha$ 15	17	$\alpha$ 26	26.....	15	20	24	$\alpha$ 25	$\alpha$ 25	11
12.....	17	19	$\alpha$ 21	30	$\alpha$ 16	26	27.....	15	$\alpha$ 15	27	$\alpha$ 24	25	10
13.....	16	$\alpha$ 18	21	$\alpha$ 30	16	$\alpha$ 24	28.....	15	8	$\alpha$ 25	23	$\alpha$ 18	$\alpha$ 10
14.....	18	$\alpha$ 18	$\alpha$ 21	31	$\alpha$ 18	$\alpha$ 23	29.....	15	$\alpha$ 12	23	$\alpha$ 22	11	9
15.....	18	$\alpha$ 17	21	$\alpha$ 31	$\alpha$ 20	22	30.....	16	15	26	20	$\alpha$ 16	8
							31.....	17	14		19	$\alpha$ 21	

$\alpha$  Interpolated.

*Monthly discharge of McIntyre canal at Leamington, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	15.2	935	July.....	24.5	1,510
May 11-31.....	15.2	635	August.....	18.6	1,140
June.....	20.2	1,200	September.....	20.1	1,200

## LEAMINGTON CANAL NEAR LEAMINGTON, UTAH.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 32, T. 14 S., R. 3 W., 200 feet below head of canal and 6 miles northeast of Leamington, Millard County.

**RECORDS AVAILABLE.**—April 20, 1914, to September 30, 1917; irrigation seasons only; miscellaneous measurements in 1913.

**GAGE.**—Stevens water-stage recorder on right bank, with inside and outside staff gages.

**DISCHARGE MEASUREMENTS.**—Made by wading or from footbridge 150 feet below gage.

**CHANNEL AND CONTROL.**—Bed composed of gravel. Concrete wall, about 6 feet below gage serves as control but gravel fills in at times between gage and control, causing changes in stage-discharge relation. Growth of moss in canal below control causes backwater at times, except for low stages.

**DIVERSIONS.**—Above all diversions from canal.

**REGULATION.**—Flow controlled by head gates.

**ACCURACY.**—Stage-discharge relation permanent except for period July 9–31 when heavy moss growth produced backwater effect over control at stages exceeding 2 feet. One well-defined rating curve used. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for period noted above. Records good.

Canal diverts water from left bank of Sevier River, in SW.  $\frac{1}{4}$  sec. 32, T. 14 S., R. 3 W. Water used for irrigation around Leamington, east of river.

*Discharge measurements of Leamington canal near Leamington, Utah, during the year ending Sept. 30, 1917.*

[Made by E. A. Porter.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 7.....	1.12	<sup>a</sup> 1.0	June 7.....	1.74	22.6
31.....	1.51	9.6	7.....	1.58	12.3
May 18.....	2.08	45.7			

<sup>a</sup> Estimated.

*Daily discharge, in second-feet, of Leamington canal near Leamington, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	May.	June.	July.	Aug.	Sept.	Day.	Oct.	May.	June.	July.	Aug.	Sept.
1.....	18		24	30	35	31	16.....	8	49	31		27	16
2.....	14		23	26	30	30	17.....	7	50	31		29	16
3.....	13		22	25	30	29	18.....	5	46	32		28	17
4.....	6		22	25	30	29	19.....	6	37	32	31	27	18
5.....	4		22	23	27	28	20.....	7	46	33	11	30	16
6.....	3		21	25	26	26	21.....	8	47	29		30	16
7.....	2		21	14	23	24	22.....	10	46	29		30	16
8.....	1		22	6	19	24	23.....	10	41	27		32	18
9.....	3		24	12	22	23	24.....	8	35	27		40	21
10.....	6	20	27		22	24	25.....	7	32	27		38	12
11.....	8	23	28		21	25	26.....	6	32	27		32	6
12.....	9	28	30		20	23	27.....	6	25	25		30	6
13.....	9	30	30		19	20	28.....	7	22	20		28	6
14.....	9	39	30		20	18	29.....	8	23	22		27	6
15.....	9	46	30		23	16	30.....	8	25	31		27	6
							31.....	9	25			30	

NOTE.—Discharge estimated because of effect of moss: July 10–18, 30 second-feet; July 21–31, 27 second-feet.

*Monthly discharge of Leamington canal near Leamington, Utah, for the year ending Sept. 30, 1917.*

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	7.5	460	July.....	25.6	1,570
May 10-31.....	34.9	1,520	August.....	27.5	1,690
June.....	26.6	1,580	September.....	18.9	1,120

#### CANAL A NEAR DELTA, UTAH.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 26, T. 16 S., R. 6 W., a quarter of a mile below head gates and 8 miles northeast of Delta, Millard County.

**RECORDS AVAILABLE.**—April 14, 1912, to September 30, 1917; irrigation seasons only.

**GAGE.**—Gurley printing water-stage recorder on right bank a quarter of a mile below head gates since March 14, 1913; inclined staff gage at same site and datum, April 14, 1912, to March 14, 1913.

**DISCHARGE MEASUREMENTS.**—Made from cable about 80 feet below gage.

**CHANNEL AND CONTROL.**—Channel uniform earth section. No well-defined control.

Silt, moss, and weeds probably cause backwater.

**DIVERSIONS.**—No diversions between head gates and gage. About 6 miles below the canal divides into canal B and canal C.

**REGULATION.**—Flow regulated at head gates.

**ACCURACY.**—Stage-discharge relation fairly permanent; affected during summer by moss growing in canal below gage. Well-defined standard rating curve used with shifts to parallel curve. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table the mean daily gage height determined by averaging gage heights printed every 15 minutes by water-stage recorder; shifting-control method used for periods of change in rating. Records good.

**COOPERATION.**—Gage heights and discharge measurements furnished by water commissioner of lower Sevier River.

Canal diverts water from Sevier River in SE.  $\frac{1}{4}$  sec. 26, T. 16 S., R. 6 W., and is used jointly by Delta Land & Water Co. and Melville Irrigation Co. About 6 miles below gage the canal divides into canal B, which serves north side tract of Delta Land & Water Co., and canal C, which serves Melville Irrigation Co. Canal C will later be enlarged to serve south tract of Delta Land & Water Co. Waste waters only are returned to river.

*Discharge measurements of canal A near Delta, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 4	Porter and Thurston.....	3.11	173	July 1	W. L. Lackyard.....	3.10	173
27	E. A. Porter.....	2.71	136	15	do.....	5.30	469
Nov. 17	do.....	1.96	67	29	do.....	3.33	201
Apr. 22	do.....	1.93	90	Aug. 14	do.....	2.65	142
May 1	W. L. Lackyard.....	3.40	238	15	E. A. Porter.....	1.95	67
9	Porter and Lackyard.....	4.28	350	Sept. 2	W. L. Lackyard.....	3.80	281
27	W. L. Lackyard.....	4.43	358	16	do.....	3.32	225
June 3	do.....	3.48	244	30	do.....	3.10	179
13	E. A. Porter.....	5.18	451				

Daily discharge, in second-feet, of canal A near Delta, Utah, for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1.	194	147	42	.....	233	255	135	197	283
2.	194	147	42	.....	241	230	76	208	289
3.	170	147	20	.....	248	242	38	282	290
4.	170	139	.....	.....	272	259	55	264	287
5.	176	91	.....	.....	281	304	58	293	285
6.	170	48	.....	.....	285	312	55	310	283
7.	145	67	.....	.....	308	338	53	317	266
8.	135	58	.....	.....	339	368	57	337	241
9.	142	51	.....	.....	340	380	353	380	239
10.	129	44	.....	.....	347	400	422	324	236
11.	131	44	.....	.....	338	428	458	194	245
12.	147	72	.....	.....	338	448	407	108	264
13.	156	106	.....	.....	354	452	489	59	277
14.	142	72	.....	.....	408	448	492	66	269
15.	114	57	.....	.....	445	440	481	67	249
16.	116	59	.....	.....	460	437	483	68	229
17.	126	59	.....	.....	478	444	470	86	221
18.	120	68	.....	.....	481	448	258	221	241
19.	110	70	.....	42	494	425	446	296	247
20.	111	73	.....	54	499	413	455	355	237
21.	118	75	.....	65	502	396	425	395	251
22.	112	73	.....	73	505	377	392	410	253
23.	109	70	.....	106	492	383	388	419	251
24.	121	68	.....	119	440	401	352	404	251
25.	122	68	.....	123	387	425	324	366	216
26.	121	63	.....	160	366	424	303	337	211
27.	131	55	.....	179	368	428	285	329	199
28.	136	55	.....	185	337	432	282	285	193
29.	137	52	.....	190	317	431	278	271	189
30.	136	42	.....	220	313	395	246	273	184
31.	144	.....	.....	.....	275	.....	210	284	.....

Monthly discharge of canal A near Delta, Utah, for the year ending Sept. 30, 1917.

Month.	Mean discharge in second-feet.	Run-off in acre-feet.	Month.	Mean discharge in second-feet.	Run-off in acre-feet.
October.....	138	8,480	June.....	385	22,900
November.....	74.7	4,440	July.....	300	18,400
December 1-3.....	34.7	200	August.....	285	16,300
April 19-30.....	126	3,010	September.....	246	14,600
May.....	371	22,800			

## BEAVER RIVER BASIN.

### BEAVER RIVER NEAR BEAVER, UTAH.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 13, T. 29 S., R. 7 W., half a mile above city diversion dam at mouth of canyon and 3 miles above Beaver, Beaver County.

DRAINAGE AREA.—82 square miles.

RECORDS AVAILABLE.—June 15 to September 26, 1906; March 15, 1914, to September 30, 1917.

GAGE.—Stevens continuous water-stage recorder on right bank November 14, 1914, to September 30, 1917; inspected by George Valentine. Leitz recorder used March 30 to November 13, 1914. Datum of recording gages 0.03 foot lower than that of old vertical staff gage at same site, used prior to March 30, 1914.

DISCHARGE MEASUREMENTS.—Made from footbridge 70 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and coarse gravel; fairly permanent. One channel. Left bank is overflowed at extreme stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.55 feet at 5 p. m. June 9 (discharge, 610 second-feet); minimum stage, 2.64 feet at 4 p. m. December 2 (discharge, 15 second-feet).

1914-1917: Maximum stage occurred in 1917; minimum stage, 2.57 feet, January 28, 1916 (discharge, 8 second-feet).

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

DIVERIONS.—Above all irrigation diversions. Above station is a small storage reservoir known as Cants Lake. Water is diverted by Beaver River Power Co., but returned to stream several miles above station.

REGULATION.—Flow probably not affected by operation of Beaver River Power Co.'s plant, but is somewhat affected by Cants Lake storage reservoir.

ACCURACY.—Stage-discharge relation assumed to have changed slightly June 8-10; affected by ice December 3-22, December 25 to January 27, and March 2-4. Rating curves well defined between 20 and 300 second-feet and fairly well defined above and below. Operation of water-stage recorder satisfactory except for short periods during winter and as indicated in footnote to daily-discharge table. Daily discharge ascertained by applying mean daily gage height to rating tables applicable October 1 to June 7 and June 11 to September 30, except for periods in winter when flow was estimated and at times when water-stage recorder was not in operation. See footnote to daily-discharge table. Shifting-control method used June 8-10. Records good when rating tables were used; other records fair.

*Discharge measurements of Beaver River near Beaver, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
Mar. 12	C. W. Bennett.....	<i>Feet.</i> 2.85	<i>Sec.-ft.</i> 25.5
July 12	.....do.....	3.54	74
Aug. 2	L. W. Jordan.....	3.20	42.5

*Daily discharge, in second-feet, of Beaver River near Beaver, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	48	34	28	.....	.....	24	29	55	146	.....	40	23
2.....	34	34	20	.....	.....	.....	25	56	164	.....	38	22
3.....	37	35	.....	.....	.....	.....	26	55	205	.....	35	25
4.....	38	34	.....	.....	25	.....	28	59	228	.....	35	26
5.....	35	32	.....	.....	27	27	29	55	221	.....	33	23
6.....	65	30	.....	.....	27	26	34	55	250	70	33	25
7.....	63	32	.....	.....	27	26	43	58	287	78	32	27
8.....	46	33	.....	.....	27	26	56	55	320	81	27	26
9.....	45	34	.....	.....	25	26	53	53	352	75	28	26
10.....	45	35	.....	.....	25	26	40	54	309	75	32	26
11.....	45	35	.....	.....	24	24	37	59	256	84	35	35
12.....	45	37	.....	.....	25	24	48	76	253	76	32	26
13.....	37	38	.....	.....	26	23	52	100	248	71	33	27
14.....	37	40	.....	.....	26	23	53	172	261	68	35	27
15.....	38	41	.....	.....	26	24	48	240	248	67	30	25
16.....	40	43	.....	.....	27	23	39	233	223	66	29	25
17.....	40	33	.....	.....	28	24	37	212	216	65	29	24
18.....	41	34	.....	.....	28	25	35	182	200	62	29	25
19.....	39	34	.....	.....	26	27	34	137	181	62	27	26
20.....	37	32	.....	.....	27	28	34	120	169	60	26	27
21.....	37	32	.....	.....	27	28	35	114	158	58	25	29
22.....	38	32	.....	.....	26	27	55	115	147	58	25	26
23.....	39	32	27	.....	26	24	81	117	136	56	26	27
24.....	38	.....	25	.....	26	24	104	94	.....	53	24	27
25.....	36	.....	.....	.....	26	27	128	107	.....	47	26	27
26.....	35	.....	.....	.....	27	26	120	96	.....	46	26	27
27.....	34	.....	.....	.....	26	27	88	104	.....	46	27	28
28.....	34	22	.....	26	24	30	73	134	.....	50	26	26
29.....	34	24	.....	26	.....	34	63	153	.....	48	25	25
30.....	36	26	.....	27	.....	42	55	159	85	45	30	27
31.....	35	.....	32	.....	.....	32	.....	146	.....	43	26	.....

NOTE.—Discharge interpolated on account of breaks in gage-height record, Nov. 24-27, 27 second-feet; Feb. 1-3, 28 second-feet; June 24-29, 111 second-feet; and July 1-5, 78 second-feet. Discharge estimated on account of ice Dec. 3-8, 17 second-feet; Dec. 9-22, 20 second-feet; Dec. 25-31, 17 second-feet; Jan. 1-27, 18 second-feet; and Mar. 2-4, 22 second-feet.



*Monthly discharge of Beaver River near Beaver, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	65	34	40.4	2,480
November.....	43		32.5	1,980
December.....			19.4	1,190
January.....	32		19.3	1,190
February.....		24	26.4	1,470
March.....	42		26.2	1,610
April.....	128	25	52.7	3,140
May.....	240	53	110	6,760
June.....	352	85	198	11,800
July.....		43	64.5	3,970
August.....	40	24	29.8	1,830
September.....	35	22	26.2	1,560
The year.....	352		53.8	38,900

#### BEAVER RIVER AT ADAMSVILLE, UTAH.

**LOCATION.**—In S.  $\frac{1}{2}$  sec. 30, T. 29 S., R. 8 W., 100 yards below highway bridge on road from Milford to Beaver, a quarter of a mile above mouth of Indian Creek, and three-quarters of a mile south of Adamsville, Beaver County.

**DRAINAGE AREA.**—272 square miles.

**RECORDS AVAILABLE.**—December 16, 1913, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on right bank 5 feet below cable March 13, 1914, to September 30, 1917; inspected by W. A. Rees. Friez water-stage recorder at same site December 16, 1913, to March 12, 1914.

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

**CHANNEL AND CONTROL.**—Bed composed of fine gravel. Concrete control constructed July 11, 1916. Stage of zero flow about 1.2 feet. Banks low; covered with willows; overflowed at extremely high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.29 feet at 4 a. m. June 9 (discharge, 275 second-feet); minimum stage, 1.21 feet July 21 to 23, inclusive (discharge, 1.0 second-foot).

1914-1917: Maximum stage recorded, 4.26 feet at 5 a. m. June 3, 1914 (discharge, 544 second-feet); minimum stage occurred in 1917.

**ICE.**—Stage-discharge relation seriously affected by ice for short periods.

**DIVERSIONS.**—No diversions between station and storage reservoir of Beaver County Irrigation Co.. A number of ditches above station supply Adamsville and Beaver districts.

**REGULATION.**—Low-water flow affected by irrigation diversions.

**ACCURACY.**—Stage-discharge relation fairly permanent except as affected by ice. Operation of Stevens water-stage recorder satisfactory except during winter when stream was frozen. Mean daily gage height determined by inspecting recorder graph. Discharge determined by applying mean daily gage height to rating tables as follows: October 1 to December 28; February 11 to July 31; and August 11 to September 30, except as indicated in footnote to daily-discharge table. Rating curves well defined below 150 second-feet. Shifting-control method used August 1-10. Records good.

*Discharge measurements of Beaver River at Adamsville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		Feet.	Sec.-ft.
Mar. 12	C. W. Bennett.....	1.87	43.0
July 12	do.....	1.30	3.1
Aug. 2	L. W. Jordan.....	1.35	3.5

*Daily discharge, in second-feet, of Beaver River at Adamsville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	33	47	53	.....	52	39	53	36	5	7	9
2.....	32	47	53	.....	52	39	52	36	5	4	8
3.....	43	47	50	.....	47	38	46	42	5	3	8
4.....	37	46	50	.....	54	37	43	72	5	3	7
5.....	37	46	50	.....	45	32	39	85	5	3	8
6.....	79	46	47	.....	44	34	36	82	5	3	5
7.....	69	47	55	.....	45	38	37	105	5	2	5
8.....	49	48	55	.....	44	43	35	123	5	1	4
9.....	48	49	55	.....	44	52	36	206	5	1	3
10.....	46	52	52	.....	43	52	37	202	5	1	2
11.....	44	50	57	57	41	45	37	152	5	2	3
12.....	43	47	59	55	42	40	52	126	3	2	3
13.....	42	63	61	55	44	39	55	104	4	3	3
14.....	50	63	67	46	42	41	69	90	3	5	3
15.....	55	57	69	50	44	33	123	89	2	6	
16.....	52	57	69	52	48	34	123	69	2	8	2
17.....	49	54	61	47	50	36	106	49	2	11	2
18.....	46	55	59	48	46	38	96	46	2	11	2
19.....	44	55	55	49	47	42	59	32	2	12	3
20.....	44	56	54	48	49	43	44	21	1	13	3
21.....	44	55	58	48	47	43	34	18	1	13	3
22.....	44	57	65	57	47	42	30	11	1	13	4
23.....	43	53	65	74	44	49	24	8	1	14	4
24.....	43	53	54	68	43	56	13	6	1	14	4
25.....	46	57	55	76	44	63	11	6	2	16	5
26.....	46	54	57	59	42	57	13	6	2	17	5
27.....	46	50	55	49	40	67	13	6	2	16	5
28.....	45	50	46	48	44	61	8	5	6	14	4
29.....	45	55	45	.....	44	54	5	5	30	12	3
30.....	45	54	45	.....	44	53	13	5	31	9	3
31.....	45	.....	45	.....	42	.....	44	.....	20	9	.....

NOTE.—Discharge interpolated Oct. 22, 23, Feb. 20, and Apr. 23, 24. Discharge estimated on account of ice as follows: Dec. 29 to Feb. 10, 45 second-feet.

*Monthly discharge of Beaver River at Adamsville, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	79	32	46.3	2,850
November.....	63	46	52.3	3,110
December.....	69	45	55.5	3,410
January.....	.....	.....	45.0	2,770
February.....	76	.....	51.3	2,830
March.....	54	40	45.3	2,790
April.....	67	32	44.7	2,680
May.....	123	5	44.7	2,750
June.....	206	5	61.4	3,650
July.....	31	1	5.6	343
August.....	17	1	8.0	492
September.....	9	2	4.2	250
The year.....	206	1	38.6	27,900

## BEAVER RIVER AT ROCKYFORD DAM, NEAR MINERSVILLE, UTAH.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 11, T. 30 S., R. 9 W., half a mile below Rockyford dam and 4 miles above Minersville, Beaver County.

**DRAINAGE AREA.**—512 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—December 18, 1913, to September 30, 1917.

**GAGE.**—Friez water-stage recorder at present site since June 1, 1916; inspected by A. M. Gilbert and E. P. Works. Friez water-stage recorder 1,000 feet below dam December 18, 1913, to May 31, 1916. Between these two sites there is some inflow from springs which has at times amounted to as much as 10 second-feet. This quantity probably varies with stage of water in reservoir.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel; some vegetal growth. Concrete control installed November 2-12, 1916. Slight growth of moss on control during summer. One channel at all stages. Banks not subject to overflow. Stage of zero flow, at gage height, 0.60 foot according to measurements made October 9, 1917.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 2.11 feet June 25-27 (discharge, 162 second-feet); minimum stage recorded, 0.18 foot October 9-10 (discharge, 6.4 second-feet).

1913-1917: Maximum stage recorded, 5.37 feet, June 6, 1914 (discharge, 366 second-feet); minimum stage recorded, 1.68 feet March 19 and 20, 1914 (discharge estimated 0.3 second-foot).

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

**DIVERSIONS.**—None between dam and station.

**REGULATION.**—Flow controlled by operation of gates at Rockyford dam.

**ACCURACY.**—Stage-discharge relation changed November 5-11 by construction of concrete control; changed for extremely low stage during spring high water. Rating curve used October 1 to November 4 well defined; curve used November 12 to July 31 fairly well defined between 10 and 20 second-feet, well defined between 20 and 100 second-feet, and extended above; curve used August 1 to September 30 well defined. Operation of water-stage recorder satisfactory except as noted below. Daily discharge ascertained by applying to rating table the mean daily gage height determined by inspecting recorder graph, except for periods indicated in footnote to daily-discharge table. For days of considerable range in stage, mean discharge was determined by averaging values obtained by applying to rating table the mean gage heights for shorter intervals. During period November 28 to March 3 only fragmentary gage-height record was obtained. Reservoir gates were closed and discharge at gaging station represents leakage through gates and inflow between dam and station. This gradually increased with rising stage in reservoir. Records good.

*Discharge measurements of Beaver River at Rockyford dam, near Minersville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 25	Stoner and Porter.....	1.21	27.7	Mar. 13	Bennett and Works....	1.04	16.2
26	do.....	1.38	47.8	July 12	C. W. Bennett.....	1.70	92
Dec. 13	E. A. Porter.....	.97	10.6	Aug. 2	L. W. Jordan.....	1.72	90

*Daily discharge, in second-feet, of Beaver River at Rockyford dam, near Minersville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	32	7.8	11	12	14	15	16	25	81	144	46	31
2.....	34	7.8	11	12	14	15	16	35	34	142	93	30
3.....	34	7.8	11	12	14	15	17	38	75	96	87	31
4.....	26	8.2	11	12	14	15	17	38	100	68	75	31
5.....	7.4	8.4	11	12	14	15	17	44	97	68	90	31
6.....	7.8	8.6	12	12	14	15	17	48	100	128	88	24
7.....	6.7	8.9	12	12	14	15	17	48	117	110	87	21
8.....	6.7	9.1	12	12	14	15	17	48	121	84	88	20
9.....	6.4	9.3	12	12	14	15	17	48	121	86	86	17
10.....	6.4	9.5	12	12	14	15	17	48	124	87	86	20
11.....	6.7	9.8	12	12	14	15	17	52	128	89	90	16
12.....	6.7	10	12	12	14	15	17	54	128	90	90	19
13.....	6.7	10	12	13	14	15	17	58	137	90	82	18
14.....	6.7	10	12	13	14	15	17	64	144	75	82	19
15.....	6.7	10	12	13	14	15	17	65	144	44	87	19
16.....	6.7	10	12	13	14	15	17	67	144	45	42	18
17.....	6.7	10	12	13	14	15	17	88	144	54	23	18
18.....	7.0	10	12	13	14	15	17	98	138	82	23	17
19.....	7.0	10	12	13	15	15	17	126	138	93	31	13
20.....	7.0	10	12	13	15	15	17	131	135	98	32	18
21.....	7.0	10	12	13	15	16	17	117	131	97	68	19
22.....	7.0	16	12	13	15	16	17	128	126	95	78	17
23.....	7.0	28	12	13	15	16	17	142	121	90	48	17
24.....	7.0	28	12	13	15	16	18	153	142	30	32	18
25.....	7.0	51	12	13	15	16	18	147	162	37	32	18
26.....	7.0	45	12	13	15	16	18	135	162	98	32	18
27.....	7.4	10	12	13	15	16	18	135	162	61	32	18
28.....	7.8	10	12	14	15	16	18	135	162	53	31	18
29.....	7.8	10	12	14	15	16	18	138	146	46	75	18
30.....	7.8	10	12	14	15	16	18	142	146	46	54	17
31.....	7.8	-----	12	14	-----	16	-----	142	-----	46	31	-----

NOTE.—Discharge interpolated because of no gage-height record, Nov. 28 to Dec. 10, Dec. 17-18, 20-22, 24-27, 29-30, Jan. 1-3, 5-21, 23-31, Feb. 1, 3-10, 12-25, 27-28, Mar. 1-3, and June 9-11; estimated June 13.

*Monthly discharge of Beaver River at Rockyford dam, near Minersville, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	34	6.4	10.2	627
November.....	51	7.8	13.4	797
December.....	12	11	11.8	726
January.....	14	12	12.7	781
February.....	15	14	14.4	800
March.....	16	15	15.4	947
April.....	18	16	17.2	1,020
May.....	153	25	88.3	5,430
June.....	162	34	127	7,560
July.....	144	30	79.7	4,900
August.....	93	24	62.0	3,810
September.....	31	13	20.3	1,210
The year.....	162	6.4	39.6	28,600

#### INDIAN CREEK AT ADAMSVILLE, UTAH.

LOCATION.—In sec. 30, T. 29 S., R. 8 W., at highway bridge just east of Adamsville, Beaver County, about three-quarters of a mile above confluence with Beaver River.

DRAINAGE AREA.—180 square miles (measured on topographic map).

RECORDS AVAILABLE.—June 26 to August 31, 1906; March 16, 1914, to September 30, 1917.

GAGE.—Vertical staff nailed to left bridge abutment; read by W. A. Rees.

DISCHARGE MEASUREMENTS.—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of rocks, gravel, and sand. Rock control, semipermanent. One channel at all stages. Banks high and not subject to overflow under ordinary conditions.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.5 feet at 8.30 a. m. October 1 (discharge not determined); minimum discharge, 0.1 second-foot January 13 to February 12 and August 31 to September 3.

1914-1917: Maximum stage recorded, 6.5 feet at 8.30 a. m. October 1, 1916 (discharge not determined); minimum stage, 1.70 feet March 24-28 and April 1-2, 1914 (no flow).

**ICE.**—Stage-discharge relation affected by ice at times.

**DIVERSIONS.**—Below all diversions. At certain seasons a small amount of seepage (probably not more than 1 or 2 second-feet) enters between gage and mouth of creek.

**REGULATION.**—Flow affected by small storage reservoir and irrigation diversions above.

**ACCURACY.**—Stage-discharge relation not permanent. Affected by ice January 20-27.

Gage read twice weekly, sometimes daily. Discharge not determined as rating curves are not sufficiently defined.

*Discharge measurements of Indian Creek at Adamsville, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
Mar. 12	C. W. Bennett.....	<i>Feet.</i> 2.91	<i>Sec.-ft.</i> 11.0
Aug. 2	L. W. Jordan.....	2.13	.9

*Daily gage height, in feet, of Indian Creek at Adamsville, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	4.6	2.08							2.52		2.06	1.92
2.....	2.50	2.08	2.24					2.40	2.60		2.13	
3.....	2.22	2.08		2.10	1.84	2.00			2.68			
4.....	2.10	2.10	2.16				2.04			2.10	1.98	
5.....	2.12	2.12	2.14					2.34				1.94
6.....	3.8	2.10	2.14	2.04			2.18		2.70			
7.....	2.14	2.12	2.12		1.80	1.98	2.25			2.16		
8.....	2.06	2.14							2.64		2.00	1.96
9.....	2.04	2.14	2.10					2.00	2.38			
10.....	2.16	2.18	2.10	2.10	1.86	2.00						
11.....	2.14	2.18				2.0	2.20		2.36	2.22	2.04	
12.....	2.12	2.20				2.4		2.00				1.96
13.....	2.12	2.18	2.14	1.80	2.80	2.00			2.40			
14.....	2.14	2.10			2.04	2.00	2.14			2.20		
15.....	2.12	2.14			2.04			2.70			2.00	1.96
16.....	2.06		2.10	1.50				2.40	2.30			
17.....	2.04		2.10		1.98	2.02		2.20				
18.....	2.04	2.20				2.80	2.00			2.16	2.10	
19.....		2.16				2.10		2.30				1.96
20.....	2.06	2.20	2.12	2.60		3.90			2.30			
21.....		2.20			2.10	2.56	2.00			2.12		
22.....		2.22						2.60			1.94	2.10
23.....		2.20	2.14		2.80			2.40	2.22	3.3		
24.....	2.04	2.18		2.60	2.50	2.04				2.6		
25.....	2.18	2.18			4.2	2.20	2.40			2.20	1.96	
26.....	2.18	2.20			3.0			2.10				2.30
27.....	2.20	2.20	2.20	2.80	2.20		2.20		2.20	3.80		
28.....	2.12	2.22			2.04	2.30	2.20			2.1		
29.....	2.12	2.04								2.6	1.96	2.30
30.....	2.10		2.14						2.30	2.00		
31.....	2.08			1.80		2.35		2.58		2.1		

## COAL CREEK NEAR CEDAR CITY, UTAH.

**LOCATION.**—In E.  $\frac{1}{2}$  sec. 13, T. 36 S., R. 11 W., 500 feet above power plant of Cedar Electric Co. and  $1\frac{1}{4}$  miles southeast of Cedar City, Iron County.

**DRAINAGE AREA.**—92.5 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—May 28, 1915, to September 30, 1917.

**GAGE.**—Vertical staff on right bank August 24 to September 30, 1917. Gage washed out October 6, 1916, and replaced at approximately same location and datum October 10, 1916; datum lowered 1.85 feet August 1, 1917; read by J. T. Wilkinson. May 28 to July 24, 1915, vertical staff about 150 feet upstream; July 29, 1915, to August 4, 1916, vertical staff at about same site as present gage. Relation of gages prior to October 10, 1916, not determined.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge about a mile below or by wading.

**CHANNEL AND CONTROL.**—Bed composed of coarse gravel and boulders; shifting.

**EXTREMES OF DISCHARGE.**—Not determined.

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

**DIVERSIONS.**—The only large diversion above the station is power canal, which returns water to stream about 500 feet below gage. This diversion is fairly constant, 6 to 8 second-feet, and should be added to obtain total flow above Cedar City.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation frequently changed by scouring of control during freshets; affected by ice December 26–28 and February 2. Rating curves poorly defined except that used July 26 to September 30 which is fairly well defined between 10 and 100 second-feet. Gage read to hundredths once daily. Daily discharge determined by applying daily gage heights to rating table except for periods when stage-discharge relation was affected by ice or shifting control. Records poor, except for the period July 26 to September 30, for which they are fair.

*Discharge measurements of Coal Creek near Cedar City, Utah, during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 2	C. W. Bennett.....	0.67	15.6	July 11	C. W. Bennett.....	-.02	31.4
Mar. 11	.....do.....	.48	11.8	Aug. 1	L. W. Jordan.....	a.82	22.6

a Datum of gage lowered 1.85 feet.

*Daily discharge, in second-feet, of Coal Creek near Cedar City, Utah, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		16	5.0	7.5	5.0	17	18	158	159	46	23	10
2		16	5.0	6.6	5.0	13	11	136	190	41	17	10
3		16	5.0	6.6	6.2	19	23	158	278	44	51	10
4		16	5.0	6.6	5.8	14	24	147	208	41	19	10
5		17	5.0	6.6	5.0	9.0	49	126	180	39	19	9.6
6		16	5.0	6.6	5.0	8.0	41	131	213	38	16	13
7		22	7.5	7.0	5.0	12	44	136	229	44	15	11
8		17	6.6	7.5	6.6	7.5	62	131	250	35	15	10
9		17	5.8	3.4	8.0	7.5	18	121	268	33	14	9.6
10	25	17	6.6	2.7	9.0	13	16	158	222	29	15	39
11	25	16	7.5	3.4	6.6	12	16	209	201	27	145	13
12	25	13	12	3.4	4.2	8.0	16	261	161	26	20	11
13	25	6.6	10	10	4.2	20	28	356	155	26	44	10
14	25	4.2	6.6	7.1	4.2	8.0	24	387	161	35	17	10
15	25	12	12	4.2	5.4	7.0	18	390	155	27	17	9.6
16	25	15	9.5	5.0	8.0	11	18	296	153	23	15	9.6
17	24	14	8.5	6.6	4.6	14	18	213	147	23	17	9.6
18	24	15	6.6	7.5	4.8	12	17	151	137	21	16	9.6
19	22	12	5.8	6.6	5.0	9.0	16	141	119	20	13	8.9
20	24	8.5	5.0	5.0	5.0	9.0	17	107	103	20	13	9.6
21	22	6.6	5.8	5.0	5.4	10	24	116	99	20	13	11
22	20	8.5	5.0	5.0	5.4	9.0	41	121	84	20	13	11
23	19	8.5	3.4	10	5.4	24	77	123	78	20	13	10
24	17	6.6	7.7	5.0	8.5	14	136	118	72	19	12	9.6
25	17	10	12	4.2	8.5	18	202	99	70	100	12	9.6
26	17	12	12	3.4	8.5	21	176	82	64	36	11	9.6
27	17	5.8	12	4.2	7.0	23	147	119	59	32	11	9.6
28	17	5.8	12	4.2	13	33	131	193	54	36	11	8.9
29	17	5.0	12	4.2	-----	41	136	130	51	32	11	8.9
30	17	5.0	12	4.2	-----	28	141	128	46	32	11	15
31	16	-----	13	3.4	-----	24	-----	119	-----	25	11	-----

NOTE.—Discharge Oct. 1-9 estimated at 50 second-feet. Discharge interpolated Dec. 3, 10, 24; Jan. 7, 14, 21, 28; Feb. 4, 11, 18, 25; Mar. 4, 18, 25; Apr. 1, 29; May 6. Discharge estimated on account of ice Dec. 26-28 and Feb. 2.

*Monthly discharge of Coal Creek near Cedar City, Utah, for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	-----	16	29.5	1,810
November	22	4.2	12.0	714
December	13	3.4	7.96	489
January	10	2.7	5.57	342
February	13	4.2	6.24	347
March	41	7.0	15.3	941
April	202	11	56.8	3,380
May	390	82	170	10,500
June	278	46	146	8,690
July	100	19	32.6	2,000
August	145	11	21.0	1,290
September	39	8.9	11.2	666
The year	390	2.7	42.9	31,200

NOTE.—Mean discharge of tailrace, about 8 second-feet, should be added to flow past the station to get total flow of Coal Creek.

## MINOR BASINS IN NEVADA.

## OVERLAND CREEK NEAR RUBY VALLEY, NEV.

LOCATION.—In NE.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 26, T. 30 N., R. 58 E., at old weir 500 feet above upper Wines ranch canal and 1 mile northeast of Ruby Valley post office, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 24 to September 30, 1917.

GAGE.—Stevens eight-day water-stage recorder on right bank 10 feet above old weir.

DISCHARGE MEASUREMENTS.—Made by wading 20 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Dense growth of brush along banks. Control is 10-foot crest rectangular contracted weir. Stage of zero flow at gage height 0.30 foot, determined April 25, 1917.

EXTREMES OF DISCHARGE.—Maximum stage recorded from water-stage recorder, 2.77 feet at 5 p. m., June 17 (discharge, 143 second-feet); minimum stage recorded, 0.42 foot at 8 p. m. September 18 (discharge, 0.9 second-foot).

ICE.—No information.

DIVERSIONS.—Above all diversions.

REGULATION.—Storage has been developed at a small lake 6 or 8 miles above gage for use in emergency.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 0 and 80 second-feet. Operation of water-stage recorder satisfactory except for breaks in record as shown in footnote of daily-discharge table. Daily discharge ascertained by applying to the rating table mean daily gage height determined by inspecting recorder graph except for short periods when water-stage recorder was stopped, for which it was ascertained by interpolation. Records obtained by use of rating table for stages up to 80 second-feet excellent; others good.

*Discharge measurements of Overland Creek near Ruby Valley, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
Apr. 24.....	<i>Feet.</i> 1.17	<i>Sec.-ft.</i> 26.8	June 1.....	<i>Feet.</i> 1.51	<i>Sec.-ft.</i> 47.7	June 30.....	<i>Feet.</i> 1.82	<i>Sec.-ft.</i> 69
25.....	1.07	23.3	2.....	1.46	45.1	Sept. 19.....	.46	1.6

*Daily discharge, in second-feet, of Overland Creek near Ruby Valley, Nev., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		14	45	64	12	2.7	16.....			111	33	4.3	1.9
2.....		14	48	62	11	2.4	17.....			125	34	4.3	1.7
3.....		14	50	61	11	2.4	18.....			124	32	4.0	1.4
4.....		15	53	60	11	2.4	19.....			114	30		1.6
5.....		16	55	60	9.6	3.1	20.....			112	28		1.6
6.....		17	60	60	8.9	3.6	21.....			113	26		1.7
7.....		19	73	57	8.2	2.7	22.....			107	23		1.7
8.....		19	90	55	7.5	2.4	23.....			99	22		1.7
9.....		20	102	53	7.2		24.....	26		95	20		1.7
10.....		22	97	48	6.9		25.....	26		89	19	3.6	1.9
11.....		26	81	43	6.6		26.....	26		86	18	3.6	1.7
12.....		32	70	41	5.6	2.2	27.....	22		83	20	3.6	1.6
13.....		40	67	39	4.5	2.2	28.....	19	35	80	19	3.1	1.6
14.....		55	73	37	4.5	2.2	29.....	17	39	76	16	3.1	1.4
15.....		67	88	34	4.3	1.9	30.....	15	42	67	15	2.9	1.4
							31.....		41		13	2.9	

NOTE.—Discharge interpolated because of no gage-height record: May 16-27, 51 second-feet; Aug. 12, 5.6 second-feet; Aug. 19-25, 3.8 second-feet; Sept. 9-11, 2.3 second-feet; and Sept. 30, 1.4 second-feet.



*Monthly discharge of Overland Creek near Ruby Valley, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 24-30.....	26	15	21.6	300
May.....		14	37.4	2,300
June.....	125	45	84.4	5,020
July.....	64	13	36.8	2,260
August.....	12	2.9	5.71	351
September.....	3.6	1.4	2.06	123
The period.....				10,400

#### CURRENT CREEK NEAR CURRENT, NEV.

**LOCATION**—In sec. 25, T. 11 N., R. 58 E., 10 feet above highway bridge at Cazier's ranch, on road from Ely to Tonopah, 2 miles above Current, Nye County, and 2½ miles below inflow from Cazier's reservoir.

**DRAINAGE AREA**.—Not measured.

**RECORDS AVAILABLE**.—May 5, 1913, to September 30, 1913; May 25, 1914, to September 30, 1917, when station was discontinued.

**GAGE**.—Vertical staff on left bank 10 feet above highway bridge, June 24, 1916, to September 30, 1917; read by Edmund Cazier. Original gage nailed to downstream side of right bridge abutment, at different datum, washed out March 20, 1916.

**DISCHARGE MEASUREMENTS**.—Made by wading or from bridge below gage.

**CHANNEL AND CONTROL**.—Bed composed of gravel and boulders. One channel at all stages. Banks high and clean.

**EXTREMES OF DISCHARGE**.—Maximum discharge recorded during year, 24 second-feet, May 25; minimum discharge, 4 second-feet, February 18 to May 6.

1913-1917: Maximum discharge, 24 second-feet, April 30 and May 1, 1915, and May 25, 1917; minimum discharge, 2.6 second-feet September 3, 1913, and September 28, 1915.

**ICE**.—Stage-discharge relation not seriously affected by ice. Stream fed by springs in canyon about half a mile above gage.

**DIVERSIONS**.—Three small irrigation ditches divert water above gage, total capacity 3 to 5 second-feet.

**REGULATION**.—Flow somewhat affected by inflow from Cazier's reservoir and by changes in irrigation ditches above gage.

**ACCURACY**.—Stage-discharge relation changed probably during high water in May. Rating curve not well defined. Gage read to quarter-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods when gage was not read, for which it was interpolated; shifting-control method used May 25-31. Records fair except for discharge above 10 second-feet, which are poor.

The following discharge measurement was made by L. W. Jordan:

June 12, 1917: Gage height, 4.63 feet; discharge, 9.0 second-feet.

*Daily discharge, in second-feet, of Currant Creek near Currant, Nev., for the year ending Sept. 30, 1917.*

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

*Monthly discharge of Currant Creek near Currant, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	6	6	6.00	369
November.....	6	6	6.00	357
December.....	6	6	6.00	369
January.....	6	6	6.00	369
February.....	6	4	5.21	289
March.....	4	4	4.00	246
April.....	4	4	4.00	228
May.....	24	4	9.58	589
June.....	16	6	10.3	613
July.....	10	6	7.81	480
August.....	6	6	6.00	369
September.....	6	6	6.00	357
The year.....	24	4	6.41	4,650

## DUCKWATER CREEK NEAR DUCKWATER, NEV.

**LOCATION.**—In T. 12 N., R. 56 E., 200 feet below old stone building,  $1\frac{1}{2}$  miles below Duckwater, Nye County, 2 miles by present channel below Big Warm Spring, and 50 miles south of Eureka.

**DRAINAGE AREA.**—Indeterminate. Stream fed by springs.

**RECORDS AVAILABLE.**—September 7, 1915, to October 15, 1917, when station was discontinued.

**GAGE.**—Stevens 8-day water-stage recorder on left bank, 15 feet above weir; inspected by G. T. Saxton. Lietz water-stage recorder was used previous to July 21, 1917.

**DISCHARGE MEASUREMENTS.**—Made by wading 50 feet above weir.

**CHANNEL AND CONTROL.**—Bed composed of sand; dense growth of aquatic plants above weir pool. Sharp-crested Cippoletti weir with 4.04-foot crest serves as control. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 0.77 foot at 10 a. m. August 2 (discharge, 9.7 second-feet); minimum stage, 0.26 foot October 12–15, 1917 (discharge, 2.1 second-feet).

1915–1917: Maximum stage recorded 0.90 foot at 2.30 p. m. January 28, 1916 (discharge, 12.1 second-feet); minimum stage occurred in 1917.

**ICE.**—Station discontinued during winter.

**DIVERSIONS.**—A few small ditches divert from creek above gage.

**REGULATION.**—Entire flow of Big Warm Spring followed natural course into large slough, from which Duckwater Creek was fed through seepage and overflow, until June 11, 1917, when it was diverted from spring into Brown canal; water was then diverted from Brown canal into the creek from June 21 until October 8, 1917.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined between 0 and 12 second-feet. Operation of water-stage recorder satisfactory except for occasional breaks in record due to stopping of clock. Daily discharge ascertained by applying to rating table mean daily height gage determined by inspecting recorder graph. Records good.

The following discharge measurement was made by L. W. Jordan:

June 12, 1917: Gage height, 0.61 foot; discharge, 6.7 second-feet.

*Daily discharge, in second-feet, of Duckwater Creek near Duckwater, Nev., for the period May 21 to Oct. 15, 1917.*

Day.	May.	June.	July.	Aug.	Sept.	Oct.	Day.	May.	June.	July.	Aug.	Sept.	Oct.
1.....		5.9	8.9	7.4	8.4	4.1	16.....		7.2	8.6	8.8	7.0	.....
2.....		5.9	8.9	8.4	8.4	4.1	17.....		7.2	8.4	8.8	7.0	.....
3.....		5.9	8.9	8.8	8.4	4.1	18.....		7.2	8.4	8.8	6.9	.....
4.....		5.9	8.8	8.8	8.4	4.0	19.....		7.2	8.4	8.9	6.9	.....
5.....		5.9	8.2	8.8	8.6	3.8	20.....		7.4	8.4	8.8	6.7	.....
6.....		5.9	8.2	8.8	8.6	3.7	21.....		7.9	8.6	8.8	6.7	.....
7.....		6.1	8.6	8.8	8.2	3.0	22.....		7.4	8.8	8.6	6.7	.....
8.....		6.1	8.6	8.6	7.7	2.9	23.....		7.0	9.3	8.4	6.7	.....
9.....		6.1	8.4	8.6	7.7	2.2	24.....		6.1	9.3	8.9	6.7	.....
10.....		6.1	8.6	9.3	7.6	2.2	25.....		5.9	9.1	8.8	6.7	.....
11.....		6.5	8.4	9.1	7.6	2.2	26.....			8.2	8.8	6.7	.....
12.....		6.9	8.2	8.9	7.6	2.1	27.....	5.9		7.9	9.3	6.2	.....
13.....		7.0	8.2	8.9	7.2	2.1	28.....			8.6	7.7	8.4	4.7
14.....		7.0	8.4	8.8	7.0	2.1	29.....			8.4	7.7	8.4	4.1
15.....		7.2	8.6	8.8	6.9	2.1	30.....			8.6	7.6	8.4	4.1
							31.....				7.4	8.4	.....

*Monthly discharge of Duckwater Creek near Duckwater, Nev., for the period, June 1 to Oct. 15, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June.....	9.3	5.9	7.22	430
July.....	9.3	7.4	8.45	520
August.....	9.3	7.4	8.67	533
September.....	8.6	4.1	7.07	421
October 1-15.....	4.1	2.1	2.98	88.7
The period.....				1,990

### SALTON SINK BASIN.

#### SALTON SEA NEAR SALTON, CALIF.

**LOCATION.**—Near mouth of Salt Creek, 1 mile west of Durmid,  $2\frac{1}{2}$  miles east of Salton, Riverside County, and 7 miles east of Mecca.

**RECORDS AVAILABLE.**—November, 1904, to September 30, 1917.

**GAGE.**<sup>1</sup>—Vertical staff in several sections fastened to piling. Gage is graduated to feet and inches and is inverted (reads down) with its zero at 6.1 feet above mean sea level, United States Geological Survey datum. To obtain depths subtract reading from 279.6 feet, because the lowest point in bottom of Salton Sea is at 273.5 feet below mean sea level, United States Geological Survey datum. Gage is read by an employee of Southern Pacific Co. Original gage, read November 1, 1904, to February 26, 1906, was established by New Liverpool Salt Co. and read depths directly. It was about  $3\frac{1}{2}$  miles northwest of Salton. First Survey gage, read March 2, 1906, to June 5, 1906, half a mile west of Salton, also read depths directly. First Southern Pacific Co.'s gage, read June 6, 1906, to July 5, 1909, was at present location with its zero at 6.8 feet above mean sea level, United States Geological Survey datum. Readings from its inverted scale, subtracted from 280.35 feet, gave depths in Salton Sea. Second Survey gage, read July 6, 1909, to April 21, 1914, at the same place, read elevations below mean sea level, United States Geological Survey datum. Readings subtracted from 273.5 feet gave depths. The present gage has been read since April 24, 1914.

**EXTREMES OF DEPTH.**—Maximum depth during year, 33.75 feet, October 6; minimum depth, 30.6 feet, September 8.

1904-1917: Maximum depth, 76.0 feet February 10 to March 29, 1907; minimum depth, no water at gage November 1 to 14, 1904.

**COOPERATION.**—The Southern Pacific Co. has furnished the record since June 30, 1914.

Area of sea was 443 square miles January 1, 1909.

Practically all water now received by Salton Sea enters through Alamo and New rivers, chiefly through the former. These rivers run through Imperial Valley and are drainage channels for excess and waste waters from the irrigation system and from power plants. The following table shows depths of Salton Sea.

<sup>1</sup> History of gages previously published in water-supply papers incomplete, and some statements regarding datums erroneous.

*Daily depth, in feet, of Salton Sea near Salton, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			32.85						31.8			
2		33.35			32.35	32.31						
3											31.27	
4				32.48				32.0				
5												
6	33.75						32.2			31.6		
7												30.85
8			32.75						31.8			
9					32.35	32.31						
10		33.2									31.18	
11												
12				32.43				32.0				
13	33.6						32.1			31.52		
14												30.77
15			32.7						31.8			
16												
17		33.1			32.35	32.27					31.1	
18								31.9				
19				32.43								
20	33.5						32.1			31.43		
21												30.68
22			32.6						31.7			
23					32.35	32.22						
24		33.0									31.02	
25								31.9				
26				32.39								
27	33.45						32.1			31.35		
28												30.6
29			32.5						31.7			
30						32.22						
31											30.93	

## OWENS LAKE BASIN.

## OWENS RIVER NEAR ROUND VALLEY, CALIF.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 10, T. 6 S., R. 31 E., below sheep bridge, 700 feet above mouth of Rock Creek, and 2 miles north of Round Valley, Inyo County.

**DRAINAGE AREA.**—About 450 square miles.

**RECORDS AVAILABLE.**—August 4, 1903, to September 30, 1917.

**GAGE.**—Vertical staff on left bank 85 feet below bridge; read by W. D. Roberts. The datum differs from that of previous gage, which was 100 feet above present one, and used prior to May 29, 1907.

**DISCHARGE MEASUREMENTS.**—Made from cable at gage.

**CHANNEL AND CONTROL.**—Rock and boulders; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.6 feet at 11 a. m. June 12 (discharge, 875 second-feet); minimum stage recorded, 1.80 feet December 26 and 30 (discharge, 150 second-feet).

1903-1917: Maximum stage recorded, 4.0 feet June 30, 1907 (discharge, 1,190 second-feet); minimum discharge recorded, 120 second-feet, September 21, 1913.

**ICE.**—Shore ice exists at times, but ordinarily does not affect stage-discharge relation.

**DIVERSIONS.**—No water is diverted above station.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation fairly permanent; not affected by ice during year. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table, directly, October 1 to February 7, and by shifting-control method February 8 to September 30, for days when gage was read; discharge interpolated for days when gage was not read. Records good.

**COOPERATION.**—Gage-height and discharge-measurement records furnished by the city of Los Angeles.

*Discharge measurements of Owens River near Round Valley, Calif., during the year ending Sept. 30, 1917.*

[Made by J. E. Jones.]

	Gage height.	Dis-charge.		Gage height.	Dis-charge.
1911.	<i>Feet.</i>	<i>Sec.-ft.</i>	1912.	<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 16.....	1. 99	193	Aug. 2.....	2. 30	302
Feb. 8.....	1. 95	178	Sept. 11.....	2. 00	202
Mar. 21.....	2. 05	220			

*Daily discharge, in second-feet, of Owens River near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	229	229	a 170	160	181	179	a 241	a 272	a 570	a 602	a 329	204
2.....	a 236	a 222	170	a 160	a 178	a 179	234	264	570	722	300	a 210
3.....	242	216	181	160	174	179	a 222	a 272	a 570	a 722	a 300	216
4.....	a 236	a 210	a 176	a 165	a 176	a 181	209	279	570	722	300	a 210
5.....	229	204	170	170	179	183	a 222	a 272	a 643	a 648	a 285	204
6.....	242	a 198	a 170	a 170	a 180	a 182	234	264	716	575	270	a 203
7.....	a 242	192	170	170	181	181	a 234	a 268	a 768	a 575	a 242	202
8.....	242	a 190	a 170	a 176	181	a 181	234	273	821	575	214	a 202
9.....	a 240	188	170	181	a 181	181	a 248	a 268	a 821	a 624	a 214	202
10.....	239	a 190	a 174	a 172	181	a 188	262	264	821	673	214	a 202
11.....	a 240	192	177	164	179	194	a 248	a 272	a 848	a 624	a 226	202
12.....	242	170	a 174	a 164	a 181	a 193	234	279	875	575	239	a 202
13.....	242	a 170	170	164	183	192	a 222	a 276	a 848	a 600	a 225	202
14.....	239	170	170	a 166	a 184	a 199	209	273	821	624	211	a 196
15.....	a 240	a 170	a 170	168	185	206	262	a 273	a 821	a 566	a 205	190
16.....	242	170	170	a 168	a 184	a 208	a 248	273	821	508	199	a 196
17.....	a 240	a 170	a 170	168	183	209	234	264	a 821	a 542	a 199	202
18.....	237	170	170	a 169	a 184	a 222	262	a 272	821	575	199	a 202
19.....	a 240	170	177	170	185	234	a 252	279	a 834	a 530	a 210	202
20.....	242	170	a 174	a 170	a 191	a 248	248	a 272	848	485	221	a 202
21.....	a 240	170	170	170	197	262	a 255	264	a 834	a 496	a 228	202
22.....	237	a 174	a 170	a 169	a 224	a 262	262	a 272	821	508	235	a 196
23.....	a 233	177	170	168	250	262	263	279	a 794	a 496	a 222	190
24.....	229	a 177	a 169	a 169	a 218	a 236	264	a 284	768	485	209	a 184
25.....	a 229	177	168	170	185	209	a 264	288	a 755	a 475	a 214	179
26.....	229	170	150	a 170	a 186	a 247	264	a 284	742	465	219	a 184
27.....	a 233	a 174	a 155	170	188	285	a 264	279	a 656	a 455	a 212	190
28.....	237	177	160	170	a 184	a 274	264	a 322	570	445	206	a 184
29.....	242	170	a 155	a 178	.....	262	a 272	366	a 526	a 416	a 219	179
30.....	a 236	170	150	185	.....	a 255	279	a 468	481	388	232	202
31.....	229	.....	a 155	a 183	.....	248	.....	570	.....	a 358	a 217	.....

a No gage-height record; discharge interpolated.

*Monthly discharge of Owens River near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	242	229	237	14,600
November.....	229	170	183	10,900
December.....	181	150	168	10,300
January.....	185	160	170	10,500
February.....	250	174	188	10,400
March.....	285	179	217	13,300
April.....	279	209	247	14,700
May.....	570	264	294	18,100
June.....	875	481	739	44,000
July.....	722	358	550	33,800
August.....	329	199	233	14,300
September.....	216	179	198	11,800
The year.....	875	150	286	207,000

#### OWENS RIVER NEAR BIG PINE, CALIF.

**LOCATION.**—In sec. 2, T. 11 S., R. 34 E., at Charlies Butte, 11 miles southeast of Big Pine, Inyo County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—September 20, 1906, to September 30, 1917.

**GAGE.**—Vertical staff on left bank; read by J. I. Jones.

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

**CHANNEL AND CONTROL.**—Sand and gravel; shifts slightly. Right bank high; left bank subject to overflow during floods.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.75 feet at 11 a. m. February 26 (discharge, 980 second-feet); minimum stage recorded, 0.7 foot September 14, 17–21 (discharge, 86 second-feet).

1906–1917: Maximum stage recorded, 11.2 feet at about 9 p. m. January 26, 1914 (discharge, from extension of rating curve, 3,220 second-feet); minimum stage recorded, –0.05 foot June 13 to 16, 1908 (discharge, 36 second-feet).

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

**DIVERSIONS.**—On account of diversions above station, the record does not indicate the total run-off from the drainage area.

**REGULATION.**—Flow is partially regulated by diversions.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to half-tenths once daily, sometimes to hundredths. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

**COOPERATION.**—Gage-height and discharge-measurement records furnished by the city of Los Angeles.

*Discharge measurements of Owens River near Big Pine, Calif., during the year ending Sept. 30, 1917.*

[Made by J. E. Jones.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 4.....	3.25	556	May 5.....	1.10	144	Sept. 1.....	1.02	120
Feb. 22.....	4.27	865	June 30.....	3.72	649	22.....	.72	87
Mar. 17.....	3.11	552	Aug. 14.....	1.53	199			

*Daily discharge, in second-feet, of Owens River near Big Pine, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	284	533	557	533	581	680	557	220	112	655	463	125
2.....	333	509	557	605	581	655	509	202	112	655	396	125
3.....	375	557	557	557	605	605	463	202	112	655	375	118
4.....	440	557	557	557	630	605	509	194	112	655	354	112
5.....	463	557	581	557	655	605	557	139	154	655	354	125
6.....	509	557	581	533	705	605	581	132	154	655	354	125
7.....	581	605	533	509	830	605	605	132	154	655	333	118
8.....	605	581	533	509	830	605	605	125	139	655	294	112
9.....	581	557	509	509	755	581	605	132	146	655	266	118
10.....	581	581	509	509	730	581	605	146	211	605	247	112
11.....	605	581	509	509	705	581	440	154	294	655	238	112
12.....	581	557	509	509	705	557	418	146	375	557	220	106
13.....	605	509	533	509	705	557	396	146	396	533	211	99
14.....	605	509	557	533	705	557	375	154	418	509	220	86
15.....	581	533	533	533	655	533	294	132	463	557	211	92
16.....	581	533	509	463	605	533	275	132	509	655	202	99
17.....	557	557	509	463	605	533	275	125	630	605	220	86
18.....	557	557	509	463	581	509	266	125	730	655	229	86
19.....	557	557	533	486	557	509	256	125	805	557	211	86
20.....	557	557	557	533	557	509	247	125	830	605	211	86
21.....	557	557	557	557	655	509	229	125	860	630	202	86
22.....	557	557	557	486	830	509	202	118	860	630	185	92
23.....	533	557	557	509	805	486	194	112	860	655	185	92
24.....	509	581	533	509	705	463	185	118	830	605	177	99
25.....	509	605	509	509	805	463	185	118	860	581	177	106
26.....	509	581	463	509	980	463	169	118	830	557	169	112
27.....	533	581	440	533	780	463	154	118	780	509	177	112
28.....	557	581	463	533	705	509	146	118	755	486	162	125
29.....	557	557	486	533	.....	509	139	118	755	463	154	125
30.....	533	557	509	557	.....	533	146	112	680	486	146	125
31.....	533	.....	533	557	.....	605	.....	118	.....	463	139	.....

*Monthly discharge of Owens River near Big Pine, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off- in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	605	284	530	32,600
November.....	605	509	559	33,300
December.....	581	440	527	32,400
January.....	605	463	522	32,100
February.....	980	557	698	38,800
March.....	680	463	549	33,800
April.....	605	139	353	21,000
May.....	220	112	138	8,490
June.....	860	112	498	29,600
July.....	655	463	595	36,600
August.....	463	139	241	14,800
September.....	125	86	107	6,370
The year.....	980	86	442	320,000



## OWENS RIVER NEAR LONE PINE, CALIF.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 23, T. 15 S., R. 36 E., at Mount Whitney highway bridge,  $2\frac{1}{2}$  miles northeast of Lone Pine, Inyo County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—January 1, 1909, to September 30, 1917.

**GAGE.**—Vertical staff fastened to a pile in channel at downstream side of bridge; read by G. F. Marsh. The high water, January 27–29, 1914, raised pier to which gage was fastened, 1.83 feet. Gage has not been reset.

**DISCHARGE MEASUREMENTS.**—Made from cable about 1,000 feet below bridge or by wading.

**CHANNEL AND CONTROL.**—Sandy; fairly permanent. One channel at low stages; three or more during floods.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.0 feet on morning of February 26 (discharge, 906 second-feet); minimum stage recorded, 1.30 feet October 1–6 (discharge, 4 second-feet).

1909–1917: Maximum stage recorded, 10.6 feet July 7, 1909 (discharge, 2,050 second-feet); minimum stage recorded, 1.3 feet September 28 to October 6, 1916 (discharge, 4 second-feet).

**ICE.**—Shore ice sometimes forms at station during very cold weather but usually does not affect stage-discharge relation.

**DIVERSIONS.**—Record does not show total run-off from drainage area on account of diversions above station. The Los Angeles Aqueduct, which has its intake above station, was formally opened February 13, 1913.

**REGULATION.**—Flow is partly regulated by diversions above.

**ACCURACY.**—Stage-discharge relation changed slightly about February 21, due to caving in of banks; affected by ice for short periods in December and January. Rating curve for first period well defined above 200 second-feet; for second period, well defined between 18 and 1,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for periods indicated in footnote to daily-discharge table. Records good.

**COOPERATION.**—Gage-height and discharge-measurement records furnished by the city of Los Angeles.

*Discharge measurements of Owens River near Lone Pine, Calif., during the year ending Sept. 30, 1917.*

[Made by J. E. Jones.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1908.	<i>Feet.</i>	<i>Sec.-ft.</i>	1909.	<i>Feet.</i>	<i>Sec.-ft.</i>	1911.	<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 2.....	4.65	435	Mar. 19.....	5.45	554	June 29.....	3.72	233
Feb. 21.....	5.60	590	May 4.....	3.35	203	Aug. 15.....	2.82	119
						Sept. 3.....	2.75	100

*Daily discharge, in second-feet, of Owens River near Lone Pine, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	4	375	435	-----	355	626	460	144	34	192	386	137
2.....	4	375	435	-----	355	540	460	144	30	170	334	100
3.....	4	375	415	-----	375	520	480	144	27	163	317	100
4.....	4	375	435	415	335	460	480	192	27	163	285	100
5.....	4	355	435	415	335	422	480	192	27	156	285	106
6.....	4	355	435	415	455	386	500	156	27	156	285	106
7.....	166	335	455	395	535	351	480	156	24	207	253	112
8.....	255	335	455	395	685	351	480	150	24	222	222	118
9.....	300	335	455	375	751	404	500	137	20	222	137	118
10.....	270	335	415	375	773	560	670	137	20	285	130	112
11.....	495	335	415	375	795	560	582	137	100	440	124	112
12.....	535	375	415	375	795	460	540	137	150	520	124	112
13.....	535	375	415	395	707	460	440	137	207	480	124	112
14.....	515	375	415	395	685	460	422	137	253	440	118	112
15.....	495	395	415	395	707	500	422	137	285	440	118	112
16.....	300	395	415	375	641	540	422	137	301	460	112	106
17.....	225	395	415	375	597	540	422	137	285	460	112	100
18.....	126	395	415	355	597	540	253	118	237	460	112	77
19.....	114	355	375	355	575	540	253	112	301	520	106	42
20.....	91	355	335	355	575	520	253	100	404	520	106	34
21.....	75	375	335	-----	670	500	253	88	422	520	88	34
22.....	70	415	335	-----	714	500	253	82	460	460	88	34
23.....	66	415	335	-----	738	500	237	72	460	460	82	30
24.....	66	415	335	-----	810	500	237	58	351	440	77	27
25.....	70	415	-----	-----	834	500	192	54	334	440	72	24
26.....	75	415	-----	-----	834	500	184	50	317	422	72	20
27.....	138	415	-----	355	906	500	177	46	301	422	67	14
28.....	300	415	-----	375	810	500	156	42	285	404	67	8
29.....	315	435	-----	355	-----	480	150	42	253	404	192	6
30.....	375	435	-----	335	-----	500	150	38	192	422	200	5
31.....	375	-----	-----	335	-----	460	-----	34	-----	422	177	-----

NOTE.—Discharge estimated because of ice, from observer's notes as follows: Dec. 25-Jan. 3, 390 second feet; Jan. 21-26, 355 second-feet.

*Monthly discharge of Owens River near Lone Pine, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	535	4	206	12,700
November.....	435	335	382	22,700
December.....	455	335	402	24,700
January.....	415	335	374	23,000
February.....	906	335	641	35,600
March.....	626	351	490	30,100
April.....	670	150	366	21,800
May.....	192	34	111	6,830
June.....	460	20	205	12,200
July.....	520	156	371	22,800
August.....	386	67	160	9,840
September.....	137	5	74.3	4,430
The year.....	906	4	313	227,000

### OWENS LAKE NEAR LONE PINE, CALIF.<sup>2</sup>

LOCATION.—On west shore of Owens Lake, 1 mile north of Brier siding on California & Nevada Railroad (Southern Pacific Co.) and 9 miles south of Lone Pine, Inyo County.

RECORDS AVAILABLE.—March, 1908, to September 30, 1917.

<sup>2</sup> Formerly known as "near Olancha."

**GAGE.**—Vertical staff, installed November 1, 1911, at a boulder point east of railroad culvert No. 507B; read occasionally by an employee of the city of Los Angeles. Original gage, a vertical staff near old Smith ranch, was submerged in July, 1911. whereupon an upper section was installed. Gage datum before July 29, 1913, 3,564.90 feet above sea level, United States Geological Survey datum; after that date, 3,561.90 feet. January 12, 1915, gage was washed out but was replaced at same location and datum.

**EXTREME OF STAGE.**—1911–1917: Maximum stage recorded, 8.75 feet March 16 and April 7, 1912; minimum stage recorded, 4.3 feet November 22 and December 4, 1913.

**COOPERATION.**—Record of elevations furnished by city of Los Angeles.

Elevations given are values computed from original readings made on gage, the datum of which is stated in paragraph under "Gage." To reduce these elevations to mean sea level (United States Geological Survey datum), add 3,570 feet.

*Elevation of water surface, in feet, of Owens Lake near Lone Pine, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.					7.75	7.85						
2.		6.70					8.35					
3.	6.75			7.30				8.40		7.85	7.60	
4.			6.90						7.90			6.95
5.							8.35					
6.	6.80	6.70			7.80	8.15						6.90
7.				7.35				8.30			7.50	
8.	6.70				7.80	8.15				7.80		
9.		6.70					8.40				7.35	6.80
10.												
11.			6.90					8.30	7.90			
12.				7.35		8.20				7.75		
13.	6.75		6.95		7.85							
14.		6.75	6.95								7.20	6.70
15.				7.35	7.85				7.85			
16.								8.30		7.75		
17.	6.80	6.75										
18.				7.40			8.40	8.20				6.65
19.	6.75	6.75	7.00			8.30						
20.										7.70	7.05	
21.				7.50	7.85				7.90			6.65
22.						8.30						
23.		6.80	7.00									
24.	6.70									7.70	7.00	
25.												6.60
26.					7.85	8.30			7.90			
27.	6.70										7.00	
28.												
29.			7.25	7.65		8.35		8.05				6.50
30.	6.70						8.40		7.85			
31.								8.00		7.70		

#### ROCK CREEK NEAR ROUND VALLEY, CALIF.

**LOCATION.**—In NE.  $\frac{1}{4}$  SE.  $\frac{1}{4}$  sec. 9, T. 6 N., R. 31 E., below highway bridge a short distance above mouth of Pine Creek and 2 miles northwest of Round Valley, Inyo County.

**DRAINAGE AREA.**—About 46 square miles.

**RECORDS AVAILABLE.**—August 3, 1903, to September 30, 1917.

**GAGE.**—Vertical staff on left bank about 600 feet below bridge; read by W. D. Roberts. Gage was at highway bridge prior to July, 1906.

**DISCHARGE MEASUREMENTS.**—Made from foot bridge at gage or by wading.

**CHANNEL AND CONTROL.**—Sand and cobblestones; somewhat shifting.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 2.85 feet at 9 a. m., July 4 (discharge, 170 second-feet); minimum stage recorded, 1.0 foot September 22, 23, 27, and 30 (discharge, 24 second-feet).

1903-1917: Maximum stage recorded, 5.0 feet January 25, 1914 (discharge, 360 second-feet); minimum stage recorded, 1.0 foot April 20 to 23, 1905 (discharge, 14 second-feet).

**ICE.**—Shore ice forms at times but probably does not affect stage-discharge relation.

**DIVERSIONS.**—Water for irrigation is diverted above the station.

**REGULATION.**—Flow partially regulated by diversions.

**ACCURACY.**—Stage-discharge relation changed frequently. Standard rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height directly to rating table for period, October 1 to February 23; shifting-control method and parallel ratings used for remainder of year; discharge interpolated for days when gage was not read. Records fair.

**COOPERATION.**—Gage-height and discharge-measurement records furnished by the city of Los Angeles.

*Discharge measurements of Rock Creek near Round Valley, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 16	J. E. Jones.....	1.25	34	Aug. 2	J. E. Jones.....	1.60	72
Feb. 8	Jones and Young.....	1.30	37	Sept. 11	.....do.....	1.02	26
Mar. 21	J. E. Jones.....	1.28	41				

*Daily discharge, in second-feet, of Rock Creek near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	49	43	a 43	36	46	48	a 53	a 46	a 81	a 118	a 73	36
2.....	a 54	a 43	43	a 38	a 44	a 49	52	48	93	164	72	a 35
3.....	60	43	43	41	43	50	a 51	a 48	a 93	a 167	a 68	34
4.....	a 62	a 44	a 42	a 42	a 42	a 49	50	48	93	170	64	a 32
5.....	63	45	40	43	40	48	a 54	a 48	a 102	a 164	a 62	30
6.....	70	a 44	a 42	a 44	a 38	a 48	57	48	110	157	60	a 30
7.....	a 66	43	43	40	37	47	a 54	a 49	a 114	a 158	a 52	30
8.....	63	a 43	a 43	a 40	39	a 46	52	50	119	158	43	a 28
9.....	a 60	43	43	34	41	45	a 51	a 49	a 128	a 154	a 42	27
10.....	56	a 43	a 43	a 38	a 43	a 50	50	48	137	150	42	a 26
11.....	a 54	43	43	a 42	45	55	a 49	a 48	a 140	a 148	a 44	26
12.....	51	40	a 43	34	a 46	a 58	48	48	142	146	45	a 26
13.....	49	a 41	43	a 36	46	60	a 48	a 52	a 135	a 144	a 45	27
14.....	49	42	43	37	a 46	a 64	47	55	128	142	45	a 27
15.....	a 49	a 42	a 40	.....	47	69	38	a 54	a 119	a 134	a 43	27
16.....	49	42	38	a 38	a 44	a 64	a 36	52	110	125	41	a 26
17.....	a 48	a 42	a 38	40	42	60	34	a 50	a 112	a 112	a 42	26
18.....	46	43	37	a 40	a 42	a 51	26	a 52	115	100	43	a 26
19.....	a 48	43	48	40	43	42	28	55	a 117	a 100	a 42	a 25
20.....	49	43	a 38	a 42	a 56	a 42	29	a 54	119	100	40	a 25
21.....	a 49	43	34	43	70	41	a 32	52	a 114	a 92	a 41	25
22.....	49	a 43	a 38	a 42	a 74	a 44	36	a 50	110	84	42	a 24
23.....	a 48	43	43	42	78	48	36	48	a 110	a 82	a 40	24
24.....	48	a 43	32	a 42	a 66	a 48	a 38	a 50	110	81	39	a 27
25.....	a 48	43	32	43	55	48	39	52	a 106	a 80	a 38	30
26.....	49	42	34	a 43	a 52	a 55	36	a 52	101	78	38	a 27
27.....	a 49	a 42	a 36	43	50	62	a 39	52	a 93	a 78	a 36	24
28.....	48	43	37	a 43	a 49	a 60	42	a 54	85	78	35	a 26
29.....	48	43	a 34	a 44	.....	59	a 44	55	a 79	a 76	a 36	27
30.....	a 47	43	32	45	.....	a 56	45	a 62	73	75	37	24
31.....	46	.....	34	a 40	.....	54	.....	69	.....	a 74	a 36	.....

a No gage-height record; discharge interpolated.

*Monthly discharge of Rock Creek near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	70	46	52.4	3,220
November.....	45	40	42.8	2,550
December.....	43	32	39.3	2,420
January.....	46	34	40.8	2,510
February.....	78	37	48.7	2,700
March.....	69	41	52.3	3,220
April.....	57	26	43.1	2,560
May.....	69	46	51.5	3,170
June.....	142	73	110	6,550
July.....	170	74	119	7,320
August.....	73	35	46.0	2,830
September.....	36	24	27.6	1,640
The year.....	170	24	56.2	40,700

#### PINE CREEK NEAR ROUND VALLEY, CALIF.

**LOCATION.**—In NE.  $\frac{1}{4}$  SE.  $\frac{1}{4}$  sec. 9, T. 6 S., R. 31 E., 300 feet above highway bridge, 600 feet above junction with Rock Creek, and 2 miles northwest of Round Valley, Inyo County.

**DRAINAGE AREA.**—About 32 square miles above mouth of canyon.

**RECORDS AVAILABLE.**—August 3, 1903, to September 30, 1917.

**GAGE.**—Vertical staff on left bank 300 feet above bridge; read by W. D. Roberts.

Prior to May 13, 1908, gage was located 150 feet below highway bridge.

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

**CHANNEL AND CONTROL.**—Lava rock and sand; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.2 feet at 1.20 p. m. June 16 (discharge, 283 second-feet); minimum stage recorded, 3.30 feet at 2.35 p. m. December 30 (discharge, 0.7 second-foot).

1903–1917: Maximum discharge recorded, 370 second-feet June 22, 1911; minimum stage recorded, 3.2 feet June 15, 1913 (discharge, 0.2 second-foot).

**ICE.**—Ice occasionally forms along shores at station, but it has never been known to affect the stage-discharge relation.

**DIVERSIONS.**—Water is diverted above station for irrigation.

**REGULATION.**—Probably diversions partly regulate the flow.

**ACCURACY.**—Stage-discharge relation changed February 23, and again during the summer. Rating curve for period, October 1 to February 23, fairly well defined; for remainder of year, a fairly well-defined standard rating curve used with shifts to parallel curve. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table; shifting-control method used for periods of change; discharge interpolated for days when gage was not read. Records good.

**COOPERATION.**—Gage-height and discharge-measurement records furnished by the city of Los Angeles.

*Discharge measurements of Pine Creek near Round Valley, Calif., during the year ending Sept. 30, 1917.*

[Made by J. E. Jones.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 16.....	3.50	3.1	Aug. 2.....	3.80	11
Feb. 8.....	3.58	5.6	Sept. 11.....	3.55	4.3
Mar. 21.....	3.55	5.3			

*Daily discharge, in second-feet, of Pine Creek near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	7.5	2.4	α 3.2	2.0	2.7	3.4	α 4.2	α 2.7	α 7.0	α 210	α 13	1.3
2.....	α 8.0	α 2.0	3.2	α 2.6	α 2.1	α 2.7	4.2	2.2	9.5	245	12	α 1.6
3.....	9.0	1.5	3.2	3.2	1.5	2.2	α 3.9	α 2.2	α 12	α 230	α 10	2.0
4.....	α 9.0	α 1.5	α 2.8	α 3.0	α 1.4	α 3.2	3.6	2.2	14	215	7.5	α 1.8
5.....	9.0	1.5	2.4	2.9	1.3	4.2	α 3.7	α 2.2	α 20	α 215	α 7.0	1.5
6.....	15	α 1.5	α 2.0	α 3.0	α 2.6	α 5.5	3.8	2.2	25	215	6.0	α 1.5
7.....	α 12	1.5	1.5	3.2	α 4.0	6.5	α 3.0	α 2.5	α 32	α 194	α 4.2	1.5
8.....	9.0	α 1.5	α 1.5	α 3.2	5.3	α 5.5	2.2	3.8	40	174	2.3	α 2.4
9.....	α 7.5	1.5	1.5	3.2	1.5	4.2	α 2.7	α 2.5	α 53	α 177	α 2.4	3.2
10.....	6.0	α 1.5	α 1.5	2.0	α 1.5	α 4.2	3.2	2.2	66	180	2.5	α 3.8
11.....	α 5.0	1.5	1.5	α 1.8	1.5	4.2	α 3.2	α 2.2	α 81	α 177	α 2.4	4.3
12.....	4.5	1.3	α 1.5	α 1.7	α 1.4	α 4.0	3.2	2.2	96	174	2.2	α 3.8
13.....	3.2	α 1.4	1.5	1.5	1.3	3.8	α 2.7	α 2.2	α 158	α 171	α 2.4	3.2
14.....	3.2	1.5	1.5	α 1.4	α 1.4	α 4.0	2.2	2.2	221	168	2.5	α 3.8
15.....	α 3.2	α 1.5	α 2.4	1.3	1.4	4.2	2.8	α 2.2	α 252	α 114	α 3.0	4.3
16.....	3.2	1.5	3.2	α 1.2	α 1.4	α 3.7	α 2.5	2.2	283	61	3.6	α 3.8
17.....	α 2.8	α 2.0	α 3.0	1.1	1.5	3.4	2.2	3.2	α 276	α 48	α 3.2	3.2
18.....	2.4	2.4	α 2.8	α 1.3	α 1.8	4.7	2.2	α 3.5	268	36	2.7	α 2.7
19.....	α 2.0	2.9	α 2.6	1.5	2.0	6.0	α 2.5	3.8	α 264	α 29	α 2.5	2.2
20.....	1.5	3.2	α 2.4	α 1.5	α 1.0	α 6.0	2.8	α 2.7	260	22	2.3	α 1.8
21.....	α 2.4	3.2	α 2.2	1.5	18	5.5	α 3.5	1.6	α 252	α 22	α 2.5	1.5
22.....	3.2	α 3.0	α 2.0	α 1.5	α 21	α 4.6	4.2	α 1.9	245	22	2.7	α 2.4
23.....	α 2.6	2.9	α 1.8	1.5	24	3.8	4.2	2.2	α 245	α 29	α 2.7	3.2
24.....	2.0	α 3.0	1.5	α 2.2	α 14	α 4.0	α 4.2	α 2.7	245	36	2.7	α 2.6
25.....	α 1.8	3.2	1.1	2.9	4.8	4.2	4.2	3.2	α 230	α 24	α 3.4	2.0
26.....	1.5	3.2	1.5	α 2.9	α 4.2	α 5.5	4.2	α 2.7	215	12	4.1	α 1.6
27.....	α 1.5	α 2.8	α 1.5	2.9	3.6	6.5	α 4.2	2.2	α 212	α 10	α 3.6	1.3
28.....	1.5	2.4	1.5	2.0	α 3.4	α 6.0	4.2	α 3.2	208	7.5	3.0	α 1.3
29.....	3.2	2.4	α 1.1	α 2.2	5.5	α 3.7	4.2	α 1.91	α 11	α 11	α 2.6	1.3
30.....	α 2.6	3.2	.7	2.4	α 4.8	3.2	4.2	174	14	14	2.0	2.0
31.....	2.0	-----	1.4	α 2.6	-----	4.2	-----	4.2	-----	α 13	α 1.6	-----

α No gage-height record, discharge interpolated.

*Monthly discharge of Pine Creek near Round Valley, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	15	1.5	4.75	292
November.....	3.2	1.3	2.16	129
December.....	3.2	1.7	1.98	122
January.....	3.2	1.1	2.17	133
February.....	24	1.3	5.02	279
March.....	6.5	2.2	4.52	278
April.....	4.2	2.2	3.35	199
May.....	4.2	1.6	2.66	164
June.....	283	7.0	155	9,220
July.....	245	7.5	105	6,460
August.....	13	1.6	4.02	247
September.....	4.3	1.3	2.43	145
The year.....	283	.7	24.4	17,700

### MONO LAKE BASIN.

#### MONO LAKE NEAR MONO LAKE, CALIF.

LOCATION.—In lot 6, SE.  $\frac{1}{4}$  NE.  $\frac{1}{4}$  sec. 31, T. 2 N., R. 20 E., 2 miles south of Mono Lake post office, Mono County.

RECORDS AVAILABLE.—June 15, 1912, to September 30, 1917 (fragmentary).

**GAGE.**—Vertical staff fastened to willow tree about 400 feet from Hammon's store used June 15, 1912, to September 30, 1915, when a temporary gage was installed about 300 feet northwest of the above-mentioned gage and has been used since the latter date.

**EXTREMES OF STAGE.**—1912-1917: Maximum stage recorded, 13.3 feet May 27, 1915; minimum stage recorded, 7.93 feet December 11, 1913.

**COOPERATION.**—The following gage-height record was furnished by United States Forest Service:

November 20, 1.40 feet; April 15 and 27, 1.80 feet; May 4, 1.85 feet; May 19, 1.95 feet; May 28, 2.05 feet; June 15, 2.10 feet; June 26, 2.25 feet; July 10, 2.35 feet; July 29, 2.42 feet; August 23, 2.42 feet; September 26, 1.80 feet.

### WALKER LAKE BASIN.

#### EAST WALKER RIVER ABOVE MASON VALLEY, NEAR MASON, NEV.

**LOCATION.**—In sec. 9, T. 11 N., R. 26 E., half a mile above highway bridge, a mile above Strosnider's ranch, and 14 miles southeast of Mason, Lyon County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—August 27, 1916, to September 30, 1917.

**GAGE.**—Vertical staff on right bank about half a mile above highway bridge; read by D. M. Ricker. Datum lowered 1.08 feet April 12, 1917.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge about half a mile below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of loose sand. Right bank is overflowed at extremely high stages. Control is gravel bar of shifting character.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period, 5.3 feet April 8 (discharge, 1,030 second-feet); minimum stage recorded, 1.73 feet September 21, 1916 (discharge, 42 second-feet).

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

**DIVERSIONS.**—Station is above all diversions into Mason Valley. Strosnider's canal heads about a mile above gage and waters the ranch, which is not strictly in Mason Valley (see list of miscellaneous measurements).

**REGULATION.**—Flow only slightly affected by regulation of Strosnider canal heading.

**ACCURACY.**—Stage-discharge relation not permanent; affected by ice November 12-20, December 6-10, and December 13 to February 11. Rating curve used August 27, 1916, to July 14, 1917, fairly well defined between 100 and 800 second-feet; that used for remainder of year fairly well defined between 25 and 200 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for periods when stage-discharge relation was affected by ice, for which it was ascertained by means of discharge measurements, observer's notes, and weather records. Records fair.

*Discharge measurements of East Walker River above Mason Valley, near Mason, Nev., during the period Aug. 19, 1916, to Sept. 30, 1917.*

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Aug. 19.....	2.19	112	Feb. 3.....	3.11	102	June 24.....	4.59	762
Nov. 13.....	a2.28	102	Apr. 12.....	3.65	505	Sept. 30.....	2.43	85

a Stage-discharge relation affected by ice.

**NOTE.**—All measurements are referred to gage datum established Apr. 12, 1917.

*Daily discharge, in second-feet, of East Walker River above Mason Valley, near Mason, Nev., for the period Aug. 27, 1916, to Sept. 30, 1917.*

Day.	Aug.	Sept.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Sept.
1.		172	117	198	184		162	268	327	384	730	
2.		169	138	193	184		156	278	327	384	697	
3.		169	212	198	176		147	384	341	384	697	
4.		169	227	198	181		156	458	341	384	697	
5.		165	232	191	193		162	504	341	384	664	
6.		165	237	188			169	664	355	398	664	
7.		165	247	188			167	780	355	398	664	
8.		160	263	188			160	1,030	370	473	664	
9.		160	263	188			160	780	370	600	632	
10.		158	263	184			156	680	370	730	632	
11.		153	316	184	136		176	473	384	763	600	
12.		149	319		156	165	167	504	384	730	600	
13.		136	268			160	169	413	384	697	600	
14.		125	252			160	158	413	398	664	668	
15.		123	247			156	160	384	384	664		
16.			115	239		156	160	314	384	664		68
17.			113	237		172	153	300	355	730		68
18.			109	237		151	156	300	355	763		68
19.			115	234		142	174	273	327	796		68
20.			95	234		144	179	273	300	796		68
21.			42	232	181	136	172	286	286	796		75
22.			78	232	203	140	179	327	300	796		75
23.			105	232	198	144	181	355	314	796		75
24.			105	227	196	142	188	355	327	796		83
25.			105	222	191	138	181	355	341	796		75
26.			107	217	184	144	188	341	341	796		83
27.	179	65	212	191		149	188	327	355	796		83
28.	179	81	208	193		158	208	327	355	763		83
29.	176	93	208	188			247	327	355	763		83
30.	181	98	208	188			311	327	355	730		91
31.	179		205				300		370			

NOTE.—Because of ice discharge estimated from observer's notes, discharge measurements, and climatic records: Nov. 12-20, 130 second-feet; Dec. 6-10, 110 second-feet; Dec. 13-31, 100 second-feet; Jan. 1-25, 75 second-feet; Jan. 26 to Feb. 11, 110 second-feet. No gage-height record July 15 to Sept. 15; discharge not determined.

*Monthly discharge of East Walker River above Mason Valley near Mason, Nev., for the period Aug. 27, 1916, to Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
August 27-31.....	181	176	179	1,780
September.....	172	42	125	7,440
October.....	319	117	232	14,300
November.....	203		173	10,300
December.....	193		118	7,260
January.....			81.8	5,030
February.....	172		135	7,500
March.....	311	147	180	11,100
April.....	1,030	268	427	25,400
May.....	398	286	350	21,500
June.....	796	384	654	38,900
July 1-14.....	730	600	658	18,300
September 16-30.....	91	68	76.4	2,270



## WALKER RIVER AT SCHURZ, NEV.

**LOCATION.**—In sec. 36, T. 13 N., R. 28 E., 50 feet below Southern Pacific Railroad bridge at Schurz, Mineral County, 3 miles above Walker Lake, and 6 miles below diversion dam of Walker River Indian Reservation.

**DRAINAGE AREA.**—2,850 square miles.

**RECORDS AVAILABLE.**—July 2, 1913, to September 30, 1917.

**GAGE.**—Inclined staff gage on right bank 50 feet below Southern Pacific Railroad bridge; installed November 14, 1916; read by J. G. Bradford. Original gage, vertical staff fastened to tree on right bank about a quarter of a mile above bridge, July 2, 1913, to July 1, 1914, when it was washed out by flood; August 4, 1914, to November 14, 1916, vertical staff on downstream pile of left abutment of highway bridge, about 300 feet back of depot, a quarter of a mile below original gage, and 1,000 feet above present gage.

**DISCHARGE MEASUREMENTS.**—Made by wading or from flume half a mile below gage.

**CHANNEL AND CONTROL.**—Bed composed of loose sand; shifts occasionally. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.3 feet June 21 (discharge, 1,860 second-feet); minimum stage recorded, 0.55 foot August 19–24, August 26 to September 3 and September 17–22 (discharge, 0.8 second-foot).

1913–1917: Maximum stage recorded, 11.0 feet June 8 and 9, 1914 (discharge, 2,530 second-feet); minimum stage recorded, 1.60 feet August 17–30 and September 23 to October 18, 1913 (discharge, zero).

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

**DIVERSIONS.**—Below all diversions.

**REGULATION.**—Flow affected by irrigation diversions above.

**ACCURACY.**—Stage-discharge relation changed October 14–16 during freshet; changed November 14 when new gage was established at different site; and changed again June 11–24 during high water; affected by ice December 7 to January 2, January 12–22, and January 27 to February 21. Rating curve used October 1 to November 14 poorly defined; curve used November 15 to June 10, fairly well defined between 200 and 600 second-feet, and that used June 25 to September 30 well defined between 0 and 1,800 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods when stage discharge relation was affected by ice, for which it was ascertained by means of discharge measurements, observer's notes, and weather records; shifting-control method October 14–16 and June 11–24. Records obtained by use of rating tables good; others fair.

*Discharge measurements of Walker River at Schurz, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 14.....	<sup>a</sup> 3.37	280	June 25.....	6.81	
Feb. 2.....	<sup>b</sup> 3.97	232	Sept. 30.....	.73	2.3
Apr. 13.....	4.06	494			

<sup>a</sup> Gage used prior to Nov. 14, read 4.55 feet. Stage-discharge relation slightly affected by ice.

<sup>b</sup> Complete ice cover below gage.

*Daily discharge, in second-feet, of Walker River at Schurz, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	2	269	265	220	.....	340	367	572	604	1,180	134	0.8
2.....	3	269	265	220	.....	314	340	604	604	1,140	142	.8
3.....	5	250	277	242	.....	327	367	541	604	1,060	160	.8
4.....	20	250	289	277	.....	289	367	510	636	1,030	142	1.0
5.....	46	250	314	302	.....	289	394	480	669	990	125	1.0
6.....	69	269	314	340	.....	265	422	480	737	990	125	1.0
7.....	134	269	.....	340	.....	265	480	480	737	990	117	1.0
8.....	153	269	.....	327	.....	265	636	541	807	953	109	1.0
9.....	167	269	.....	327	.....	289	703	636	772	916	94	1.0
10.....	182	269	.....	340	.....	314	807	604	879	916	94	1.0
11.....	206	269	.....	340	.....	289	772	604	1,190	916	94	1.0
12.....	232	269	.....	.....	.....	302	541	636	1,360	916	52	1.0
13.....	260	269	.....	.....	.....	289	510	669	1,460	843	41	1.0
14.....	300	269	.....	.....	.....	289	510	669	1,430	807	17	1.0
15.....	310	277	.....	.....	.....	289	480	737	1,400	772	8.4	1.0
16.....	300	242	.....	.....	.....	289	480	737	1,420	807	3.0	1.0
17.....	310	265	.....	.....	.....	289	480	807	1,430	843	3.0	.8
18.....	289	289	.....	.....	.....	277	451	879	1,480	916	3.0	.8
19.....	289	302	.....	.....	.....	265	394	703	1,580	953	.8	.8
20.....	289	314	.....	.....	.....	265	394	669	1,720	953	.8	.8
21.....	289	340	.....	.....	.....	265	367	669	1,860	916	.8	.8
22.....	289	340	.....	.....	394	277	367	604	1,750	916	.8	.8
23.....	289	314	.....	289	367	289	314	604	1,720	807	.8	1.0
24.....	289	289	.....	302	367	265	314	541	1,740	772	.8	1.0
25.....	289	314	.....	314	394	254	340	510	1,710	703	1.0	1.0
26.....	269	314	.....	340	422	242	394	510	1,620	636	.8	1.3
27.....	289	314	.....	.....	422	242	422	480	1,460	636	.8	1.5
28.....	289	289	.....	.....	367	242	480	510	1,380	604	.8	1.5
29.....	289	289	.....	.....	.....	254	510	541	1,260	572	.8	1.5
30.....	269	265	.....	.....	.....	289	541	541	1,220	480	.8	2.4
31.....	269	.....	.....	.....	.....	302	.....	572	.....	277	.8	.....

NOTE.—Discharge estimated because of ice: Dec. 7-24, 300 second-feet; Dec. 25-31, 180 second-feet; Jan. 12-22, 200 second-feet; Jan. 27-31, 340 second-feet; and Feb. 1-21, 330 second-feet.

*Monthly discharge of Walker River at Schurz, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	310	2	216	13,300
November.....	340	242	282	16,800
December.....	314	.....	270	16,600
January.....	340	.....	272	16,700
February.....	422	.....	345	19,200
March.....	340	242	281	17,300
April.....	807	314	465	27,700
May.....	879	480	601	37,000
June.....	1,860	604	1,240	73,800
July.....	1,180	277	845	52,000
August.....	160	.8	47.5	2,920
September.....	2.4	.8	1.05	62.5
The year.....	1,860	.8	405	293,000

## WEST WALKER RIVER NEAR COLEVILLE, CALIF.

**LOCATION.**—In NE.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  sec. 28, T. 8 N., R. 23 E., at mouth of Ross Canyon, at head Antelope Valley, 400 feet east of State highway, 1.2 miles above Terry ranch of house, 5.5 miles above Coleville, Mono County, and 40 miles southeast of Gardnerville, Nev.

**DRAINAGE AREA.**—245 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—June 18, 1915, to September 30, 1917; October 5, 1902, to July 31, 1908, a station was maintained half a mile above present gage.

**GAGE.**—Water-stage recorder built by S. P. Ferguson, Reno, Nev., installed April 29, 1915, on left bank, 15 feet below large yellow pine tree, to which upper section of outside staff gage is fastened, and about 100 feet above Terry canal heading.

**DISCHARGE MEASUREMENTS.**—Made from cable 15 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of large boulders. Fairly permanent riffle. Stage-discharge relation affected at times by a temporary jetty built each year at the Terry canal heading. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 5.75 feet at 4 a. m. June 17 (discharge, 2,400 second-feet); minimum discharge occurred during ice-affected period, quantity not determined.

1915-1917: Maximum stage occurred in 1917; minimum stage, 2.20 feet at 10 p. m. March 2, 1916 (discharge, 14 second-feet).

**ICE.**—Stage-discharge relation not seriously affected by ice except for short periods.

**DIVERSIONS.**—Station is above all diversions in Antelope Valley.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation is fairly permanent during two conditions of flow—when the jetty at the Terry canal heading is in place, and when it has been destroyed by high water. The jetty was washed out April 23-25 and replaced August 16. Affected by ice December 8 to February 3. Rating curves well defined for ranges of stage for which used. Operation of water-stage recorder satisfactory except during January, February, March, and June 17 to July 8, when weekly hook gage readings were used. Daily discharge determined by applying to the rating tables mean daily gage height determined by inspecting recorder graph except for periods when stage-discharge relation was affected by ice or shifting control, or when gage height records were missing for which it was obtained as shown in footnote to table of daily discharge. Records obtained by use of rating tables good; others fair.

*Discharge measurements of West Walker River near Coleville, Calif., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordon.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 12.....	a 2.45	61	June 23.....	c 5.03	1,560
Feb. 5.....	a 2.50	64	Sept. 29.....	d 2.46	78
Apr. 11.....	b 3.44	301			

a Slight shore ice, probably no backwater effect.

b Jetty extending part way across channel at control.

c Jetty washed out.

d Jetty rebuilt.

*Daily discharge, in second-feet, of West Walker River near Coleville, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	121	110	91	.....	.....	75	121	502	977	.....	437	129
2.....	158	110	59	.....	.....	78	121	502	1,070	.....	373	121
3.....	145	110	74	.....	.....	80	145	512	1,200	.....	347	115
4.....	145	121	121	.....	74	82	185	538	1,150	.....	347	117
5.....	133	110	121	.....	66	82	245	550	1,150	.....	331	119
6.....	133	100	100	.....	66	82	296	629	1,240	.....	303	131
7.....	146	121	91	.....	66	82	359	722	1,430	.....	273	124
8.....	158	133	.....	.....	66	82	344	629	1,630	.....	251	117
9.....	158	133	.....	.....	66	82	328	600	1,850	1,070	224	108
10.....	185	133	.....	.....	66	82	312	635	1,960	962	204	102
11.....	185	133	.....	.....	66	82	296	754	1,580	962	186	102
12.....	171	91	.....	.....	65	83	363	728	1,430	992	214	98
13.....	171	82	.....	.....	64	84	315	858	1,530	992	192	96
14.....	158	91	.....	.....	63	86	289	962	1,800	992	172	94
15.....	171	110	.....	.....	62	87	248	946	1,960	1,020	184	94
16.....	185	110	.....	.....	61	89	229	788	2,020	962	175	92
17.....	199	100	.....	.....	60	90	205	901	.....	931	198	88
18.....	199	110	.....	.....	59	91	193	778	.....	880	198	88
19.....	199	91	.....	.....	60	92	196	656	.....	795	201	88
20.....	185	82	.....	.....	65	94	223	533	.....	761	192	87
21.....	185	91	.....	.....	.....	95	289	560	.....	678	189	85
22.....	185	91	.....	.....	.....	96	379	594	.....	618	186	83
23.....	171	91	.....	.....	.....	98	432	606	.....	588	181	88
24.....	145	91	.....	.....	.....	99	497	577	1,380	555	172	88
25.....	158	91	.....	.....	66	100	612	533	.....	533	172	87
26.....	145	91	.....	.....	68	105	716	507	.....	523	169	83
27.....	145	91	.....	.....	71	111	653	572	.....	533	161	81
28.....	145	91	.....	.....	73	116	618	672	.....	476	156	79
29.....	100	82	.....	.....	.....	122	544	678	.....	427	146	77
30.....	121	91	.....	.....	.....	127	512	802	.....	404	141	81
31.....	110	.....	.....	.....	.....	133	.....	843	.....	432	133	.....

NOTE.—Discharge estimated on account of ice, from recorded gage heights and temperature records: Dec. 8-20, 80 second-feet; Dec. 21-31, 40; Jan. 1-31, 35; and Feb. 1-3, 65 second-feet. Discharge estimated Feb. 21-24, 125 second-feet. Discharge estimated by hydrographic comparison with West Walker River at Hudson, Nev., because of backwater from jetty, Apr. 8-10, 23-25 and May 18-19 as in table, and June 17; 2,200 second-feet; June 18-23, 1,790 second-feet; June 24, 1,380 second-feet; June 25-29, 1,240 second-feet; June 30, 1,100 second-feet; July 1, 1,200 second-feet; July 2-5, 1,160 second-feet; July 6, 1,120 second-feet; July 7, 1,140 second-feet; and July 8, 1,150 second-feet. Discharge interpolated Oct. 7, Nov. 23-25, and between days of weekly gage readings in February and March.

*Monthly discharge of West Walker River near Coleville, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	199	100	159	978
November.....	135	82	103	613
December.....	121	.....	69	424
January.....	.....	.....	35	215
February.....	.....	59	74	411
March.....	133	75	93	572
April.....	716	121	342	20,400
May.....	962	502	667	41,000
June.....	2,200	977	1,520	90,400
July.....	.....	404	850	51,600
August.....	437	133	220	13,500
September.....	131	77	98.1	5,840
The year.....	2,200	.....	353	226,000

## WEST WALKER RIVER AT HUDSON, NEV.

**LOCATION.**—About sec. 11, T. 11 N., R. 24 E., at highway bridge at Hudson, Lyon County, 1 mile above canyon between Smith and Mason valleys.

**DRAINAGE AREA.**—953 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—August 3, 1914, to September 30, 1917.

**GAGE.**—Vertical staff fastened to downstream pile in middle bent of highway bridge; read by A. E. Purvine.

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

**CHANNEL AND CONTROL.**—Bed composed of loose sand; light gravel riffle. One channel at all stages. Gage height of zero flow about 1.5 feet.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.9 feet at 5 p. m. June 18 and 7 a. m. June 19 (discharge, 2,200 second-feet); minimum stage recorded, 2.40 feet September 7, 8, and 11–18 (discharge, 32 second-feet).

1914–1917: Maximum stage occurred in 1917; minimum stage recorded, 2.30 feet August 25 to September 3, 1915 (discharge, 31 second-feet).

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

**DIVERSIONS.**—Below all diversions in Smith Valley and above those in Mason Valley.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation slightly changed for low stages by high water in June and July; affected by ice November 12 and 13, December 7–11, and December 25 to February 3. Rating curves well defined between 30 and 1,500 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as indicated in footnote to daily-discharge table. Records good.

*Discharge measurements of West Walker River at Hudson, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Fect.</i>	<i>Sec.-ft.</i>		<i>Fect.</i>	<i>Sec.-ft.</i>
Nov. 12.....	3.40	163	June 23.....	5.92	1,430
Feb. 4.....	3.25	141	Sept. 29.....	2.50	39.9
Apr. 12.....	3.57	212			

<sup>a</sup> Stage-discharge relation slightly affected by ice.

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*Daily discharge, in second-feet, of West Walker River at Hudson, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	65	176	137	.....	166	128	428	708	815	152	40
2.....	89	176	137	.....	156	128	388	815	930	174	40
3.....	146	176	137	.....	156	128	315	930	990	152	40
4.....	176	166	137	146	156	120	332	1,050	930	123	40
5.....	198	166	146	128	146	120	350	1,050	930	106	36
6.....	223	176	146	137	156	146	369	990	930	98	36
7.....	223	156	.....	167	156	187	492	990	930	95	32
8.....	210	156	.....	137	156	237	657	990	990	78	32
9.....	210	176	.....	137	156	282	608	1,400	1,050	49	36
10.....	223	176	.....	137	156	176	560	1,790	870	49	36
11.....	251	176	.....	137	156	210	608	1,950	708	44	32
12.....	251	163	120	137	146	210	708	1,400	608	57	32
13.....	223	120	128	137	146	237	815	1,190	608	51	32
14.....	210	104	120	137	137	251	930	1,330	708	49	32
15.....	210	112	104	137	137	223	1,050	1,470	815	51	32
16.....	210	156	104	137	137	223	930	1,790	930	49	32
17.....	210	156	120	137	137	223	708	1,950	930	49	32
18.....	251	156	120	137	137	223	657	2,110	870	47	32
19.....	251	137	120	137	137	198	514	2,110	815	49	36
20.....	237	137	137	137	137	198	449	1,920	708	49	36
21.....	223	137	128	156	137	198	388	1,740	608	49	36
22.....	223	137	120	176	137	251	369	1,550	537	49	36
23.....	223	137	120	223	128	315	369	1,470	449	44	36
24.....	223	146	104	350	128	369	388	1,330	369	40	36
25.....	198	137	.....	350	128	492	374	1,260	315	42	36
26.....	198	146	.....	237	128	560	360	1,190	252	47	40
27.....	198	146	.....	187	128	657	346	1,120	224	49	40
28.....	198	137	.....	166	128	608	332	1,050	224	44	40
29.....	198	137	.....	.....	128	608	492	1,050	198	40	40
30.....	176	137	.....	.....	128	514	492	990	174	40	40
31.....	176	.....	.....	.....	128	.....	608	.....	152	40	.....

NOTE.—Discharge estimated on account of ice, from observer's notes, discharge measurements, and climatic records as follows: Nov. 12 and 13, as in table; Dec. 7-11, 120 second-feet; Dec. 25-31, 75 second-feet; Jan. 1-13, 105 second-feet; Jan. 14-25, 75 second-feet; Jan. 26-31, 110 second-feet, and Feb. 1-3, 140 second-feet. Discharge interpolated May 25-27 and June 20-21, because of missing gage heights.

*Monthly discharge of West Walker River at Hudson, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	251	65	203	12,500
November.....	176	104	150	8,930
December.....	146	.....	113	6,950
January.....	.....	.....	84.6	5,200
February.....	350	128	164	9,110
March.....	166	128	142	8,730
April.....	657	120	281	16,700
May.....	1,050	315	528	32,500
June.....	2,110	708	1,360	80,900
July.....	1,050	152	663	40,800
August.....	174	40	66.3	4,080
September.....	40	32	35.9	2,140
The year.....	2,110	32	315	229,000

## HUMBOLDT-CARSON SINK DRAINAGE BASIN.

## CARSON RIVER BASIN.

## EAST FORK OF CARSON RIVER NEAR MARKLEEVILLE, CALIF.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 27, T. 10 N., R. 20 E., at Hangman's Bridge, 2 miles east of Markleeville, Alpine County. Hangman's Creek enters 100 feet above gage and Markleeville Creek  $1\frac{1}{4}$  miles below.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—November 13, 1910, to September 30, 1917 (fragmentary).

**GAGE.**—Vertical staff, 75 feet below bridge, bolted to rock ledge on right bank; read by W. J. Clark.

**DISCHARGE MEASUREMENTS.**—Made from cable, installed April 18, 1914, 400 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Gravel and small boulders; apparently permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.1 feet June 18 and 20 (discharge, 2,140 second-feet); minimum stage recorded, 2.45 feet at 11.10 a. m. November 14 (discharge, 44 second-feet).

1910-1917: Maximum stage recorded, 7.7 feet June 7, 1911 (discharge not determined); minimum stage recorded, 1.45 feet September 20, 1913 (discharge, 6 second-feet).

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

**DIVERSIONS.**—No information.

**REGULATION.**—Low-water flow is augmented by storage developed on Silver Creek above the station.

**ACCURACY.**—Stage-discharge relation permanent; affected by ice during winter. Rating curve fairly well defined above 40 second-feet. Gage read to half-tenths occasionally. Daily discharge ascertained by applying daily gage height to rating table. Records good for periods covered by gage-height record. On account of fragmentary gage-height record, monthly discharge was not determined.

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

*Discharge measurements of East Fork of Carson River near Markleeville, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 30	H. J. Tompkins .....	<sup>a</sup> 3.90	64
July 25	H. D. McGlashan .....	3.77	317

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of East Fork of Carson River near Markleeville, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1		85						
2				488	1,480		184	
3								
4							174	92
5						956		92
6							156	
7								
8								
9				652				99
10								92
11								99
12	129				1,560			92
13					1,520			
14		44				794		
15		54			1,920		146	
16		72					138	
17		92					122	80
18		92			2,140			
19		85			1,800			
20				698	2,140	184	114	
21		66			2,050		106	67
22		85					102	67
23	106	99						
24	99	85						
25					1,400	250	99	
26		114		546	2,050	248		
27								66
28				794				
29				846	1,880			
30			64	1,070				
31								

#### EAST FORK OF CARSON RIVER NEAR GARDNERVILLE, NEV.

**LOCATION.**—In sec. 25, T. 12 N., R. 20 E., 300 feet below dam of Douglas Power Co., 1,000 feet above highway bridge; half a mile southwest of Rodenbah's ranch and about 5 miles southeast of Gardnerville, Douglas County.

**DRAINAGE AREA.**—381 square miles.

**RECORDS AVAILABLE.**—April 7, 1890, to December 31, 1893; October 17, 1900, to December 31, 1906; March 27, 1908, to December 26, 1910; June 22 to October 31, 1917, when station was discontinued.

**GAGE.**—Vertical staff on left bank installed October 8, 1905, about 1,000 feet above highway bridge, read October 8, 1905, to December 31, 1906, and June 22 to October 31, 1917; a high-water section of vertical type was installed June 22, 1917, on right bank, directly opposite. Gage read by F. W. Sarman. Original gage was inclined staff on right bank 400 feet above highway bridge at place where measurements were made in 1890 to 1893; this gage was destroyed and was replaced March 10, 1901, by a vertical staff on right bank a short distance downstream which was read until October 8, 1905. An inclined gage was installed October 3, 1902, on left bank 600 feet above but was never read. On March 27, 1908, the station was moved to a place known as Horseshoe Bend, 3 miles above original station and 9 miles south of Gardnerville. The record at this point was discontinued December 26, 1910.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge 1,000 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of large rocks and gravel. Banks high and not subject to overflow. Control permanent. One channel at all stages.



**EXTREMES OF DISCHARGE.**—Maximum stage recorded during period 4.1 feet, June 23 (discharge, 2,070 second-feet); minimum stage recorded, 0.80 foot September 29 (discharge, 67 second-feet).

1890–1893, 1900–1906, 1908–1910, and 1917: Maximum discharge, 5,540 second-feet (estimated) December 25, 1892; minimum discharge, 8 second-feet December 4–10 and 19–23, 1904.

**ICE.**—No information.

**DIVERSIONS.**—Above all diversions and tributaries. Plant of Douglas Power Co. not in operation.

**REGULATION.**—Flow slightly affected during construction of Douglas Power Co.'s dam.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined between 50 and 2,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table; interpolated for periods when gage was not read. Records good.

*Discharge measurements of East Fork of Carson River near Gardnerville, Nev., during the period Mar. 14, 1916, to Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
1916.	<i>Feet.</i>	<i>Sec.-ft.</i>	1917.	<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 14.....	2.65	646	June 22.....	3.78	1,680
Aug. 17.....	1.42	173	Sept. 29.....	.80	70

*Daily discharge, in second-feet, of East Fork of Carson River near Gardnerville, Nev., for the period June 22 to Oct. 31, 1917.*

Day.	June.	July.	Aug.	Sept.	Oct.	Day.	June.	July.	Aug.	Sept.	Oct.
1.....		1,110	200	83	75	16.....		590	146		69
2.....		1,110	212	80	73	17.....		646	128		70
3.....		1,110	188	78	70	18.....		646	120		73
4.....		1,040	177	78	70	19.....		512	116		73
5.....		965	166	91	69	20.....		469	112		75
6.....		965	156	89	69	21.....		425	104		73
7.....		924	137	89	70	22.....	1,360	381	94		70
8.....		841	128	86	68	23.....	2,090	338	94		73
9.....		758	128	88	68	24.....	1,840	302	91	82	73
10.....		675	128	91	68	25.....	1,600	302	104	79	69
11.....		646	128	91	69	26.....	1,600	269	99	79	68
12.....		646	128		68	27.....	1,480	269	94	76	67
13.....		590	128		69	28.....	1,540	239	91	75	67
14.....		590	146		69	29.....	1,420	226	91	70	67
15.....		590	137		69	30.....	1,110	212	86	75	66
						31.....		200	86		66

NOTE.—Discharge Sept. 12–23 estimated 86 second-feet.

*Monthly discharge of East Fork of Carson River near Gardnerville, Nev., for the period June 22 to Oct. 31, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 22-30.....	2,090	1,110	1,630	29,100
July.....	1,110	200	600	36,900
August.....	212	86	127	7,810
September.....		75	83.4	4,960
October.....	75	66	69.8	4,290
The period.....				83,100

#### CARSON RIVER NEAR EMPIRE, NEV.

**LOCATION.**—In sec. 12, T. 15 N., R. 20 E., just below tailrace of Brunswick mill, a quarter of a mile below highway bridge, and 2 miles below Empire, Ormsby County.

**DRAINAGE AREA.**—988 square miles (measured on topographic map).

**RECORDS AVAILABLE.**—June 25 to December 31, 1895; October 21, 1900, to September 30, 1917.

**GAGE.**—Inclined staff on left bank used since February 24, 1911; vertical staff on left abutment of highway bridge, June 7, 1907, to February 23, 1911; prior to June 7, 1907, several gages at different points.

**DISCHARGE MEASUREMENTS.**—Made from cable a quarter of a mile above gage or by wading just above bridge. When made from cable the power canal is measured and this quantity added.

**CHANNEL AND CONTROL.**—Bed composed of gravel and boulders, fairly permanent. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum daily mean stage during year, 6.9 feet June 11 and 12 (discharge, 3,250 second-feet); minimum daily mean stage, 2.7 feet September 10-16 and 19-22 (discharge, 13 second-feet).

1895, 1900-1917: Maximum stage recorded, 8.0 feet January 23, 1914 (discharge, 5,160 second-feet); minimum stage, 0.7 foot August 31 and September 4, 5, and 14, 1905 (discharge, zero).

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

**DIVERSIONS.**—A large amount of water is diverted above station for irrigation in Carson Valley. The water diverted by Brunswick mill power canal is returned to river above gage.

**ACCURACY.**—No information.

**COOPERATION.**—Record of daily discharge furnished by United States Reclamation Service.

No discharge measurements were made during the year.

*Daily discharge, in second-feet, of Carson River near Empire, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	36	236	236	122	1,180	391	512	1,020	2,030	1,270	122	27
2.....	122	236	285	335	1,020	335	450	940	2,150	1,180	122	27
3.....	155	236	285	285	780	335	450	940	2,270	1,100	93	27
4.....	236	236	285	285	512	335	450	1,020	2,390	1,020	69	27
5.....	285	236	335	285	285	335	575	1,020	2,390	940	50	27
6.....	285	236	391	285	391	335	575	1,270	2,390	860	50	27
7.....	236	236	335	285	391	335	710	1,270	2,390	860	50	27
8.....	236	236	285	285	285	335	780	1,580	2,390	860	69	21
9.....	285	236	285	285	285	335	940	1,270	2,390	860	50	16
10.....	335	236	285	236	285	335	1,020	1,270	2,950	860	50	13
11.....	335	236	236	236	285	335	780	1,370	3,250	780	50	13
12.....	335	194	236	236	285	335	780	1,800	3,250	780	27	13
13.....	335	122	236	391	335	335	710	1,800	2,390	780	27	13
14.....	335	194	236	450	335	335	780	2,030	2,390	710	27	13
15.....	335	236	236	780	285	335	780	2,390	2,660	710	27	13
16.....	335	226	194	1,370	285	335	710	2,030	2,660	780	27	13
17.....	335	236	236	2,030	285	335	710	1,800	2,950	860	36	16
18.....	335	236	236	2,150	285	335	640	1,580	2,800	1,180	36	16
19.....	335	236	194	2,030	285	335	512	1,270	2,660	1,020	50	13
20.....	335	285	194	2,030	285	335	512	1,270	2,520	1,020	36	13
21.....	285	236	236	2,150	285	335	512	1,100	2,520	710	36	13
22.....	285	236	236	2,030	335	335	512	1,100	2,150	710	36	13
23.....	285	236	236	1,910	640	335	640	1,200	2,150	512	50	16
24.....	285	236	236	1,370	640	285	860	1,270	1,800	452	50	16
25.....	285	236	194	1,020	1,270	335	1,020	1,180	1,690	335	69	16
26.....	285	236	194	1,020	1,370	335	1,270	1,180	1,580	285	27	16
27.....	285	285	93	285	640	335	1,470	1,100	1,470	236	27	16
28.....	285	285	122	194	450	335	1,470	1,470	1,370	155	27	16
29.....	236	285	122	335	.....	450	1,370	1,690	1,370	122	27	16
30.....	236	236	122	710	.....	512	1,180	1,690	1,270	122	27	27
31.....	236	.....	69	1,370	.....	575	.....	2,030	.....	93	27	.....

*Monthly discharge of Carson River near Empire, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	335	36	276	17,000
November.....	285	122	236	14,000
December.....	391	69	229	14,100
January.....	2,150	122	864	53,100
February.....	1,370	285	500	27,800
March.....	575	285	342	21,000
April.....	1,470	450	789	46,900
May.....	2,390	940	1,420	87,300
June.....	3,250	1,270	2,290	136,000
July.....	1,270	93	715	44,000
August.....	122	27	47.5	2,920
September.....	27	13	18.0	1,070
The year.....	3,250	13	643	465,000

NOTE.—Monthly discharge computed by the U. S. Geological Survey.

#### CARSON RIVER NEAR FORT CHURCHILL, NEV.

LOCATION.—In sec. 5, T. 16 N., R. 23 E., 1 mile west of Clifton station, on Mound House-Churchill branch of Southern Pacific Railroad, 9 miles west of Fort Churchill, Lyon County, and 10 miles below Dayton.

DRAINAGE AREA.—1,200 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 13, 1911, to September 30, 1917.

GAGE.—Inclined staff on right bank with vertical extension for high water.

DISCHARGE MEASUREMENTS.—Made from suspension bridge 500 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum daily mean stage during year, 8.6 feet June 11 (discharge, 3,050 second-feet); minimum daily mean stage, 2.9 feet September 21-30 (discharge, 27 second-feet).

1911-1917: Maximum stage, 11.5 feet January 26, 1914 (discharge, 6,150 second-feet); minimum stage, 2.2 feet September 15, 1915 (discharge, 8 second-feet).

ICE.—No information.

DIVERIONS.—Carson and Dayton valleys are irrigated above the station.

REGULATION.—Flow affected by diversions.

ACCURACY.—No information.

COOPERATION.—Record of daily discharge furnished by United States Reclamation Service.

*Discharge measurements of Carson River near Fort Churchill, Nev., during the year ending Sept. 30, 1917.*

[Made by R. E. Hartley.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
June 29.....	6.54	1,200	Aug. 8.....	3.28	46.6

*Daily discharge, in second-feet, of Carson River near Fort Churchill, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.
1.....	83	337	337	337	465	535	650	1,160	2,140	1,400	165	34
2.....	83	337	337	369	465	401	570	1,050	2,060	1,160	120	34
3.....	83	337	337	369	337	337	570	1,050	2,220	1,100	58	34
4.....	171	337	337	369	337	337	570	1,160	2,310	1,050	40	34
5.....	337	337	433	401	401	401	570	1,050	2,310	950	40	34
6.....	369	337	433	369	465	433	690	1,000	2,220	1,000	40	34
7.....	337	307	401	278	535	401	770	1,340	2,310	950	40	30
8.....	307	307	369	337	433	433	770	1,540	2,310	950	40	30
9.....	278	278	307	369	369	401	1,050	1,340	2,490	1,050	40	30
10.....	250	278	307	278	401	433	850	1,280	2,850	1,000	40	30
11.....	250	337	307	278	337	433	770	1,400	3,050	850	40	30
12.....	250	307	278	307	369	465	690	1,610	2,850	770	40	30
13.....	465	278	369	222	401	465	810	1,610	2,490	730	40	30
14.....	465	278	337	850	401	465	850	1,900	2,490	770	40	30
15.....	401	278	369	770	369	433	770	2,310	2,310	770	40	30
16.....	401	222	250	650	401	465	730	2,490	2,220	770	40	30
17.....	401	250	307	650	401	465	770	2,140	2,670	810	40	30
18.....	401	278	337	535	369	433	690	1,680	2,760	1,340	40	30
19.....	401	278	337	465	337	401	730	1,680	2,850	1,280	34	30
20.....	401	278	337	433	337	433	690	1,540	2,490	1,050	34	30
21.....	401	278	369	465	401	433	770	1,340	2,580	900	34	27
22.....	369	278	337	500	690	401	770	1,280	2,490	770	30	27
23.....	369	307	250	610	1,100	401	730	1,340	2,490	610	30	27
24.....	369	307	250	535	1,160	433	810	1,340	2,310	570	30	27
25.....	369	307	222	690	1,280	433	1,000	1,340	2,060	535	30	27
26.....	337	337	250	610	1,160	401	1,280	1,340	1,820	390	34	27
27.....	337	369	222	690	690	535	1,400	1,340	1,680	258	30	27
28.....	337	401	369	610	610	433	1,400	1,340	1,540	223	34	27
29.....	337	401	337	570	.....	770	1,470	1,400	1,400	223	34	27
30.....	337	337	337	401	.....	690	1,280	1,680	1,340	223	34	27
31.....	337	.....	278	850	.....	610	.....	1,820	.....	223	34	.....

*Monthly discharge of Carson River near Fort Churchill, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	465	83	324	19,900
November.....	401	222	310	18,400
December.....	433	222	324	19,900
January.....	850	222	489	30,100
February.....	1,280	337	536	29,800
March.....	770	337	455	28,000
April.....	1,470	570	849	50,500
May.....	2,490	1,000	1,480	91,000
June.....	3,050	1,340	2,300	137,000
July.....	1,400	223	796	48,900
August.....	165	30	44.0	2,710
September.....	34	27	29.8	1,770
The year.....	3,050	27	660	478,000

NOTE.—Monthly discharge computed by U. S. Geological Survey.

#### MARKLEEVILLE CREEK <sup>3</sup> ABOVE MARKLEEVILLE, CALIF.

**LOCATION.**—At highway bridge above mouth of Pleasant Valley Creek, three-fourths of a mile above Markleeville, Alpine County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—November 7, 1911, to September 30, 1917 (fragmentary).

**GAGE.**—Vertical staff in two sections on left abutment of bridge; read by W. J. Clark.  
Datum of gage was raised 5.71 feet August 18, 1914.

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

**CHANNEL AND CONTROL.**—Gravel and small boulders; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.65 feet at 4.30 p. m. June 15 (discharge, 602 second-feet); minimum stage recorded, 0.88 foot at 6.10 p. m. September 9 (discharge, 0.9 second-foot).

1911–1917: Maximum stage recorded, 3.65 feet at 4.30 p. m. June 15, 1917 (discharge, 602 second-feet); minimum stage recorded, 0.7 foot September 19, 1916 (discharge, 0.1 second-foot).

**ICE.**—Stage-discharge relation occasionally affected by ice.

**DIVERSIONS.**—Town ditch, which heads above gage, furnishes water for irrigation and domestic supply at Markleeville. Also, a small ditch diverts water for irrigation on Hot Springs ranch.

**REGULATION.**—No information.

**ACCURACY.**—Stage-discharge relation probably permanent; affected by ice during winter. Rating curve well defined, except for extreme low stages and high stages, for which it has been extended. Gage read to half-tenths occasionally. When gage-height record was available daily discharge was ascertained by applying daily gage height to rating table. Records fair.

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

*Discharge measurements of Markleeville Creek above Markleeville, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis- charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Dec. 30	H. J. Tompkins.....	( <sup>a</sup> )	10
July 25	H. D. McGlashan.....	1.52	22

<sup>a</sup> Stage-discharge relation affected by ice.

<sup>3</sup> Locally known as Hot Springs Creek.

*Daily discharge, in second-feet, of Markleeville Creek above Markleeville, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1.								
2.				135	245			
3.				135		95	14	1.0
4.				160			15	
5.				160				
6.							10	
7.						95	6	
8.								
9.				135				.9
10.				185				
11.				200	282			
12.	7			245	245	76		1.0
13.					215			
14.		5		380				
15.		5		260	602		4.7	
16.	9	5			310		4.3	
17.		5				76	4.3	
18.		5				47	3.1	1.2
19.	9	5			275	60		1.2
20.					230	60	3.5	1.2
21.	4.5	5			230		3.1	1.0
22.		5			230		3.5	1.0
23.		5			185			
24.		9		125				
25.	3.5					20		
26.	3.5	7		135		22		
27.							1.5	
28.				160			2.5	
29.								
30.			10	260				
31.				230				

NOTE.—Discharge estimated because of ice, Nov. 14–22.

#### MARKLEEVILLE CREEK AT MARKLEEVILLE, CALIF.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 21, T. 10 N., R. 20 E., at highway bridge at Markleeville Alpine County, three-fourths of a mile below junction with Pleasant Valley Creek.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—November 11, 1910, to September 30, 1917 (fragmentary).

**GAGE.**—Vertical staff on left abutment of highway bridge near downstream end; read by W. J. Clark.

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

**CHANNEL AND CONTROL.**—Gravel and boulders; somewhat shifting during high water. Banks high and not subject to overflow.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.3 feet at 6.15 p. m. June 18 (discharge, 750 second-feet); minimum stage recorded, 0.90 foot September 5, 18, 19, 21, 22, and 27 (discharge, 5 second-feet).

1910–1917: Maximum stage recorded, 5.3 feet June 15, 1912 (discharge, 915 second-feet); minimum stage recorded, 0.70 foot September 20, 1913 (discharge, 3 second-feet); may have been lower September 16, 1916. Flood of March, 1907, reached a stage about 9 feet.

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

**DIVERSIONS.**—See Markleeville Creek above Markleeville. Water is also diverted from Pleasant Valley Creek for irrigation purposes.

**REGULATION.**—Diversions partly regulate flow. Some storage has been developed on Pleasant Valley Creek.

ACCURACY.—Stage-discharge relation permanent; affected by ice November 14–22. Rating curve fairly well defined below 500 second-feet and extended above. Gage read to half-tenths occasionally. When gage-height record was available, daily discharge was ascertained by applying mean daily gage height to rating table. Records fair.

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

*Discharge measurements of Markleeville Creek at Markleeville, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
Dec. 30	H. J. Tompkins.....	<i>Feet.</i> a 2.20	<i>Sec.-ft.</i> 26
July 25	H. D. McGlashan.....	1.82	60

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Markleeville Creek at Markleeville, Calif., or the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	May.	June.	July.	Aug.	Sept.
1.		32						
2.				241	600		39	
3.				265		176		
4.				292			28	10
5.				292				5
6.							25	
7.						176	20	
8.								
9.				253				7
10.				424				6.5
11.				387	600			6
12.	53			424	552			6
13.				650	552			
14.						158		
15.					600		26	
16.					600		22	
17.						176	19	
18.				292	650		15	5
19.					507			5
20.					600	96	15	
21.					552		12	5
22.							10	5
23.	35	25						
24.	32	25		241				
25.	28				336	55	8.5	
26.		32		197	241	53		
27.	32							5
28.				292			10	
29.				352				
30.			26	424				
31.								

NOTE.—Discharge estimated because of ice, Nov. 14–22, 25 second-feet.

## WEST FORK OF CARSON RIVER AT WOODFORDS, CALIF.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 34, T. 11 N., R. 19 E., at highway bridge at Woodfords, Alpine County.

DRAINAGE AREA.—70 square miles.

RECORDS AVAILABLE.—April, 1890, to March, 1892; October 18, 1900, to September 30, 1915; April 12, 1916, to September 30, 1917.

GAGE.—Vertical staff on right bank just above highway bridge, installed at independent datum August 21, 1914; read by Mrs. M. Merrill. Original gage, near present site, used April, 1890, to March, 1892. Vertical staff on left bank at cable half a mile above bridge read October 18, 1900, to May 18, 1907. Vertical staff on left bank just above highway bridge read June 8, 1907, to November 10, 1913, except for certain periods in 1910 and 1911 when gage at cable was used. Vertical staff on right bank 20 feet above site of previous gage November 11, 1913, to August 20, 1914.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading. CHANNEL AND CONTROL.—Fine gravel and boulders; section rough, but fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.8 feet June 13 (discharge, 944 second-feet); minimum stage recorded, 0.8 foot September 18–23 (discharge, 3 second-feet).

1900–1917: Maximum stage recorded, 6.8 feet May 9 and 10, 1906 (discharge, 1,570 second-feet); minimum stage occurred in 1917.

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

DIVERSIONS.—Three irrigation canals divert on right bank between cable and gage. The water is used mainly for irrigation in California. Their flow is not included in record.

REGULATION.—Flow partly regulated by diversions.

ACCURACY.—Stage-discharge relation changed during winter; affected by ice December 28 to January 24. Rating curve used October 1 to December 27 well defined between 20 and 100 second-feet; that used January 25 to September 30 well defined between 20 and 500 second-feet. Gage read to half-tenths once daily with frequent omissions. Daily discharge determined by applying daily gage height to rating table except for days when gage was not read, for which it was interpolated; and except for period when stage-discharge relation was affected by ice for which it was estimated. Records fair.

*Discharge measurements of West Fork of Carson River at Woodfords, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 11 <sup>a</sup>	L. W. Jordan.....	1.50	<sup>b</sup> 52	Apr. 10	L. W. Jordan.....	1.92	<sup>b</sup> 85
Dec. 31	H. J. Tompkins.....	<sup>c</sup> 1.38	<sup>b</sup> 25.0	June 22	.....do.....	3.30	<sup>d</sup> 415
Feb. 6	L. W. Jordan.....	1.32	26.1	Sept. 28	.....do.....	1.27	<sup>e</sup> 20.0

<sup>a</sup> Measuring conditions very poor.

<sup>b</sup> No water in canals.

<sup>c</sup> Stage-discharge relation slightly affected by ice.

<sup>d</sup> 26 second-feet, measured flow in canals, deducted from total flow measured.

<sup>e</sup> Measured below canals.



*Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	23	48	44	28	28	21	42	354	480	195	70	16
2.....	23	53	48	28	28	21	47	354	480	195	70	16
3.....	23	53	53	28	28	21	52	415	480	195	70	11
4.....	23	53	53	28	26	24	52	415	447	195	70	6
5.....	23	53	44	28	24	26	58	447	514	172	70	6
6.....	23	53	44	28	21	28	64	514	548	172	64	6
7.....	24	53	44	28	28	28	58	384	583	172	58	6
8.....	26	53	36	28	26	21	64	480	725	151	58	6
9.....	28	53	36	28	24	21	70	548	761	132	58	6
10.....	29	48	44	28	28	21	83	548	797	132	.....	14
11.....	29	44	44	28	28	21	98	548	834	123	.....	21
12.....	29	53	44	28	26	21	83	653	870	114	.....	21
13.....	29	48	44	28	24	21	76	870	944	83	.....	18
14.....	29	44	44	28	24	21	76	797	833	98	.....	16
15.....	29	44	44	28	28	22	70	653	761	151	.....	16
16.....	29	44	44	28	32	24	70	618	653	219	.....	16
17.....	29	44	44	28	28	28	70	548	618	176	.....	10
18.....	29	44	44	28	24	21	70	514	583	132	.....	3
19.....	29	44	44	27	20	21	70	514	548	132	.....	3
20.....	29	44	44	26	16	21	76	514	480	132	.....	3
21.....	29	53	44	25	18	21	88	514	447	115	.....	3
22.....	29	53	44	24	20	21	132	447	415	98	.....	3
23.....	29	53	44	26	21	21	244	415	384	98	.....	3
24.....	29	53	41	27	24	28	384	384	384	83	.....	16
25.....	29	53	38	28	28	37	548	325	325	83	.....	16
26.....	29	44	36	30	24	37	653	325	325	83	16	16
27.....	29	44	36	32	21	37	548	384	297	83	16	12
28.....	31	40	33	28	21	47	384	297	270	76	16	18
29.....	34	36	30	28	.....	47	325	325	244	70	16	9
30.....	36	36	28	28	.....	37	340	415	219	70	16	9
31.....	42	.....	28	28	.....	37	.....	480	.....	70	16	.....

NOTE.—Discharge Dec. 28 to Jan. 24 estimated on account of ice, from observer's notes and one discharge measurement. Discharge Aug. 10-25 estimated as 37 second-feet.

*Monthly discharge of West Fork of Carson River at Woodfords, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	42	23	28.4	1,750
November.....	53	36	47.9	2,850
December.....	53	28	41.5	2,550
January.....	32	24	27.8	1,710
February.....	32	16	24.6	1,370
March.....	47	21	26.5	1,670
April.....	653	42	166	9,880
May.....	870	297	484	29,800
June.....	944	219	542	32,300
July.....	219	70	129	7,990
August.....	70	16	41.2	2,530
September.....	21	3	10.8	643
The year.....	944	3	131	95,000

## HUMBOLDT RIVER BASIN.

## HUMBOLDT RIVER AT PALISADE, NEV.

**LOCATION.**—In sec. 36, T. 32 N., R. 51 E., at highway bridge at Palisade, Eureka County, 100 feet below Southern Pacific Railroad bridge and 1 mile above mouth of Pine Creek.

**DRAINAGE AREA.**—5,010 square miles.

**RECORDS AVAILABLE.**—November 27, 1902, to October 19, 1906; July 26, 1911, to September 30, 1917.

**GAGE.**—Chain gage at highway bridge December 1, 1911, to September 30, 1917; read by Albina Siri. Inclined staff on left bank near Southern Pacific Railroad bridge, at same datum as present gage, read from July 26 to November 30, 1911. Original gage was a vertical staff on right abutment of highway bridge, which was destroyed by high water in 1910. No determined relation between original and present datum.

**DISCHARGE MEASUREMENTS.**—Made from cable about an eighth of a mile above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of sand and gravel. Control at low stages is a gravel bar 50 to 75 feet below gage; at high stages a pile bent railroad bridge about 300 feet below gage and a rock riffle a few hundred feet farther downstream become effective; both fairly permanent. One channel at all stages. Point of zero flow, about gage height, 0.4 foot.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.4 feet at 2.40 p. m. May 30 (discharge, 3,170 second-feet); minimum stage recorded, 1.24 feet, September 15 (discharge, 32 second-feet).

1903–1906, 1911–1917: Maximum stage occurred in 1917; minimum stage recorded, 0.96 foot, August 28 to September 1, 1915 (discharge, 12 second-feet).

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

**DIVERSIONS.**—Some water diverted for irrigation in valley above canyon.

**REGULATION.**—Flow affected by irrigation diversions above.

**ACCURACY.**—Stage-discharge relation permanent; affected by ice December 23 to February 4. Rating curve well defined below 2,500 second-feet; extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except for period when stage-discharge relation was affected by ice, for which it was ascertained from discharge measurements, observer's notes, and weather records. Records good.

*Discharge measurements of Humboldt River at Palisade, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Jan. 31.....	<sup>a</sup> 2.44	85	May 26.....	6.41	2,400
Apr. 21.....	4.59	1,170	Sept. 22.....	1.33	36.6

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Humboldt River at Palisade, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	39	88	112	.....	242	1,240	2,060	2,550	1,850	358	44
2.....	44	88	112	.....	242	1,240	1,920	2,410	1,780	324	42
3.....	48	90	119	.....	258	1,430	1,780	2,340	1,640	292	42
4.....	51	94	121	.....	227	1,120	1,710	2,270	1,570	258	41
5.....	51	94	130	84	198	1,180	1,640	2,200	1,300	242	41
6.....	53	94	130	84	227	1,180	1,570	2,060	1,120	227	39
7.....	53	94	130	84	227	1,180	1,500	1,920	1,120	198	39
8.....	55	94	119	86	242	1,710	1,570	1,850	1,060	173	39
9.....	55	94	112	86	227	1,570	1,500	1,850	945	173	38
10.....	57	90	102	86	227	1,570	1,500	1,850	889	150	38
11.....	57	90	96	89	227	1,500	1,570	1,990	783	140	36
12.....	62	90	90	92	227	1,710	1,920	1,990	733	130	35
13.....	69	82	85	84	212	1,920	1,920	1,990	685	116	35
14.....	74	72	82	79	198	1,780	1,920	1,920	595	106	33
15.....	79	68	77	71	198	1,780	1,920	1,990	553	96	32
16.....	79	61	77	62	198	1,710	2,060	2,130	513	90	39
17.....	74	56	82	101	198	1,640	2,200	2,130	475	85	39
18.....	69	52	90	94	198	1,570	2,270	2,130	475	80	39
19.....	66	52	100	101	198	1,500	2,340	2,130	513	75	39
20.....	64	56	116	111	198	1,430	2,410	2,200	475	68	39
21.....	62	61	90	130	198	1,240	2,410	2,200	440	63	39
22.....	64	61	68	140	198	1,240	2,410	2,270	475	61	39
23.....	69	63	.....	150	258	1,300	2,410	2,480	440	58	42
24.....	74	65	.....	161	341	1,300	2,410	2,550	407	56	42
25.....	79	68	.....	185	475	1,360	2,340	2,480	374	56	42
26.....	79	72	.....	198	475	1,570	2,410	2,410	374	54	42
27.....	81	82	.....	247	835	1,780	2,550	2,340	374	52	42
28.....	84	94	.....	247	1,180	1,850	2,770	2,200	407	50	42
29.....	84	106	.....	.....	1,850	1,920	2,850	1,990	407	48	42
30.....	86	109	.....	.....	2,270	2,130	3,170	1,920	407	47	41
31.....	86	.....	.....	.....	1,780	.....	2,850	.....	390	45	.....

NOTE.—Discharge estimated because of ice Dec. 23–31, 50 second-feet; Jan. 1–20, 60 second-feet; Jan. 21–30 90 second-feet; Feb. 1–4, 85 second-feet.

*Monthly discharge of Humboldt River at Palisade, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	86	39	66.0	4,060
November.....	109	52	79.3	4,720
December.....	130	.....	86.8	5,340
January.....	.....	.....	70.5	4,330
February.....	247	62	114	6,330
March.....	2,270	198	459	28,200
April.....	2,130	1,120	1,520	90,400
May.....	3,170	1,500	2,120	130,000
June.....	2,550	1,850	2,160	129,000
July.....	1,850	374	760	46,700
August.....	358	45	128	7,870
September.....	44	32	39.4	2,340
The year.....	3,170	32	635	459,000

**HUMBOLDT RIVER NEAR GOLCONDA, NEV.**

**LOCATION.**—In sec. 21, T. 36 N., R. 40 E., at highway bridge  $1\frac{1}{4}$  miles northwest of Golconda, Humboldt County, and 12 miles above mouth of Little Humboldt River.

**DRAINAGE AREA.**—10,800 square miles.

**RECORDS AVAILABLE.**—October 24, 1894, to December 31, 1909; September 8, 1910, to September 30, 1917, when station was discontinued.

**GAGE.**—Chain gage on downstream side of bridge near right bank; installed November 5, 1910; read by Florence Bernard. Several gages at various datums and at various sites used prior to this date.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge, at gage, or by wading.

**CHANNEL AND CONTROL.**—Bed composed of loose sand; shifts occasionally. One channel at all stages. Point of zero flow, about gage height, 1.6 feet.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 11.0 feet May 31 (discharge, 1,950 second-feet); minimum stage recorded, 1.85 feet October 1 to November 11 (discharge, 2.5 second-feet).

1900-1917: Maximum stage recorded, 16.6 feet April 3, 5, 6, 8, 10, 13, 15, 17, 20, 22, 24, 27, 29, and May 1, 1907 (discharge, 3,160 second-feet); minimum stage, 2.7 feet January 2, 4, 6, 9, 10, 11, and 17, 1906 (discharge, zero).

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

**DIVERSIONS.**—Considerable water is diverted above the station.

**REGULATION.**—Low-water flow regulated by the following diversion dams, which provide practically no storage: Bernard's dam, rock and brush, half a mile above gage; Anderson's dam, rock and brush,  $1\frac{1}{4}$  miles above; Taylor and Sheehan dam, concrete spillway with flashboards, small power plant which develops power for pumping into high-line canal; Pinson's dam, rock and brush, about 5 miles above gage.

**ACCURACY.**—Stage-discharge relation practically permanent; affected by ice December 7-9, and December 25 to February 22. Rating curve well defined below 1,600 second-feet; extended above. Gage read to half-tenths once a day. Daily discharge ascertained by applying daily gage height to rating table except for periods indicated in footnote to daily-discharge table. Records obtained by use of rating table good; others fair.

*Discharge measurements of Humboldt River near Golconda, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 15.....	a 2.68	34.0	Apr. 6.....	6.62	714	June 27.....	8.58	1,250
Feb. 10.....	b 3.70	59	June 16.....	9.55	1,510	Sept. 24.....	2.03	7.0

a Slight shore ice. Probably no backwater effect.

b Complete ice cover.

*Daily discharge, in second-feet, of Humboldt River near Golconda, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	2.5	2.5	64	.....	418	460	1,210	1,920	1,150	377	38
2.	2.5	2.5	64	.....	482	482	1,240	1,830	1,150	357	38
3.	2.5	2.5	56	.....	418	550	1,270	1,830	1,180	357	44
4.	2.5	2.5	56	.....	377	622	1,300	1,830	1,180	337	50
5.	2.5	2.5	64	.....	317	671	1,360	1,830	1,210	460	50
6.	2.5	2.5	64	.....	277	696	1,360	1,800	1,240	184	56
7.	2.5	2.5	.....	.....	238	721	1,360	1,800	1,240	184	56
8.	2.5	2.5	.....	.....	219	746	1,390	1,800	1,240	184	56
9.	2.5	2.5	.....	.....	257	772	1,420	1,800	1,210	168	64
10.	2.5	2.5	64	.....	277	798	1,450	1,800	1,160	168	50
11.	2.5	2.5	64	.....	257	824	1,450	1,740	1,100	168	50
12.	2.5	13	64	.....	277	850	1,390	1,650	1,040	184	13
13.	2.5	21	64	.....	297	876	1,360	1,620	984	184	13
14.	2.5	30	64	.....	317	903	1,360	1,566	930	201	15
15.	2.5	32	64	.....	439	930	1,300	1,530	930	219	15
16.	2.5	32	64	.....	397	957	1,300	1,530	876	184	15
17.	2.5	32	64	.....	397	984	1,300	1,510	824	184	15
18.	2.5	32	64	.....	397	1,070	1,270	1,450	772	146	11
19.	2.5	32	67	.....	337	1,100	1,270	1,420	746	184	11
20.	2.5	53	67	.....	257	1,120	1,270	1,360	721	184	8
21.	2.5	53	67	.....	219	1,180	1,300	1,330	696	184	.....
22.	2.5	53	67	.....	184	1,180	1,360	1,300	671	219	.....
23.	2.5	56	67	84	168	1,210	1,480	1,240	622	146	.....
24.	2.5	56	67	93	168	1,240	1,590	1,240	527	64	.....
25.	2.5	153	.....	93	168	1,270	1,650	1,210	418	64	.....
26.	2.5	153	.....	126	168	1,260	1,680	1,210	527	50	.....
27.	2.5	153	.....	184	219	1,250	1,740	1,210	397	38	.....
28.	2.5	153	.....	297	297	1,230	1,830	1,180	357	38	.....
29.	2.5	64	.....	.....	337	1,220	1,890	1,180	377	38	.....
30.	2.5	64	.....	.....	377	1,210	1,920	1,150	397	38	.....
31.	2.5	.....	.....	.....	418	.....	1,950	.....	397	38	.....

NOTE.—Discharge estimated because of ice from observer's notes, climatic records, and one discharge measurement, Dec. 7-9 and 25-31, 60 second-feet; Jan. 1-31, 40 second-feet, and Feb. 1-22, 65 second-feet; interpolated because of missing gage heights Dec. 24, Apr. 26-29, and July 10; estimated Sept. 21-30, 7 second-feet from discharge measurements made Sept. 24, because of unreliable gage-height record for the period.

*Monthly discharge of Humboldt River near Golconda, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	2.5	2.5	2.5	154
November.....	153	2.5	42.1	2,510
December.....	67	56	62.8	3,860
January.....	.....	.....	40	2,460
February.....	297	.....	82.4	4,580
March.....	482	168	302	18,600
April.....	1,270	460	946	56,300
May.....	1,950	1,210	1,450	89,200
June.....	1,920	1,150	1,530	91,000
July.....	1,240	357	847	52,100
August.....	460	38	178	10,900
September.....	64	.....	24.6	1,460
The year.....	1,950	2.5	460	333,000

## HUMBOLDT RIVER NEAR OREANA, NEV.

LOCATION.—In sec. 35, T. 29 N., R. 32 E., 2 miles above highway bridge near J. J. McCarthy's ranch and 2 miles southwest of Oreana, Humboldt County (railroad station called Nenzel).

DRAINAGE AREA.—13,800 square miles (measured on map issued by General Land Office).

187044°—21—wsp 460—13

**RECORDS AVAILABLE.**—January 27, 1896, to December 31, 1909; September 7, 1910, to September 30, 1917.

**GAGE.**—Friez water-stage recorder on right bank February 24 to August 22, 1914, and October 4, 1914, to September 30, 1917; inspected by Nora McCarthy. Original gage vertical staff nailed to right abutment of old highway bridge was installed January 27, 1896, and was washed out May 26, 1897. A temporary gage was used until September 7, 1897; September 8 a new inclined staff gage was installed on left bank about  $1\frac{1}{2}$  miles above old bridge and opposite railroad section house. This gage was washed out in 1902. A vertical staff gage fastened to piling of old Lovelock Valley dam, at same datum and presumably at same site as inclined gage, was read from November 29, 1902, until December 31, 1909, when station was discontinued. The datum was lowered 2.0 feet October 1, 1904. Station was reestablished September 7, 1910, a temporary gage at a new datum, 150 feet above bridge, being used until November 9, 1910; then a permanent vertical staff gage was installed at highway bridge and was read November 9, 1910, to February 23, 1914, and August 23 to October 3, 1914.

**DISCHARGE MEASUREMENTS.**—Made from cable 20 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of sand. Principal control not well defined but is probably about half a mile below gage, where bed is composed of firm clay; fairly permanent; low-water control is about 50 feet below gage. Right bank high and comparatively clean; left bank not likely to be overflowed, but subject to caving.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year from water-stage recorder, 7.13 feet at 7 a. m. June 7 (discharge, 1,910 second-feet); minimum discharge occurred during winter; not determined.

1896–1917: Maximum stage recorded, 12.0 feet May 12, 1897 (discharge, 3,050 second-feet); minimum stage, river dry in June and July, 1905, and in August and September, 1915.

**ICE.**—Stage-discharge relation seriously affected by ice November to March.

**DIVERSIONS.**—Station is above all diversions for Lovelocks district, but considerable water is diverted above station for direct irrigation and storage.

**REGULATION.**—Flow is affected by water stored and released by Humboldt-Lovelocks Irrigation, Light & Power Co. at its reservoirs a few miles up the river, near Humboldt.

**ACCURACY.**—Stage-discharge relation for low stages changed during fall and winter; for medium and high stages it is practically permanent; affected by ice November 12 to December 1 and December 7 to March 8. Rating curve used to March 30 fairly well defined between 20 and 600 second-feet; curve used for remainder of year well defined between 10 and 2,000 second-feet. 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 tables the mean daily gage height determined by inspecting recorder graph except for periods when stage-discharge relation was affected by ice and for breaks in gage-height record; see footnote to daily-discharge table. Records obtained by use of rating tables excellent; others fair.

*Discharge measurements of Humboldt River near Oreana, Nev., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 18	S. E. Jamesona.....	1.03	27.8	Apr. 7	L. W. Jordan.....	2.97	393
Nov. 9	L. W. Jordan.....	.93	21.6	June 18	do.....	6.75	1,750
12	S. E. Jamesona.....	.82	7.9	27	do.....	5.46	1,200
Feb. 9	L. W. Jordan.....	21.60	1.5				

<sup>a</sup> Deputy State engineer.

<sup>b</sup> Complete ice cover.

*Daily discharge, in second-feet, of Humboldt River near Oreana, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	Sept.
1.	25	23	17	-----	238	843	1,510	-----
2.	30	23	17	-----	254	826	1,600	-----
3.	34	23	16	-----	287	792	1,680	-----
4.	34	23	14	-----	332	843	1,770	-----
5.	33	23	14	-----	344	878	1,860	-----
6.	34	22	14	-----	367	913	1,900	-----
7.	65	22	-----	-----	403	949	1,900	-----
8.	53	21	-----	-----	391	949	1,900	-----
9.	39	21	-----	77	403	986	1,860	-----
10.	38	20	-----	62	379	998	1,860	-----
11.	34	17	-----	56	344	1,010	1,810	-----
12.	31	-----	-----	48	320	1,020	1,770	-----
13.	31	-----	-----	44	332	1,060	1,770	-----
14.	31	-----	-----	42	320	1,060	1,770	-----
15.	29	-----	-----	49	332	1,060	1,810	-----
16.	28	-----	-----	49	416	1,100	1,810	-----
17.	28	-----	-----	46	494	1,060	1,770	-----
18.	28	-----	-----	49	507	986	1,730	-----
19.	27	-----	-----	50	520	949	1,770	-----
20.	24	-----	-----	57	548	986	1,640	-----
21.	20	-----	-----	61	591	1,020	1,550	-----
22.	17	-----	-----	58	620	1,020	1,510	-----
23.	18	-----	-----	56	650	1,020	1,470	-----
24.	19	-----	-----	48	666	1,060	1,380	-----
25.	20	-----	-----	46	696	1,140	1,300	-----
26.	20	-----	-----	41	728	1,140	1,260	-----
27.	20	-----	-----	37	744	1,180	1,220	60
28.	23	-----	-----	41	760	1,220	-----	58
29.	23	-----	-----	102	776	1,300	-----	57
30.	23	-----	-----	135	809	1,380	-----	55
31.	23	-----	-----	218	-----	1,420	-----	-----

NOTE.—No gage-height record, Oct. 23-25, Oct. 29 to Nov. 3, Nov. 5-8, May 10-11 and June 17; discharge interpolated. Discharge estimated because of ice, from observer's notes, discharge measurements, and climatic records Nov. 12-24, 7 second-feet; Nov. 25 to Dec. 1, 17 second-feet; Dec. 7-31, 7 second-feet; Jan. 1 to Feb. 20, 2 second-feet; Feb. 21-28, 25 second-feet; Mar. 1-8, 45 second-feet. No gage-height record June 28 to Sept. 26; discharge not determined.

*Monthly discharge of Humboldt River near Oreana, Nev., for the year ending Sept. 30, 1917.*

Month	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	65	17	29.1	1,790
November.....	23	-----	14.4	857
December.....	17	-----	8.61	529
January.....	-----	-----	2.0	123
February.....	-----	-----	8.57	476
March.....	218	37	59.1	3,630
April.....	809	238	496	28,900
May.....	1,420	792	1,040	64,000
June 1-27.....	1,900	1,220	1,670	89,400
September 27-30.....	60	55	57.5	456

#### HUMBOLDT RIVER NEAR LOVELOCKS, NEV.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 11, T. 25 N., R. 31 E., 1,500 feet below dam and reservoir on Big 5 ranch, lowest diversion for irrigation on Humboldt River, and 9 miles south of Lovelocks, Humboldt County.

DRAINAGE AREA.—14,200 square miles.

RECORDS AVAILABLE.—February 7, 1912, to September 30, 1917.

GAGE.—Lietz water-stage recorder on left bank; inspected by W. B. Gibson. Original inclined staff gage on right bank was read February 7 to June 17, 1912, when Lietz gage was installed a few feet below it; Lietz gage washed out June 18, 1914, and was replaced on left bank June 26, 1914. Datum lowered 2 feet on October 1, 1917.

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

CHANNEL AND CONTROL.—Bed is composed of firm clay. Control fairly permanent.

One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage occurred during early part of June (gage height not determined); minimum discharge, practically zero flow, October 1 to May 2 and September 26–30.

1912–1917: Maximum stage recorded, 5.15 feet May 4, 1914 (discharge, 1,450 second-feet); minimum discharge, practically zero, for periods in 1913, 1916, and 1917.

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

DIVERSIONS.—Below all irrigation diversions.

REGULATION.—Flow affected by irrigation diversions and storage.

ACCURACY.—Stage-discharge relation changed by high water in June. Operation of water-stage recorder not satisfactory. Discharge not determined on account of poor definition of rating curve.

*Discharge measurements of Humboldt River near Lovelocks, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.
June 19.....	<i>Feet.</i> a 5.34	<i>Sec.-ft.</i> 1,160
26.....	a 4.58	918

a Gage height referred to datum established Oct. 1, 1917.

*Daily gage height, in feet, of Humboldt River near Lovelocks, Nev., for the year ending Sept. 30, 1917.*

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....			4.00			16.....			3.60		
2.....			4.10			17.....			3.50		
3.....			3.90			18.....			3.80		
4.....						19.....	1.68	5.40			1.00
5.....	0.94				1.50	20.....		5.40			
6.....						21.....		5.10		1.62	
7.....				1.50		22.....		5.00			
8.....						23.....		5.00			
9.....						24.....		5.10	2.95		
10.....			3.70			25.....		4.90			
11.....						26.....	3.80	4.60			
12.....	.93				1.10	27.....		4.30			
13.....						28.....		4.30		1.24	
14.....			3.90	1.60		29.....	3.90	4.20			
15.....			3.70			30.....	3.80	4.10			.62
						31.....			1.62		

NOTE.—Reservoir outlet gates closed Oct. 1 to May 2 and Sept. 26–30; flow practically zero. Gage heights are referred to datum established Oct. 1, 1917.



## STARR CREEK NEAR DEETH, NEV.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 12, T. 36 N., R. 59 E., at highway bridge 2 miles above mouth and 3 miles southeast of Deeth, Elko County; below all large tributaries except Boulder Creek.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—June 4, 1913, to September 30, 1917.

**GAGE.**—Vertical staff nailed to upstream pile of bridge bent near right bank; read by H. S. Burtenshaw. Datum of gage raised 1.0 foot August 23, 1916.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of small gravel. Control is gravel bar; shifts occasionally. One channel except at extremely high stages, when part of the flow passes under an auxiliary bridge.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.8 feet, June 27 (discharge, 383 second-feet); minimum stage recorded, 1.50 feet, August 26 to September 15 (discharge, 2.3 second-feet); actual minimum flow probably occurred during period in January when stage-discharge relation was affected by ice.

1913-1917: Maximum stage occurred in 1917; minimum stage recorded, 1.42 feet, August 23 to September 1, and September 6, 1916 (discharge, 1.3 second-feet).

**ICE.**—Stage-discharge relation slightly affected by ice in December and January.

**DIVERSIONS.**—Station is below practically all diversions from Starr Creek.

**REGULATION.**—Some variation in daily flow at times caused by diversions for irrigation.

**ACCURACY.**—Stage-discharge relation practically permanent; affected by ice December 25-31 and January 10-23. Rating curve well defined below 250 second-feet; extended above. Gage read to quarter-tenths three to five times a week. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days when gage was not read, except during period when stage-discharge relation was affected by ice for which it was ascertained by means of observer's notes and temperature records. That part of record obtained by use of rating table, good; remainder, fair.

*Discharge measurements of Starr Creek near Deeth, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 31.....	1.70	7.6	June 30.....	3.70	208
Apr. 25.....	2.34	47.1	Sept. 18.....	1.72	7.4
May 25.....	2.57	68			

*Daily discharge, in second-feet, of Starr Creek near Deeth, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	4.3	7.0	7.7	4.3	5.6	6.2	30	40	.....	157	44	2.3
2.....	8.6	7.0	8.1	5.0	5.6	5.9	22	29	.....	142	44	2.3
3.....	13	7.0	8.4	5.6	5.6	5.6	15	31	.....	127	44	2.3
4.....	8.8	7.0	8.8	6.0	5.6	6.5	54	34	.....	127	33	2.3
5.....	7.0	7.7	7.7	6.5	5.6	5.6	92	36	.....	127	22	2.3
6.....	8.8	7.7	7.0	6.5	5.6	4.8	81	58	.....	121	7.0	2.3
7.....	8.8	7.7	7.0	6.5	5.6	5.6	44	81	.....	115	4.3	2.3
8.....	8.8	7.7	7.0	6.5	5.6	6.5	39	81	.....	207	4.3	2.3
9.....	10	7.7	6.3	6.5	5.6	6.8	34	81	.....	193	4.3	2.3
10.....	10	7.7	5.6	.....	5.6	7.0	29	92	.....	179	4.3	2.3
11.....	10	7.4	5.6	.....	5.6	11	30	92	152	179	4.3	2.3
12.....	8.8	7.0	5.6	.....	5.6	14	30	92	139	179	4.3	2.3
13.....	8.8	7.0	4.3	.....	5.6	16	30	100	139	172	4.3	2.3
14.....	8.8	7.0	5.6	.....	5.6	12	30	109	139	165	4.3	2.3
15.....	7.7	7.0	5.6	.....	5.6	7.0	30	103	173	71	4.3	2.3
16.....	7.7	7.0	5.6	.....	5.6	5.6	26	98	207	74	4.3	4.1
17.....	7.7	7.0	5.6	.....	5.6	4.3	23	92	284	76	4.3	5.9
18.....	7.7	7.0	5.6	.....	5.6	4.3	19	89	316	78	4.3	7.7
19.....	7.7	5.6	6.0	.....	6.5	5.0	20	86	316	81	4.3	7.0
20.....	7.7	5.6	6.5	.....	7.4	5.6	21	74	316	78	4.3	7.0
21.....	7.7	5.6	6.5	.....	8.3	5.6	22	61	300	76	4.3	7.0
22.....	7.7	7.0	6.5	.....	9.2	5.6	28	63	300	61	4.3	7.0
23.....	7.7	6.5	6.5	.....	10	6.3	35	66	300	61	4.3	7.0
24.....	7.7	7.0	6.5	5.6	11	7.0	41	68	284	61	3.8	7.0
25.....	7.7	7.0	.....	5.6	8.8	7.0	48	71	268	52	3.3	7.0
26.....	7.7	7.0	.....	5.6	6.5	7.0	40	103	252	56	2.3	6.8
27.....	7.7	7.0	.....	5.6	6.5	19	32	.....	383	54	2.3	6.5
28.....	7.7	6.5	.....	5.6	6.5	61	40	.....	295	52	2.3	6.5
29.....	7.4	7.0	.....	5.6	.....	52	34	.....	207	52	2.3	6.5
30.....	7.2	7.4	.....	5.6	.....	45	29	.....	172	52	2.3	6.5
31.....	7.0	.....	.....	5.6	.....	37	.....	.....	.....	44	2.3	.....

NOTE.—Discharge estimated because of ice Dec. 25-31, 4 second-feet, and Jan. 10-23, 2 second-feet; interpolated because of missing gage heights May 27-31, 112 second-feet, and June 1-10, 135 second-feet.

*Monthly discharge of Starr Creek near Deeth, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	13	4.3	8.19	504
November.....	7.7	5.6	6.99	416
December.....	8.8	.....	5.92	364
January.....	6.5	.....	4.07	250
February.....	11	5.6	6.48	360
March.....	61	4.3	12.8	787
April.....	92	15	34.9	2,080
May.....	.....	29	80.3	4,940
June.....	383	.....	210	12,500
July.....	207	44	105	6,460
August.....	44	2.3	9.29	571
September.....	7.7	2.3	4.47	266
The year.....	383	.....	40.8	29,500

## MARYS RIVER NEAR DEETH, NEV.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 31, T. 40 N., R. 60 E., at bridge 300 feet east of Mala Vista ranch house of Nevada Land & Livestock Co. and 20 miles north of Deeth, Elko County.

**DRAINAGE AREA.**—355 square miles (measured on map of Nevada issued by General Land Office, edition of 1903).

**RECORDS AVAILABLE.**—November 24, 1902, to July 14, 1903; January 17, 1912, to September 30, 1917.

**GAGE.**—Chain gage on upstream side of bridge; read by Jess Larson. Original staff gage at same bridge, but at different datum, read November 24, 1902, to July 14, 1903.

**DISCHARGE MEASUREMENTS.**—Made from bridge, at gage, or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and loose sand. Banks below gage subject to caving. Control slightly shifting. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, water running over bridge May 16 and 17 (discharge estimated, 420 second-feet); minimum stage recorded, 2.28 feet, February 24 (discharge, 2.2 second-feet); actual minimum flow probably occurred during period of ice effect.

1902-3, 1912-1917: Maximum stage recorded, 6.3 feet May 19 and June 3-7, 1912 (discharge, 439 second-feet); minimum stage, 2.24 feet September 26-30, 1916 (discharge, 1.4 second-feet).

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

**DIVERSIONS.**—Station is below all diversions except one small ditch on the Mala Vista ranch and the Cross ranch diversions about 14 miles below.

**REGULATION.**—During low-water periods flow is affected by diversions above.

**ACCURACY.**—Stage-discharge relation changed by high water in May; affected by ice November 11 to March 16. Rating curve used October 1 to May 20 fairly well defined from 25 to 150 second-feet, and well defined above and below; curve used May 21 to September 30 well defined for range of stage during year. Gage read to hundredths once daily except during winter when it was read at irregular intervals. Daily discharge ascertained by applying daily gage height to rating table except for periods when stage-discharge relation was affected by ice or by backwater from bridge at gage; see footnote to daily-discharge table. That part of record obtained by use of rating table, good; remainder, fair.

*Discharge measurements of Marys River near Deeth, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 1.....	2.62	12.8	June 29.....	4.22	151
Apr. 22.....	4.52	165	Sept. 18.....	2.11	3.6
May 25.....	5.80	354			

*Daily discharge, in second-feet, of Marys River near Deeth, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	11	12	12			72	250	370	130	14	4.8
2.	12	12	12			58	236	355	120	14	4.4
3.	12	12	13			45	221	355	110	14	3.6
4.	12	12	13			42	207	340	96	13	3.2
5.	12	12	19			56	192	311	92	12	3.2
6.	12	13				89	235	311	92	11	3.2
7.	12	13				98	250	297	92	10	3.2
8.	12	13				151	250	297	110	10	3.0
9.	12	11				192	265	311	96	9.6	2.8
10.	12	11				185	310	355	92	9.2	2.8
11.	12					178	355	370	79	8.8	2.8
12.	12					192	385	370	71	8.4	2.8
13.	12					181	385	297	67	8.4	3.6
14.	12					171	400	244	51	8.4	5.2
15.	11					160	400	231	55	8.1	3.6
16.	11					150	420	257	48	7.8	5.2
17.	12				13	139	420	283	48	7.8	4.8
18.	12				13	128	400	311	44	7.4	4.0
19.	12				14	108	385	325	55	7.0	4.0
20.	12				14	108	370	325	88	6.6	3.6
21.	12				15	123	355	308	67	6.0	3.8
22.	11				16	164	333	291	56	6.0	4.0
23.	11				18	235	311	274	46	6.0	4.4
24.	11	12		2.2	20	288	340	257	35	5.6	4.4
25.	11				22	340	355	244	32	5.2	5.2
26.	11				24	385	348	219	27	5.2	5.6
27.	11				26	400	340	207	27	4.8	5.6
28.	11				80	400	340	195	25	5.6	5.2
29.	11				139	385	355	150	22	5.2	5.6
30.	11				110	280	370	150	18	5.2	5.6
31.	11				80		370		17	4.8	

NOTE.—Discharge estimated because of ice, from observer's notes and weather records, Nov. 11–23, 25–30, and Dec. 6–25, 12 second-feet; Dec. 26 to Jan. 16, 6 second-feet; Jan. 17 to Feb. 23, 2 second-feet; Feb. 25–28, 5 second-feet; and Mar. 1–16, 11 second-feet. Discharge estimated as in table for Apr. 27, 28, and May 14–18 because of backwater from bridge to which gage is attached.

*Monthly discharge of Marys River near Deeth, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	12	11	11.6	713
November			12.0	714
December			11.1	682
January			4.06	250
February			2.44	136
March	139		25.2	1,550
April	400	62	183	10,900
May	420	192	328	20,200
June	370	150	287	17,100
July	130	17	64.8	3,980
August	14	4.8	8.23	506
September	5.6	2.8	4.11	245
The year	420		78.6	57,000

## LAMOILLE CREEK NEAR LAMOILLE, NEV.

**LOCATION.**—In sec. 6, T. 32 N., R. 58 E., 50 feet below tailrace of Elko-Lamoille Power Co.'s plant, 50 feet above first irrigation diversion, 2 miles above Lamoille, and 22 miles southeast of Elko, Elko County.

**DRAINAGE AREA.**—14 square miles (measured on maps issued by United States Forest Service).

**RECORDS AVAILABLE.**—May 8, 1915, to September 30, 1917.

**GAGE.**—Vertical staff on right bank, July 4 to September 30, 1917; read by E. Galloway. Original gage, vertical staff on left bank directly opposite and at same datum, washed out June 18, 1917.

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

**CHANNEL AND CONTROL.**—Bed composed of gravel and large boulders. Control shifts at extremely high water. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year probably occurred June 18-25 after gage had been washed out (discharge not determined); minimum stage occurred during January when stage-discharge relation was affected by ice (discharge, estimated 2 second-feet).

1915-1917: Maximum stage probably occurred in 1917; minimum stage recorded, 0.48 foot, December 29, 1915, and January 20, 1916 (discharge, 2 second-feet).

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

**DIVERSIONS.**—Above all irrigation diversions. Water is diverted for Elko-Lamoille Power Co.'s plant, but returned to stream about 50 feet above gage.

**REGULATION.**—A daily fluctuation occurs on days when power plant is not in continuous operation.

**ACCURACY.**—Stage-discharge relation changed in May and June by high water and in September by removing cable gaging bridge from bed of stream; affected by ice November 11-18 and December 8 to February 19. Rating curve used October 1 to June 8 fairly well defined below 250 second-feet; curve used July 4 to September 20 poorly defined; and curve used September 21-30 well defined for low stages. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for periods indicated in footnote to daily-discharge table. Shifting-control method used May 15-22. Records obtained by use of rating table, fair; others, poor.

*Discharge measurements of Lamoille Creek near Lamoille, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 30.....	0.95	10.7	Apr. 16.....	0.95	11.7	July 4.....	2.68	274
Feb. 11.....	a. 88	5.0	May 23.....	1.36	81	Sept. 21.....	.88	6.7

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Lamoille Creek near Lamoille, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Apr.	May.	June.	July.	Aug.	Sept.
1.	16	14	8.4	.....	30	103	.....	46	10
2.	15	13	8.4	.....	27	111	.....	43	10
3.	13	14	8.4	.....	27	116	.....	45	10
4.	12	13	8.4	4.4	28	126	275	44	9.0
5.	12	13	8.4	5.4	28	132	307	37	10
6.	16	11	6.4	7.4	28	152	315	39	10
7.	21	11	6.9	7.4	31	171	299	27	10
8.	18	9.9	.....	11	33	259	294	30	10
9.	17	11	.....	11	36	.....	275	27	10
10.	18	9.2	.....	12	41	.....	238	26	10
11.	17	.....	.....	12	46	.....	228	25	8.5
12.	19	.....	.....	14	52	.....	216	24	9.0
13.	18	.....	.....	13	62	.....	211	22	8.0
14.	19	.....	.....	14	84	.....	194	22	8.5
15.	18	.....	.....	13	108	.....	170	20	8.5
16.	20	.....	.....	14	113	.....	194	22	8.5
17.	22	.....	.....	11	108	.....	168	18	7.6
18.	24	.....	.....	11	100	.....	148	18	7.6
19.	24	9.9	.....	11	93	.....	142	17	7.6
20.	22	9.2	.....	14	88	.....	130	17	8.0
21.	22	8.4	.....	16	84	.....	122	15	6.8
22.	21	7.9	.....	16	84	.....	111	15	7.4
23.	20	8.4	.....	17	79	.....	107	14	8.0
24.	18	8.4	.....	24	77	.....	96	13	7.6
25.	18	8.4	.....	28	79	.....	92	12	7.6
26.	17	7.9	.....	33	84	.....	85	12	7.6
27.	17	9.9	.....	33	86	.....	111	12	8.0
28.	16	8.4	.....	32	93	.....	82	12	7.6
29.	16	8.4	.....	31	100	.....	60	12	7.6
30.	14	7.9	.....	30	98	.....	57	12	7.6
31.	14	.....	.....	.....	100	.....	49	10	.....

NOTE.—Discharge estimated because of ice, from observer's notes, one discharge measurement, weather records, and comparison with Lamoille Creek near Halleck, Nev.; Nov. 11–18, 7 second-feet; Dec. 8–20, 6 second-feet; Dec. 21–31, 4 second-feet; Jan. 1–31, 2 second-feet; Feb. 1–19, 3 second-feet; Feb. 20–28, 4 second-feet. Discharge estimated because of missing gage heights June 1–3, 4 second-feet. Discharge not determined Mar. 1–31 and June 9 to July 3, because of insufficient data.

*Monthly discharge of Lamoille Creek near Lamoille, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	24	12	17.9	1,100
November.....	14	.....	9.27	552
December.....	.....	.....	5.72	352
January.....	.....	.....	2.00	123
February.....	.....	.....	3.32	184
April.....	33	.....	15.3	910
May.....	113	27	68.6	4,220
June 1–8.....	259	103	146	2,320
July 4–31.....	315	49	171	9,500
August.....	46	10	22.8	1,400
September.....	10	6.8	8.55	509

## LAMOILLE CREEK NEAR HALLECK, NEV.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 9, T. 35 N., R. 58 E., half a mile below mouth of Secret Creek, the largest tributary,  $1\frac{1}{2}$  miles south of Halleck, Elko County, on Southern Pacific Railroad, and 2 miles above confluence with Humboldt River.

**DRAINAGE AREA.**—245 square miles.

**RECORDS AVAILABLE.**—May 12, 1913, to September 30, 1917.

**GAGE.**—Vertical staff on left bank, 200 feet below ford; read by R. W. Randolph and Harry Gorman. Datum lowered 1.00 foot August 19, 1915; datum raised 2.5 feet September 20, 1917.

**DISCHARGE MEASUREMENTS.**—Made from cable 200 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel. Control is gravel bar, which shifts occasionally; affected by beaver dams at times. Channel very crooked. Both banks are overflowed during floods.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 7.1 feet June 21–23 (discharge, 311 second-feet); creek dry October 1–21.

1913–1917: Maximum stage recorded, 6.7 feet, June 5, 1914 (discharge, 556 second-feet); minimum stage (creek dry in August, September, and October, 1915; and August, September, and October, 1916).

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

**DIVERSIONS.**—Below all diversions except one small ditch.

**REGULATION.**—Flow affected by irrigation diversions above.

**ACCURACY.**—Stage-discharge relation changed slightly during winter period when no record was being obtained. Rating curve well defined between 20 and 200 second-feet: fairly well defined below, and extended above. Gage read to hundredths once daily except December 10–31 and January 14 to March 19 when no readings were secured. Daily discharge determined by applying daily gage height to rating table except as shown in footnote to table of daily discharge. Records of flow in main channel are good. A varying quantity of water was carried in sloughs around the gaging station when discharge in main channel exceeded 100 second-feet. See table of discharge measurements.

*Discharge measurements of Lamoille Creek near Halleck, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 1.....	1.65	15.0	July 5.....	3.53	<sup>b</sup> 195
Apr. 22.....	2.35	80	Sept. 20.....	1.20	1.7
May 24.....	3.09	<sup>a</sup> 153			

<sup>a</sup> About 3 second-feet carried around gage in slough and is not included in measurement.

<sup>b</sup> About 32 second-feet carried around gage in slough and is not included in measurement.

NOTE.—All gage heights are referred to datum established Sept. 20, 1917.

*Daily discharge in second-feet, of Lamoille Creek near Halleck, Nev., for the year ending Sept. 30, 1917.*

Day.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	15	17	-----	128	108	168	223	80	1
2.	15	18	-----	128	98	123	213	70	1
3.	15	19	-----	118	93	138	213	54	1
4.	16	20	-----	98	80	148	213	47	1
5.	16	20	-----	91	66	148	213	37	1
6.	16	20	-----	118	70	138	213	32	1
7.	16	22	-----	98	79	133	203	29	1
8.	16	24	-----	108	90	123	193	27	1
9.	18	24	-----	118	82	138	188	24	1
10.	20	-----	-----	108	80	188	178	22	1
11.	20	-----	-----	103	77	183	168	17	2
12.	19	-----	-----	103	88	267	148	14	2
13.	19	-----	-----	108	93	223	148	10	2
14.	18	-----	-----	108	84	183	138	8	3
15.	17	-----	-----	103	91	168	138	6	2
16.	17	-----	-----	90	94	188	133	6	2
17.	16	-----	-----	86	93	245	128	5	2
18.	16	-----	-----	82	113	238	138	4	2
19.	16	-----	-----	80	133	289	148	4	2
20.	16	-----	39	77	123	289	138	3	2
21.	16	-----	39	77	118	311	138	3	2
22.	14	-----	40	77	108	311	123	3	2
23.	16	-----	42	91	108	311	113	3	2
24.	19	-----	42	98	133	289	103	2	2
25.	17	-----	45	108	168	278	90	2	2
26.	18	-----	47	108	245	278	86	2	2
28.	19	-----	64	118	278	267	82	2	2
28.	19	-----	148	148	278	267	153	2	2
29.	19	-----	128	143	245	215	118	2	2
30.	18	-----	158	108	223	245	103	1	2
31.	-----	-----	128	-----	203	-----	90	1	-----

NOTE.—Discharge Oct. 1-21 reported as zero; Oct. 22-31, estimated because of missing gage heights, 8 second-feet. Discharge not determined Dec. 10 to Mar. 19 because of no gage-height record except for a few days in January when stream was frozen over. At stages above 2.5 feet (discharge about 100 second feet), part of flow was carried around gage in sloughs and is not included in table.

*Monthly discharge of Lamoille Creek near Halleck, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	-----	0	2.58	159
November.....	20	14	17.1	1,020
December 1-9.....	24	17	20.4	364
March 20-31.....	158	39	76.7	1,820
April.....	148	77	104	6,190
May.....	278	66	127	7,810
June.....	311	123	219	13,000
July.....	223	82	151	9,280
August.....	80	1	16.8	1,030
September.....	3	1	1.70	101

#### SECRET CREEK NEAR HALLECK, NEV.

LOCATION.—In NE.  $\frac{1}{4}$  NW.  $\frac{1}{4}$  sec. 1, T. 34 N., R. 59 E., at Ryan's ranch, 500 feet from Secret Pass highway, half a mile below mouth of Doisey Creek, three-quarters of a mile above old private gage at Sotty's mine, 12 miles above confluence with Lamoille Creek, and 15 miles southeast of Halleck, Elko County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 28 to September 30, 1917.



GAGE.—Vertical staff on right bank, 75 feet below lower fence on Ryan's ranch; read by James Ryan.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Bed composed of sand and gravel. One channel except at extremely high stages when water runs through shallow overflow channel on right bank. Control is coarse gravel bar which is fairly permanent. Stage of zero flow at gage height  $0.7 \pm 0.1$  foot, determined June 30, 1917.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, 2.71 feet at 5 p. m. June 4 (discharge, 170 second-feet); minimum stage recorded, 0.95 foot at 3 p. m. August 15 (discharge, 1.3 second-feet).

ICE.—No information.

DIVERSIONS.—Below Secret Valley and Ryan's ranch diversions; the 71 ranch diverts water about 5 miles below.

REGULATION.—Flow affected by irrigation diversions above.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 90 second-feet; extended above. Gage read to hundredths once daily except during part of June and most of July when it was read twice daily, and in August and September when breaks of several days occur. Daily discharge determined by applying mean daily gage height to rating table or by interpolating for periods when gage was not read, except that for period August 22 to September 18 which was estimated. Records good.

*Discharge measurements of Secret Creek near Halleck, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>
May 28.....	2.00	75
June 30.....	1.44	22.1
Sept. 19.....	.99	1.9

*Daily discharge, in second-feet, of Secret Creek near Halleck, Nev., for the year ending Sept. 30, 1917.*

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1.....		83	19	4.1		16.....		70	5.8	1.6	
2.....		78	19	4.1		17.....		53	6.2	1.5	
3.....		110	19	4.1		18.....		71	6.2	1.4	
4.....		143	16	4.7		19.....		66	8.2	1.7	1.9
5.....		93	14			20.....		60	8.2	1.9	
6.....		81	14			21.....		55	5.8	1.6	
7.....		78	14			22.....		50	7.0		
8.....		86	10	3.5		23.....		45	6.6		
9.....		88	9.0			24.....		43	5.5		
10.....		122	9.0			25.....		30	4.4		
11.....		108	8.6			26.....		30	4.1		
12.....		76	8.6			27.....		29	4.1		2.9
13.....		82	8.6			28.....	76	22	8.2		2.3
14.....		88	7.6	1.6		29.....	128	22			2.3
15.....		76	6.6	1.9		30.....	104	22			2.3
						31.....	100				

NOTE.—Discharge interpolated, July 29-31, 6 second-feet; Aug. 5-7, 4.1 second-feet; Aug. 9-13, 2.6 second-feet; Sept. 20-26, 2.4 second-feet. Discharge estimated from comparison with flow of Lamoille Creek near Halleck Aug. 22 to Sept. 12, 1.5 second-feet; Sept. 13-18, 1.9 second-feet.

*Monthly discharge of Secret Creek near Halleck, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 28-31.....	128	76	102	809
June.....	143	22	68.7	4,090
July.....	19	4.1	9.07	558
August.....	4.7		2.39	147
September.....			1.93	115
The period.....				5,720

#### NORTH FORK OF HUMBOLDT RIVER AT DEVILS GATE, NEAR HALLECK, NEV.

**LOCATION.**—In sec. 13, T. 38 N., R. 57 E., at narrows  $3\frac{1}{2}$  miles above buildings of Charles Clayton ranch (also known as Devils Gate ranch), 17 miles north of Halleck, Elko County, and 27 miles by wagon road from Elko.

**DRAINAGE AREA.**—830 square miles (measured on General Land Office maps).

**RECORDS AVAILABLE.**—November 11, 1913, to September 30, 1917, also at mouth of stream from October 10, 1902, to December 31, 1909, and October 1, 1910, to December 31, 1913.

**GAGE.**—Stevens continuous water-stage recorder on right bank; inspected by C. H. Crane. Original gage was about 15 miles downstream; comparatively little run-off enters below present station except during storms.

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

**CHANNEL AND CONTROL.**—Bed composed of sand with gravel riffle at control; about half of the control section is affected by growth of moss. Channel crooked. Banks high and covered with willows; at extremely high stages water may overflow right bank and pass in an overflow channel around gage.

**EXTREMES OF DISCHARGE.**—Maximum stage during year estimated 9.0 feet at 8 p. m. April 9 (discharge, 1,260 second-feet); minimum stage recorded, 1.50 feet September 20 (discharge, 9 second-feet). Discharge was probably less than 9 second-feet when stage-discharge relation was affected by ice in January.

1913-1917: Maximum stage occurred in 1917; minimum discharge, 1 second-foot, August 20-28 and September 30, 1913.

**ICE.**—Stage-discharge relation seriously affected by ice in winter; river freezes over at gage, but riffle is sometimes partly open; anchor ice collects on riffle.

**DIVERSIONS.**—Numerous diversions in the valley above and below Devils Gate. During summer almost all low-water flow is diverted.

**REGULATION.**—Flow during summer depends on amount of irrigation above. A small flow is maintained from seepage and springs.

**ACCURACY.**—Stage-discharge relation affected by moss on control during low water; permanent at high stages; affected by ice, November 11-30, December 6-9, and December 13 to March 24. Rating curve well defined between 70 and 1,000 second-feet; extended above; fairly well defined below 70 second-feet. 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 the daily mean gage height determined from recorder graph by inspection, except for periods when stage-discharge relation was affected by ice or when gage-height record was missing, for which it was estimated. Records obtained by use of rating table, good; others, fair.

*Discharge measurements of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 31.....	1.50	20.5	Apr. 27.....	7.74	<sup>b</sup> 947	Sept. 17.....	<sup>c</sup> 1.51	9.6
Feb. 13.....	<sup>a</sup> 2.44	18.7	May 24.....	6.06	566	18.....	<sup>c</sup> 1.51	9.9
Apr. 5.....	3.18	153	June 29.....	3.69	200			

<sup>a</sup> Complete ice cover.

<sup>b</sup> Includes 59 second-feet carried in slough around gage.

<sup>c</sup> Stage-discharge relation affected by moss on control.

*Daily discharge, in second-feet, of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Sept.
1.....	13	20	20	-----	-----	516	516	173	-----
2.....	15	20	19	-----	-----	478	478	163	-----
3.....	17	20	20	-----	-----	425	442	153	-----
4.....	17	20	20	-----	-----	375	425	143	-----
5.....	18	20	21	-----	158	375	408	129	-----
6.....	17	20	-----	-----	408	351	375	120	-----
7.....	18	20	-----	-----	478	425	375	116	-----
8.....	19	20	-----	-----	749	704	359	114	-----
9.....	20	21	-----	-----	1,110	818	351	103	-----
10.....	20	20	25	-----	937	660	375	92	-----
11.....	21	-----	26	-----	617	596	425	87	-----
12.....	21	-----	24	-----	772	660	478	76	-----
13.....	20	-----	-----	-----	818	841	-----	72	-----
14.....	20	-----	-----	-----	682	795	-----	68	-----
15.....	20	-----	-----	-----	596	772	-----	65	-----
16.....	20	-----	-----	-----	408	818	-----	60	-----
17.....	20	-----	-----	-----	321	726	-----	58	10
18.....	20	-----	-----	-----	287	660	-----	78	10
19.....	19	-----	-----	-----	256	682	-----	66	10
20.....	19	-----	-----	-----	244	704	-----	55	9
21.....	19	-----	-----	-----	314	575	-----	54	10
22.....	19	-----	-----	-----	478	478	-----	54	10
23.....	18	-----	-----	-----	638	460	-----	52	10
24.....	19	-----	-----	-----	749	555	-----	48	10
25.....	19	-----	-----	-----	889	726	-----	45	10
26.....	20	-----	-----	-----	913	795	-----	44	10
27.....	20	-----	-----	-----	913	726	-----	42	10
28.....	20	-----	-----	415	772	596	-----	40	10
29.....	20	-----	-----	-----	617	555	205	40	12
30.....	20	-----	-----	-----	535	596	188	40	12
31.....	20	-----	-----	-----	-----	555	-----	40	-----

NOTE.—Discharge estimated because of ice Nov. 11–30, 20 second-feet; Dec. 6–9, 23 second-feet; Dec. 13–25, 26 second-feet; Dec. 26 to Jan. 10, 16 second-feet; Jan. 11–31, 8 second-feet; Feb. 1–10, 10 second-feet; Feb. 11–28, 25 second-feet; Mar. 1–6, 36 second-feet; and Mar. 7–24, 70 second-feet. Estimated when water-stage recorder was not operating Mar. 25–27, 275 second-feet; Mar. 29–31, 315 second-feet; Apr. 1–4, 175 second-feet; June 13–28, 355 second-feet; Aug. 1–31, 25 second-feet; and Sept. 1–16, 10 second-feet. Discharge for period of ice effect estimated from observer's notes, one discharge measurement, and weather records. Discharge for periods of no gage-height record, estimated from hydrographic comparison with Marys River near Deeth.

*Monthly discharge of North Fork of Humboldt River at Devils Gate, near Halleck, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	21	13	19.0	1,170
November.....			20.0	1,190
December.....			22.6	1,390
January.....			10.6	652
February.....			19.6	1,090
March.....	415		81.5	5,010
April.....	1,110	158	545	32,400
May.....	841	351	613	37,700
June.....	516	188	369	22,000
July.....	173	40	80.3	4,940
August.....			25	1,540
September.....	12	9	10.1	601
The year.....	1,110	9	152	110,000

#### SOUTH FORK OF HUMBOLDT RIVER NEAR ELKO, NEV.

**LOCATION.**—In sec. 19, T. 33 N., R. 55 E., at head of canyon below Cowling's ranch, 4 miles above mouth and 10 miles southwest of Elko, Elko County.

**DRAINAGE AREA.**—Not measured (1,150 square miles at old station  $1\frac{1}{2}$  miles above).

**RECORDS AVAILABLE.**—August 29, 1896, to December 31, 1909; September 9, 1910, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on right bank  $1\frac{1}{2}$  miles below highway bridge, November 14, 1913, to September 30, 1917; inspected by Harry Cowling and Fred Henrich. Inclined staff on left bank, a quarter of a mile above bridge, February 26, 1907, to November 13, 1913; prior to February, 1907, several gages at slightly different sites and datums.

**DISCHARGE MEASUREMENTS.**—Made from cable 110 feet above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand. Rock riffle a short distance below gage affords fairly permanent control. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year, from high-water mark in gage well, 6.08 feet, reported by observer to have occurred March 28 (discharge, 1,700 second-feet); river dry October 1.

1896-1917: Maximum stage recorded, 10.0 feet, January 26, 1914 (discharge, 2,400 second-feet); minimum stage (dry in August, September, and October, 1915; and September and October 1, 1916).

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

**DIVERSIONS.**—Below all tributaries and all diversions except those of the Hunter & Banks ranch, 3 miles downstream.

**REGULATION.**—Flow affected by diversions above.

**ACCURACY.**—Stage-discharge relation practically permanent; affected by ice from about November 15 to March 21. Rating curve well defined between 0 and 450 second-feet, and fairly well defined up to 1,200 second-feet. Operation of water-stage recorder satisfactory except for breaks in record shown in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph, except for breaks in gage-height record for which it was estimated or interpolated, and except for period when stage-discharge relation was affected by ice. Records obtained by use of rating table, good; others, fair.

*Discharge measurements of South Fork of Humboldt River near Elko, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
Nov. 6.....	<i>Feet.</i> 0.97	<i>Sec.-ft.</i> 29.5	Apr. 3.....	<i>Feet.</i> 2.02	<i>Sec.-ft.</i> 161	May 31.....	<i>Feet.</i> 3.29	<i>Sec.-ft.</i> 567
Jan. 30.....	<i>a</i> 1.90	14.7	.....	1.98	146	July 3.....	2.88	391
Feb. 14.....	<i>a</i> 1.95	18.0	May 22.....	2.80	365	Sept. 10.....	.10	.7

*a* Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of South Fork of Humboldt River near Elko, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		30		678	265	495	428	63	3
2.....		31		420	235	455	404	56	3
3.....		31		163	214	421	372	49	2
4.....		31		156	197	411	362	49	1
5.....		31		270	176	404	362	47	.8
6.....		31		335	174	395	335	40	.5
7.....		31		398	195	388	320	33	.5
8.....				491	226	421	284	28	.5
9.....				528	221	524	265	21	.5
10.....				401	214	720	223	16	.5
11.....				303	233	777	208	14	.4
12.....				306	270	684	193	12	.3
13.....		25		289	309	551	176	12	.3
14.....				275	350	495	159	11	.6
15.....				240	428	528	145	11	.8
16.....				219	517	652	140	11	.8
17.....				182	477	781	137	10	.9
18.....				182	428	960	137	9	1
19.....				174	401	1,000	144	8	1
20.....				165	448	960	136	8	1
21.....				168	382	931	132	9	2
22.....			356	178	356	902	103	10	2
23.....				199	353	810	79	9	3
24.....		29		219	375	753	74	8	3
25.....		29		243	438	708	77	7	4
26.....	29			292	632	656	68	5	5
27.....	29			317	826	609	105	4	5
28.....	30			323	749	562	172	4	5
29.....	30		1,450	326	662	539	118	4	5
30.....	30		1,190	306	574	473	96	3	5
31.....	30		935		532		77	3	.....

NOTE.—Discharge determined for periods when water-stage recorder was not operating, as follows: Oct. 1, estimated zero; Oct. 2-10, estimated, 10 second-feet; Oct. 11-23, estimated 25 second-feet; Nov. 8-11, interpolated 28 second-feet; Nov. 13-30, estimated 18 second-feet; Dec. 1-31, estimated 12 second-feet; Jan. 1-17, estimated 8 second-feet; Jan. 18-31, estimated 10 second-feet; Feb. 1-15, estimated 14 second-feet; Feb. 16-28, estimated 25 second-feet; Mar. 1-18, estimated 35 second-feet; Mar. 19-21, estimated 195 second-feet; Mar. 23-28, interpolated 900 second-feet.

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*Monthly discharge of South Fork of Humboldt River near Elko, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	30	0	21.0	1,290
November.....	31		22.6	1,340
December.....			12.0	738
January.....			8.9	547
February.....			19.1	1,060
March.....	1,450		340	20,900
April.....	678	156	292	17,400
May.....	826	174	382	23,500
June.....	1,000	388	632	37,600
July.....	428	68	195	12,000
August.....	63	3	18.5	1,140
September.....	5	.3	1.95	116
The year.....	1,450	0	162	118,000

#### MAGGIE CREEK AT CARLIN, NEV.

**LOCATION.**—In sec. 26, T. 33 N., R. 52 E., 700 feet above highway bridge, half a mile above confluence with Humboldt River, and half a mile east of Carlin, Elko County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—June 6, 1913, to September 30, 1917.

**GAGE.**—Vertical staff on right bank about 800 feet above Pacific Fruit Express Co.'s dam May 24 to July 15 and September 22–30, 1917; read by J. F. Robinson and R. Tank. Vertical staff at bridge 100 feet above dam June 6 to October 25, 1913; inclined staff on left bank about 600 feet above dam October 26, 1913, to May 23, 1917, and July 21 to September 21, 1917.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge or by wading.

**CHANNEL AND CONTROL.**—Bed composed of sand and gravel; shifts occasionally. One channel at all stages. Stage of zero flow at gage height,  $0.60 \pm 0.10$  foot, determined September 22, 1917.

**EXTREMES OF DISCHARGE.**—Maximum discharge during year, 300 second-feet at 7.30 a. m. April 27, during period when control was shifting; minimum discharge, 0.3 second-foot June 17–20.

1913–1917: Maximum stage recorded, 4.5 feet April 28, 1914 (discharge, 394 second-feet); minimum stage recorded, 0.95 foot August and September, 1915 (discharge, 0.1 second-foot).

**DIVERSIONS.**—No information.

**REGULATION.**—No information.

**ACCURACY.**—Stage-discharge relation changed by backwater from dam November 12 to January 14 and by shifting control April 8 and 26–27. Rating curves fairly well defined below 160 second-feet except that used April 9–25, which is poorly defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except for period when stage-discharge relation was affected by backwater from dam; for this period the only flow was the water pumped, of which a record was kept. Records fair.

*Discharge measurements of Maggie Creek at Carlin, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.		Dis-charge.	Date.	Gage height.		Dis-charge.
	Gage A.	Gage B.			Gage A.	Gage B.	
Nov. 6. ....	<i>Feet.</i> a3.25	<i>Feet.</i> .....	<i>Sec.-ft.</i> 6.4	June 28. ....	<i>Feet.</i> 0.57	<i>Feet.</i> 1.22	<i>Sec.-ft.</i> 10.4
Apr. 21. ....	b3.37	.....	105	Sept. 22. ....	.26	0.90	1.9
May 23. ....	2.53	2.59	152				

a Affected by backwater from dam.

b Affected by backwater from caving banks.

NOTE.—Gage A used Oct. 26, 1913, to May 23, 1917, and July 21, to Sept. 21, 1917. Gage B used May 24 to July 15 and Sept. 22-30, 1917.

*Daily discharge, in second-feet, of Maggie Creek at Carlin, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1. ....	8.0	10	5.3	1.6	0.5	37	62	199	177	8.1	0.8	0.8
2. ....	8.3	8	5.3	1.6	.5	31	62	199	177	7.1	.8	1.0
3. ....	8.6	6	5.3	1.9	.7	30	58	179	169	6.1	.8	1.0
4. ....	8.9	5.3	5.3	1.9	.8	28	51	179	146	5.6	.8	1.3
5. ....	9.4	5.3	5.3	1.4	.9	27	62	169	139	5.6	.8	1.2
6. ....	10	5.3	5.3	1.6	1.1	26	91	179	139	5.9	.8	1.3
7. ....	11	5.3	5.3	1.4	1.2	26	118	189	116	6.4	.8	1.3
8. ....	11	5.3	5.3	1.4	1.3	25	141	220	95	6.4	.8	1.3
9. ....	12	5.3	5.3	1.3	1.4	25	164	220	88	6.4	.8	1.3
10. ....	12	5.3	4.2	1.2	1.6	24	174	209	76	6.1	.8	1.3
11. ....	13	5.3	4.0	1.2	1.6	23	174	220	76	5.6	.8	1.0
12. ....	14	4.4	4.6	1.2	1.8	24	184	230	76	5.6	.9	1.0
13. ....	14	4.2	4.2	1.2	2.0	26	184	242	70	4.8	1.0	1.0
14. ....	15	5.1	4.0	1.2	2.3	29	184	242	61	4.3	.8	1.3
15. ....	15	5.1	4.2	.6	2.6	35	174	252	56	4.3	.9	1.0
16. ....	16	5.3	4.6	.5	2.8	36	164	252	51	4.0	.9	1.2
17. ....	17	5.3	4.2	.3	3.1	37	136	230	46	3.8	.8	1.0
18. ....	18	5.1	4.0	.3	3.1	36	127	209	44	3.6	.8	1.0
19. ....	17	5.3	4.0	.3	3.3	38	127	220	38	3.4	.8	1.0
20. ....	15	5.3	3.7	.3	4.8	41	109	199	34	3.2	.8	1.0
21. ....	15	5.3	3.7	.4	7.8	44	109	189	28	3.0	.8	1.0
22. ....	14	5.3	3.2	.4	14	44	174	169	21	2.6	.8	1.9
23. ....	14	5.3	2.8	.5	66	44	204	159	16	2.6	.8	2.3
24. ....	13	5.3	4.0	.4	116	51	236	162	16	1.0	.8	2.7
25. ....	12	5.3	3.5	.5	158	51	269	185	14	.8	.8	2.7
26. ....	12	5.3	3.2	.5	159	51	280	233	8.8	.8	.9	2.7
27. ....	11	5.3	2.8	.5	134	54	291	250	11	.8	1.0	2.7
28. ....	11	5.3	1.9	.5	93	58	286	250	13	.8	.9	2.7
29. ....	11	5.3	1.4	.5	.....	58	252	250	11	.8	.8	2.8
30. ....	11	5.3	1.9	.6	.....	70	220	217	8.8	.8	.8	2.7
31. ....	11	.....	1.4	.7	.....	66	.....	209	.....	.8	.....	.....

NOTE.—Discharge interpolated because of doubtful gage-height record, Nov. 1-3 and July 16-20.

*Monthly discharge of Maggie Creek at Carlin, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	18	8.0	12.5	769
November.....	10	4.2	5.48	326
December.....	5.3	1.4	3.97	244
January.....	1.9	.3	.900	55.3
February.....	159	.5	28.0	1,560
March.....	70	23	38.5	2,370
April.....	291	51	162	9,640
May.....	252	159	210	12,900
June.....	177	8.8	67.4	4,010
July.....	8.1	.8	3.91	240
August.....	1.0	.8	.829	51.0
September.....	2.8	.8	1.55	92.2
The year.....	291	.3	44.6	32,300

#### ROCK CREEK AT ROCK CREEK RANCH, NEAR BATTLE MOUNTAIN, NEV.

**LOCATION.**—About in sec. 7, T. 37 N., R. 47 E., 1,000 feet below diversion dam at mouth of canyon, 1,000 feet from Rock Creek ranch house, a few miles south of Dutton, and 35 miles north of Battle Mountain, Lander County. Willow Creek is the only large tributary between this station and the one maintained several miles below in 1896.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—May 13, 1915, to September 30, 1917, when the station was discontinued.

**GAGE.**—Vertical staff on right bank 1,000 feet below diversion dam, November 8, 1916, to September 30, 1917; read by foreman of Rock Creek ranch. Vertical staff near left end of footbridge about a mile above dam, May 13, 1915, to November 7, 1916; datum raised 0.62 foot June 14, 1916.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Bed composed of rocks and gravel, but likely to shift at extremely high stages. Banks high and clean. One channel at all stages.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from high-water mark on bank, 3.5 feet some time between April 8 and June 14 (discharge, 330 second-feet); minimum stage recorded, 0.28 foot July 27–29 (discharge, 2.8 second-feet).

1915–1917: Maximum discharge from discharge measurement, 933 second-feet, March 21, 1916; minimum discharge, 0.4 second-foot July 5 and 7, 1915.

**DIVERSIONS.**—Numerous small diversions above station; there is a small reservoir on one of the tributaries above Squaw Valley.

**REGULATION.**—Flow affected by diversions and storage above.

**ACCURACY.**—Stage-discharge relation changed by high water in spring; affected by ice December 1 to February 22. Rating curve used to April 7 poorly defined; that used June 15 to September 30 fairly well defined below 100 second-feet; extended above. Gage read to hundredths once a week October 1 to November 7 and once daily for remainder of year except April 8 to June 14 and August 8 to September 22 when it was not read. Daily discharge determined by applying daily gage height to rating table; mean discharge estimated for periods when gage was not read and when stage-discharge relation was affected by ice. Records obtained by use of rating table, fair; others, poor.



*Discharge measurements of Rock Creek at Rock Creek ranch near Battle Mountain, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 8.....	a 0.79	5.8	June 28.....	0.40	5.8
June 15.....	1.39	63	Sept. 23.....	.60	10.4

a Previous gage read 1.10 feet. About 0.5 second-foot diverted between the two gages.

*Daily discharge, in second-feet, of Rock Creek at Rock Creek ranch, near Battle Mountain, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	June.	July.	Aug.	Sept.
1.....				6.0	67		6.0	3.0	
2.....				6.0	68		6.0	3.0	
3.....				6.0	61		6.5	3.0	
4.....				8.9	56		6.5	3.0	
5.....				8.9	85		6.0	3.4	
6.....				8.9	125		6.0	3.4	
7.....	5.8			8.9	183		5.5	3.4	
8.....		6.0		13			5.5		
9.....		6.0		13			6.0		
10.....		6.0		13			6.5		
11.....		6.0		13			6.5		
12.....		3.8		13			6.0		
13.....		3.8		13			6.0		
14.....	5.8	3.8		13			6.0		
15.....		3.8		13		62	6.0		
16.....		6.0		13		54	6.0		
17.....		6.0		13		46	5.5		
18.....		6.0		13		38	5.5		
19.....		6.0		13		31	5.5		
20.....		6.0		22		25	5.5		
21.....	5.8	6.0		22		25	5.5		
22.....		6.0		27		25	5.0		
23.....		6.0	8.9	27		25	5.0		11
24.....		6.0	8.9	22		21	4.2		11
25.....		6.0	8.9	17		17	3.0		6.0
26.....		6.0	8.9	13		13	3.0		6.5
27.....		6.0	8.9	34		9	2.8		6.0
28.....	5.8	6.0	8.9	67		5.0	2.8		6.0
29.....		6.0		52		5.5	2.8		6.5
30.....		6.0		54		5.5	3.0		6.5
31.....				67			3.0		

NOTE.—Discharge estimated because of no gage-height record: Nov. 1-7, 5.8 second-feet; Aug. 8-31, 3 second-feet; and Sept. 1-22, 5 second-feet. Discharge interpolated June 16 and 24-27. Discharge estimated because of ice, from weather records: Dec. 1-31, 5 second-feet; Jan. 1-31, 4 second-feet; and Feb. 1-22, 5 second-feet. Discharge not determined Apr. 8 to June 14.

*Monthly discharge of Rock Creek at Rock Creek ranch, near Battle Mountain, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....			5.80	357
November.....	6.0	3.8	5.66	337
December.....			5.00	307
January.....			4.00	246
February.....	8.9		5.84	324
March.....	67	6.0	20.4	1,250
April 1-7.....	183	56	92.1	1,280
June 15-30.....	62	5.0	25.4	806
July.....	6.5	2.8	5.13	315
August.....			3.04	187
September.....			5.65	336

**HUMBOLDT-LOVELOCKS IRRIGATION, LIGHT & POWER CO.'S FEEDER CANAL NEAR MILL CITY, NEV.**

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 29, T. 33 N., R. 35 E., a quarter of a mile below head of canal and 2 miles north of Mill City, Humboldt County.

**RECORDS AVAILABLE.**—February 19, 1914, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on left bank; inspected by Peter Organ.

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

**CHANNEL AND CONTROL.**—Earth section. Control indefinite; stage-discharge relation is affected by growth of aquatic plants and by the wash from several small gullies below the station.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from water-stage recorder, 4.16 feet about March 26 (clock not running) (discharge, 187 second-feet); minimum stage, canal dry October 1-16, October 20 to November 3, April 2-30, and September 1-30

1914-1917: Maximum stage from water-stage recorder, 4.78 feet at 6 a. m. April 5, 1916 (discharge, 243 second-feet); canal dry at various times.

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

**DIVERSIONS.**—None.

**REGULATION.**—Flow regulated by head gates a quarter of a mile above station.

**ACCURACY.**—Stage-discharge relation permanent; affected by ice November 19 to early part of March. Rating curve well defined between 0 and 250 second-feet. Operation of water-stage recorder satisfactory November 9-12, March 19-22, March 31 to July 15, and August 3-29. Daily discharge for periods when water-stage recorder was operating ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph, except that for May 1 and June 1 which was determined by averaging results obtained by applying hourly gage height to rating table; discharge for remainder of year estimated except that for November 13-18, 23-26, and July 16 to August 2, which was interpolated. Records obtained by use of rating table, good; others fair, except those for period December 1 to March 18, which are poor.

Canal diverts from Humboldt River in sec. 29, T. 33 N., R. 35 E., for storage in the Taylor-Pitt reservoirs near Humboldt. The water is returned to the river during the irrigation season, about 3 miles west of Humboldt through Humboldt-Lovelocks Irrigation, Light & Power Co.'s outlet canal and carried in the natural channel to head gates of the canals serving the Lovelocks district.

*Discharge measurements of Humboldt-Lovelocks Irrigation, Light & Power Co.'s feeder canal, near Mill City, Nev., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Nov. 9	L. W. Jordan.....	<i>Feet.</i> 2.09	<i>Sec.-ft.</i> 36.0	Feb. 9	L. W. Jordan.....	<i>Feet.</i> <sup>a</sup> 4.10	<i>Sec.-ft.</i> 60
10	S. E. Jameson.....	2.00	34.0	June 17	do.....	1.71	23.3
19	do.....	<sup>a</sup> 2.35	42.0				

<sup>a</sup> Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Humboldt-Lovelocks Irrigation, Light & Power Co.'s feeder canal near Mill City, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.
1				0.2	37	133	24	10
2					74	41	24	7.8
2					104	39	25	5.6
4		19			130	34	25	4.7
5		38			136	30	25	4.1
6		38			140	28	27	3.6
7		38			145	26	29	2.6
8		38			143	25	32	2.4
9		38			147	25	34	2.1
10		26			147	24	38	1.8
11		16			148	23	38	1.7
12		32			147	23	39	1.7
13					140	23	40	1.5
14					150	24	41	1.3
15					150	24	42	1.2
16					140	24		.9
17	10				138	23		.7
18	20				133	23		.9
19	10	42	168		144	23		.9
20		41	171		139	23		.8
21		41	174		136	24		.8
22		39	177		139	24		.8
23			179		146	23		.7
24			182		159	23		.7
25			184		161	23		.6
26			187		170	23		.6
27		43	94		173	22		.6
28			4		173	22		.6
29			2		170	23		.5
30			1		146	23		.4
31			.4		153			.3

NOTE.—Discharge Oct. 17-19 and Nov. 4-8 estimated from deputy State engineer's notes; interpolated Nov. 13-18, 37 second-feet; Nov. 25-26, 41 second-feet; and July 16-31, 26 second-feet; estimated because of ice, from two discharge measurements and comparison with Humboldt River near Oreana, Nov. 19-22 as in table given; Nov. 28-30 and Jan. 1-31, 40 second-feet; Dec. 1-31, 50 second-feet; Feb. 1-28, 60 second-feet and Mar. 1-18, 170 second-feet; estimated from observer's notes and pencil trace for period Mar. 23-30 when clock was not running. Canal dry Oct. 1-16, Oct. 19 to Nov. 3, Apr. 2-30, and Sept. 1-30.

*Monthly discharge of Humboldt-Lovelocks Irrigation, Light & Power Co.'s feeder canal near Mill City, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	20	0	1.29	79.3
November		0	33.2	1,980
December			50	3,070
January			40	2,460
February			60	3,330
March	187	.4	148	9,100
April	.2	0	.007	.4
May	173	37	141	8,670
June	133	22	28.9	1,720
July	42		29.0	1,780
August	10	.3	2.03	125
September	0	0	0	0
The year	187	0	44.6	32,300

**HUMBOLDT-LOVELOCKS IRRIGATION, LIGHT & POWER CO.'S OUTLET CANAL NEAR HUMBOLDT, NEV.**

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 30, T. 32 N., R. 33 E., at outlet of lower Taylor-Pitt reservoir,  $2\frac{1}{2}$  miles west of Humboldt, Humboldt County.

**RECORDS AVAILABLE.**—February 15, 1914, to September 30, 1917.

**GAGE.**—Stevens continuous water-stage recorder on right bank about 100 feet above weirs; inspected by Albert Olson.

**DISCHARGE MEASUREMENTS.**—Made from a footbridge a quarter of a mile below gage or by wading.

**CHANNEL AND CONTROL.**—Two 8-foot Cippoletti weirs form a permanent control. Stage of zero flow at gage height 0.04 foot, determined April 7, 1917.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 288 feet, July 17 (discharge, 277 second-feet); canal dry October 1 to about April 1.

1914-1917: Maximum stage recorded, 3.02 feet at noon April 30, 1915 (discharge, 296 second-feet).

**ICE.**—Gates usually closed during winter.

**DIVERSIONS.**—None.

**REGULATION.**—Flow regulated by outlet gates a few hundred feet above station.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve well defined below 150 second-feet. Operation of water-stage recorder satisfactory during period when reservoir gates were open; only seepage through gates passed at other times when breaks in record occurred. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph except for periods when water-stage recorder was not operating for which it was interpolated, and for July 16, 19, and 20 for which it was determined by averaging the results obtained by applying hourly gage height to rating table. Records excellent for period when reservoir gates were open; fair for remainder of year.

Canal conducts stored water released from the Taylor-Pitt reservoirs to Humboldt River in SW.  $\frac{1}{4}$  sec. 31, T. 33 N., R. 33 E., for irrigation in Lovelocks Valley, several miles downstream.

No discharge measurements were made during the year.

*Daily discharge, in second-feet, of Humboldt-Lovelocks Irrigation, Light & Power Co.'s outlet canal near Humboldt, Nev., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	.....	0.6	0.5	2.1	1.7	1.3	16.....	0.4	0.4	1.3	90	1.7	0.8
2.....	.....	.6	.5	2.5	1.7	1.3	17.....	.4	.4	1.3	277	1.7	.8
3.....	.....	.6	.5	2.5	1.6	1.2	18.....	.4	.4	1.3	246	1.7	.7
4.....	.....	.5	.6	2.5	1.4	1.2	19.....	.4	.5	1.3	105	1.7	.7
5.....	.....	.5	.8	2.5	1.3	1.2	20.....	.4	.5	1.3	31	1.7	.7
6.....	.....	.5	.9	2.5	1.7	1.1	21.....	.4	.5	1.3	2.9	1.7	.6
7.....	0.2	.5	1.0	2.5	1.7	1.1	22.....	.5	1.3	1.3	1.7	1.6	.6
8.....	.3	.5	1.2	2.5	1.7	1.1	23.....	.6	1.1	1.7	1.3	1.6	.6
9.....	.4	.5	1.3	2.5	1.7	1.0	24.....	.8	1.0	1.7	1.3	1.6	.5
10.....	.4	.4	1.3	2.5	1.7	1.0	25.....	.6	.8	1.7	1.3	1.5	.5
11.....	.4	.5	1.3	2.5	1.7	1.0	26.....	.5	.7	1.7	1.3	1.5	.5
12.....	.4	.5	1.3	2.5	1.7	.9	27.....	.5	.5	1.7	1.3	1.5	.5
13.....	.4	.5	1.3	2.5	1.7	.9	28.....	.6	.5	2.1	1.3	1.4	.5
14.....	.4	.4	1.3	2.5	1.7	.9	29.....	.6	.5	2.1	1.3	1.4	.5
15.....	.4	.4	1.3	2.1	1.7	.8	30.....	.6	.5	2.1	1.3	1.4	.5
							31.....	.....	.5	.....	1.3	1.3	.....

**NOTE.**—Canal dry Oct. 1 to Apr. 6 and only seepage through closed reservoir outlet gates flowing Apr. 7 to July 15 and July 21 to Sept. 30. Water-stage recorder not in operation Oct. 1 to Apr. 6; May 23-26; June 4-8, and 10-19; Aug. 3-4, 7-8, and 10-14; Aug. 22 to Sept. 25, and Sept. 27-30, discharge interpolated.

*Monthly discharge of Humboldt-Lovelocks Irrigation, Light & Power Co.'s outlet canal near Humboldt, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April.....	0.6	0	0.360	21.4
May.....	1.3	.4	1.568	34.9
June.....	2.1	.5	1.30	77.4
July.....	277	1.3	25.9	1,590
August.....	1.7	1.3	1.60	98.4
September.....	1.3	.5	.833	49.6
The year.....	277	0	5.16	1,870

NOTE.—No flow Oct. 1 to Apr. 6.

## PYRAMID AND WINNEMUCCA LAKES BASIN.

### LAKE TAHOE AT TAHOE, CALIF.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 6, T. 15 N., R. 17 E., near outlet of lake at Tahoe, Placer County.

DRAINAGE AREA.—519 square miles (including water surface of lake, which is 193 square miles).

RECORDS AVAILABLE.—1900 to September 30, 1917.

GAGE.—Vertical staff fastened to piling of boat landing near outlet; read by an employee of United States Reclamation Service. Datum is 6,220 feet above sea level. Mean low-water elevation of lake is 6,226.0 feet.

EXTREMES OF STAGE.—Maximum stage recorded during year, 9.78 feet July 17; minimum stage recorded, 7.76 feet February 15 and 16.

1900–1917: Maximum stage recorded, 11.26 feet July 14, 15, 17, and 18, 1907; minimum stage recorded, 4.68 feet December 19 to 21, 1913.

ACCURACY.—Gage read to hundredths once daily and is not read when water surface is rough.

COOPERATION.—Record furnished by United States Reclamation Service.

*Daily gage height, in feet, of Lake Tahoe at Tahoe, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	8.82	8.42	8.07	8.20	7.87	8.32	8.28	8.61	9.25	9.69	9.57	9.05
2.....	8.84	8.40	8.13	8.19	7.86	8.31	8.28	8.61	9.28	9.69	9.56	9.04
3.....	8.82	8.37	8.20	8.18	7.86	8.30	8.28	8.61	9.31	9.69	9.55	9.02
4.....	8.81	8.35	8.26	8.20	7.86	8.30	8.29	8.62	9.33	9.69	9.54	8.99
5.....	8.80	8.33	8.24	8.19	7.85	8.30	8.29	8.63	9.36	9.68	9.52	8.96
6.....	8.79	8.35	8.24	8.19	7.83	8.30	8.29	8.65	9.39	9.68	9.49	8.93
7.....	8.75	8.37	8.23	8.20	7.81	8.30	8.30	8.66	9.41	9.67	9.47	8.90
8.....	8.74	8.33	8.22	8.19	7.80	8.31	8.30	8.69	9.45	9.67	9.45	8.88
9.....	8.74	8.32	8.21	8.18	7.81	8.30	8.31	8.72	9.47	9.67	9.43	8.86
10.....	8.72	8.32	8.22	8.17	7.80	8.32	8.32	8.75	9.48	9.67	9.41	8.84
11.....	8.72	8.29	8.22	8.16	7.80	8.33	8.33	8.78	9.51	9.67	9.39	8.82
12.....	8.70	8.28	8.21	8.14	7.79	8.33	8.37	8.81	9.57	9.67	9.37	8.79
13.....	8.68	8.27	8.19	8.13	7.78	8.34	8.39	8.84	9.57	9.67	9.35	8.76
14.....	8.68	8.23	8.18	8.12	7.77	8.38	8.40	8.87	9.56	9.68	9.34	8.73
15.....	8.67	8.22	8.17	8.10	7.76	8.37	8.40	8.90	9.56	9.68	9.33	8.71
16.....	8.66	8.20	8.16	8.08	7.76	8.37	8.41	8.93	9.57	9.70	9.32	8.69
17.....	8.66	8.18	8.16	8.05	7.77	8.36	8.41	8.96	9.59	9.78	9.31	8.67
18.....	8.64	8.17	8.15	8.01	7.77	8.36	8.41	8.98	9.61	9.77	9.29	8.65
19.....	8.63	8.16	8.13	7.98	7.81	8.36	8.41	9.00	9.63	9.77	9.27	8.63
20.....	8.60	8.14	8.12	7.95	7.85	8.35	8.40	9.03	9.65	9.75	9.25	8.61
21.....	8.58	8.13	8.10	7.93	8.02	8.35	8.42	9.06	9.67	9.74	9.24	8.59
22.....	8.58	8.11	8.10	7.91	8.06	8.34	8.44	9.06	9.68	9.73	9.22	8.57
23.....	8.57	8.10	8.15	7.90	8.09	8.33	8.46	9.07	9.69	9.71	9.20	8.55
24.....	8.55	8.09	8.18	7.89	8.18	8.31	8.48	9.09	9.70	9.69	9.18	8.52
25.....	8.53	8.09	8.20	7.88	8.30	8.30	8.50	9.11	9.70	9.68	9.17	8.49
26.....	8.50	8.10	8.21	7.87	8.33	8.30	8.52	9.12	9.70	9.67	9.15	8.47
27.....	8.50	8.13	8.21	7.86	8.34	8.29	8.54	9.14	9.70	9.65	9.14	8.46
28.....	8.48	8.11	8.20	7.86	8.35	8.29	8.56	9.16	9.70	9.63	9.12	8.45
29.....	8.46	8.10	8.20	7.85	.....	8.27	8.58	9.18	9.70	9.61	9.10	8.43
30.....	8.44	8.08	8.19	7.87	.....	8.30	8.60	9.20	9.69	9.59	9.09	8.42
31.....	8.44	.....	8.19	7.87	.....	8.29	.....	9.22	.....	9.58	9.07	.....

NOTE.—No reading June 12; lake too rough for accurate reading.

## TRUCKEE RIVER AT TAHOE, CALIF.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 7, T. 15 N., R. 17 E., at Tahoe, Placer County, a short distance below dam at outlet of Lake Tahoe.

DRAINAGE AREA.—519 square miles.

RECORDS AVAILABLE.—July 3, 1895, to February 29, 1896; June 17, 1900, to September 30, 1917.

GAGE.—Vertical staff fastened to a large cottonwood tree on left bank, 300 feet below dam at outlet of Lake Tahoe. Original gage was destroyed by dredging operation July 15, 1912.

DISCHARGE MEASUREMENTS.—Made from cable 140 feet below gage or by wading.

CHANNEL AND CONTROL.—Gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge for the year, 1,160 second-feet, October 21; minimum mean daily discharge, 23 second-feet, April 6 to June 5.

1895-96 and 1900-1917: Maximum mean daily discharge reported, 1,340 second-feet: July 13 to 20, 1907 (stage, 4.3 feet); minimum, river dry during parts of 1900, 1901, and 1914.

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

DIVERSIONS.—No information.

REGULATION.—Flow regulated by operation of gates in dam at Lake Tahoe.

ACCURACY.—Stage-discharge relation not permanent. Two well-defined rating curves used, one applicable October 1-18, 1916, the other October 19, 1916, to September 30, 1917. Gage read to hundredths at least once daily. Stage controlled by outlet gates at Lake Tahoe. Daily discharge ascertained by applying mean daily gage height to rating tables.

COOPERATION.—Daily-discharge and discharge-measurement records furnished by United States Reclamation Service who maintain the station in cooperation with Stone & Webster Engineering Corp.

*Discharge measurements of Truckee River at Tahoe, Calif., during the year ending Sept. 30, 1917.*

[Made by U. S. Reclamation Service].

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 19.....	3.46	550	Oct. 19.....	4.31	878	Oct. 20.....	5.08	1,250
19.....	3.90	660	20.....	4.67	1,030	Nov. 9.....	3.17	405
						June 21.....	458	994

*Daily discharge, in second-feet, of Truckee River at Tahoe, Calif., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	408	355	279	390	401	313	70	23	23	1,010	523	463
2.....	408	426	279	390	401	313	70	23	23	1,010	523	463
3.....	408	426	282	390	401	313	70	23	23	1,010	523	463
4.....	408	426	282	390	342	253	70	23	23	1,010	519	463
5.....	408	426	282	390	342	209	70	23	23	1,010	934	459
6.....	408	426	285	390	323	209	23	23	404	754	934	459
7.....	400	426	285	390	323	209	23	23	750	754	550	459
8.....	278	426	285	390	270	209	23	23	821	404	550	459
9.....	278	426	285	390	270	209	23	23	948	404	550	455
10.....	271	422	282	390	270	273	23	23	975	404	550	455
11.....	271	422	282	390	270	273	23	23	1,020	404	550	455
12.....	271	422	282	390	270	273	23	23	1,090	404	546	451
13.....	271	422	282	390	270	273	23	23	1,000	404	546	401
14.....	271	422	282	387	270	273	23	23	1,100	404	546	401
15.....	271	422	282	387	294	273	23	23	1,000	404	546	401
16.....	271	415	329	387	294	225	23	23	1,010	404	546	411
17.....	271	415	329	750	294	267	23	23	1,010	404	546	411
18.....	271	411	329	750	294	267	23	23	1,080	404	546	411
19.....	705	411	329	697	294	267	23	23	1,080	790	546	411
20.....	1,050	411	329	697	294	267	23	23	1,010	790	546	411
21.....	1,160	408	329	697	451	285	23	23	1,010	790	546	411
22.....	397	397	329	697	451	285	23	23	1,010	790	542	411
23.....	394	397	329	589	451	285	23	23	1,010	411	542	411
24.....	394	397	329	589	303	285	23	23	1,010	411	542	408
25.....	394	279	390	589	307	297	23	23	1,010	527	542	408
26.....	394	279	390	497	310	297	23	23	1,010	527	542	404
27.....	394	279	390	497	313	297	23	23	1,010	527	542	404
28.....	394	279	390	437	313	242	23	23	1,010	527	542	404
29.....	355	279	390	437	.....	186	23	23	1,010	527	463	437
30.....	355	279	390	342	.....	70	23	23	1,010	527	463	437
31.....	355	.....	390	401	.....	70	.....	23	.....	527	463	.....

*Monthly discharge of Truckee River at Tahoe, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
October.....	1,160	271	406	25,000
November.....	426	279	388	23,100
December.....	390	279	319	19,600
January.....	750	342	481	29,600
February.....	451	270	324	18,000
March.....	313	70	251	15,400
April.....	70	23	30.8	1,830
May.....	23	23	23.0	1,410
June.....	1,100	23	817	48,600
July.....	1,010	404	602	37,000
August.....	934	463	560	34,400
September.....	463	401	430	25,600
The year.....	1,160	23	386	280,000

NOTE.—Monthly discharge computed by U. S. Geological Survey.

#### TRUCKEE RIVER AT ICELAND, CALIF.

LOCATION.—In sec. 36, T. 18 N., R. 17 E., above dam of ice company, 400 feet north-east of Southern Pacific Railroad station at Iceland, Nevada County, and 23 miles west of Reno, Nev.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 1, 1912, to September 30, 1917.

GAGE.—Barrett & Lawrence water-stage recorder on right bank above dam; auxiliary vertical staff is fastened to gage well.

DISCHARGE MEASUREMENTS.—Made from cable 130 feet above gage.

CHANNEL AND CONTROL.—Small boulders; fairly smooth and permanent. Left bank high; right bank subject to overflow at high water for 60 feet back from stream. Dam of National Ice Co. serves as permanent control.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge during the year, 3,650 second-feet June 10; minimum mean daily discharge, 390 second-feet for several days in October, December, and February.

1907-1917: Maximum mean daily discharge reported, 15,300 second-feet March 18, 1907 (stage, 11.5 feet); minimum mean daily discharge reported, 310 second-feet December 10, 1908 (stage, 7.9 feet).

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

DIVERSIONS.—No information.

REGULATION.—See Truckee River at Tahoe.

ACCURACY.—Stage-discharge relation changed July 1 and September 1. No information regarding rating curves. Mean daily gage height determined from water-stage recorder sheets. Daily discharge ascertained by applying mean daily gage height to rating tables.

COOPERATION.—Daily-discharge and discharge-measurement records furnished by United States Reclamation Service, which maintains the station in cooperation with Stone & Webster Engineering Corp.

The following discharge measurement was made by H. J. Tompkins, Dec. 28, 1916: Gage height, 1.79 feet; discharge, 560 second-feet.

*Daily discharge, in second-feet, of Truckee River at Iceland, Calif, for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	525	455	429	539	553	553	525	835	1,870	1,790	720	561
2.....	525	476	490	539	525	539	525	1,300	2,170	1,770	727	538
3.....	511	476	525	539	567	511	567	1,870	2,290	1,790	699	538
4.....	511	504	750	539	483	469	670	1,970	2,220	1,810	699	538
5.....	511	525	920	553	483	416	920	2,030	2,220	1,770	1,140	538
6.....	511	525	710	553	455	442	1,060	2,030	2,450	1,480	1,140	538
7.....	511	525	560	553	442	429	1,400	2,030	3,010	1,220	755	538
8.....	390	525	511	539	403	442	1,740	2,070	3,090	1,100	685	547
9.....	390	525	511	539	390	497	1,570	2,140	3,570	1,090	685	547
10.....	423	525	455	539	403	539	1,460	2,690	3,650	1,060	685	625
11.....	410	525	455	539	403	560	1,620	2,220	3,570	1,040	720	556
12.....	410	595	455	511	390	560	1,870	2,290	2,770	1,040	699	556
13.....	403	595	390	511	390	546	1,510	2,450	2,610	1,060	679	525
14.....	410	595	455	511	390	546	1,350	3,250	2,690	1,020	672	512
15.....	416	560	403	469	416	546	1,100	3,570	2,690	1,060	679	512
16.....	416	560	390	447	416	525	877	2,770	3,010	1,040	665	512
17.....	416	560	497	765	442	490	835	2,370	3,010	1,060	659	512
18.....	416	546	455	765	429	504	792	2,140	3,010	1,200	652	512
19.....	595	546	455	757	429	504	835	1,870	3,090	1,160	652	525
20.....	965	553	455	757	390	504	1,010	1,740	3,010	1,120	652	525
21.....	878	553	455	757	497	525	1,510	1,680	2,770	1,110	672	525
22.....	539	553	455	757	595	504	2,610	1,680	2,610	1,100	633	525
23.....	525	539	455	649	581	504	2,930	1,740	2,290	1,080	633	525
24.....	525	539	455	649	567	504	3,090	1,800	2,140	685	652	525
25.....	490	525	525	649	686	525	3,570	1,800	2,140	755	652	512
26.....	469	455	525	557	655	560	3,570	1,570	1,940	755	652	512
27.....	455	469	610	557	640	595	3,350	1,570	1,870	741	652	512
28.....	423	469	595	497	595	670	2,770	1,680	1,740	727	652	504
29.....	403	469	551	402	.....	818	2,610	2,940	1,680	713	608	504
30.....	403	442	539	402	.....	640	2,000	2,000	1,620	713	590	508
31.....	455	.....	539	461	.....	567	.....	1,870	.....	713	560	.....

NOTE.—No gage-height record Jan. 17-31; discharge estimated.



*Monthly discharge of Truckee River at Iceland, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	965	390	491	30,200
November.....	595	442	524	31,200
December.....	929	390	516	31,700
January.....	765	402	574	35,300
February.....	686	390	486	27,000
March.....	818	416	533	32,800
April.....	3,570	525	1,670	99,400
May.....	3,570	835	2,030	125,000
June.....	3,650	1,620	2,560	152,000
July.....	1,810	685	1,120	68,900
August.....	1,140	560	697	42,900
September.....	625	504	530	31,500
The year.....	3,650	390	979	708,000

NOTE.—Monthly discharge computed by U. S. Geological Survey.

#### TRUCKEE RIVER AT RENO, NEV.

**LOCATION.**—In sec. 11, T. 19 N., R. 19 E., at Virginia Street Bridge in Reno, Washoe County, 6 miles above mouth of Steamboat Creek and 12 miles below Nevada-California boundary.

**DRAINAGE AREA.**—1,070 square miles (measured on topographic maps).

**RECORDS AVAILABLE.**—July 1, 1906, to September 30, 1917.

**GAGE.**—Vertical staff fastened to retaining wall on left bank about 20 feet below the bridge; datum 4,481.60 feet above sea level.

**DISCHARGE MEASUREMENTS.**—Made from Rock Street Bridge 800 feet below gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and boulders; slightly shifting. One channel at all stages; river confined by retaining walls.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.8 feet April 26 (discharge, 3,680 second-feet); minimum stage, 1.0 foot several days in September (discharge, 152 second-feet).

1906–1917: Maximum stage recorded, 8.2 feet March 18, 1907 (discharge, 14,600 second-feet); minimum stage, –0.1 foot July 2 and 3, 1912 (discharge, 18 second-feet).

**ICE.**—Stage-discharge relation slightly affected by ice.

**DIVERSIONS.**—Numerous diversions for Truckee Valley above and below station.

**REGULATION.**—Flow affected somewhat by operation of several power plants above the station, by storage at Lake Tahoe, and by irrigation diversions for Truckee Valley.

**ACCURACY.**—Stage-discharge relation changed somewhat in fall of 1916; not affected by ice during year. Rating curves well defined between 100 and 4,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to two rating tables; one applicable to February 17 and the other thereafter. Records good.

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

*Discharge measurements of Truckee River at Reno, Nev., during the year ending Sept. 30, 1917.*

[Made by L. W. Jordan.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 10.....	1.62	427	June 21.....	4.12	2,680
Feb. 7.....	1.62	430	Sept. 28.....	1.00	146
Apr. 8.....	3.16	1,560			

*Daily discharge, in second-feet, of Truckee River at Reno, Nev., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	213	324	324	368	418	532	532	1,930	1,930	1,710	418	185
2.....	284	324	368	368	474	474	532	1,710	1,930	1,600	364	185
3.....	247	324	368	474	474	474	532	1,600	2,160	1,500	418	152
4.....	284	368	592	474	474	474	718	1,930	2,160	1,500	364	185
5.....	284	474	474	474	474	474	784	2,040	2,040	1,500	718	185
6.....	324	418	474	474	474	474	1,060	1,930	2,160	1,300	818	152
7.....	324	418	474	474	418	474	1,130	2,400	2,790	1,210	474	185
8.....	368	418	474	474	418	418	1,710	1,820	3,060	1,060	364	185
9.....	284	418	474	418	368	532	1,500	2,160	3,510	784	363	185
10.....	284	418	418	418	368	532	1,210	2,400	3,680	718	313	185
11.....	324	418	418	368	474	532	1,210	2,790	3,290	654	313	185
12.....	284	418	418	368	368	474	1,930	2,280	2,790	654	313	185
13.....	324	418	368	368	368	474	1,400	2,530	2,660	654	313	185
14.....	324	418	368	368	368	532	1,210	3,060	2,530	852	266	152
15.....	368	418	368	368	368	474	990	3,200	2,790	654	266	185
16.....	368	474	368	368	368	474	784	2,160	2,930	718	266	185
17.....	324	474	418	368	418	418	718	1,930	3,060	718	266	185
18.....	324	474	368	368	418	474	654	1,710	3,060	784	266	152
19.....	324	474	418	418	418	474	654	1,400	2,920	784	266	152
20.....	718	474	418	418	418	418	784	1,300	2,920	718	266	152
21.....	920	474	418	532	474	474	920	1,210	2,660	718	185	152
22.....	418	418	368	784	592	474	1,500	1,300	2,530	654	223	152
23.....	474	418	368	852	532	474	2,400	1,300	2,280	654	223	152
24.....	418	418	368	852	852	474	2,920	1,400	2,280	364	223	185
25.....	368	418	368	784	1,060	474	3,200	1,400	2,160	364	223	185
26.....	368	418	368	592	784	532	3,680	1,130	1,930	364	223	185
27.....	368	418	368	592	654	592	3,200	1,130	1,930	364	223	185
28.....	368	368	368	532	592	718	2,660	1,400	2,160	364	266	152
29.....	324	368	368	592	.....	920	1,930	1,600	1,820	418	223	152
30.....	324	368	368	474	.....	852	1,930	1,930	1,930	364	185	152
31.....	324	.....	368	474	.....	654	.....	2,040	.....	364	185	.....

*Monthly discharge of Truckee River at Reno, Nev., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	920	213	363	22,300
November.....	474	324	415	24,700
December.....	592	324	402	24,700
January.....	852	368	492	30,300
February.....	1,060	368	496	27,500
March.....	920	418	524	32,200
April.....	3,680	532	1,480	88,100
May.....	3,200	1,130	1,870	115,000
June.....	3,680	1,820	2,530	151,000
July.....	1,710	364	809	49,700
August.....	718	185	313	19,200
September.....	185	152	172	10,200
The year.....	3,680	152	822	595,000

## HONEY LAKE BASIN.

## LONG VALLEY CREEK NEAR SCOTTS, CALIF.

LOCATION.—At the dam site about 1 mile below Scotts, Lassen County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 10 to September 30, 1917.

GAGE.—Inclined staff in two sections on right bank; read by an employee of Long Valley Irrigation District.

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

CHANNEL AND CONTROL.—Sand; shifts considerably.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.65 feet at 8 a. m. April 4 (discharge, 104 second-feet); creek dry June 24 to September 10.

ICE.—No information.

DIVERSIONS.—No information.

REGULATION.—No information.

ACCURACY.—Stage-discharge relation not permanent. Shifting-control method used for entire period. Gage read to half-tenths once a day, sometimes twice. Records fair.

COOPERATION.—Gage-height record and all but one discharge measurement furnished by the Long Valley Irrigation District.

*Discharge measurements of Long Valley Creek near Scotts, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 12	Charles Leidl	3.05	8.2	May 8	G. B. Shaber	3.22	42
Apr. 6	G. B. Shaber	3.50	72	12	do	3.25	45
10	do	3.40	42	15	do	3.18	40
12	do	3.50	77	18	do	3.20	24
14	do	3.40	51	22	do	3.10	18
17	do	3.25	23	25	do	3.10	28
20	do	3.25	25	29	do	3.10	20
24	do	3.50	77	June 5	do	3.00	3.9
27	do	3.48	76	8	do	3.00	3.9
May 1	do	3.30	49	23	do	2.90	1.2
4	do	3.30	47				

*Daily discharge, in second-feet, of Long Valley Creek near Scotts, Calif., for the year ending Sept. 30, 1917.*

Day.	Mar.	Apr.	May.	June.	Sept.	Day.	Mar.	Apr.	May.	June.	Sept.
1.		39	58	15		16.	28	32	29	1.3	0.1
2.		39	48	14		17.	8	30	23	1.3	.1
3.		45	44	10		18.	16	30	15	1.2	.1
4.		76	40	8.0		19.	16	44	20	1.2	.1
5.		39	36	4.8		20.	22	32	16	1.2	.1
6.		82	38	4.8		21.	24	35	17	1.2	.1
7.		84	45	3.9		22.	22	55	18	1.2	.2
8.		86	42	3.0		23.	16	76	23	1.2	.2
9.		54	41	3.1		24.	28	77	38		.2
10.	13	42	42	3.2		25.	34	78	35		.2
11.	10	81	42	3.3	0.1	26.	39	79	33		.2
12.	12	94	40	2.1	.1	27.	93	70	24		.2
13.	10	84	39	1.3	.1	28.	89	73	28		.2
14.	30	70	41	1.3	.1	29.	49	64	20		.2
15.	12	69	40	1.3	.1	30.	32	55	19		.2
						31.	49		16		

NOTE.—No gage-height record Mar. 25 and Apr. 7; discharge interpolated. No flow June 24 to Sept. 10. Discharge Sept. 11-30 estimated from observer's notes.

*Monthly discharge of Long Valley Creek near Scotts, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 10-31. ....	93	8	29.6	1,290
April. ....	94	30	60.5	3,600
May. ....	58	15	32.6	2,000
June. ....	15	0	2.96	176
July. ....	0	0	.00	0
August. ....	0	0	.00	0
September. ....	.2	0	.10	6
The year. ....				7,070

#### LONG VALLEY CREEK NEAR DOYLE, CALIF.

**LOCATION.**—At Bird Flat Bridge, half a mile above Honey Lake, and 8 miles below Doyle, Lassen County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—March 28 to September 30, 1917.

**GAGE.**—Vertical staff in two sections on the right bank; lower section fastened to first pile bent from right bank on downstream side of bridge; upper section fastened to downstream edge of right abutment; read by Loren Thornhill.

**DISCHARGE MEASUREMENTS.**—Made from bridge or by wading. Bridge is at an angle to the current.

**CHANNEL AND CONTROL.**—Shifting sand and very unstable. Banks low and subject to overflow.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.3 feet March 29, 30 and April 8; no flow in creek June 3 to September 30.

**DIVERSIONS.**—Several diversions in valley above, using all the water at times.

**REGULATION.**—Diurnal fluctuation from diversions above, and at times complete regulation.

**ACCURACY.**—Discharge measurements indicate that stage-discharge relation is not permanent. Channel and control shift considerably; daily discharge not determined. Gage read to half-tenths twice daily. Diurnal fluctuation, due to irrigation above, introduces errors in the mean gage height, which is the average of two readings for the day.

**COOPERATION.**—Gage-height record and two discharge measurements furnished by Long Valley Irrigation District.

*Discharge measurements of Long Valley Creek near Doyle, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Mar. 7	Charles Leidl. ....	3.45	30
12	G. B. Shaber. ....	3.60	16
Apr. 7	do. ....	3.90	71

Daily gage height, in feet, of Long Valley Creek near Doyle, Calif., for the year ending Sept. 30, 1917.

Day.	Mar.	Apr.	May.	June.	Day.	Mar.	Apr.	May.	June.
1.....		3.85	3.75	3.65	16.....		3.9	3.65	
2.....		3.7	3.78	4.0	17.....		3.82	3.68	
3.....		3.7	3.8		18.....		3.8	3.7	
4.....		3.9	3.78		19.....		3.8	1.85	
5.....		3.9	3.78		20.....		3.78	2.15	
6.....		4.1	3.8		21.....		3.8	.3	
7.....		4.0	3.8		22.....		3.82	.32	
8.....		4.3	3.82		23.....		3.95	.12	
9.....		4.0	3.85		24.....		3.98	.08	
10.....		3.9	3.9		25.....		3.98	3.78	
11.....		3.9	3.88		26.....		4.0	3.8	
12.....		4.05	3.8		27.....		3.98	3.8	
13.....		4.0	2.0		28.....	4.0	3.92	3.78	
14.....		3.95	2.1		29.....	4.3	3.85	3.8	
15.....		3.98	.55		30.....	4.3	3.82	3.78	
					31.....	3.9		3.78	

NOTE.—No flow in creek June 3 to Sept. 30.

#### SUSAN RIVER AT SUSANVILLE, CALIF.

LOCATION.—Three-fourths of a mile southwest of Susanville, Lassen County, 2 miles above Piute Creek, and  $3\frac{1}{2}$  miles below Chevey Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 3, 1900, to December 31, 1905; February 8, to September 30, 1917.

GAGE.—Staff gage attached to an alder tree on right bank at old electric light plant. No change in datum since December 20, 1903, when it was lowered 2 feet; read by F. W. Hutchison.

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

CHANNEL AND CONTROL.—Bed composed of gravel and cobblestones; practically permanent. Right bank high and covered with vegetation. Left bank low and covered with sparse growth of willows; subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.3 feet at 7 p. m. April 25 (discharge, 609 second-feet); minimum stage recorded, 4.66 feet at 7 p. m. September 12 (discharge, 4.7 second-feet).

1900-1905 and 1916-1917: Maximum stage recorded, 9.9 feet February 22, 1904 (discharge, 1,750 second-feet); minimum stage, 4.66 feet at 7 p. m. September 12, 1917 (discharge, 4.7 second-feet).

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Ramsey ditch<sup>4</sup> diverts from right bank about 800 feet above station; discharge on September 12, 1917, was 5 second-feet.

REGULATION.—Probably none.

ACCURACY.—Stage-discharge relation permanent during the year, except as affected by ice. Rating curve fairly well defined between 2 and 800 second-feet. Gage read to hundredths twice daily, sometimes more frequently, and the maximum stages are recorded. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

<sup>4</sup>Called Masten ditch in previous reports.

*Discharge measurements of Susan River near Susanville, Calif., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Feb. 8	Charles Leidl.....	a 5.17	18	Mar. 21	S. C. Whipple.....	5.70	48
8	do.....	a 5.16	17	22	do.....	5.81	56
9	S. C. Whipple.....	a 5.13	17	22	do.....	5.96	75
9	do.....	a 5.13	18	25	do.....	6.22	89
25	do.....	8.49	422	28	do.....	7.15	192
26	do.....	6.89	187	28	do.....	9.20	611
27	do.....	6.16	77	Apr. 3	do.....	6.82	161
Mar. 5	do.....	5.48	38	22	do.....	9.08	517
19	do.....	5.23	33	June 11	do.....	7.28	200
20	do.....	5.43	41	19	do.....	6.10	80
20	do.....	5.44	32	Sept. 12	Charles Leidl.....	4.66	4.7
20	do.....	5.52	37				

a Stage-discharge relation affected by ice.

*Daily discharge, in second-feet, of Susan River near Susanville, Calif., for the year ending Sept. 30, 1917.*

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		67	114	269	233	73	121	21
2.....		57	187	240	233	66	117	13
3.....		48	173	262	226	87	128	9
4.....		39	200	269	206	105	115	8
5.....		34	277	269	194	76	97	7
6.....		35	277	277	226	113	84	5.5
7.....		34	320	302	220	118	80	5
8.....	18	37	320	285	220	108	94	5
9.....	18	37	213	311	220	101	87	5
10.....	17	29	181	311	226	119	97	5.5
11.....	17	30	285	320	213	119	80	5.5
12.....	17	38	302	311	200	109	111	4.7
13.....	17	31	233	320	181	112	95	5
14.....	17	26	213	302	152	121	93	5
15.....	17	27	161	262	128	115	84	5.5
16.....	17	27	140	220	115	121	84	5.5
17.....	18	25	137	213	99	119	80	5.5
18.....	18	23	124	213	44	118	82	5.5
19.....	17	26	130	194	76	119	79	5
20.....	17	33	161	194	66	120	72	5
21.....	20	54	200	200	58	96	70	5
22.....	30	45	488	206	51	93	66	5.5
23.....	30	42	535	213	46	110	49	6
24.....	128	97	535	187	41	118	42	6
25.....	488	113	572	200	38	121	45	6
26.....	168	97	511	187	36	118	57	6
27.....	111	213	442	187	35	128	54	5.5
28.....	75	302	399	200	33	117	36	5.5
29.....		358	285	233	29	93	35	5.5
30.....		213	285	226	44	95	32	34
31.....		130		233		154	31	

NOTE.—Discharge Feb. 8-17 estimated because of ice, from observer's notes and discharge measurements.

*Monthly discharge of Susan River near Susanville, Calif., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 8-28.....	488	17	60.7	2,530
March.....	358	23	76.4	4,700
April.....	572	114	280	16,700
May.....	320	187	246	15,100
June.....	233	29	130	7,740
July.....	154	66	109	6,700
August.....	128	31	77.3	4,750
September.....	34	4.7	7.37	439
The period.....				58,700

### RED ROCK CREEK NEAR RED ROCK, CALIF.

**LOCATION.**—In SE.  $\frac{1}{4}$  sec. 10, T. 35 N., R. 16 E., a quarter of a mile below diversion for reservoir No. 3, near Red Rock, Lassen County.

**DRAINAGE AREA.**—About 56.5 square miles.

**RECORDS AVAILABLE.**—April 10 to July 15, 1917.

**GAGE.**—Staff gage; read by August Anderson.

**DISCHARGE MEASUREMENTS.**—No information.

**CHANNEL AND CONTROL.**—A gravel riffle just below gage serves as a control; apparently permanent.

**DIVERSIONS.**—About 710 acre-feet are diverted annually about a quarter of a mile above gage. This is stored in a storage reservoir known as reservoir No. 3 and is used for irrigation.

**REGULATION.**—Flow completely regulated by outlet gates of reservoir No. 1.

**ACCURACY.**—Stage-discharge relation permanent. Rating curve fairly well defined.

Gage read to half-tenths once daily, sometimes oftener. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

**COOPERATION.**—Records furnished by State Water Commission.

*Discharge measurements of Red Rock Creek near Red Rock, Calif., during the year ending Sept. 30, 1917.*

[Made by S. C. Whipple.]

Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.	Date.	Gage height.	Dis-charge.
	<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 10.....	1.03	5.1	May 7.....	3.30	150	May 8.....	1.04	7.3
May 7.....	2.13	71.0	May 7.....	2.75	101	May 8.....	1.32	17.0

*Daily discharge, in second-feet, of Red Rock Creek near Red Rock, Calif., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1.....			15		16.....		13	17	
2.....			15	17	17.....			17	
3.....			15		18.....				
4.....			15		19.....			17	
5.....			17	8	20.....		13	17	
6.....			17		21.....				
7.....		2		14	22.....	41			
8.....					23.....	34	13	27	
9.....		15			24.....	56		27	
10.....	6				25.....	76			
11.....			20		26.....	90	38	22	
12.....	26		20		27.....	76	38	25	
13.....	13	11	17		28.....	69	33		
14.....				14	29.....	6	33		
15.....				1	30.....		22		
					31.....		13		

## ABERT LAKE BASIN.

## CHEWAUCAN RIVER NEAR PAISLEY, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 27, T. 33 S., R. 18 E., just above mouth of Mill Creek, half a mile above intake of Conn ditch, and  $2\frac{1}{2}$  miles upstream from Paisley, Lake County.

**DRAINAGE AREA.**—263 square miles (measured on map of Fremont National Forest).  
**RECORDS AVAILABLE.**—January 20, 1914, to September 30, 1917. Records giving practically the same yearly run-off are available as follows: Chewaucan River above Mill Creek, near Paisley, Oreg. (Geological Survey gage), November 6, 1912, to September 30, 1914; Chewaucan River above Conn ditch, near Paisley, Oreg., April 3 to July 13, 1912; Chewaucan River at Paisley, Oreg., January 4, 1905, to December 31, 1907, and January 18, 1909, to April 15, 1912.

**GAGE.**—Lietz water-stage recorder belonging to Chewacan Land & Cattle Co., on left bank, known as ZX gage, about 50 feet above Geological Survey gage; inspected by A. A. Farrow and W. A. Banister. Stevens 8-day water-stage recorder belonging to Northwest Townsite Co., on left bank, May 1 to November 28, 1916, referred to vertical staff known as Geological Survey gage; inspected by W. S. Daniels. Both gages refer to same datum, but slope of water surface causes a slight difference in comparative readings.

**DISCHARGE MEASUREMENTS.**—Made from cable located between the two recorders, or by wading; fairly good section.

**CHANNEL AND CONTROL.**—Channel of gravel and boulders. Control same for both gages; located just above Mill Creek; composed of boulders and shifts slightly during floods.

**EXTREMES OF DISCHARGE.**—Maximum stage during year from ZX water-stage recorder 3.76 feet from 11 p. m. April 23 to 1 a. m. April 24 (discharge, 1,140 second-feet); minimum stage from water-stage recorder, 0.44 foot on Geological Survey gage at 2.15 p. m. November 11 (discharge, 9.6 second-feet).

1905-1907 and 1909-1917: Maximum stage recorded on old gage half a mile above Paisley, 9.40 feet at 5 p. m. November 23, 1909 (discharge estimated from extension of rating curve, 4,000 second-feet); minimum discharge is that of 1917.

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

**DIVERSIONS.**—Surveys made by State engineer show that 160 acres are irrigated above station.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation practically permanent; affected by ice November 9 to March 24. Rating curve for ZX gage revised slightly on basis of measurements made in 1917 and is fairly well defined. Curve for Geological Survey gage well defined. Operation of both recorders satisfactory, except the ZX gage for period January 10 to 16. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, except for period April 5 to 30, for which discharge records are the means obtained by applying to table gage heights taken from graph for 2-hour intervals. Open-water records good; winter records fair.

**COOPERATION.**—Most of field data furnished by Chewacan Land & Cattle Co. and Northwest Townsite Co.



*Discharge measurements of Chewaucan River near Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.		Dis-charge.	Date.	Made by—	Gage height.		Dis-charge.
		U. S. G. S. gage.	ZX gage.				U. S. G. S. gage.	ZX gage.	
Oct. 21	Bert Harber.....	<i>Feet.</i> 0.87	<i>Feet.</i> 0.90	<i>Sec.-ft.</i> 33.0	Apr. 12	Bert Harber.....	<i>Feet.</i> .....	<i>Feet.</i> .....	<i>Sec.-ft.</i> 314
Nov. 11	W. S. Daniels.....	.45	.47	10.1	25	do.....	.....	3.10	620
13	do.....	01.39	01.42	28.1	29	F. F. Henshaw.....	.....	2.51	384
25	Bert Harber.....	.....	01.30	41.0	May 14	Briggs and Hen- shaw.....	3.40	3.54	952
28	W. S. Daniels.....	01.26	01.28	54.0	27	Bert Harber.....	.....	2.80	452
Dec. 28	Bert Harber.....	.....	01.45	43.4	June 27	do.....	.....	2.30	272
Jan. 17	W. S. Daniels.....	01.66	01.68	29.2	July 29	do.....	.....	1.05	49.4
27	Bert Harber.....	.....	01.80	38.8	Aug. 30	do.....	.....	.90	30.3
Feb. 5	W. S. Daniels.....	01.42	01.50	40.7	Sept. 23	Briggs and Green- slet.....	.94	.95	44.5
25	Bert Harber.....	.....	02.35	72					
Mar. 11	do.....	.....	01.35	54					
24	do.....	.....	01.00	43.0					

α Stage-discharge relation affected by ice.

NOTE.—Harber is an employee of Chewaucan Land & Cattle Co.; Daniels of Northwest Townsite Co.

*Daily discharge, in second-feet, of Chewaucan River near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	34	38	42	30	34	89	110	308	780	205	52	35
2.....	34	37	42	34	34	82	150	308	780	195	52	34
3.....	36	37	38	52	42	76	190	290	780	175	52	33
4.....	38	38	42	58	42	70	230	325	680	165	49	32
5.....	38	47	42	52	42	64	270	360	710	145	45	32
6.....	38	29	38	47	42	64	274	465	710	135	42	32
7.....	39	28	38	47	42	64	388	515	745	125	42	32
8.....	37	46	38	47	42	58	496	590	780	125	42	32
9.....	37	45	38	38	42	58	364	650	920	110	42	32
10.....	37	30	38	.....	42	58	304	590	990	110	42	32
11.....	36	17	38	.....	42	52	479	745	780	103	41	32
12.....	35	20	42	.....	42	52	416	745	680	96	39	32
13.....	35	26	38	.....	42	47	337	815	590	88	43	32
14.....	35	26	34	.....	42	47	282	850	590	86	47	32
15.....	35	26	38	.....	42	52	205	815	565	90	47	32
16.....	35	30	42	.....	38	52	178	620	590	90	44	32
17.....	35	30	42	26	38	52	157	590	650	96	42	32
18.....	35	30	42	30	38	47	142	515	650	86	42	32
19.....	34	30	42	26	38	52	195	465	590	76	38	32
20.....	35	26	42	26	38	52	304	440	565	70	38	32
21.....	37	26	38	26	42	52	414	400	540	70	38	32
22.....	36	35	38	38	42	58	616	400	465	70	38	33
23.....	31	40	38	47	42	47	812	440	400	65	38	36
24.....	34	35	38	52	52	52	785	440	325	60	38	38
25.....	39	40	38	47	76	76	749	420	308	59	40	38
26.....	40	45	42	42	89	82	698	465	308	58	47	37
27.....	38	45	42	38	96	96	526	490	290	56	42	36
28.....	35	56	42	38	96	230	439	620	260	54	40	36
29.....	35	42	34	38	.....	308	355	745	260	52	39	35
30.....	41	42	30	38	.....	155	337	780	230	52	38	34
31.....	38	.....	30	42	.....	125	.....	745	.....	52	38	.....

NOTE.—Daily discharge ascertained by means of records from Geological Survey gage Oct. 7 to Nov. 28 and Jan. 17-18; from ZX gage at other times. Stage-discharge relation affected by ice Nov. 9 to Mar. 24; daily discharge estimated from discharge measurements, observer's notes, and temperature records. Recorder not working Jan. 10-16 (mean discharge estimated as 32 second-feet), Apr. 2-4 and Aug. 28-29 (discharge interpolated).

*Monthly discharge of Chewaucan River near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	41	31	36.2	2,236
November.....	56	17	34.7	2,000
December.....	42	30	38.9	2,390
January.....	58	26	38.2	2,350
February.....	96	34	478	2,650
March.....	308	47	796	4,890
April.....	812	110	373	22,200
May.....	850	290	547	33,600
June.....	990	230	584	34,800
July.....	205	52	97.4	5,990
August.....	52	38	42.5	2,610
September.....	38	32	33.4	1,990
The year.....	990	17	163	118,000

#### CHEWAUCAN RIVER AT NARROWS, NEAR PAISLEY, OREG.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 24, T. 34 S., R. 19 E., at a constriction in Chewaucan Marsh known as "The Narrows," one-eighth of a mile below lower end of outside canal and 15 miles southeast of Paisley, Lake County, by road around north and east sides of marsh. Moss Creek enters upper marsh but seldom contributes any water to river.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—January 18, 1914, to September 30, 1917.

**GAGE.**—ZX (Chewacan Land & Cattle Co.) gage: Vertical staff on left bank just below wagon bridge, installed October 22, 1916; gage reader, John Hamilton. Northwest Townsite Co. gage: Vertical staff on right bank just below wagon bridge; read August 19 to November 29, 1916; gage reader, Mrs. B. A. Webster. Former ZX gages as follows: Vertical staff on left bank of old channel, in NW.  $\frac{1}{4}$  sec. 19, T. 34 S., R. 20 E., January 18, 1914, to March 23, 1916; vertical staff on left bank just below outlet of outside canal, March 24 to October 21, 1916. Former Northwest Townsite Co. gages: Temporary staff about a quarter of a mile below original ZX gage, read March 27 to June 3, 1916, after dredge had passed it; vertical staff just east of original ZX gage, in backwater of dredging operations, June 3 to August 19, 1916.

**DISCHARGE MEASUREMENTS.**—Made from wooden wagon bridge, or by wading at low and medium stages. Bottom of dredged channel somewhat rough as left by clam-shell bucket; conditions fairly good.

**CHANNEL AND CONTROL.**—Dredged canal fairly permanent, but stage-discharge relation affected by backwater from dam downstream during part of year.

**EXTREMES OF DISCHARGE.**—Maximum stage, unaffected by backwater, recorded during year, 3.7 feet on ZX gage April 24 (discharge, 710 second-feet); minimum stage recorded, 0.65 foot September 3 (discharge, 11 second-feet).

1914-1917: Maximum stage recorded is that of 1917; minimum stage recorded, 0.22 foot September 8 to 10, 1915 (channel dry).

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

**DIVERSIONS.**—About 6,200 acres of uplands and 14,300 acres of marsh hay land are irrigated between the station above Paisley and this station.

**REGULATION.**—Discharge varies considerably owing to manipulation of dams and ditches used for irrigating marsh and bordering lands.

**ACCURACY.**—Stage-discharge relation not permanent; affected by backwater as indicated in footnote to table of daily discharge. Rating curves applicable as follows: October 1 to 21, well defined; applied to readings on old gage; October 22 to March 10, fairly well defined; March 2 to May 8, well defined; June 26 to September 24, fairly well defined; shifting-control method used May 9 to June 25 and September 25 to 30. Gage read daily to half-tenths. Daily discharge ascertained by applying daily gage reading to rating table. Records good except for periods during which stage-discharge relation was affected by backwater, for which they are fair.

COOPERATION.—Part of discharge measurements and gage readings furnished by Chewacan Land & Cattle Co., W. C. Hammatt, engineer, and part by Northwest Townsite Co.

*Discharge measurements of Chewacan River at Narrows, near Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.		Dis-charge.	Date.	Made by—	Gage height.		Dis-charge
		ZX gage.	N. T. Co. gage.				ZX gage.	N. T. Co. gage.	
Oct. 14	W. S. Daniels	<i>Feet.</i> -1.60	<i>Feet.</i> 0.68	<i>Sec.-ft.</i> 24.0	Apr. 13	Bert Harber	<i>Feet.</i> 2.40	<i>Feet.</i> .....	<i>Sec.-ft.</i> 236
22	Bert Harber	1.50	.....	28.4	26	do	3.30	.....	540
Nov. 8	W. S. Daniels	1.30	72	26.5	29	P. F. Henshaw	2.74	.....	347
21	do	1.94	1.53	17.1	May 13	Bert Harber	3.80	.....	538
24	Bert Harber	1.90	1.54	22.5	13	R. C. Briggs	3.80	.....	316
Dec. 27	do	1.60	.....	31.0	28	Bert Harber	2.30	.....	246
Jan. 18	W. S. Daniels	1.59	.....	23.6	June 29	do	.....	.....	14.0
25	Bert Harber	1.70	.....	31.9	July 29	do	.....	.....	13.8
Feb. 6	W. S. Daniels	1.62	.....	36.2	Aug. 30	do	.70	.....	21.9
26	Bert Harber	2.00	.....	79	Sept. 24	R. C. Briggs	.81	.....	23.9
Mar. 25	do	.90	.....	17.6	28	Bert Harber	.90	.....	.....

<sup>a</sup> Stage-discharge relation affected by backwater from ice and temporary dam.

<sup>b</sup> Stage-discharge relation affected by ice.

NOTE.—Harber is an employee of Chewacan Land & Cattle Co. and Daniels of the Northwest Townsite Co.

*Daily discharge, in second-feet, of Chewacan River at Narrows, near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.	14	27	.....	.....	27	48	122	315	360	196	14	14
2.	13	24	.....	.....	27	48	139	285	395	185	24	14
3.	16	27	.....	.....	27	48	99	285	395	154	24	11
4.	16	24	.....	.....	31	39	148	300	395	141	28	14
5.	16	35	.....	.....	35	39	270	330	395	128	24	14
6.	17	31	.....	.....	36	31	330	360	430	154	24	14
7.	18	29	.....	.....	35	35	330	465	448	145	24	21
8.	18	27	.....	.....	35	35	640	378	448	128	24	18
9.	18	27	.....	.....	35	31	520	395	500	120	24	18
10.	20	31	.....	.....	31	27	315	395	520	90	24	18
11.	23	14	.....	.....	27	.....	395	560	412	83	14	18
12.	23	17	.....	.....	27	.....	500	500	345	76	21	21
13.	23	17	.....	.....	27	.....	240	520	330	70	21	21
14.	23	12	.....	27	27	.....	285	550	315	59	21	21
15.	23	12	.....	27	25	.....	179	500	315	49	21	21
16.	26	12	.....	27	23	.....	148	500	300	44	21	21
17.	26	14	.....	27	21	.....	139	448	285	54	21	21
18.	26	14	.....	24	19	.....	92	412	270	54	21	21
19.	26	14	.....	24	17	.....	78	345	270	49	21	18
20.	26	17	.....	27	17	.....	179	330	270	40	21	18
21.	26	17	.....	27	24	.....	345	315	255	40	21	18
22.	27	17	.....	27	20	18	465	315	228	40	21	18
23.	24	20	.....	31	20	25	540	300	190	36	18	18
24.	24	23	35	31	38	29	710	300	190	24	18	21
25.	24	27	34	31	56	19	660	285	179	21	14	21
26.	24	27	32	31	74	46	580	285	174	18	14	21
27.	27	27	.....	31	80	55	430	285	258	18	18	21
28.	27	27	.....	31	62	139	395	315	220	14	18	24
29.	24	27	.....	27	.....	378	345	330	220	14	18	21
30.	27	27	.....	27	.....	270	330	360	232	14	14	21
31.	24	.....	.....	27	.....	85	.....	360	.....	14	14	.....

NOTE.—Stage-discharge relation affected by ice from about Nov. 16 to Mar. 21, also by backwater from temporary dam below station from about Nov. 16 to Dec. 16; daily discharge estimated from meter measurements, observer's notes, and records of temperature and precipitation. Stage-discharge relation affected by backwater from dam May 9-28 and June 5-25; daily discharge estimated from meter measurements and observer's notes of change in backwater effect. Mean discharge estimated as follows: Dec. 1-23, 27 second-feet; Dec. 27 to Jan. 13, 31 second-feet; Mar. 11-21, 23 second-feet.

*Monthly discharge of Chewaucan River at Narrows, near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	27	13	22.2	1,360
November.....	35	12	22.1	1,320
December.....			28.3	1,740
January.....			29.3	1,800
February.....	80	17	33.0	1,830
March.....	378	18	54.8	3,370
April.....	710	99	332	19,800
May.....	580	285	376	23,100
June.....	520	174	318	18,900
July.....	196	14	73.3	4,510
August.....	28	14	20.2	1,240
September.....	24	11	18.7	1,110
The year.....	710	11	111	80,100

#### CHEWAUCAN RIVER AT HOTCHKISS FORD, NEAR PAISLEY, OREG.

**LOCATION.**—At river crossing known as Hotchkiss Ford, near line between secs. 11 and 12, T. 35 S., R. 20 E., below lower Chewaucan Marsh, above Crooked Creek, and 20 miles southeast of Paisley, Lake County. Willow Creek enters lower marsh but contributes no water to it except at time of floods in the early spring, the entire flow being diverted at other times for irrigation.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—January 18, 1914, to September 30, 1917.

**GAGE.**—Vertical staff on left bank. Gage readers, W. W. Hampton for Chewaucan Land & Cattle Co., and Mrs. B. A. Webster, until November 29, for Northwest Townsite Co.

**DISCHARGE MEASUREMENTS.**—Made by wading at medium and low stages; at high water, from plank projecting from a wagon drawn across river by horse on shore, or from a boat.

**CHANNEL AND CONTROL.**—Bed composed of fine gravel, sand, and mud; channel somewhat shifting; growth of aquatic plants, mostly tules, affects stage-discharge relation most of the year. Banks low and river widens considerably at high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.55 feet April 26 and 27 (discharge, 506 second-feet); minimum stage recorded, 1.1 feet September 7 (discharge, 10 second-feet); minimum discharge, 6 second-feet July 6 to 8, 10 to 11, 13 to 16 (gage height varying; affected by growth of aquatic plants).

1914-1917: Maximum stage recorded is that of 1917; minimum stage recorded, 0.9 foot September 6, 1915; stream bed practically dry September 7 to 17, 1915.

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

**DIVERSIONS.**—About 7,800 acres of marsh hay land are irrigated between the Narrows and Hotchkiss Ford stations. A total of 28,300 acres is watered from the river above station.

**REGULATION.**—Discharge may vary during irrigating season owing to manipulation of dams and ditches for irrigating the marsh.

**ACCURACY.**—Stage-discharge relation unstable owing to growth of aquatic plants. Rating curves used as follows: October 1 to February 23, well defined; February 26 to April 21 and April 25 to May 30, fairly well defined. Shifting-control method, April 22 to 24 and June 1 to September 30. Gage read once daily to half-tenths by ZX observer and three times weekly to hundredths by observer of Northwest Townsite Co. Mean of two readings used for days when both observers visited gage. Daily discharge ascertained by applying mean daily gage

height to rating table, except for periods indicated in footnote to daily-discharge table. Records good except for periods of ice effect November to March, and period of greatest effect of aquatic plants in June and July. During these times not enough measurements were made to indicate the varying extent of back-water, and results are poor.

COOPERATION.—Part of field data furnished by Chewacan Land & Cattle Co., through W. C. Hammatt, consulting engineer, and part by Northwest Townsite Co.

*Discharge measurements of Chewacan River at Hotchkiss Ford, near Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 14	W. S. Daniels.....	1.29	14.8	Feb. 27	Bert Harber.....	1.90	81
22	Bert Harber.....	1.35	18.8	Mar. 26	.....do.....	1.10	34.0
28	Daniels and Harber.....	1.36	21.4	Apr. 13	.....do.....	3.85	333
Nov. 8	W. S. Daniels.....	1.44	25.8	27	.....do.....	4.55	504
21	.....do.....	a 1.50	20.3	May. 28	.....do.....	2.70	179
25	Bert Harber.....	a 1.45	21.0	June 29	.....do.....	3.60	161
Dec. 27	.....do.....	a 1.65	34.6	July 29	.....do.....	1.90	15.7
Jan. 18	W. S. Daniels.....	a 1.61	11.9	Aug. 30	.....do.....	1.20	10.4
Feb. 6	W. S. Daniels.....	a 1.55	10.5	Sept. 25	R. C. Briggs.....	1.19	16.6
		a 1.41	15.3	28	Bert Harber.....	1.20	15.3

a Stage-discharge relation affected by ice.

NOTE.—Harber is an employee of Chewacan Land & Cattle Co.; Daniels of Northwest Townsite Co.

*Daily discharge, in second-feet, of Chewacan River at Hotchkiss Ford, near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	12	18	22	32	12	81	107	360	246	160	10	12
2.....	12	22	22	32	12	81	98	324	287	154	8	12
3.....	12	20	22	32	12	78	94	290	305	154	8	12
4.....	12	22	22	32	12	74	85	272	311	160	8	10
5.....	12	22	22	32	12	67	94	256	317	166	8	12
6.....	12	22	22	32	16	61	112	256	323	160	6	12
7.....	12	24	22	27	14	61	149	290	305	154	6	10
8.....	12	26	22	27	14	58	184	351	287	149	6	12
9.....	12	27	22	27	14	58	254	370	278	138	8	12
10.....	12	23	22	27	12	55	305	370	305	127	6	12
11.....	14	22	22	27	9	52	262	370	323	122	6	12
12.....	14	18	22	22	12	52	296	380	350	107	8	12
13.....	14	18	22	22	14	49	332	390	370	98	6	12
14.....	14	18	22	18	18	49	296	390	380	85	6	14
15.....	14	15	22	18	18	49	262	370	370	78	6	14
16.....	14	14	18	14	22	46	210	410	360	70	6	14
17.....	14	14	14	14	22	46	178	410	350	61	8	14
18.....	14	14	12	12	27	44	154	390	341	52	8	14
19.....	14	18	22	12	22	44	127	351	332	49	8	14
20.....	18	18	22	12	18	42	98	306	314	46	8	14
21.....	18	20	22	12	18	39	98	272	287	44	8	14
22.....	18	22	32	12	14	36	166	248	262	42	10	14
23.....	16	22	27	12	14	36	239	233	232	39	8	16
24.....	14	22	27	12	39	34	360	218	217	36	8	16
25.....	17	21	30	12	64	34	462	204	197	32	8	16
26.....	14	22	32	10	89	34	506	191	184	26	8	16
27.....	17	22	34	10	81	39	506	185	172	24	8	16
28.....	16	22	32	10	89	52	495	179	166	20	10	16
29.....	22	22	32	10	.....	78	440	179	160	16	10	16
30.....	21	22	32	10	.....	89	390	167	166	12	10	16
31.....	18	.....	32	10	.....	107	.....	191	.....	12	10	.....

NOTE.—Stage-discharge relation affected by ice Nov. 11 to Feb. 22 and most of the time Mar. 3-25; daily discharge estimated from meter measurements, observer's notes, and records of temperature and precipitation. Discharge interpolated Feb. 24-25 and June 4-5.

*Monthly discharge of Chewaucan River at Hotchkiss Ford, near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	22*	12	14.7	904
November.....	27	14	20.4	1,210
December.....	34	12	24.2	1,490
January.....	32	10	19.1	1,170
February.....	89	9	25.7	1,430
March.....	107	34	55.6	3,420
April.....	506	85	245	14,600
May.....	410	167	296	18,200
June.....	380	160	283	16,800
July.....	166	12	83.6	5,140
August.....	10	6	7.8	480
September.....	16	10	13.5	803
The year.....	506	6	90.7	65,600

#### CONN DITCH NEAR PAISLEY, OREG.

LOCATION.—In SE.  $\frac{1}{4}$  sec. 27, T. 33 S., R. 18 E., just below road crossing, half a mile below intake of ditch, and 2 miles southwest of Paisley, Lake County.

RECORDS AVAILABLE.—July 17, 1914, to September 30, 1917.

GAGE.—Vertical staff on left or upper side of ditch about 40 feet below road bridge.

Gage readers, A. A. Farrow and W. A. Banister.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Ditch not particularly well built or maintained; control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet June 16 (discharge, 13 second-feet); minimum stage not known.

1914-1916: Maximum stage recorded, 1.75 feet July 20, 1914 (discharge, 19 second-feet). Canal dry at times.

ICE.—Water generally turned out of canal during extremely cold weather.

ACCURACY.—Stage-discharge relation changed by cleaning out ditch during periods of no flow; fairly permanent at other times. Rating curves fairly well defined. Gage read daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating table. Records, fair.

COOPERATION.—Most of the gage readings and meter measurements were furnished by Chewacan Land & Cattle Co.

Conn ditch diverts from Chewaucan River in SE.  $\frac{1}{4}$  sec. 27, T. 33 S., R. 18 E., about three-eighths of a mile below the gaging station just above Mill Creek. The water is used for irrigating 600 acres of the Conn ranch on a bench northwest of Paisley.

*Discharge measurements of Conn ditch near Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
June 6	Bert Harber a.....	1.00	4.9	Aug. 30	Bert Harber a.....	1.30	7.5
27	do.....	1.50	10.7	Sept. 20	R. C. Briggs.....	.96	3.8
July 29	do.....	1.25	7.2				

a Employee of Chewacan Land & Cattle Co.

*Daily discharge, in second-feet, of Conn ditch near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	June	July.	Aug.	Sept.
1.	3.0	0.2	0.3	.....	10	6.7	7.4
2.	3.0	.3	.2	.....	11	7.4	8.0
3.	3.0	.1	.3	.....	10	8.0	8.0
4.	3.0	.....	.3	.....	10	8.6	7.4
5.	3.0	.....	.3	.....	11	6.7	7.4
6.	2.6	.....	.3	4.4	11	7.4	8.0
7.	3.2	.....	.4	4.4	11	6.7	8.0
8.	.2	.....	.4	4.4	12	6.7	8.0
9.	.2	.1	1.2	5.0	12	6.7	8.0
10.	.2	.....	1.6	5.5	.....	6.7	8.6
11.	.2	.1	.....	4.4	.....	7.4	8.6
12.	.1	.1	.....	5.5	.....	6.1	8.6
13.	.1	.....	.....	5.5	10	6.1	8.0
14.	.1	.....	.....	6.1	11	6.7	8.0
15.	.1	.....	.....	6.1	11	6.7	8.0
16.	.....	.....	.....	13	11	6.7	4.4
17.	.1	.....	.....	.....	11	6.7	4.4
18.	.2	.....	.....	11	11	6.1	4.4
19.	.1	.....	.....	11	11	6.1	4.4
20.	.1	.....	.....	11	9.3	6.7	4.4
21.	.1	.....	.....	11	9.3	6.1	5.0
22.	.3	.....	.....	11	8.6	6.1	5.0
23.	.2	.....	.....	11	8.6	6.7	5.5
24.	.1	.....	.....	10	8.6	5.5	5.0
25.	.2	.3	.....	10	9.3	6.1	.4
26.	.2	.3	.....	9.3	8.0	6.1	.4
27.	.2	.3	.....	11	8.0	7.4	.4
28.	.2	.2	.....	12	7.4	7.4	.4
29.	.1	.3	.....	11	7.4	8.0	.4
30.	.1	.2	.....	10	7.4	8.6	.4
31.	.1	.....	.....	.....	7.4	8.0	.....

NOTE.—Canal dry Dec. 11 to June 5 and on days for which no discharge record is given. Discharge Oct. 1-5 estimated as in table.

*Monthly discharge of Conn ditch near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October (30 days).....	.....	0.1	0.81	48
November (12 days).....	0.3	.1	.21	5
December (10 days).....	1.6	.2	.53	11
June (24 days).....	13	4.4	8.48	404
July (23 days).....	12	7.4	9.76	542
August.....	8.6	5.5	6.87	422
September.....	8.6	.4	5.50	327
The year.....	.....	.....	.....	1,760

NOTE.—See footnote to daily-discharge table.

## SMALLS CREEK AT PAISLEY, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 24, T. 33 S., R. 18 E., in western part of Paisley, Lake County, just above road bridge, 200 yards below point of diversion from Chewaucan River, and about same distance above head gate of Bagley ditch.

**RECORDS AVAILABLE.**—January 18, 1914 to September 30, 1917.

**GAGE.**—Vertical staff on right bank; probably not at correct datum from some time during March until July 12, 1917. An old gage was used up to June 28, 1914. Gage readers, A. A. Farrow and W. A. Banister.

**DISCHARGE MEASUREMENTS.**—Made from highway bridge or by wading.

**CHANNEL AND CONTROL.**—A natural stream channel, narrow, with well-defined banks, fairly straight, with gravel bed; shifts only at high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 2.05 feet May 28 and 30 (discharge, 86 second-feet); minimum stage recorded, 0.4 foot November 11 and 12 (discharge, 0.2 second-foot.)

1914-1917: Maximum stage recorded, 2.2 feet May 15, 1914 (discharge, 107 second-feet); minimum stage recorded, 0.4 foot November 11, 1914, and February 29, March 1, and November 11 and 12, 1916 (discharge, 0.2 second-foot.)

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

**ACCURACY.**—Stage-discharge relation changed during winter and also during break in gage-height record, July 13 to 18; both changes may be partly due to change in gage datum. Rating curves well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods indicated in footnote to daily-discharge table. Records for irrigating season, good; others, poor.

**COOPERATION.**—Part of field data furnished by Chewacan Land & Cattle Co.

Smalls Creek is a natural slough or defluent of Chewaucan River which has been converted into an irrigation canal. It diverts water from the river in SW.  $\frac{1}{4}$  sec. 24, T. 33 S., R. 18 E., and irrigates 2,417 acres of the alluvial fan of Chewaucan River above the upper marsh, including 1,209 acres watered from Bagley ditch which diverts water from Smalls Creek a short distance from the river. The irrigation season extends from about April 1 to September 15. Water is diverted at other times for watering stock. Surplus and return waters find their way to the marsh.

*Discharge measurements of Smalls Creek at Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 21	Bert Harber.....	0.75	3.3	Apr. 29	F. F. Henshaw.....	0.90	16.1
Nov. 25	do.....	1.15	7.7	May 14	Briggs and Henshaw...	1.18	28.7
Dec. 27	do.....	.90	1.8	May 27	Bert Harber.....	1.85	70
Jan. 19	W. S. Daniels.....	1.00	.08	June 27	do.....	1.95	80
Jan. 27	Bert Harber.....	1.30	.3	July 29	do.....	1.30	26.0
Feb. 5	W. S. Daniels.....	1.35	.4	Aug. 30	do.....	.85	10.2
Feb. 25	Bert Harber.....	1.60	2.00	Sept. 20	R. C. Briggs.....	.69	5.3
Mar. 24	do.....	.95	7.0				

<sup>a</sup> Stage-discharge relation affected by ice.

**NOTE.**—Harber is an employee of Chewacan Land & Cattle Co.; Daniels of Northwest Townsite Co.



Daily discharge, in second-feet, of Smalls Creek at Paisley, Oreg., for the year ending Sept. 30, 1917.

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		5.0	2	3.2	20	61	47	24	8
2.....		4.0	2	3.2	16	61	50	22	6.8
3.....		5.0	2	4	18	64	50	22	5.5
4.....		5.0	2	5	18	61	44	14	5.5
5.....		5.0	2	9	22	61	38	12	5.5
6.....	3.0	4.0	2	10	30	68	38	11	5.5
7.....	4.0	.6	2	54	41	68	35	11	4.6
8.....	4.0	1.0	2	9	47	68	30	10	4.6
9.....	4.0	3.0	2	6	47	72	30	11	2.2
10.....	4.0	3.0	5	2.4	25	68	61	11	4.6
11.....	5.0	.2	5	3.2	35	54	61	14	3.7
12.....	4.0	.2	5	2.4	38	58	54	14	8
13.....	4.0		5	2.1	30	68		14	8
14.....	4.0		5	1.8	32	75		16	5.5
15.....	4.0		5	5	41	75		11	5.5
16.....	4.0		2	5	25	82		10	8
17.....	4.0		2	5	30	82		10	8
18.....	4.0		8	3.2	25	78		11	6.8
19.....	4.0		8	5	30	75	22	10	5.5
20.....	4.0		8	8	18	68	22	10	5.5
21.....	4.0		8	10	18	64	24	10	5.5
22.....	7.0		8	12	18	54	22	11	5.5
23.....	6.0		8	10	32	75	25	10	12
24.....	4.0		7	3.2	32	75	28	10	12
25.....	4.0		6	9	28	61	28	10	12
26.....	4.0		6	5	75	54	44	11	14
27.....	4.0		39	18	74	81	31	10	11
28.....	4.0		30	20	86	75	31	10	10
29.....	4.0		20	15	75	68	28	10	10
30.....	4.0		20	12	86	54	31	10	10
31.....	4.0		1		68		26	11	

NOTE.—Stage-discharge relation affected by ice Nov. 13 to about Mar. 24; discharge estimated from discharge measurements, observer's notes, and temperature records. Mean discharge estimated as 1 second-foot, Nov. 13-15, and 5 second-feet Nov. 16-24 and 26-30. No gage-height record; discharge estimated, July 13-18, 38 second-feet.

Monthly discharge of Smalls Creek at Paisley, Oreg., for the year ending Sept. 30, 1917.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	7.0		4.16	256
November.....		0.2	3.90	232
December.....			2.0	123
January.....			1.0	61
February.....			2.0	111
March.....	30		6.4	394
April.....	54	1.8	8.69	517
May.....	86	16	38.1	2,340
June.....	82	54	67.6	4,020
July.....	61		36.4	2,240
August.....	24	10	12.3	756
September.....	14	2.2	7.31	435
The year.....	86		15.9	11,500

<sup>a</sup> Estimated.

## BAGLEY DITCH AT PAISLEY, OREG.

LOCATION.—In SW.  $\frac{1}{4}$  sec. 24, T. 33 S., R. 18 E., just below head gate, in Paisley, Lake County.

RECORDS AVAILABLE.—January 18, 1914, to September 30, 1917.

GAGE.—Vertical staff on left bank. Gage readers, A. A. Farrow and W. A. Banister.

DISCHARGE MEASUREMENTS.—Made by wading or from plank across ditch at gage.

CHANNEL AND CONTROL.—Earth channel. Control somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.15 feet May 28 (discharge, 58 second-feet). Canal dry at times.

1914-1917: Maximum stage recorded, 2.5 feet May 15, 1914 (discharge, 68 second-feet).

ICE.—Stage-discharge relation affected by ice. Only a small quantity of water is carried in extremely cold weather.

ACCURACY.—Stage-discharge relation changed during ice period and again when ditch was cleaned out May 20-25. Three well-defined rating curves used, applicable October 1 to November 10, March 27 to May 19, and May 26 to September 30, respectively. Gage read daily to half-tenths. Daily discharge ascertained by applying daily gage height to rating tables except for periods indicated in footnote to daily-discharge table. Records good for irrigation season; fair for rest of year.

COOPERATION.—Field data furnished by Chewacan Land & Cattle Co., W. C. Ham-matt, consulting engineer.

Bagley ditch (sometimes called Brattain ditch) diverts water from Smalls Creek in SW.  $\frac{1}{4}$  sec. 24, T. 33 S., R. 18 E., a few hundred yards below the point where Smalls Creek diverts from Chewaucan River, extends 6 miles in a southerly direction, and irrigates 1,209 acres lying above area watered by Smalls Creek. Return and waste waters reach upper Chewaucan Marsh. The irrigation season extends from late in March or early in April to about September. Water is diverted for stock during most of year.

*Discharge measurements of Bagley ditch at Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 21	Bert Harber.....	0.40	1.4	May 27	Bert Harber.....	2.00	54
Nov. 25	.....do.....	1.40	3.4	June 27	.....do.....	2.00	47.4
Mar. 27	.....do.....	.95	6.4	July 29	.....do.....	1.45	25.5
Apr. 30	F. F. Henshaw.....	1.11	8.7	Aug. 30	.....do.....	.75	5.6
May 14	Briggs and Henshaw...	1.52	18.0	Sept. 20	R. C. Briggs.....	.41	1.4

<sup>a</sup> Stage-discharge relation affected by ice.

NOTE.—Harber is an employee of Chewacan Land & Cattle Co.

*Daily discharge, in second-feet, of Bagley ditch at Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1.4		1.0	13	36	31	22	6
2		1.4		.8	12	38	34	20	6
3		1.4		1.3	12	40	34	18	4.3
4		1.1		3.0	14	38	28	10	4.3
5		2.0		5.0	16	38	22	7	3.0
6	1.4	2.0		7	21	42	22	7	3.0
7	1.4	0		40	26	42	20	8	2.4
8	1.4	.8		5.0	27	45	18	5	2.4
9	1.4	3.4		3.0	27	45	18	7	2.4
10	1.4	7		.8	16	45	31	7	1.1
11	1.4	0		1.0	21	36	31	9	.8
12	1.4	0		.4	24	36	31	12	5.0
13	1.4			.8	18	45	29	12	5.0
14	1.4			1.3	18	45	27	11	3.6
15	1.4			3.5	26	50	27	10	3.6
16	1.4			3.5	15	55	29	9	5.0
17	1.4			2.5	20	52	29	11	5.0
18	1.4			1.0	14	50	31	11	5.0
19	1.4			2.0	18	50	31	8	1.9
20	1.4			4.0		45	22	9	1.7
21	1.4			9		42	22	9	1.9
22	1.4			9		36	22	10	1.9
23	1.4			4.0		50	26	9	10
24	1.4			2.5		50	31	10	10
25	1.4			4.0		40	31	10	11
26	1.4			3.0	40	36	34	9	11
27	1.4		6.2	12	50	50	25	8	10
28	1.4		20	20	58	48	27	8	8
29	1.4		16	10	50	48	6	8	8
30	1.4		7	9	50	36	27	7	8
31	1.4		0		38		23	6	

NOTE.—Stage-discharge relation affected by ice from about Nov. 13 to Mar. 24; discharge estimated as follows: Nov. 13-15, 0.5 second-foot; Nov. 16-24, 2 second-feet; Nov. 26-30, 3 second-feet; Mar. 1-3, 1 second-foot; Mar. 10-15, 2 second-feet; Mar. 19-26, 3 second-feet. Canal dry Nov. 11-12, Jan. 14 to Feb. 9, Mar. 4-9, 16-18, 31, and May 20-25. Mean discharge Oct. 1-5, estimated as 2 second-feet.

*Monthly discharge of Bagley ditch at Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October		1.4	1.50	92
November (27 days)	7		2.16	116
December (30 days)			1.0	60
January (13 days)			.5	13
February (19 days)			1.0	38
March (21 days)	20	1	4.20	175
April	40	.4	5.65	336
May (25 days)	58	12	25.8	1,280
June	55	36	43.6	2,590
July	34	18	27.1	1,670
August	22	5	9.90	609
September	11	.8	5.04	300
The year				7,280

a Estimated.

## JONES-INNIS-ZX DITCH NEAR PAISLEY, OREG.

LOCATION.—In NW.  $\frac{1}{4}$  sec. 19, T. 33 S., R. 19 E., 100 yards below intake and 1 mile east of Paisley, Lake County.

RECORDS AVAILABLE.—July 20, 1914, to September 30, 1917.

GAGE.—Vertical staff. Gage readers, A. A. Farrow and W. A. Banister.

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

CHANNEL AND CONTROL.—Channel excavated in gravel and firm soil. Control fairly permanent. Stage-discharge relation affected at times by growth of aquatic plants or changes in gates.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year and since 1914, 3.25 feet June 10 (discharge, 193 second-feet); minimum stage recorded, 0.45 foot April 10 to 12 (canal practically dry).

ICE.—Stage-discharge relation seriously affected by ice; discharge at such times is very small.

ACCURACY.—Stage-discharge relation changed during ice period. Two fairly well defined rating curves used, one applicable October 6 to November 12; and the other March 31 to September 30, except June 1 to July 3, when there was back-water caused either by growth of aquatic plants or by operation of check gates. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for periods noted in footnote to daily-discharge table. Records good October to May, August, and September; fair rest of year except for ice period, for which they are poor.

COOPERATION.—Most of field data furnished by Chewacan Land & Cattle Co.

Jones-Innis-ZX ditch (so called from the largest water users under it, ZX being the common name of the Chewacan Land & Cattle Co.'s ranch) diverts water from Chewaucan River in NW.  $\frac{1}{4}$  sec. 19, T. 33 S., R. 19 E., into natural sloughs, from which is irrigated an area of 2,218 acres of lowest part of the alluvial fan of Chewaucan River immediately above upper marsh. One of these, Paisley slough, at its lower end discharges into "Stock ditch" which is used for irrigation and watering cattle. The irrigating season extends from early in April to about July 1. Water is diverted practically the entire year for either irrigation or stock.

*Discharge measurements of Jones-Innis-ZX ditch near Paisley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 21	Bert Harber.....	1.00	1.4	May 14	F. F. Henshaw.....	2.07	61
Jan. 19	W. S. Daniels.....	<sup>a</sup> 2.21	3.6	27	Bert Harber.....	2.30	86
29	Bert Harber.....	<sup>a</sup> 1.70	5.2	June 27	.....do.....	2.40	83
Feb. 7	W. S. Daniels.....	<sup>a</sup> 2.14	4.8	Sept. 24	R C. Briggs.....	.94	3.7
Mar. 4	Bert Harber.....	<sup>a</sup> 1.00	1.8				

<sup>a</sup> Stage-discharge relation affected by ice.

NOTE.—Harber is an employee of the Chewacan Land & Cattle Co.; Daniels of the Northwestern Townsite Co.

*Daily discharge, in second-feet, of Jones-Innis-ZX ditch near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1.		1.4	1.8	0.1	134	59	0.3	0.9
2.		1.4	1.8	.1	140	54	.3	.9
3.		1.4	1.8	.1	134	50	.3	.9
4.		1.4	1.8	17	128	27	.3	.9
5.		2.6	1.8	19	140	3.9	.3	.9
6.	1.4	1.0	1.8	27	147	3.9	.3	.9
7.	1.4	.7	.9	34	154	3.9	.3	.9
8.	1.4	.7	.6	54	147	3.1	.3	.9
9.	1.4	.7		45	180	2.4	.3	.9
10.	2.0	.4		54	193	1.8	.3	.9
11.	2.0	.4		59	160	1.8	.3	.9
12.	2.0	.4		59	134	1.8	.3	.9
13.	2.0			54	122	1.8	.6	.9
14.	1.4			59	110	1.8	.6	.9
15.	1.4			59	110	3.9	.6	.9
16.	1.4			70	128	1.8	.6	.9
17.	1.4			70	122	1.8	.6	.9
18.	1.4			110	116	3.9	.3	.9
19.	1.4			104	110	3.9	.3	.9
20.	1.4			92	110	3.9	.6	.9
21.	1.4			86	92	2.4	.9	3.1
22.	1.4			92	92	.9	.9	3.1
23.	1.0		15	98	14	.8	.9	3.9
24.	1.4		.2	92	14	.6	.9	3.9
25.	1.4		.2	92	122	3.1	.9	3.9
26.	1.4		.2	92	110	.3	.9	3.9
27.	1.4		.2	86	83	.3	.9	3.9
28.	1.4		.2	134	80	.3	.9	3.9
29.	1.4		.2	154	75	.3	.9	3.9
30.	2.0		.2	160	70	.3	.9	3.1
31.	1.4			154		.3	.9	

NOTE.—Stage-discharge relation affected by ice Nov. 13 to Mar. 30; discharge estimated from meter measurements, observer's notes, and temperature records. Mean discharge estimated as follows: Oct. 1-5, 5 second-feet; Nov. 13-30, 1 second-foot; Apr. 9-22, 0.1 second-foot.

*Monthly discharge of Jones-Innis-ZX ditch near Paisley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October		1.0	2.06	127
November	2.6		1.02	61
December			2.0	123
January			3.5	215
February			3.6	200
March			2.8	172
April	15		1.0	60
May	160	.1	71.8	4,410
June	193	14	116	6,900
July	59	.3	7.90	486
August	.9	.3	.57	35
September	3.9	.9	1.82	108
The year	193		17.8	12,900

α Estimated.

## SILVER LAKE BASIN.

## SILVER CREEK NEAR SILVER LAKE, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 28, T. 28 S., R. 14 E., about 1 mile below proposed diversion dam for Silver Lake irrigation district,  $1\frac{1}{2}$  miles southwest of Silver Lake post office, Lake County, and 3 miles above mouth of Bridge Creek.

**DRAINAGE AREA.**—221 square miles.

**RECORDS AVAILABLE.**—December 29, 1904, to March 31, 1907; January 11, 1909, to September 30, 1917.

**GAGE.**—Inclined staff on right bank, since July 24, 1915; read by J. H. Gowdy. Vertical staff on right bank, 10 feet upstream, used April 5, 1912, to July 23, 1915; inclined staff at location of present gage, 1905 to 1912.

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

**CHANNEL AND CONTROL.**—Composed of rocks and gravel; fairly permanent.

**EXTREMES OF DISCHARGE.**—Maximum stage during year, 5.1 feet during night of April 24, observed from high-water marks next morning (discharge, 560 second-feet); minimum stage recorded during year, 0.20 foot February 10, March 7, 10, and 11 (discharge, 1.5 second-feet).

1905-1907 and 1909-1917: Maximum stage recorded, 6.40 feet at 4 p. m., November 23, 1909 (discharge, 910 second-feet); minimum stage recorded, 0.15 foot August 7-8 and October 9, 1915 (discharge, 0.8 second-foot).

**ICE.**—Stage-discharge relation somewhat affected by ice.

**DIVERSIONS.**—A few small tracts irrigated above station, chiefly in Thompson Valley.

**REGULATION.**—Some water stored in a small reservoir in Thompson Valley.

**ACCURACY.**—Stage-discharge relation changed during high water in April, the change affecting only medium and low stages. Fairly well defined rating curves used; identical above gage height 2.5 feet. Gage read to quarter-tenths once daily March 28 to July 29, twice a day March 24 to 27, and about three times a week at other times. Daily discharge ascertained by applying daily gage heights to rating table, except for periods indicated in footnote to daily-discharge table. Records only fair on account of diurnal fluctuation during spring flood, uncertainty as to when change in rating occurred, and lack of meter measurements during ice period.

*Discharge measurements of Silver Creek near Silver Lake, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 29	F. F. Henshaw.....	2.18	104
May 13	.....do.....	3.62	299
Aug. 23	R. C. Briggs.....	.48	4.9

*Daily discharge, in second-feet, of Silver Creek near Silver Lake, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	9.5				8.0	180	86	14	3.4	4.6
2		8.6	6.5		6.5	169	82	14		4.6
3			5.6		6.5	169	78	14		
4		9.5	5.6		8.0	148	66	13	3.4	
5		9.5			9.5	158	62	12	3.4	
6	9.5				11	169	59	11		4.6
7		11			11	169	59	10		
8	9.5				23	217	55	10	3.4	
9		12			30	275	55	8.6		3.4
10	8.6				41	260	55	10		
11					82	231	52	10	4.6	
12	9.5				71	245	48	8.6	4.6	
13					64	290	45	10		3.4
14	9.5				78	217	39	10		
15	8.6				71	192	36	10		
16					50	180	30	8.6		3.4
17	8.6				41	192	25	7.4	4.6	
18					50	169	23	5.6		
19	8.6				86	169	21	5.6	4.6	4.6
20					158	148	19	5.0		
21	8.6				129	128	19	5.0		
22	8.6				169	104	19	4.6		5.6
23				55	360	109	16	4.6	4.6	5.6
24	8.6			50	400	86	16	4.0	4.6	
25		8.0		52	400	91	14	4.0		
26	9.5	9.5		60	290	91	14	3.4	4.6	4.6
27				37	231	118	14	3.4		
28	8.6	9.5		24	231	118	14	3.4		
29	8.6			10	148	123	14	3.4		3.4
30		8.0		8	138	118	14	3.4		3.4
31	9.5					91		3.4		

NOTE.—Stage-discharge relation affected by ice from about Nov. 10 to Mar. 27; discharge estimated from observer's notes and records of temperature and precipitation. Mean discharge estimated as 8 second-feet Nov. 10 to 24, 1.5 second-feet Mar. 1-15, and 2.5 second-feet Mar. 16-23.

*Monthly discharge of Silver Creek near Silver Lake, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	9.5	8.6	8.99	553
November	12	8.0	8.80	524
December			a 4.31	265
January			a 2.84	175
February			a 1.5	83
March	60		10.9	670
April	400	6.5	113	6,720
May	290	86	165	10,100
June	86	14	38.3	2,280
July	14	3.4	7.74	476
August	4.6	3.4	4.16	256
September	5.6	3.4	4.27	254
The year	400		31.0	22,400

a Estimated.

**SILVER LAKE NEAR SILVER LAKE, OREG.**

**LOCATION.**—In lot 3, sec. 11, T. 29 S., R. 15 E., on west shore of lake, 1 mile south of Duncan place and 9 miles from Silver Lake, Lake County.

**RECORDS AVAILABLE.**—Occasional readings 1905 to 1917.

**GAGE.**—Vertical staff bolted to large boulder was used in 1905 and 1906. Since then water surface has been referred to bench mark. Datum of gage is 4,425.54 feet above sea level, according to surveys by Oregon Eastern Railroad and United States Reclamation Service.

**EXTREMES OF STAGE.**—Maximum stage during recent years 16.5 feet in spring of 1904 determined from high-water marks. Lake bed dry in 1889 and during September or October, 1917.

Gage readings in feet during 1916 and 1917:

June 11, 1916, 8.35 feet.

August 24, 1917, 5.46 feet.

**MALHEUR AND HARNEY LAKES BASIN.****MUD LAKE OUTLET NEAR NARROWS, OREG.**

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 17, T. 27 S., R. 30 E., half a mile above gap in sand reef through which outlet enters Harney Lake, 4 miles southwest of Mud Lake, and 6 miles southwest of Narrows, Harney County.

**RECORDS AVAILABLE.**—May 10 to July 19, 1916; April 28 to September 30, 1917.

**GAGE.**—Vertical staff on bent of bridge; read by C. Grousbeck.

**DISCHARGE MEASUREMENTS.**—Made from footbridge; channel deep and narrow; current swift.

**CHANNEL AND CONTROL.**—Channel of mud and sand; shifting. No well-defined control.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during season, 3.8 feet May 31 (discharge, 245 second-feet); may have gone slightly higher. Stream bed dry up to about April 24.

1916-17: Maximum that of 1917.

**ICE.**—No flow during ice period.

**DIVERSIONS.**—A little hay land is irrigated by natural overflow below gage on Malheur Lake outlet; most of the loss is caused by evaporation on Mud Lake.

**ACCURACY.**—Stage-discharge relation not permanent owing to erosion of the friable stream bed by the swift current; the high stages of 1917 cut the bed down to fairly solid material; gage read about twice a week; fluctuation in stage very gradual. Fairly well defined rating curve used April 28 to May 31; well-defined rating curve, June 5 to September 30. Daily discharge ascertained by applying daily gage height to rating tables. Records good except for April, which are fair.

*Discharge measurements of Mud Lake outlet near Narrows, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 24	C. L. Batchelder .....	0.40	0.5	May 22	R. C. Briggs .....	3.17	155
Apr. 19	F. F. Henshaw .....	1.30	0	June 16	R. D. Cooper <sup>a</sup> .....	3.30	200
May 18	Briggs and Henshaw .....	3.06	138	July 13	R. C. Briggs .....	1.60	64
22	R. C. Briggs .....	3.16	151	20	do .....	1.28	42.7

<sup>a</sup> Engineer for Harney Basin Development Co.



*Daily discharge, in second-feet, of Mud Lake outlet near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1						20	16		144	210			20
2				116			17				57		
3					28		18		138	200		28	
4		83				20	19	0	144		44		
5			241				20		144		40	25	
6		94		100			21						
7					25		22		152				20
8						20	23			140			
9		116	241	85			24		215				22
10					20		25			156	30	22	
11						20	26		230				
12		118	241				27						
13				64	20		28	73			25	20	16
14		144		64			29						
15						20	30	73					18
							31		245	140	25		

*Monthly discharge of Mud Lake outlet near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 25-30	73		60	714
May	245	83	151	9,280
June	241	140	196	11,700
July	116	25	59.1	3,630
August	28	20	23.5	1,440
September	22	16	19.6	1,170
The period				27,900

#### SILVIES RIVER NEAR BURNS, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 31, T. 21 S., R. 30 E., 1 mile above Sylvester's ranch and 12 miles northwest of Burns, Lake County.

**DRAINAGE AREA.**—940 square miles (measured on United States Reclamation Service map).

**RECORDS AVAILABLE.**—May 10, 1903, to July 24, 1906; December 14, 1908, to September 30, 1915; February 1 to June 19, 1916; March 25 to September 30, 1917.

**GAGE.**—Gurley printing water-stage recorder on left bank, used December, 1911, to June 20, 1917. Prior to December, 1911, and beginning June 24, 1917, station was about  $1\frac{1}{4}$  miles downstream, at wagon bridge near Parker's house, in sec. 7, T. 22 S., R. 30 E.; staff gage in two sections, on right bank. Upper section vertical; lower section inclined; read by Mrs. Leona Parker.

**DISCHARGE MEASUREMENTS.**—Made from cable, highway bridge, or by wading.

**CHANNEL AND CONTROL.**—Upper gage: Low-water control is a gravel riffle about 25 feet below gage. Probably shifts in high water. Above gage height 13 feet river overflows its banks near the gage and begins cutting across the bends with no defined control.

Lower site: Bed composed of clean gravel and sand. Left bank rocky; banks covered with willows and brush. One channel at low stages, two or more at medium and high stages.

**EXTREMES OF DISCHARGE.**—Maximum stage from water-stage recorder, 16.4 feet April 27 at midnight (discharge, 2,300 second-feet); minimum stage recorded, 2.20 feet on Parker gage September 7 to 11 (discharge, 13 second-feet).

1904-1906 and 1909-1917: Maximum stage recorded, 17.12 feet April 15, 1904 (discharge, 4,730 second-feet); minimum stage recorded, 2.2 feet September 6 to 12, 1903 (discharge, 3 second-feet).

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

DIVERSIONS.—A large area of land in headwaters of Silvies River is irrigated with flood water.

REGULATION.—Flow at lower station is affected by operation of Sylvester's dam half a mile above.

ACCURACY.—Stage-discharge relation for upper gage changed slightly during winter of 1916-17. Rating curve well defined. Operation of water-stage recorder fairly satisfactory March 25 to May 24; did not work thereafter. Lower gage read to half-tenths once daily. Stage-discharge relation changed slightly in August and September. Well-defined rating curve used June and July; shifting-control method used August and September. Daily discharge ascertained by applying to rating table the mean daily gage height obtained by inspecting the record tape, or the daily gage reading, except for periods indicated in footnote to daily-discharge table. Records good except for June, which are mostly estimated.

*Discharge measurements of Silvies River near Burns, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height (feet).		Dis-charge.	Date.	Made by—	Gage height (feet).		Dis-charge.
		Lower gage.	Water-stage recorder.				Lower gage.	Water-stage recorder.	
Oct. 23	Batchelder and Reineking.....	.....	6.26	<i>Sec.-ft.</i> 29.1	May 24	R. C. Briggs.....	.....	12.52	<i>Sec.-ft.</i> 1,040
Apr. 17	F. F. Henshaw.....	.....	7.20	399	June 20	R. D. Cooper.....	5.10	6.05	<i>a</i> 253
27	M. V. Dodge.....	.....	16.03	2,050	July 10	R. C. Briggs.....	.....	2.48	<i>a</i> 33.1
May 19	R. C. Briggs.....	.....	14.65	1,590	22	.....do.....	2.45	.....	34.7

*a* Flow in main channel at Parker Bridge; some overflow not included.

*Daily discharge, in second-feet, of Silvies River near Burns, Oreg., for the year ending Sept. 30, 1917.*

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.....	.....	225	1,670	.....	107	35	16
2.....	.....	215	1,570	.....	71	35	16
3.....	.....	205	1,540	.....	71	35	16
4.....	.....	195	1,510	.....	71	35	16
5.....	.....	260	1,570	.....	67	31	16
6.....	.....	360	1,600	.....	63	31	16
7.....	.....	430	1,640	.....	51	31	13
8.....	.....	460	1,750	.....	39	31	13
9.....	.....	510	1,860	.....	39	31	13
10.....	.....	500	1,970	.....	39	27	13
11.....	.....	540	2,080	.....	39	27	13
12.....	.....	560	2,190	.....	35	27	13
13.....	.....	500	2,220	.....	31	27	13
14.....	.....	530	2,240	.....	31	23	13
15.....	.....	470	2,140	.....	31	23	13
16.....	.....	420	2,040	.....	27	20	13
17.....	.....	400	1,900	.....	27	20	13
18.....	.....	380	1,780	.....	27	20	13
19.....	.....	380	1,600	.....	27	20	13
20.....	.....	440	1,450	285	35	23	13
21.....	.....	530	1,340	266	31	20	13
22.....	.....	679	1,190	247	31	20	13
23.....	.....	830	1,110	228	31	20	13
24.....	.....	1,070	1,060	210	31	20	16
25.....	165	1,420	.....	200	31	20	23
26.....	.....	165	1,940	.....	195	20	23
27.....	.....	170	2,190	.....	134	20	23
28.....	.....	175	2,190	.....	125	16	23
29.....	.....	225	2,040	.....	102	16	23
30.....	.....	265	1,860	.....	89	16	23
31.....	235	.....	.....	.....	43	16	.....

NOTE.—Discharge estimated as 940 second-feet May 25-31, and as 560 second-feet June 1-19. Discharge interpolated Apr. 1-3, May 8-11, and June 21-23.

*Monthly discharge of Silvies River near Burns, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 25-31.....	265	165	200	2,780
April.....	2,190	195	758	45,100
May.....	2,240		1,540	94,700
June.....		89	424	25,200
July.....	107	27	43.3	2,660
August.....	35	16	24.4	1,500
September.....	23	13	15.7	934
The period.....				173,000

#### WEST FORK OF SILVIES RIVER NEAR LAWEN, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 24, T. 25 S., R. 32 E., at Crowley Bridge, a quarter of a mile from Herman Ruh's house and 5 miles southeast of Lawen, Harney County.

**DRAINAGE AREA.**—Indeterminate.

**RECORDS AVAILABLE.**—March 31 to July 1, 1916; April 15 to July 11, 1917.

**GAGE.**—Vertical staff on abutment of bridge; read by Frank A. Ruh.

**DISCHARGE MEASUREMENTS.**—Made from upstream side of bridge. Direction of current makes an angle with bridge, but this has been carefully measured and correction applied. At high stages some water flows through culverts on either side of main bridge.

**CHANNEL AND CONTROL.**—Channel deep at bridge and bends to left just above it. Old Crowley dam acts as control; fairly permanent and no change made to it during time that records were being procured. Water surface below dam is only slightly above that in Malheur Lake, and as lake rose the drop at dam became less and there was backwater at gage beginning about May 21.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during season, 9.7 feet May 18 to 20 (discharge, 1,250 second-feet). Flow practically ceases during summer.

**ICE.**—No record during period when stream was frozen.

**DIVERSIONS.**—Many thousand acres of hay land irrigated from flood water above this point. East Fork diverts water about a mile southeast of Burns, the main channel below the bifurcation being known as West Fork.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation fairly permanent until May 20 (rating curve fairly well defined); affected by backwater thereafter (rating curve well defined above 800 second-feet but very uncertain below that). Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage reading to rating table, except for period April 8-14, for which it was estimated. Records for April and May good; for June fair; for July poor.

*Discharge measurements of West Fork of Silvies River near Lawen, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
Apr. 15	Krumholtz and Henshaw	Feet. 7.82	Sec.-ft. 16.3	May 29	R. C. Briggs.....	Feet. 9.43	Sec.-ft. 829
May 18	Briggs and Henshaw...	9.70	1,250	July 11	.....do.....	8.35	( <sup>a</sup> )

<sup>a</sup> Estimated 5 to 10 second-feet.

*Daily discharge, in second-feet, of West Fork of Silvies River near Lawen, Oreg., for the year ending Sept. 10, 1917.*

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1.....		730	690	70	16.....	161	1,170	240	.....
2.....		940	635	70	17.....	170	1,210	240	.....
3.....		975	580	70	18.....	170	1,250	240	.....
4.....		1,010	530	70	19.....	202	1,250	240	.....
5.....		940	480	48	20.....	240	1,250	180	.....
6.....		940	480	48	21.....	260	1,170	180	.....
7.....		940	435	48	22.....	260	1,090	180	.....
8.....		905	390	25	23.....	280	1,090	150	.....
9.....		835	435	25	24.....	300	1,090	120	.....
10.....		870	390	25	25.....	300	1,090	120	.....
11.....		870	390	10	26.....	300	1,090	120	.....
12.....		870	390	.....	27.....	300	940	95	.....
13.....		940	390	.....	28.....	300	875	95	.....
14.....		1,010	310	.....	29.....	340	875	70	.....
15.....	161	1,090	275	.....	30.....	490	810	70	.....
					31.....		750	.....	.....

NOTE.—River began to rise about Apr. 8; discharge Apr. 8-14 estimated as 80 second-feet.

*Monthly discharge of West Fork of Silvies River near Lawen, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 8-30.....	490	.....	208	9,496
May.....	1,250	730	996	61,290
June.....	690	70	305	18,100
July 1-11.....	70	10	46.3	1,010
The period.....	.....	.....	.....	89,800

#### DONNER UND BLITZEN RIVER NEAR DIAMOND, OREG.

**LOCATION.**—In SW.  $\frac{1}{4}$  sec. 8, T. 32 S., R. 32 $\frac{1}{2}$  E., at mouth of canyon,  $1\frac{1}{2}$  miles above P ranch buildings, 25 miles southwest of Diamond, and 40 miles above Narrows, Harney County.

**DRAINAGE AREA.**—200 square miles (measured on special map prepared by Garfield Stubblefield).

**RECORDS AVAILABLE.**—May 22, 1910, to September 30, 1916; April 15 to September 30, 1917; also January 26, 1909, to July 31, 1910, and November 1 to 12, 1910, at former station below several diversion ditches.

**GAGE.**—Vertical staff on left bank; zero of gage was raised 0.63 foot between 1913 and 1916, probably gradually. Gage reader, Jesus Achurra. Original gage was a vertical staff on right bank just below the wagon bridge near ranch buildings.

**DISCHARGE MEASUREMENTS.**—Made from cable 75 yards above gage or by wading.

**CHANNEL AND CONTROL.**—Bed composed of gravel and sand. One channel at all stages. Banks of stream covered with a dense growth of willows and underbrush; subject to overflow at flood stages. Control of gravel; somewhat shifting.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.0 feet at 8.30 a. m., April 22 (discharge, 1,860 second-feet); minimum stage recorded, 1.52 feet at the time of meter measurement October 25 (discharge, 38 second-feet).

1909-1917: Maximum stage recorded, 6.4 feet at 7.30 p. m. May 3, 1915 (discharge, 2,060 second-feet); minimum stage recorded, 1.5 feet December 19 and 26, 1915, and Jan. 2, 9, and 16, 1916 (discharge, 23 second-feet).

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

**DIVERSIONS.**—Present gage is above all irrigation ditches. Five ditches divert water from stream above old gage at ranch buildings.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation changed during high water of April 22 and June 9. Rating curves fairly well defined below 1,000 second-feet. Gage read to tenths once daily. Daily discharge ascertained by applying the daily gage height to rating table. Records for April to June only fair on account of uncertainties of rating and diurnal fluctuation; for July to September good.

*Discharge measurements of Donner und Blitzen River near Diamond, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 25	Batchelder and Reineking.	1.52	37.8	May 17	Briggs and Henshaw	3.16	438
Apr. 20	F. F. Henshaw	2.36	225	July 18	R. C. Briggs	1.92	127

*Daily discharge, in second-feet, of Donner und Blitzen River near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1		535	712	430	62	48	16	106	892	775	146	62	48
2		455	712	390	62	48	17	106	415	1,150	122	62	48
3		495	802	390	62	48	18	106	415	1,000	122	62	48
4		535	802	355	62	48	19	128	378	865	122	62	48
5		495	802	320	62	48	20	232	378	820	122	62	48
6		578	802	320	62	48	21	260	378	775	122	62	48
7		712	802	285	62	48	22	1,860	342	730	100	62	48
8		712	985	285	62	48	23	985	342	730	100	62	48
9		668	1,480	255	62	48	24	622	455	685	100	62	80
10		758	1,250	225	62	48	25	668	378	640	80	62	80
11		802	1,000	225	62	48	26	535	415	550	80	48	62
12		848	865	198	62	48	27	495	415	510	80	48	62
13		892	820	172	62	48	28	578	495	510	62	48	48
14		985	775	172	62	48	29	495	578	510	62	48	48
15	106	1,440	775	146	62	48	30	495	802	430	62	48	48
							31		712		62	48	

*Monthly discharge of Donner und Blitzen River near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 15-30	1,860	106	486	15,400
May	1,440	342	603	37,100
June	1,480	430	802	47,700
July	430	62	184	11,300
August	62	48	59.3	3,650
September	80	48	51.1	3,040
The period				118,000

#### DONNER UND BLITZEN RIVER NEAR NARROWS, OREG.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 26, T. 29 S., R. 31 E., at "grain camp," at bridge over movable diversion dam immediately below intake of Buena Vista canal, 2 or 3 miles above mouth of Keiger Creek, and 25 miles south of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 21 to July 31, 1915; April 7 to July 17, 1916; April 16 to August 12, 1917.

GAGE.—Vertical staff on west abutment of bridge; read by Mrs. S. A. Jones.

DISCHARGE MEASUREMENTS.—Made from cable about 200 feet below gage or by wading.

CHANNEL AND CONTROL.—Artificial channel excavated in clayey material. Banks fairly even and not subject to overflow. No defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.92 feet May 17 (discharge, 670 second-feet); river probably reached a stage of 7.5 feet (780 second-feet) during March as indicated by high-water marks. Minimum stage recorded, 2.0 feet July 26 (discharge, 40 second-feet).

1915-1917: Maximum stage recorded that of 1917; minimum stage recorded 1.25 feet May 4, 1916 (discharge, 16 second-feet).

ICE.—No records during ice period.

DIVERSIONS.—Buena Vista canal and East Side ditch divert water from river just above gage; about 14,000 acres of P ranch lands are irrigated by spring flooding from the river and its tributaries. (See p. 253 for records on Buena Vista canal.)

REGULATION.—The diversion dam above gage backs water 4 or 5 miles; the pondage thus created may affect materially the discharge of a day or two.

ACCURACY.—Stage-discharge relation somewhat shifting, especially at medium stages between 3 and 5 feet gage height. Rating curve well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table, except for period indicated in footnote to daily-discharge table. Records good.

*Discharge measurements of Donner und Blitzen River near Narrows, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 25	Batchelder and Reineking	2.10	44.8	May 17	Henshaw and Briggs	6.92	670
Apr. 21	F. F. Henshaw	4.22	253	May 25	R. C. Briggs	5.88	503
				July 20	do.	3.00	109

*Daily discharge, in second-feet, of Donner und Blitzen River near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Day.	Apr.	May.	June.	July.	Aug.
1.		308	353	238	55	16.	368	667	368	323	
2.		265	323	238	55	17.	308	667	398	248	
3.		251	428	174	55	18.	251	602	458	174	
4.		251	353	119	50	19.	225	490	490	109	
5.		238	308	238	55	20.	225	443	490	119	
6.		251	338	238	48	21.	238	398	490	129	
7.		251	353	238	50	22.	368	383	490	96	
8.			368	238	52	23.	398	293	474	83	
9.			323	225	50	24.	444	279	428	75	
10.			474	225	45	25.	490	428	413	75	
11.			490	199	45	26.	554	368	428	40	
12.			506	151	48	27.	554	293	308	68	
13.			458	129		28.	522	368	293	55	
14.			428	109		29.	368	338	308	91	
15.			353	91		30.	368	308	279	55	
						31.		338		55	

NOTE.—Discharge, May 8 to 16 estimated as 450 second-feet by comparison with records above P ranch.

*Monthly discharge of Donner und Blitzen River near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 16-30.....	554	225	379	11,300
May.....	667	238	383	23,600
June.....	506	279	399	23,700
July.....	323	55	150	9,220
August 1-12.....	55	45	50.7	1,210
The period.....				69,000

*Combined monthly discharge of Donner und Blitzen River and Buena Vista canal, near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 16-30.....	571	225	391	11,600
May.....	713	245	409	35,100
June.....	536	309	423	25,500
July.....	334	55	160	9,840
August 1-12.....	55	45	50.7	1,210
The period.....				73,200

#### DONNER UND BLITZEN RIVER NEAR VOLTAGE, OREG.

**LOCATION.**—In sec. 35, T. 26 S., R. 31 E., at bridge on road known as Sod-house Lane, 2 miles west of Voltage post office and 6 miles east of Narrows, Harney County.

**DRAINAGE AREA.**—Not measured.

**RECORDS AVAILABLE.**—April 6, 1916, to September 30, 1917.

**GAGE.**—Vertical staff on downstream end of right abutment of bridge. Gage readers, Harry Cole and Wilbur Springer.

**DISCHARGE MEASUREMENTS.**—Made from bridge across main channel and 16 culverts, which carry water at high stages; measuring conditions poor.

**CHANNEL AND CONTROL.**—Channel crooked and turns abruptly to right just below bridge. No well-defined control.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 3.3 feet May 21 (discharge, 800 second-feet). Minimum stage recorded, 0.2 foot Feb. 10 and 13 (discharge uncertain).

1916-1917: Maximum and minimum those of 1917.

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

**DIVERSIONS.**—Several thousand acres irrigated from the river and its tributaries; discharge at station is largely return water.

**REGULATION.**—Flow considerably influenced by diversion dams.

**ACCURACY.**—Stage-discharge relation for main channel variable, and overflow is a function of gage height only in a general way. A fairly well defined rating curve used, except for March 22 to June 13 for which shifting-control method was used. Gage read about three times a week except December to March when it was read only once a week. Daily discharge ascertained by applying daily gage height to rating table. Records good from June to September; fair for other months except December to March, for which they are poor.

*Discharge measurements of Donner und Blitzen River near Voltage, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
Oct. 25	C. L. Batchelder.....	<i>Feet.</i> 0.70	<i>Sec.-ft.</i> 37.3	May 18	Henshaw and Briggs...	<i>Feet.</i> 3.22	<i>Sec.-ft.</i> 711
Apr. 14	F. F. Henshaw.....	3.28	586	June 16	R. D. Cooper <sup>a</sup> .....	3.18	495
19	.....do.....	2.88	316	July 12	R. C. Briggs.....	2.68	235

<sup>a</sup> Engineer for Harney Basin Development Co.

*Daily discharge, in second-feet, of Donner und Blitzen River near Voltage, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1.						408	350			51
2.			55					280	69	49
3.						302	350			
4.		43							60	51
5.		43	47					262		
6.							350		53	49
7.					510	350		262		
8.					510				53	51
9.					475	408	408	168		
10.	47				475				53	49
11.		47			492			160		
12.					510			240	55	51
13.					510	555	650	232		
14.	49				510				53	53
15.		49			555		440	280		
16.					440		496		55	
17.		47			408		408	302		55
18.	37				375	700			53	
19.					316		555	245		53
20.					325				51	
21.	40	49			366	800	475	168		
22.					408				53	79
23.	40				442			145		
24.					475	375	510		55	63
25.	37	49			475			124		
26.					475	475	475		53	66
27.					492			160		
28.		47			510	375	440		55	63
29.					492			87		
30.	43				475	475	408		53	63
31.				375				87		

NOTE.—Discharge estimated as 50 second-feet Mar. 1 to 24; 200 second-feet Mar. 25 to 30; 440 second-feet Apr. 1 to 6.

*Monthly discharge of Donner und Blitzen River near Voltage, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	49	37	41.9	2,580
November.....	49	43	46.8	2,780
December.....	55		<sup>a</sup> 40	2,460
January.....			<sup>a</sup> 35	2,150
February.....			<sup>a</sup> 25	1,390
March.....	375		89.5	5,500
April.....	555		455	27,100
May.....	800	302	475	29,200
June.....	650	350	451	26,800
July.....	302	87	200	12,300
August.....	69	51	54.9	3,380
September.....	79	49	56.4	3,360
The year.....	800			119,000

<sup>a</sup> Estimated.

NOTE.—Mean discharge is average of days for which daily discharge is given.



## BUENA VISTA CANAL NEAR NARROWS, OREG.

**LOCATION.**—In NE.  $\frac{1}{4}$  sec. 26, T. 29 S., R. 31 E., at bridge over canal 300 feet below intake, opposite station on Donner und Blitzen River at "grain camp," 25 miles south of Narrows, Harney County.

**RECORDS AVAILABLE.**—Irrigating seasons, 1915 to 1917.

**GAGE.**—Vertical staff on pier of bridge; read by Mrs. S. A. Jones.

**DISCHARGE MEASUREMENTS.**—Made from wagon bridge.

**CHANNEL AND CONTROL.**—Canal is about 4 feet deep; excavated in a clayey material.

A dam across canal about  $1\frac{1}{2}$  miles below gage causes backwater at times.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.1 feet June 1; stage-discharge relation probably affected by backwater; maximum discharge during year 89 second-feet; (gage height, 2.95 feet) May 23 and 24. Canal dry at times.

1915-1917: Maximum stage recorded, 4.6 feet May 14, 1915 (discharge, 179 second-feet).

**ICE.**—Water turned out of canal during extremely cold weather.

**ACCURACY.**—Stage-discharge relation fairly permanent April 25 to May 25, and after July 8. Rating curves poorly defined. Gage read to half-tenths once daily. On May 26 a dam,  $1\frac{1}{2}$  miles below, was put in to back water out over fields; discharge estimated up to July 7 and July 12 to 14. Records fair for April and May; very uncertain for June and July.

This canal diverts water from left bank of Donner und Blitzen River, in NE.  $\frac{1}{4}$  sec. 26, T. 29 S., R. 31 E., to irrigate marsh hay lands on west side of Donner und Blitzen River.

*Discharge measurements of Buena Vista canal near Narrows, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
May 17	Henshaw and Briggs.....	2.39	56
July 18	R. C. Briggs.....	1.95	24.8

*Daily discharge, in second-feet, of Buena Vista canal near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	July.	Day.	Apr.	May.	July.	Day.	Apr.	May.	July.
1.....		29	-----	11.....			23	21.....	10	51	-----
2.....		16	-----	12.....				22.....	50	39	-----
3.....		7	-----	13.....				23.....	40	89	-----
4.....		7	-----	14.....				24.....	30	89	-----
5.....		7	-----	15.....			16	25.....	29	0	-----
6.....		7	-----	16.....			11	26.....	17		-----
7.....		7	-----	17.....		46	18	27.....	9		-----
8.....			15	18.....		37	12	28.....	5		-----
9.....			15	19.....		29	0	29.....	0		-----
10.....			15	20.....		48		30.....	0		-----
								31.....			-----

**NOTE.**—Daily discharge for Apr. 21 to 24 estimated. Mean discharge estimated as 20 second-feet, May 8 to 16; May 26 to 31; July 1 to 7, and 12 to 14. No water flowing in canal before Apr. 20, or on Apr. 29 and 30, May 25, after July 19, and possibly at other times.

*Monthly discharge of Buena Vista canal near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April (8 days).....	50	5	23.8	378
May (30 days).....	89	7	26.9	1,600
June.....			30.0	1,790
July (18 days).....		11	18.1	646
The period.....				4,410

<sup>a</sup> Estimated.

#### KEIGER CREEK NEAR DIAMOND, OREG.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 10, T. 30 S., R. 33 E., 100 yards above point where creek forks and  $2\frac{1}{2}$  miles southeast of Diamond, Harney County.

**DRAINAGE AREA.**—75 square miles.

**RECORDS AVAILABLE.**—January 26, 1909, to May 31, 1910; May 14 to August 31, 1911; February 14, 1912, to September 5, 1913; October 5 to 27, 1915; April 11 to September 2, 1916; April 14 to July 17, 1917.

**GAGE.**—Stevens 8-day water-stage recorder on left bank; installed May 27, 25 feet downstream from old vertical staff used up to that time; gage used 1909 and 1910 at different location and datum. Gage reader, Dean Horton.

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

**CHANNEL AND CONTROL.**—Gravel; somewhat shifting. Banks brush-covered; not subject to overflow.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 4.6 feet May 15 (discharge, 297 second-feet). Maximum discharge estimated from comparison with McCoy Creek as about 300 second-feet, June 9 and 17. No record of minimum discharge.

1909-1910, 1912-1913, and 1915-1917: Maximum stage recorded, 4.7 feet May 19, 1912 (discharge, 330 second-feet). A higher flood may have occurred while records were suspended. Minimum discharge, 4.3 second-feet, December 29, 1915.

**ICE.**—Stage-discharge relation somewhat affected during extremely cold weather.

**DIVERSIONS.**—None above station.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation not permanent. Rating curve poorly defined.

Gage read to half-tenths daily until May 27; thereafter, operation of recorder satisfactory until June 6 only. Daily discharge ascertained by applying to rating table the daily gage reading, or the mean daily gage height obtained by inspecting recorder graph; shifting-control method used throughout. Records fair for April and May, poor for June and July.

*Discharge measurements of Keiger Creek near Diamond, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	Batchelder and Reineking.	<sup>a</sup> 1.18	10.3	Apr. 22	F. F. Henshaw.....	2.72	109
Apr. 14	F. F. Henshaw.....	1.83	54	May 27	R. C. Briggs.....	3.11	155
				July 17	.....do.....	1.76	58

<sup>a</sup> Gage read 1.23 feet before cleaning brush from channel.

*Daily discharge, in second-feet, of Keiger Creek near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Day.	Apr.	May.	June.	July.
1.....		66	197	80	16.....	40	202	260	52
2.....		63	217	75	17.....	37	182	300	58
3.....		82	222	70	18.....	31	158	267	
4.....		74	187	66	19.....	31	136	210	
5.....		82	192	66	20.....	37	150	190	
6.....		86	165	60	21.....	37	118	180	
7.....		145	200	60	22.....	109	114	170	
8.....		150	250	56	23.....	140	118	160	
9.....		154	300	56	24.....	145	217	150	
10.....		168	260	62	25.....	163	168	125	
11.....		227	230	69	26.....	158	145	115	
12.....		227	200	66	27.....	110	150	120	
13.....		247	168	62	28.....	74	158	110	
14.....	54	292	200	59	29.....	106	202	100	
15.....	49	297	230	55	30.....	82	182	90	
					31.....		163		

NOTE.—Daily discharge estimated by hydrographic comparison with McCoy Creek, June 7-12, 14-17, 19-23, June 25-July 3, July 12-15.

*Monthly discharge of Keiger Creek near Diamond, Oreg., for the year ending. Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre feet.
	Maximum.	Minimum.	Mean.	
April 14-30.....	163	31	82.5	2,780
May.....	297	63	159	9,780
June.....	300	90	192	11,400
July 1-17.....	80	52	63.1	2,130
The period.....				26,100

#### MCROY CREEK NEAR DIAMOND, OREG.

**LOCATION.**—In sec. 12, T. 30 S., R. 32 E., 1,000 feet above Kesterson ranch house and 5 miles southwest of Diamond, Harney County.

**DRAINAGE AREA.**—45 square miles (measured on special maps prepared by Garfield Stubblefield).

**RECORDS AVAILABLE.**—May 23, 1910, to September 30, 1914; October 5 to 27, 1915; April 11 to September 2, 1916; and April 14 to September 30, 1917; also January 27 to June 30, 1909, on original gage which was below some diversions.

**Gage.**—Vertical staff on right bank, installed August 7, 1913, 250 feet below that installed May 23, 1910. Gage reader C. A. Wells. The original gage was  $2\frac{1}{2}$  miles farther downstream and 3 miles from Diamond post office.

**DISCHARGE MEASUREMENTS.**—Made from a footbridge 300 feet above present gage or by wading.

**CHANNEL AND CONTROL.**—Channel of clean gravel and sand; likely to shift. Control is a rock diversion dam at intake of Kesterson's ditch, which changes slightly in flood.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year 5.06 feet June 17 (discharge, 300 second-feet); minimum stage recorded, 1.7 feet September 20 and 21 (discharge, 4 second-feet).

1910-1917: Maximum stage recorded, 6.6 feet during night of June 7, 1912 (discharge estimated from extension of rating curve as 300 second-feet); minimum discharge, 1.0 second-feet September 1 to 4, 1911 (gage height, 1.6 feet) and July 26 to August 1, 1914 (gage height, 1.10 feet).

ICE.—No record during winter.

DIVERSIONS.—Above all diversions except one unimportant ditch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water in June. Two fairly well defined rating curves used until and after June 17, respectively. Gage, read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

*Discharge measurements of McCoy Creek near Diamond, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Fect.</i>	<i>Sec.-ft.</i>			<i>Fect.</i>	<i>Sec.-ft.</i>
Oct. 26	Batchelder and Reineking.	1.40	5.0	Apr. 22	F. F. Henshaw.....	2.80	71
Apr. 14	F. F. Henshaw.....	1.91	21.4	May 27	R. C. Briggs.....	2.62	65
				July 17	do.....	2.52	41.8

*Daily discharge, in second-feet, of McCoy Creek near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1.....		26	104	95	12	6.4	16.....	18	88	215	38	8.8	5.8
2.....		23	112	95	11	6.1	17.....	15	74	249	43	8.8	5.2
3.....		26	112	95	11	5.5	18.....	13	67	185	36	8.2	5.2
4.....		26	92	99	11	5.2	19.....	15	60	195	37	8.2	4.9
5.....		31	104	87	10	5.2	20.....	17	53	185	29	7.6	4.0
6.....		36	120	87	10	5.2	21.....	30	47	175	26	7.0	4.0
7.....		67	137	76	10	5.2	22.....	74	47	155	23	7.0	4.3
8.....		53	173	73	9.7	5.2	23.....	56	53	145	20	6.7	8.5
9.....		64	237	66	9.1	5.2	24.....	53	67	155	18	6.7	9.4
10.....		67	173	59	8.8	5.2	25.....	53	53	127	18	6.7	8.2
11.....		84	137	52	8.5	6.4	26.....	50	53	119	17	7.0	7.9
12.....		92	104	52	8.5	5.8	27.....	41	64	127	16	7.0	7.6
13.....		112	100	49	8.2	5.5	28.....	36	84	119	15	6.7	7.0
14.....	24	112	128	43	8.5	6.4	29.....	34	104	111	14	6.7	7.0
15.....	17	120	173	40	8.8	5.8	30.....	31	104	103	13	6.7	5.8
							31.....		92		13	6.4	

*Monthly discharge of McCoy Creek near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 14-30.....	74	13	33.9	1,140
May.....	120	25	66.2	4,070
June.....	249	92	146	8,690
July.....	99	13	46.6	2,870
August.....	12	6.4	8.43	518
September.....	9.4	4.0	5.97	355
The period.....				17,600

#### RIDDLE CREEK NEAR DIAMOND, OREG.

LOCATION.—In sec. 23, T. 28 S., R. 33 E., at bridge on road from Diamond to Waverly, at dam site of proposed Happy Valley reservoir, below all tributaries, 8 miles northeast of Diamond, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 27 to Sept. 30, 1917.

GAGE.—Vertical staff on abutment of highway bridge; read by Budd Kidwell.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

**CHANNEL AND CONTROL.**—Channel of mud and sand with overhanging willows; crooked. No well-defined control.

**EXTREMES OF DISCHARGE.**—Maximum stage during year 4.5 feet, probably on March 27 (discharge, 330 second-feet); minimum stage recorded 0.68 foot, July 14-15 (discharge, 3 second-feet).

**ICE.**—No records during frozen period.

**DIVERSIONS.**—A considerable area of hay land is irrigated above station.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation practically permanent until some time in summer, when rocks were piled in channel below gage; date assumed as August 13. Fairly well defined rating curves applicable before and after that date. Gage read twice a day to hundredths until July 16; every other day thereafter. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods indicated in footnote to daily-discharge table. Records good, beginning April 14; high-water records before that date are uncertain.

*Discharge measurements of Riddle Creek near Diamond, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 27	C. L. Batchelder.....	0.70	2.8	Apr. 22	F. F. Henshaw.....	2.76	139
Apr. 15	Krumholtz and Henshaw.	1.96	77	May 28	R. C. Briggs.....	2.15	89
				July 16	.....do.....	.75	4.9

*Daily discharge, in second-feet, of Riddle Creek near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1			102	71	9		8
2			110	64	9	11	7
3			110	64	9		
4			118	57	9	11	7
5			110	47	9		
6			127	46	9	10	
7			145	43	9		7
8			145	39	9		
9			127	42	5	11	7
10			127	50	5		
11			127	50	5	11	
12			127	41	4		7
13			127	32	3	10	
14		110	127	31	3		
15		74	127	26	3		7
16		60	110	26	4	10	7
17		57	110	20	4		
18		54	86	20	5	10	
19		57	86	20	5		6
20		71	86	15	8	8	
21		78	68	19	10		
22		136	64	18	9	7	6
23		163	60	16	9	7	7
24		173	145	15	9		
25		183	163	14	9	7	
26		214	102	14	9	8	7
27		330	173	102	14	9	
28		306	145	98	13	9	
29		306	110	78	12	10	7
30			110	78	6	10	
31				78		10	

NOTE.—Daily discharge for Mar. 27 to 29 based on gage readings which were not recorded until about 2 weeks later but are believed to be fairly accurate. Mean gage height, Mar. 30 to Apr. 10 estimated by observer as 3.0 feet (discharge, 163 second-feet). Mean discharge Apr. 11 to 13 interpolated as 136 second-feet. The rise of Mar. 27 occurred suddenly, the stream having been at low-water stage up to this date.

*Monthly discharge of Riddle Creek near Diamond, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
March 27-31.....	330	163	254	2,520
April.....	214	54	134	7,970
May.....	163	60	109	6,700
June.....	71	6	31.5	1,870
July.....	10	3	7.4	455
August.....	11	7	9.2	566
September.....	8	6	6.9	411
The period.....				20,500

#### SILVER CREEK ABOVE RILEY, OREG.

**LOCATION.**—In NW.  $\frac{1}{4}$  sec. 30, T. 22 S., R. 26 E., at Cecil ranch, 3 miles below Nichols Creek and 12 miles above Riley, Harney County.

**DRAINAGE AREA.**—260 square miles (measured on United States Reclamation Service maps).

**RECORDS AVAILABLE.**—April 19, 1904, to July 14, 1906; February 16 to December 12, 1909; April 6 to October 19, 1910; flood periods of 1911, 1912, and 1914-1917.

**GAGE.**—Vertical and inclined staff on right bank, one-fourth of a mile above Cecil ranch house and 100 yards above point where creek divides into three channels. Gage reader, J. C. Cecil. Different gages used 1904 to 1906 and 1909 to 1910.

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

**CHANNEL AND CONTROL.**—Bed composed of clean gravel; slightly shifting. Banks heavily covered with willows, which may affect stage-discharge relation somewhat.

**EXTREMES OF DISCHARGE.**—Maximum stage recorded during year, 6.8 feet at 7 a. m. April 26 (discharge, 642 second-feet). Minimum stage recorded 0.38 foot at time of measurement September 28 (discharge, 1.9 second-feet).

1904-1906 and 1909-1917: Maximum stage recorded, 13.95 feet on original gage, observed from high-water mark April 14, 1904 (discharge, 1,760 second-feet). Stream bed dry in August and September, 1910.

**ICE.**—Stage-discharge relation affected by ice; no record during winter.

**DIVERSIONS.**—None of importance.

**REGULATION.**—None.

**ACCURACY.**—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to tenths once daily, and extreme high-water marks during night noted. Daily discharge ascertained by applying to rating table the daily gage height or the mean of the reading and the recorded peak. Records good.

*Discharge measurements of Silver Creek above Riley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
Apr. 12	F. F. Henshaw.....	Feet. 2.31	Sec.-ft. 110	July 9	R. C. Briggs.....	Feet. 0.57	Sec.-ft. 7.8
May 21	R. C. Briggs.....	2.50	125	Sept. 28	.....do.....	.38	1.9

*Daily discharge, in second-feet, of Silver Creek above Riley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1.....		413	71	11.....	125	426	39	21.....	113	125	36
2.....		374	71	12.....	105	439	39	22.....	156	117	34
3.....		413	57	13.....	85	374	39	23.....	275	117	31
4.....		439	57	14.....	109	335	39	24.....	478	125	27
5.....	57	426	51	15.....	93	275	39	25.....	530	117	24
6.....	97	413	45	16.....	85	210	39	26.....	642	109	.....
7.....	89	478	42	17.....	74	180	39	27.....	614	109	.....
8.....	148	504	39	18.....	68	180	39	28.....	558	101	.....
9.....	109	504	39	19.....	71	152	39	29.....	478	101	.....
10.....	71	465	39	20.....	85	143	37	30.....	426	93	.....
								31.....		85	.....

NOTE.—Stream bed practically dry up to Apr. 4. Discharge estimated as 21 second-feet June 26–30.

*Monthly discharge of Silver Creek above Riley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April.....	642	0	191	11,400
May.....	504	85	269	16,500
June.....	71		38.5	2,290
The period.....				30,200

#### SILVER CREEK NEAR NARROWS, OREG.

LOCATION.—In sec. 18, T. 25 S., R. 28 E., a quarter of a mile north of house at Dunn field, 12 miles south of Riley, and 25 miles northwest of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 8 to June 22, 1917.

GAGE.—Vertical staff on right bank 200 feet below diversion dam; read by George McLaren.

DISCHARGE MEASUREMENTS.—Made from cable 100 yards below gage or by wading near gage.

CHANNEL AND CONTROL.—One channel; smooth and straight; slightly shifting. No defined control. Grass grows in channel before water ceases to flow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year 4.5 feet, April 29 and 30 (discharge, 400 second-feet); minimum stage, 1.4 feet, June 23, creek bed dry.

ICE.—No records and probably no flow during winter.

DIVERSIONS.—From 4,000 to 5,000 acres of land, mostly in wild hay, is irrigated above the station.

REGULATION.—Small amount of water is stored in dams used to subirrigate lands within a few miles above the station.

ACCURACY.—Stage-discharge relation not permanent. Fairly well defined rating curves used as follows: April 8 to May 7, May 10 to 16, and May 19 to June 23. Shifting-control method used May 8, 9, 17, and 18. Gage read to half-tenths twice a day during higher stages; once a day at other times. Daily discharge ascertained by applying mean daily gage height to rating table, except for periods indicated in footnote to daily-discharge table. Records good.

*Discharge measurements of Silver Creek near Narrows, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.	Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>			<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 13	F. F. Henshaw	3.00	98	May 5	J. P. Walkup	4.05	280
18	do.	2.44	46	10	do.	4.57	368
25	Walkup <sup>a</sup> and Henshaw	3.49	182	16	do.	4.00	251
25	F. F. Henshaw	3.81	225	19	do.	3.65	161
28	J. P. Walkup	4.40	354	23	Briggs and Henshaw	3.10	87

<sup>a</sup> Employee of William Hanley Co.

*Daily discharge, in second-feet, of Silver Creek near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Day.	Apr.	May.	June.	Day.	Apr.	May.	June.	Day.	Apr.	May.	June.
1.		375	40	11.	100	370	18	21.	37	118	2
2.		362	34	12.	98	370	16	22.	47	97	1
3.		340	23	13.	89	350	14	23.	69	85	
4.		320	23	14.	58	340	13	24.	106	97	
5.		310	23	15.	51	290	12	25.	200	91	
6.		330	23	16.	51	250	11	26.	270	91	
7.		355	23	17.	47	210	3	27.	330	80	
8.	20	350	23	18.	43	175	3	28.	375	75	
9.	90	360	23	19.	37	155	2	29.	400	75	
10.	100	370	20	20.	37	140	2	30.	400	65	
								31.		55	

NOTE.—Daily discharge from Apr. 8 to 11 estimated from information furnished by observer. Water started flowing about 6 p. m. Apr. 8; 20 second-feet added Apr. 25 to May 4 for estimated flow around gage on east side of valley. Stream bed dry before Apr. 8 and after June 22.

*Monthly discharge of Silver Creek near Narrows, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April.	400	0	102	6,070
May.	375	55	227	14,000
June.	40	0	11.7	696
The period.				20,800

**CHICKAHOMINY CREEK NEAR RILEY, OREG.**

LOCATION.—In SE.  $\frac{1}{4}$  sec. 28, T. 23 S., R. 26 E., half a mile south of Dennis Cooper's homestead on Bend-Burns road, 7 miles northwest of Riley, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—Run-off period of 1917.

GAGE.—Vertical staff driven in stream bed near left bank; gage reader, Dennis Cooper.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Channel rough. Control of heavy boulders, wide and permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.4 feet at 6 p. m. April 8, and 9 a. m. April 9 (discharge, 70 second-feet); minimum, stream bed dry.

ICE.—No flow during winter.

DIVERSIONS.—Considerable area irrigated from flood waters of creek above station.



**REGULATIONS.**—Some water from tributaries is stored in small reservoirs for watering stock.

**ACCURACY.**—Stage-discharge relation probably permanent. Rating curve poorly defined. Gage read to half-tenths once daily. Possibly some diurnal fluctuation. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

*Discharge measurements of Chickahominy Creek near Riley, Oreg., during the year ending Sept. 30, 1917.*

[Made by F. F. Henshaw.]

Date.	Gage height.	Discharge.
Apr. 11.....	<i>Feet.</i> 1.99	<i>Sec.-ft.</i> 38.4
26.....	.94	.06

*Daily discharge, in second-feet, of Chickahominy Creek near Riley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Mar.	Apr.	Day.	Mar.	Apr.	Day.	Mar.	Apr.
1.....		1.0	11.....		42	21.....		2
2.....		.1	12.....		39	22.....		2
3.....		.1	13.....		6	23.....		1
4.....		.1	14.....		4	24.....	10	1
5.....		12	15.....		2	25.....	4	1
6.....		21	16.....		2	26.....	6	.1
7.....		39	17.....		1.3	27.....	9	
8.....		70	18.....		.6	28.....	12	
9.....		70	19.....		.6	29.....	6	
10.....		53	20.....		2	30.....	2	
						31.....	2	

NOTE.—Creek bed dry until Mar. 24 and after Apr. 26. Total run-off for March, 102 acre-feet; for April, 739 acre-feet.

#### DUNN FIELD DITCH NEAR NARROWS, OREG.

**LOCATION.**—In sec. 18, T. 25 S., R. 28 E., 200 yards below intake, opposite gage on Silver Creek at Dunn Field, 25 miles northwest of Narrows, Harney County.

**RECORDS AVAILABLE.**—Irrigating period of 1917.

**GAGE.**—Vertical staff on downstream bank of canal; read by George McLaren.

**DISCHARGE MEASUREMENTS.**—Made by wading.

**CHANNEL AND CONTROL.**—Ditch about 16 feet wide; checks put across ditch to turn water out over field causes backwater extending to intake at times.

**ACCURACY.**—Stage-discharge relation not permanent; affected by backwater. Two poorly defined rating curves used. Gage read to half-tenths once daily; observer made notes of changes in check. Daily discharge determined by applying daily gage height to rating table. Records poor but of value in connection with records on Silver Creek to give total run-off of creek.

This ditch diverts water from Silver Creek in sec. 18 to irrigate a few acres of land lying west of Silver Creek; some of the water returns to creek a short distance below gage.

*Discharge measurements of Dunn Field ditch near Narrows, Oreg., during the year ending Sept. 30, 1917.*

[Made by F. F. Henshaw.]

Date.	Gage height.	Discharge.
Apr. 18.....	<i>Feet.</i> 1.30	<i>Sec.-ft.</i> 10.7
24.....	1.29	14.9
25.....	1.36	22.6

*Daily discharge, in second-feet, of Dunn Field ditch near Narrows, Oreg., for the year ending Sept. 30, 1917.*

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

NOTE.—Canal dry until Apr. 13, May 1-22, and after May 29. Total run-off, 493 acre-feet for April; 64 acre-feet for May.

**CATLOW VALLEY DRAINAGE BASIN.****HOME CREEK NEAR BECKLEY, OREG.**

LOCATION.—In NE.  $\frac{1}{4}$  sec. 10, T. 35 S., R. 32 E., at mouth of canyon, half a mile above Home Creek ranch buildings, 12 miles southeast of Beckley, and 60 miles south of Narrows, Harney County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 21 to July 31, 1911; February 10 to July 31, 1912; April 1, 1915, to June 30, 1917, when station was discontinued.

GAGE.—Vertical staff on left bank; gage reader, Judd Wise. A similar staff at practically the same location but different datum was used in 1911 and 1912.

DISCHARGE MEASUREMENTS.—Made from foot plank near gage or by wading; measuring conditions poor.

CHANNEL AND CONTROL.—Bed composed of heavy gravel and boulders; may shift in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during year, 4.5 feet during night of May 1, observed from high-water mark (discharge, 250 second-feet); minimum stage recorded, 1.8 feet October 3, 6; February 11 to 17, March 5 to 12 (discharge, 1.2 second-feet).

1911-12 and 1915-1917: Maximum stage recorded, 4.7 feet on old gage, April 27, 1912 (discharge, 330 second-feet); minimum stage recorded 1.5 feet September 8, 9, and 16, 1916 (discharge, 0.1 second-foot; very uncertain; discharge seldom reaches less than 1 second-foot).

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

DIVERSIONS.—None above station; most of the water is used for flood irrigation on hay lands of the Home Creek ranch.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Gage read to half-tenths nearly every day. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

*Discharge measurements of Home Creek near Beckley, Oreg., during the year ending Sept. 30, 1917.*

Date.	Made by—	Gage height.	Dis-charge.
		<i>Feet.</i>	<i>Sec.-ft.</i>
Oct. 26..	Batchelder and Reineking.....	1.90	2.0
Apr. 21..	F. F. Henshaw.....	2.75	37.6
May 16..	R. C. Briggs.....	3.19	81

*Daily discharge, in second-feet, of Home Creek near Beckley, Oreg., for the year ending Sept. 30, 1917.*

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1.....	2.0	2.0	2.0	2.0	2.0	1.8	4.0	205	52
2.....	2.0	2.0	2.0	2.0	2.0	2.0	4.0	71	52
3.....	1.2	2.0	2.0	2.0	2.0	3.0	4.0	71	52
4.....	1.4	2.0	2.0	2.0	2.0	1.2	4.0	71	61
5.....	1.6	2.0	2.0	2.0	2.0	1.2	4.0	71	48
6.....	1.2	2.0	2.0	2.0	2.0	1.2	4.0	82	44
7.....	1.6	3.0	2.0	1.6	2.0	1.2	3.0	88	44
8.....	2.0	2.7	2.0	1.6	2.0	1.2	2.0	88	44
9.....	2.0	2.3	2.0	1.6	2.0	1.2	2.5	93	44
10.....	2.0	2.0	2.0	1.6	1.6	1.2	3.0	104	29
11.....	3.0	2.5	2.0	1.6	1.2	1.2	2.5	104	29
12.....	3.0	3.0	2.0	1.6	1.2	1.2	2.0	110	23
13.....	3.0	3.0	2.0	1.8	1.2	1.4	7.0	115	23
14.....	2.0	3.0	2.0	2.0	1.2	1.6	24	115	23
15.....	2.0	3.0	2.0	2.0	1.2	1.6	40	115	23
16.....	2.0	3.0	2.0	2.0	1.2	1.6	40	93	23
17.....	3.0	3.0	2.0	3.0	1.2	1.6	42	104	23
18.....	3.0	3.0	2.0	4.0	1.6	1.6	44	107	20
19.....	2.5	3.0	2.0	3.0	1.6	2.0	40	110	20
20.....	2.0	3.0	2.0	2.0	1.6	2.0	.61	104	18
21.....	2.7	3.0	2.0	2.0	1.6	2.0	71	107	18
22.....	3.3	3.0	2.0	2.0	1.6	3.0	40	110	14
23.....	4.0	3.0	2.0	2.0	1.6	3.0	40	104	14
24.....	4.0	3.0	2.0	1.6	1.6	3.0	40	110	14
25.....	3.2	3.0	2.0	1.6	1.6	3.0	61	115	14
26.....	2.4	2.0	2.0	1.6	1.6	3.0	61	110	12
27.....	2.7	3.0	2.0	1.6	1.6	2.5	61	82	12
28.....	3.0	4.0	2.0	1.6	1.7	2.0	118	82	12
29.....	2.5	4.0	2.0	1.6	.....	2.0	175	61	12
30.....	2.0	4.0	2.0	1.6	.....	2.0	190	61	12
31.....	2.0	.....	2.0	1.6	.....	3.0	.....	61	.....

*Monthly discharge of Home Creek near Beckley, Oreg., for the year ending Sept. 30, 1917.*

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October.....	4.0	1.2	2.4	148
November.....	4.0	2.0	2.8	167
December.....	2.0	2.0	2.0	123
January.....	4.0	1.6	1.9	117
February.....	2.0	1.2	1.6	89
March.....	3.0	1.2	1.9	117
April.....	190	2.0	39.8	2,370
May.....	205	61	97.5	6,000
June.....	61	12	27.6	1,640
The period.....	.....	.....	.....	10,800

## MISCELLANEOUS DISCHARGE MEASUREMENTS.

Discharge measurements of streams in the Great Basin at points other than regular gaging stations, made during the year ending September 30, 1917, are listed in the following table.

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917.*

## Bear River basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i> <i>a</i> 8.03	<i>Sec.-ft.</i> 1,030
Feb. 12	Bear River.....	Great Salt Lake..	Former gaging station at Alexander, Idaho.		
June 14	Mink Creek.....	Bear River.....	Sec. 1, T. 14 S., R. 40 E., near Mink Creek, Idaho.		312
14	Oneida canal.....	Mink Creek.....	do.		42
14	Birch Creek.....	do.	do.		37
Oct. 5	Logan River.....	Little Bear River..	200 feet below Utah Power & Light Co's tailrace, NW $\frac{1}{4}$ sec. 36, T. 12 N., R. 1 E., Utah.	.97	151
6	do.	do.	do.	.98	145
7	do.	do.	do.	1.06	169
9	do.	do.	do.	1.08	168
10	do.	do.	do.	1.08	169
11	do.	do.	do.	1.14	177
12	do.	do.	do.	1.04	162
14	do.	do.	do.	1.01	153
15	do.	do.	do.	1.00	151
16	do.	do.	do.	.99	146
5	do.	do.	600 feet below Utah Power & Light Co's tailrace, NW $\frac{1}{4}$ sec. 36, T. 12 N., R. 1 E., Utah.	1.97	148
6	do.	do.	do.	1.92	146
8	do.	do.	do.	1.94	175
9	do.	do.	do.	1.97	170
10	do.	do.	do.	2.06	165
11	do.	do.	do.	2.27	181
12	do.	do.	do.	1.92	162
15	do.	do.	do.	1.92	156
16	do.	do.	do.	1.90	149
Oct. 5	do.	do.	Former gaging station below State dam, NW $\frac{1}{4}$ sec. 36, T. 12 N., R. 1 E., Utah.	1.30	150
6	do.	do.	do.	1.30	150
7	do.	do.	do.	1.33	152
7	do.	do.	do.	1.48	184
10	do.	do.	do.	1.40	170
12	do.	do.	do.	1.32	152
14	do.	do.	do.	1.33	156
16	do.	do.	do.	1.32	154
18	Blacksmith Fork...	Logan River.....	Utah Power & Light Co's plant near Hyrum, Utah, at former gaging station.	3.86	12
Jan. 11	do.	do.	do.	3.88	9.2
June 13	do.	do.	do.	5.13	309
Aug. 24	Spring Creek.....	Blacksmith Fork...	NE $\frac{1}{4}$ sec. 18, T. 11 N., R. 2 E., just below springs near Providence, Utah.		19
24	do.	do.	SW $\frac{1}{4}$ sec. 18, T. 11 N., R. 2 E., at "Little Slide" near Providence, Utah.		20
24	do.	do.	SE $\frac{1}{4}$ sec. 13, T. 11 N., R. 1 E., at the "Comb" near Providence, Utah.		18
24	do.	do.	SW $\frac{1}{4}$ sec. 13, T. 11 N., R. 1 E., at upper diversion near Providence, Utah.		19

## Weber River basin.

May 16	Thaynes Canyon Creek.	East Canyon Creek..	Above springs near Park City, Utah.		1.7
16	Hidden Spring.....	Thaynes Canyon Creek.	Near Park City, Utah.....		.3
16	Craig Spring.....	do.	do.		.4
16	Sullivan Spring.....	do.	do.		9.4
16	Hauter Spring.....	do.	do.		13
16	Hauter ditches.....	Hauter Spring.....	do.		13

<sup>a</sup> Ice cover.

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

**Jordan River basin.**

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
June 8	East Jordan canal...	Jordan River.....	Upper rating flume, NW. $\frac{1}{4}$ sec. 26 T. 4 S., R. 1 W., Utah.	.....	118
28	.....do.....	.....do.....	.....do.....	.....	155
July 7	.....do.....	.....do.....	.....do.....	.....	164
July 7	.....do.....	.....do.....	Lower rating flume, 2 miles below upper rating flume.	.....	162
June 8	Utah & Salt Lake canal.	.....do.....	Upper rating flume NE. $\frac{1}{4}$ sec. 10, T. 4 S., R. 1 W., Utah.	.....	253
28	.....do.....	.....do.....	.....do.....	.....	290
July 7	.....do.....	.....do.....	.....do.....	.....	301
7	.....do.....	.....do.....	3 miles below upper rating flume.	.....	292

**Sevier Lake basin.**

Oct. 12	Mammoth Creek.....	Sevier River.....	SE. $\frac{1}{4}$ sec. 26, T. 36 S., R. 8 W., 3 miles south of Blue Spring Fish Hatchery, $\frac{1}{4}$ mile below junction of Castle Creek and south fork of Mammoth Creek, and 30 miles southwest of Panguitch, Utah.	0.86	5.2
Aug. 30	.....do.....	.....do.....	.....do.....	1.00	5.0
Dec. 2	.....do.....	.....do.....	.....do.....	.75	4.0
Aug. 8	Sevier River.....	Sevier Lake.....	NW. $\frac{1}{4}$ sec. 9, T. 34 S., R. 5 W., below heading of old Houston canal, $3\frac{1}{2}$ miles northeast of Panguitch, Utah.	3.85	32
Sept. 7	.....do.....	.....do.....	NE. $\frac{1}{4}$ sec. 33, T. 24 S., R. 3 W., 200 feet below heading of Annabella canal, 1 mile southeast of Elsinore, Utah.	.....	1.0
Oct. 20	.....do.....	.....do.....	.....do.....	.....	8.0
Oct. 22	.....do.....	.....do.....	.....do.....	.....	28
25	.....do.....	.....do.....	.....do.....	1.08	1.8
26	.....do.....	.....do.....	.....do.....	.86	.0
30	.....do.....	.....do.....	.....do.....	.98	.5
Sept. 12	.....do.....	.....do.....	NW. $\frac{1}{4}$ sec. 31, T. 22 S., R. 1 W., above backwater of Rockyford reservoir, $\frac{1}{2}$ mile east of Sigurd, Utah.	.....	151
Oct. 5	.....do.....	.....do.....	.....do.....	.....	225
16	.....do.....	.....do.....	.....do.....	.....	186
25	.....do.....	.....do.....	.....do.....	1.45	144
31	.....do.....	.....do.....	.....do.....	1.51	156
Nov. 26	.....do.....	.....do.....	.....do.....	1.69	208
Dec. 14	.....do.....	.....do.....	.....do.....	1.64	194
Mar. 4	.....do.....	.....do.....	At Durgards bridge, near Fayette, Utah.	1.62	361
20	.....do.....	.....do.....	.....do.....	1.61	341
Sept. 23	.....do.....	.....do.....	NE. $\frac{1}{4}$ sec. 2, T. 17 S., R. 7 W., above backwater Gunnison Bend reservoir, $1\frac{1}{2}$ miles northwest of Delta, Utah.	2.00	176
Oct. 30	.....do.....	.....do.....	.....do.....	1.91	166
Oct. 11	.....do.....	.....do.....	.....do.....	.....	65
Nov. 30	.....do.....	.....do.....	.....do.....	.....	21
Oct. 20	.....do.....	.....do.....	NE. $\frac{1}{4}$ sec. 15, T. 17 S., R. 7 W., 1,000 feet below spill of Gunnison Bend reservoir, 2 miles southwest of Delta, Utah.	.....	6.0
Oct. 12	Castle Creek.....	Mammoth Creek.....	SE. $\frac{1}{4}$ sec. 22, T. 36 S., R. 8 W., 6 miles southwest of Blue Spring Fish Hatchery and 29 miles southwest of Panguitch, Utah.	.86	.3
Aug. 30	.....do.....	.....do.....	.....do.....	.....	.0
Oct. 12	Panguitch Lake feeder canal.	Blue Spring Creek.....	SE. $\frac{1}{4}$ sec. 14, T. 36 S., R. 8 W., about 1 mile below heading, 5 miles southwest of Blue Springs, and 28 miles southwest of Panguitch, Utah.	.94	5.1
Dec. 13	.....do.....	.....do.....	.....do.....	.60	3.0
Oct. 12	South Fork of Mammoth Creek.	Mammoth Creek.....	SE. $\frac{1}{4}$ sec. 27, T. 36 S., R. 8 W., 7 miles southwest of Blue Spring Fish Hatchery and 30 miles southwest of Panguitch, Utah.	.79	21
Aug. 30	.....do.....	.....do.....	.....do.....	.30	2.0

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

## Sevier Lake basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Dis-charge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Aug. 23	East Bench canal....	Long canal.....	W. $\frac{1}{2}$ sec. 2, T. 35 S., R. 5 W., 100 feet below Long canal gaging station, and $3\frac{1}{2}$ miles southeast of Panguitch, Utah.	1.50	17.0
Oct. 11	Panguitch Creek.....	Sevier River.....	NE. $\frac{1}{2}$ sec. 34, T. 35 S., R. 7 W., 100 yards below Panguitch Lake dam and 15 miles southwest of Panguitch, Utah.	.26	4.8
Aug. 30	.....do.....	.....do.....	.....do.....	1.05	61
Aug. 30	Blue Spring Creek....	Panguitch Lake.....	NW. $\frac{1}{2}$ sec. 8, T. 36 S., R. 7 W., at Blue Spring Ranger station, 23 miles southwest of Panguitch, Utah.	.68	13.0
May 16	Vaeter ditch.....	Sevier River.....	SW. $\frac{1}{2}$ sec. 10, T. 33 S., R. 5 W., 1 mile south of Orton ranch and 10 miles north of Panguitch, Utah.	.74	3.5
June 14	.....do.....	.....do.....	.....do.....		13.5
July 17	.....do.....	.....do.....	.....do.....	1.29	11.2
Aug. 6	.....do.....	.....do.....	.....do.....	1.00	7.2
Aug. 22	.....do.....	.....do.....	.....do.....	.98	7.3
Sept. 13	.....do.....	.....do.....	.....do.....	1.15	8.6
Jan. 12	East Fork of Sevier River.	.....do.....	SE. $\frac{1}{2}$ sec. 29, T. 30 S., R. 2 W., 500 feet below Otter Creek reservoir outlet weir, 12 miles east of Kingston, Utah.		29
Aug. 22	Bullion Creek.....	.....do.....	About sec. 25, T. 27 S., R. 4 W., 100 feet above Taylor ditch heading, 1 mile above Burderson ranch, and $3\frac{1}{2}$ miles southwest of Marysvale, Utah.	.92	6.6
Sept. 13	.....do.....	.....do.....	.....do.....	.95	6.8
Aug. 18	Taylor ditch.....	Bullion Creek.....	About sec. 25, T. 27 S., R. 4 W., 100 feet below ditch heading and $3\frac{1}{2}$ miles southwest of Marysvale, Utah.	.20	.7
Sept. 13	.....do.....	.....do.....	.....do.....	.24	.9
Aug. 18	Main canal.....	.....do.....	About sec. 25, T. 27 S., R. 4 W., 100 yards below Taylor ditch heading and $3\frac{1}{2}$ miles southwest of Marysvale, Utah.	.76	6.2
Aug. 18	South ditch.....	Main canal.....	About sec. 25, T. 27 S. R. 4 W., 100 feet below junction of Main canal and waste ditch, $3\frac{1}{2}$ miles southwest of Marysvale, Utah.	1.26	2.5
Sept. 13	.....do.....	.....do.....	.....do.....	1.24	2.2
Sept. 5	State canal.....	Continuation of Sevier Valley canal.	NW. $\frac{1}{2}$ sec. 3, T. 21 S., R. 1 W., end of district No. 2, about 2 miles west of Redmond, Utah.	1.70	131
Oct. 5	Abraham canal.....	Sevier River.....	SW. $\frac{1}{2}$ sec. 10, T. 17 S., R. 7 W., 600 feet below head of canal and $3\frac{1}{2}$ miles west of Delta, Utah.	4.62	16.9
16	.....do.....	.....do.....	.....do.....	4.44	15.9
26	.....do.....	.....do.....	.....do.....	4.82	22.7
Nov. 1	.....do.....	.....do.....	.....do.....	5.04	48.5
May 6	.....do.....	.....do.....	.....do.....	6.80	93
13	.....do.....	.....do.....	.....do.....	5.56	76
27	.....do.....	.....do.....	.....do.....	6.32	77
June 3	.....do.....	.....do.....	.....do.....	6.04	60
10	.....do.....	.....do.....	.....do.....	6.75	101
17	.....do.....	.....do.....	.....do.....	6.72	94
24	.....do.....	.....do.....	.....do.....	6.46	77
July 1	.....do.....	.....do.....	.....do.....	6.64	82
8	.....do.....	.....do.....	.....do.....	7.02	108
22	.....do.....	.....do.....	.....do.....	7.41	131
29	.....do.....	.....do.....	.....do.....	6.68	107
Aug. 19	.....do.....	.....do.....	.....do.....	6.72	76
26	.....do.....	.....do.....	.....do.....	6.89	95
Sept. 2	.....do.....	.....do.....	.....do.....	5.56	44
9	.....do.....	.....do.....	.....do.....	5.27	48
16	.....do.....	.....do.....	.....do.....	6.57	68
23	.....do.....	.....do.....	.....do.....	6.41	51
29	.....do.....	.....do.....	.....do.....	5.56	35

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

## Sevier Lake basin—Continued.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Nov. 1	Midland canal.....	Abraham canal.....	SW. $\frac{1}{4}$ sec. 10, T. 17 S., R. 7 W., 75 feet below head of canal and 3 $\frac{1}{2}$ miles west of Delta, Utah.	3.73	2.5
Apr. 29	do	do	do	4.75	12.0
May 5	do	do	do	4.80	12.0
13	do	do	do	5.10	16.0
27	do	do	do	5.00	14.0
June 6	do	do	do	4.90	13.0
10	do	do	do	4.80	9.2
17	do	do	do	5.10	14.0
24	do	do	do	5.01	7.3
July 7	do	do	do	5.00	8.7
22	do	do	do	4.55	6.5
Aug. 19	do	do	do	4.40	7.8
26	do	do	do	4.35	7.0
Sept. 2	do	do	do	4.40	9.7
9	do	do	do	4.70	11.0
16	do	do	do	4.70	8.0
23	do	do	do	4.70	7.0
Oct. 5	Deseret high - line canal.	Sevier River.....	Sec. 15, T. 17 S., R. 7 W., 400 feet below head of canal and 3 miles west of Delta, Utah.	4.28	12
16	do	do	do	3.38	5
26	do	do	do	4.04	17
Nov. 1	do	do	do	4.41	25
Apr. 9	do	do	do	4.88	56
May 6	do	do	do	5.58	104
13	do	do	do	5.20	95
27	do	do	do	4.88	53
June 3	do	do	do	4.94	44
10	do	do	do	5.85	87
17	do	do	do	5.65	65
24	do	do	do	5.86	56
July 1	do	do	do	6.20	66
15	do	do	do	6.41	120
22	do	do	do	6.22	107
29	do	do	do	5.02	39
Aug. 14	do	do	do	5.28	52
19	do	do	do	5.73	78
26	do	do	do	6.15	105
Sept. 2	do	do	do	4.68	28
16	do	do	do	4.78	37
23	do	do	do	4.72	28
29	do	do	do	4.81	35
Oct. 5	Deseret canal.	do	SE. $\frac{1}{4}$ sec. 15, T. 17 S., R. 7 W., 300 feet below head of canal and 2 $\frac{1}{2}$ miles west of Delta, Utah.	4.67	36
16	do	do	do	4.53	18
26	do	do	do	4.75	38
Nov. 1	do	do	do	4.75	37
18	do	do	do	4.71	30
Apr. 29	do	do	do	4.48	43
May 6	do	do	do	4.56	85
13	do	do	do	4.66	112
27	do	do	do	4.24	66
June 3	do	do	do	4.12	59
10	do	do	do	4.32	73
17	do	do	do	4.25	62
24	do	do	do	4.25	52
July 1	do	do	do	4.62	77
8	do	do	do	5.18	118
15	do	do	do	5.23	102
22	do	do	do	5.12	79
29	do	do	do	4.93	79
Aug. 5	do	do	do	4.55	51
19	do	do	do	4.70	65
26	do	do	do	4.53	59
Sept. 2	do	do	do	4.50	58
9	do	do	do	4.25	54
16	do	do	do	4.65	67
23	do	do	do	4.88	69
9	do	do	do	4.88	16

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

**Beaver River basin.**

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
1916.					
Dec. 13	Beaver River.....	Beaver Lake.....	Just below Rocky Ford dam, 5 miles east of Minersville, Utah.		3.9
Nov. 26	.....do.....	.....do.....	Below flume of Minersville south side canal, 3 miles east of Minersville, Utah.		44
Dec. 13	.....do.....	.....do.....	.....do.....		8.0
Nov. 25	.....do.....	.....do.....	Below head of Gillins and Dobson canal at Minersville, Utah.		26
26	.....do.....	.....do.....	.....do.....		44
Dec. 13	.....do.....	.....do.....	.....do.....		8.4
Nov. 25	.....do.....	.....do.....	Below head of Beaver County Irrigation Co. canal just below Minersville, Utah.		21
26	.....do.....	.....do.....	.....do.....		25
Dec. 13	.....do.....	.....do.....	.....do.....		6.8
Nov. 26	.....do.....	.....do.....	Just above flume of project canal, 8 miles south of Milford, Utah.		20
Dec. 13	.....do.....	.....do.....	.....do.....		2.5
Nov. 26	.....do.....	.....do.....	2 miles southeast of Milford, Utah.		14
25	Minersville south side canal.	Beaver River.....	Just below head of canal 3 miles east of Minersville, Utah.		2.8
26	.....do.....	.....do.....	.....do.....		2.8
Dec. 13	.....do.....	.....do.....	.....do.....		2.6
Nov. 25	Gillins and Dobson south side canal.	.....do.....	Head of canal at Minersville, Utah.		1.7
26	.....do.....	.....do.....	.....do.....		1.7
Dec. 13	.....do.....	.....do.....	.....do.....		.4
Nov. 25	Beaver County Irrigation Co.'s canal.	.....do.....	Head of canal just below Minersville, Utah.		1.0
26	.....do.....	.....do.....	.....do.....		15
Dec. 13	.....do.....	.....do.....	.....do.....		.4
1917.					
Aug. 1	Cedar City Power Co.'s tailrace.	Coal Creek.....	Cedar City, Utah.....		5.5

**Minor basins in Nevada.**

June 12	Big Warm Spring Creek.	Duckwater Creek ..	Former gaging station maintained in 1916. 1 mile south of Duckwater, Nye County.	.....	14
12	.....do.....	.....do.....	.....do.....	.....	14
1	Lutz and Myers Creek	Franklin Lake.....	Sec. 8, T. 30 N., R. 59 E., 4 miles northeast of Ruby post office, Elko County, Nev.	.....	40
2	Hankins Creek.....	.....do.....	Sec. 27, T. 29 N., R. 53 E., 7 miles southwest of Ruby post office, Elko County, Nev.	.....	14
Sept. 19	Cave Creek.....	Ruby Lake.....	Sec. 24, T. 27 N., R. 57 E., 2 miles north of Cave Creek post office, Elko County, Nev.	.....	4.3
Apr. 6	Trout Creek.....	Pahrump Valley....	Mouth of canyon near Pahrump, Nev. Gage set with zero at elevation of crest of 2-foot Cipoletti weir.	0.60	1.8
20	.....do.....	.....do.....	.....do.....	.65	2.2
27	.....do.....	.....do.....	.....do.....	.70	2.7
May 8	.....do.....	.....do.....	.....do.....	.44	2.0
11	.....do.....	.....do.....	.....do.....	.45	2.0
17	.....do.....	.....do.....	.....do.....	.45	2.0
24	.....do.....	.....do.....	.....do.....	.43	1.9
June 1	.....do.....	.....do.....	.....do.....	.43	1.9
8	.....do.....	.....do.....	.....do.....	.42	1.8
15	.....do.....	.....do.....	.....do.....	.40	1.7
22	.....do.....	.....do.....	.....do.....	.40	1.7
30	.....do.....	.....do.....	.....do.....	.35	1.4
July 6	.....do.....	.....do.....	.....do.....	.34	1.3
13	.....do.....	.....do.....	.....do.....	.34	1.3
20	.....do.....	.....do.....	.....do.....	.33	1.3
27	.....do.....	.....do.....	.....do.....	.33	1.3
Aug. 3	.....do.....	.....do.....	.....do.....	.33	1.3
10	.....do.....	.....do.....	.....do.....	.33	1.3



*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

**Minor basins in Nevada.**

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Aug. 17	Trout Creek.....	Pahrump Valley...	Mouth of canyon near Pahrump, Nev. Gage set with zero at elevation of crest of 2-foot Cipolletti weir.	0.32	1.2
24	do.....	do.....	do.....	.32	1.2
31	do.....	do.....	do.....	.33	1.3
Sept. 7	do.....	do.....	do.....	.31	1.2
14	do.....	do.....	do.....	.29	1.0
21	do.....	do.....	do.....	.28	1.0
28	do.....	do.....	do.....	.27	.94
Oct. 5	do.....	do.....	do.....	.28	1.0
May 13	Pahrump Valley Creek.....	do.....	Mouth of canyon near Pahrump, Nev.	1.90	22.3
18	do.....	do.....	do.....	1.90	22.4
24	do.....	do.....	do.....	1.86	21.6
31	do.....	do.....	do.....	1.81	19.4
June 8	do.....	do.....	do.....	1.76	17.7
15	do.....	do.....	do.....	1.71	16.6
22	do.....	do.....	do.....	1.62	14.0
29	do.....	do.....	do.....	.....	11.7
July 6	do.....	do.....	do.....	1.46	10.4
13	do.....	do.....	do.....	1.40	9.2
20	do.....	do.....	do.....	1.44	9.6
27	do.....	do.....	do.....	1.38	8.5
Aug. 3	do.....	do.....	do.....	1.36	8.2
10	do.....	do.....	do.....	1.22	5.7
17	do.....	do.....	do.....	1.18	4.9
24	do.....	do.....	do.....	1.14	4.5
31	do.....	do.....	do.....	1.06	3.4
Sept. 7	do.....	do.....	do.....	1.02	3.0
14	do.....	do.....	do.....	1.00	2.4
21	do.....	do.....	do.....	.....	1.9
28	do.....	do.....	do.....	.94	1.3
Oct. 5	do.....	do.....	do.....	.....	.6

**Walker River basin.**

June 24	Strosnider and Fish canal.	East Walker River.	Sec. 9, T. 11 N., R. 26 E., 1 mile below head of canal and 14 miles southeast of Mason, Lyon County, Nev.	.....	9.8
24	Strosnider canal.....	do.....	Road crossing near head of canal and half a mile below gaging station on East Walker River above Mason Valley, Lyon County, Nev.; canal on right bank.	.....	2.4
24	do.....	do.....	Canal on left bank at same location.	.....	5.2

**Humboldt-Carson Sink basin.**

June 22	Snow Shoe Thompson canal.	West Carson River.	Sec. 34, T. 11 N., R. 19 E., half a mile below head of canal and one-fourth of a mile east of Woodfords, Alpine County, Calif.	.....	7.8
22	Millick canal.....	do.....	do.....	.....	8.5
22	Ellis & Dudley canal.....	do.....	do.....	.....	10
Nov. 9	Humboldt River....	Humboldt Sink....	Sec. 29, T. 33 N., R. 35 E., 50 feet below diversion dam of Humboldt-Lovelocks Irrigation, Light & Power Co. feeder canal and 2 miles north of Mill City, Humboldt County, Nev.	.....	11
Sept. 18	Starr Creek.....	Humboldt River....	Sec. 35, T. 37 N., R. 59 E., just above confluence with Humboldt River and 1 mile southeast of Deeth, Elko County, Nev.	.....	7.4
4	Upper canal.....	Lamoille Creek.....	Sec. 6, T. 32 N., R. 58 E., 100 feet below head of canal and 2 miles south of Lamoille, Elko County, Nev.	.....	18

*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.***Humboldt-Carson Sink basin—Continued.**

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
July 5	Unnamed slough....	Lamoille Creek.....	500 feet north of gaging station on Lamoille Creek near Halleck, Nev. Overflow channel.	.....	22
June 28	Jenkins canal.....	Rock Creek.....	Sec. 7, T. 37 N., R. 47 E., 200 feet below head of canal at Rock Creek ranch, 35 miles north of Battle Mountain, Lander County, Nev.	.....	6.1
14	Reese River.....	Humboldt River....	Line between Lander County and Nye County, 30 miles southwest of Austin, Nev.	.....	134
14	.....do.....	.....do.....	Malloy's ranch near Leadly, Nev.	.....	22
13	Big Creek.....	Reese River.....	Former gaging station near Austin, Lander County, Nev.	1.20	22

**Carson River basin.**

July 25	Hangman Creek.....	East Fork of Carson River.	Mouth, near Markleeville, Calif..	.....	.5
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**Honey Lake basin.**

Dec. 27	Long Valley Creek...	Honey Lake.....	Proposed dam site near Scotts, Calif.	.....	48
28	.....do.....	.....do.....	Near Red Rock, between dam site and Constantia, Calif.	.....	104
28	.....do.....	.....do.....	Mouth below Doyle, Calif.	.....	0
28	Warm Springs.....	Long Valley Creek..	Near Scotts, Calif., 800 feet below springs.	.....	3.1
Sept. 12	Ramsey ditch.....	Diverts from Susan River.	Gaging station on Susan River near Susanville, Calif.	.....	5
Apr. 6	Red Rock Creek.....	.....do.....	Sec. 15, T. 36 N., R. 16 E.	.....	4.8
June 6	.....do.....	.....do.....	.....do.....	.....	10.6
28	.....do.....	.....do.....	.....do.....	.....	2.1
June 6	.....do.....	.....do.....	.....do.....	.....	10.6
28	.....do.....	.....do.....	.....do.....	.....	2.1
July 28	.....do.....	.....do.....	.....do.....	.....	0
Apr. 9	.....do.....	.....do.....	.....do.....	.....	55.5
Feb. 15	Susan River.....	Honey Lake.....	Near Dewitt, Calif.	.....	49.2
Mar. 27	.....do.....	.....do.....	.....do.....	.....	175
May 1	.....do.....	.....do.....	.....do.....	.....	269
17	.....do.....	.....do.....	.....do.....	.....	125
28	.....do.....	.....do.....	.....do.....	.....	23.9
June 7	.....do.....	.....do.....	.....do.....	.....	11.3
Apr. 6	.....do.....	.....do.....	Near Standish, Calif.	.....	673
19	.....do.....	.....do.....	.....do.....	.....	201
26	.....do.....	.....do.....	.....do.....	.....	698
May 16	.....do.....	.....do.....	.....do.....	.....	166
28	.....do.....	.....do.....	.....do.....	.....	79.4
June 6	.....do.....	.....do.....	.....do.....	.....	93.7
17	.....do.....	.....do.....	.....do.....	.....	41.4
May 20	.....do.....	.....do.....	Above McCoy Flat reservoir, sec. 9, T. 30 N., R. 9 E., near Westwood, Calif.	.....	43
27	.....do.....	.....do.....	.....do.....	.....	56
June 4	.....do.....	.....do.....	.....do.....	.....	110
10	.....do.....	.....do.....	.....do.....	.....	110
19	.....do.....	.....do.....	.....do.....	.....	31

**Abert Lake basin.**

Apr. 30	Ana River.....	Summer Lake.....	SE. $\frac{1}{4}$ sec. 6, T. 30 S., R. 17 E., near Summer Lake, Oreg.	.....	132
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*Miscellaneous discharge measurements in Great Basin during the year ending Sept. 30, 1917—Continued.*

## Malheur Lake basin.

Date.	Stream.	Tributary to or diverting from—	Locality.	Gage height.	Discharge.
				<i>Feet.</i>	<i>Sec.-ft.</i>
Apr. 16	Silvies River .....	Malheur Lake .....	Burns-Canyon City road, Oreg. ....		313
Apr. 16	Whiting Slough .....	Effluent from Silvies River. ....	.....do.....		24.3
Apr. 16	Foley Slough .....	.....do.....	.....do.....		41.1
Apr. 15	East Fork of Silvies River. ....	.....do.....	Near Lawen, Oreg. ....		54
May 18	.....do.....	.....do.....	.....do.....		260
May 29	.....do.....	.....do.....	.....do.....		93

## Harney Lake basin.

Oct. 28	"OO" spring .....	Harney Lake .....	Sec. 34, T. 26 S., R. 28 E., Oreg. ....		16.4
Apr. 18	.....do.....	.....do.....	.....do.....		14.1
May 22	.....do.....	.....do.....	.....do.....		16.0
Oct. 28	"OO" barnyard spring. ....	.....do.....	Sec. 36, T. 26 S., R. 28 E., Oreg. ....		7.9
Apr. 19	.....do.....	.....do.....	.....do.....		6.0
May 22	.....do.....	.....do.....	.....do.....		5.7
Oct. 28	East "OO" spring .....	.....do.....	.....do.....		1.8
Apr. 19	.....do.....	.....do.....	.....do.....		2.3
Oct. 28	Johnson spring .....	.....do.....	Sec. 6, T. 27 S., R. 29 E., Oreg. ....		1.3
May 22	.....do.....	.....do.....	.....do.....		1.7
Oct. 28	Hughet spring .....	.....do.....	Flume at head .....		14.5
Apr. 19	.....do.....	.....do.....	Hurlburt place .....		13.3
May 22	.....do.....	.....do.....	Flume at head .....		12.0
Oct. 28	.....do.....	.....do.....	Sizemore's head gate, in sec. 10, T. 27 S., R. 29 E., Oreg. ....		12.2
May 22	.....do.....	.....do.....	.....do.....		3.4
Oct. 28	Upper Sizemore spring. ....	.....do.....	Sec. 9, T. 27 S., R. 29 E., Oreg. ....		1.2
May 22	.....do.....	.....do.....	.....do.....		2.8
Oct. 28	Lower Sizemore spring. ....	.....do.....	NW. $\frac{1}{4}$ sec. 15, T. 27 S., R. 29 E., Oreg. ....		1.3
May 22	.....do.....	.....do.....	.....do.....		1.6
May 22	"OO" drainage canal. ....	.....do.....	About sec. 3, T. 27 S., R. 29 E., Oreg. ....		14.2
May 22	.....do.....	.....do.....	Near Harney Lake .....		2.0
May 23	Silver Creek .....	.....do.....	Above "OO" lane, sec. 28, T. 26 S., R. 29 E., Oreg. ....		27.7
May 23	Jetley ditch .....	Diverts from Silver Creek. ....	Intake, SW. $\frac{1}{4}$ sec. 27, T. 26 S., R. 29 E., Oreg. ....		16.0
May 21	Spring .....	Silver Creek .....	Cecil ranch, above Riley, Oreg. ....		.6

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**STREAM-GAGING STATIONS**  
**AND**  
**PUBLICATIONS RELATING TO WATER RESOURCES**

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**PART X.—THE GREAT BASIN**

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# 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 water. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, professional papers, monographs, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below.

- Part I. North Atlantic slope basins.
- II. South Atlantic slope and eastern Gulf of Mexico basins
- III. Ohio River basin.
- IV. St. Lawrence River basin.
- V. Upper Mississippi River and Hudson Bay basins
- VI. Missouri River basin.
- VII. Lower Mississippi River basin.
- VIII. Western Gulf of Mexico basins.
- IX. Colorado River basin.
- X. Great Basin.
- XI. Pacific slope basins in California.
- XII. North Pacific slope basins, in three volumes:
  - A. Pacific slope basins in Washington and upper Columbia River basin.
  - B. Snake River basin.
  - C. Lower Columbia River basin and Pacific slope basins in Oregon.

## HOW GOVERNMENT REPORTS MAY BE OBTAINED OR CONSULTED.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below.

1. Copies may be obtained free of charge by applying to the Director of the Geological Survey, Washington, D. C. The edition printed for free distribution is, however, small and is soon exhausted.

2. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will furnish lists giving prices.

3. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

4. Complete sets are available for consultation in the local offices of the water-resources branch of the Geological Survey, as follows:

Boston, Mass., 2500 Customhouse.  
Albany, N. Y., Room 704, Journal Building.  
Harrisburgh, Pa., care of Water Supply Commission.  
Asheville, N. C., 32-35 Broadway.  
Chattanooga, Tenn., Temple Court Building.  
Madison, Wis., care of Railroad Commission of Wisconsin.  
Chicago, Ill., 1404 Kimball Building.  
Ames, Iowa, care of State Highway Commission.  
Boise, Idaho, 615 Idaho Building.  
Idaho Falls, Idaho, 228 Federal Building.  
Helena, Mont., Montana National Bank building.  
Topeka, Kans., 23 Federal Building.  
Austin, Tex., Capitol Building.  
Denver, Colo., 403 New Post Office Building.  
Tuscon, Ariz., University of Arizona.  
Salt Lake City, Utah, 313 Federal Building.  
Tacoma, Wash., 406 Federal Building.  
Portland, Oreg., 606 Post Office Building.  
San Francisco, Calif., 328 Customhouse.  
Los Angeles, Calif., 619 Federal Building.  
Honolulu, Hawaii, 25 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 4,240 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.....	1884 to Sept., 1890.
11th A, pt. 2.....	Monthly discharge and descriptive information.....	1884 to June 30, 1891.
12th A, pt. 2.....	.....do.....	1884 to Dec. 31, 1892.
13th A, pt. 3.....	Mean discharge in second-feet.....	1888 to Dec. 31, 1893.
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.....	1895.
B 140.....	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1896.
W 11.....	Gage heights (also gage heights for earlier years).....	1895 and 1896.
18th A, pt. 4.....	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1897.
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. 4.....	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1898.
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.
20th A, pt. 4.....	Monthly discharge (also for many earlier years).....	1898.
W 35 to 39.....	Descriptions, measurements, gage heights, and ratings.....	1899.
21st A, pt. 4.....	Monthly discharge.....	1899.
W 47 to 52.....	Descriptions, measurements, gage heights, and ratings.....	1900.
22d A, pt. 4.....	Monthly discharge.....	1900.
W 65, 66.....	Descriptions, measurements, gage heights, and ratings.....	1901.
W 75.....	Monthly discharge.....	1901.
W 82 to 85.....	Complete data.....	1902.
W 97 to 100.....	.....do.....	1903.
W 124 to 135.....	.....do.....	1904.
W 165 to 178.....	.....do.....	1905.
W 201 to 214.....	.....do.....	1906.
W 241 to 252.....	.....do.....	1907-8.
W 261 to 272.....	.....do.....	1909.
W 281 to 292.....	.....do.....	1910.
W 301 to 312.....	.....do.....	1911.
W 321 to 332.....	.....do.....	1912.
W 351 to 362.....	.....do.....	1913.
W 381 to 394.....	.....do.....	1914.
W 401 to 414.....	.....do.....	1915.
W 431 to 444.....	.....do.....	1916.
W 451 to 464.....	.....do.....	1917.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

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 which follows gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1917. 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, Maine, 1903 to 1917, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, and 451, which

contain records for the New England streams from 1903 to 1917. 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 lake surfaces and local changes in name are disregarded. All stations from the source to the mouth of the main stem of the river are presented first, and the tributaries in 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 taken up in order of streams around the rim of the lake.

Numbers of water supply papers containing results of stream measurements, 1899-1917.

Year.	I North Atlantic slope basins (St. John River to York River).	II South Atlantic and eastern Gulf of Mexico basins (James River to the Mississippi).	III Ohio River basin.	IV St. Lawrence River and Great Lakes basins.	V Hudson Bay and upper Mississippi River basins.	VI Missouri River basin.	VII Lower Mississippi River basin.	VIII Western Gulf of Mexico basins.	IX Colorado River basin.	X Great Basin.	XI Pacific slope basins in California.	XII North Pacific slope basins. Pacific slope basins in Washington and upper Columbia River basin.	Slope basins in 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, 39	38, e 39	38	38
1900 g.....	47, h 48	45, i 49	45	49	49	49, j 50	50	50	50	51	51	51	51
1901.....	65, 75	65, 75	65, 75	65, 75	65, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902.....	82	b 82, 83	83	i 82, 83	k 83, 84	k 83, 84	k 83, 84	84	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
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
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
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
1907-8.....	241	242	243	244	245	246	247	248	249	250, r 251	251	252	252
1909.....	261	262	263	264	265	266	267	268	269	270, r 271	271	272	272
1910.....	281	282	283	284	285	286	287	288	289	290	291	292	292
1911.....	301	302	303	304	305	306	307	308	309	310	311	312	312
1912.....	321	322	323	324	325	326	327	328	329	330	331	332-A	332-B
1913.....	351	352	353	354	355	356	357	358	359	360	361	362-A	362-B
1914.....	381	382	383	384	385	386	387	388	389	390	391	392	393
1915.....	401	402	403	404	405	406	407	408	409	410	411	412	413
1916.....	431	432	433	434	435	436	437	438	439	440	441	442	443
1917.....	451	452	453	454	455	456	457	458	459	460	461	462	464

a Rating tables and index to Water-Supply Papers 35-39 contained in Water Supply Paper 39. Tables for monthly discharge for 1899 in Twenty-first Annual Report, Part IV.  
 b James River only.  
 c Gallatin River.  
 d Gallatin River.  
 e Monavie 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 discharge rates for 1900 in Twenty-second Annual Report, Part IV.  
 h Wisconsin and Schuykill rivers to James River.  
 i Seboto 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 Sacramento River to Yadin 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.

## PART X. THE GREAT BASIN.

### PRINCIPAL DIVISIONS.

The Great Basin is made up of a number of minor basins whose streams do not discharge into the ocean. The largest of these minor basins are the depressions that hold Great Salt Lake, Sevier Lake, Humboldt Sink, Truckee, Walker, Carson, and Owens rivers, and Honey, Mono, Malheur, Harney, Warner, Abert, Summer, and Silver lakes. The streams in this section drain wholly or in part the States of California, Idaho, Nevada, Oregon, Utah, and Wyoming.

In addition to the list of gaging stations and the annotated list of publications relating specifically to the section, these pages contain a similar list of reports that are of general interest in many sections and cover a wide range of hydrologic subjects, and also brief references to reports published by State and other organizations (see p. xxvi).

### GAGING STATIONS.

NOTE.—Dash after a date indicates that station was being maintained September 30, 1917. Period after a date indicates discontinuance.

#### GREAT SALT LAKE BASIN.

Great Salt Lake at Saltair, Utah, 1904; 1912—

Great Salt Lake at Midlake, Utah, 1912—

Great Salt Lake at Garfield Beach gage, Utah, 1875–1899.

Bear River near Evanston, Wyo., 1913—

Bear River near Harer, Idaho, 1913–1916.

Bear River at Dingle, Idaho, 1903–1914.

Bear River at Soda Springs, Idaho, 1896.

Bear River at Alexander, Idaho, 1911–1916.

Bear River near Preston, Idaho, 1889—

Bear River near Collinston, Utah, 1889—

Bear (Mud) Lake inlet canal near Dingle, Idaho, 1911–1913.

Bear Lake at Fishaven, Idaho, 1903–1906.

Georgetown Creek near Georgetown, Idaho, 1911–1914.

Soda Creek near Soda Springs, Idaho, 1913—

Cub Creek near Franklin, Idaho, 1900–1901.

#### Little Bear River:

Logan River above State dam, near Logan, Utah, 1913—

Logan River near Logan, Utah, 1896–1912.

Logan River below State dam, near Logan, Utah, 1913–14.

Logan River below Logan Northern canal, near Logan, Utah, 1915–1917.

Utah Power & Light Co.'s tailrace near Logan, Utah, 1913—

Logan, Hyde Park, and Smithfield canal near Logan, Utah, 1904–1907; 1909—

## Great Salt Lake tributaries—Continued.

## Bear River tributaries—Continued.

## Little Bear River tributaries—Continued.

## Logan River tributaries—Continued.

Logan Northern canal near Logan, Utah, 1913-1916.

Blacksmith Fork above Utah Power & Light Co.'s dam, near Hyrum, Utah, 1900-1902; 1913-

Blacksmith Fork at Utah Power & Light Co.'s plant, near Hyrum, Utah, 1914-1916.

Blacksmith Fork below Utah Power & Light Co.'s plant, near Hyrum, Utah, 1904-1910; 1914-1916.

Hyrum city power canal (Blacksmith Fork power-plant race) near Hyrum, Utah, 1904-1910; 1914-1917.

West Side canal near Collinston, Utah, 1912-

Hammond (East Side) canal near Collinston, Utah, 1912-

Little Malad River near Malad, Idaho, 1911-1913.

Box Elder Creek at Brigham, Utah, 1909-1912.

Weber River near Oakley, Utah, 1904-

Weber River at Devils Slide (Croydon), Utah, 1905-

Weber River near Uinta, Utah, 1889-1903.

Weber River near Plain City, Utah, 1903-

Chalk Creek at Coalville, Utah, 1904-5.

Lost Creek near Croydon, Utah, 1905.

Ogden River at upper end of canyon, near Ogden, Utah, 1895-6.

Ogden River at Utah Light & Railway Co.'s dam, near Ogden, Utah, 1904-1912.

Ogden River at powder mill, near Ogden, Utah, 1889-90; 1897-1899.

Mill Creek near Bountiful, Utah, 1913-14.

Jordan River near Lehi, Utah, 1904; 1913-

Utah Lake near Spanish Fork, Utah, 1889-1896.

Utah Lake at Geneva, near outlet, Utah, 1896-1900.

Summit Creek near Santaquin, Utah, 1905; 1910-1916.

Peteetneet Creek near Payson, Utah, 1910-1916.

Spanish Fork at Thistle, Utah, 1907-

Spanish Fork near Spanish Fork (Mapleton), Utah, 1900-1901; 1903-1917.

Spanish Fork at Lake Shore, Utah, 1903-1907; 1909-

Diamond Fork near Thistle, Utah, 1907-1917.

United State Reclamation Service power canal near Spanish Fork, Utah, 1909-1917.

Hobble Creek near Springville, Utah, 1904-1916.

Maple Creek near Springville, Utah, 1910-1913.

Provo River at Forks, Utah, 1911-

Provo River above Telluride Power Co.'s dam, near Provo, Utah, 1905-1911.

Provo River at mouth of canyon, near Provo, Utah, 1889-1906.

Provo River at Denver & Rio Grande Railroad bridge, near Provo, Utah, 1905.

Provo River at San Pedro, Los Angeles & Salt Lake Railroad bridge, near Provo, Utah, 1903-4.

South Fork of Provo River at Forks, Utah, 1911-

American Fork above South Fork, near American Fork, Utah, 1912-1915.

American Fork near American Fork, Utah, 1900-1901; 1903-1905.

South Fork of American Fork near American Fork, Utah, 1912-1915.

Little Cottonwood Creek near Salt Lake City, Utah, 1898-1913.

Big Cottonwood Creek near Salt Lake City, Utah, 1898-1913.



## Great Salt Lake—Continued.

## Jordan River tributaries—Continued.

Mill Creek near Salt Lake City, Utah, 1898-1913.

Parleys Creek near Salt Lake City, Utah, 1898-1913.

Emigration Creek near Salt Lake City, Utah, 1898-1913.

City Creek near Salt Lake City, Utah, 1898-1913.

## SEVIER LAKE BASIN.

Mammoth Creek (head of Sevier River) near Hatch, Utah, 1912; 1913-14; 1915-

Sevier River at Hatch, Utah, 1911-

Sevier River near Panguitch, Utah, 1914.

Sevier River below Old Houston canal near Panguitch, Utah, 1916.

Sevier River near Circleville, Utah, 1912; 1914-

Sevier River near Kingston, Utah, 1914-

Sevier River near Junction, Utah, 1911; 1912-1916.

Piute reservoir near Marysvale, Utah, 1914-

Sevier River below Piute dam, near Marysvale, Utah, 1911; 1912-

Sevier River at Pitts ranch, near Marysvale, Utah, 1906-1911.

Sevier River at Marysvale, Utah, 1912-1914.

Sevier River at Sevier, Utah, 1911-

Sevier River near Richfield, Utah, 1916-

Sevier River at Joseph, Utah, 1889.

Sevier River near Vermilion, Utah, 1912; 1914-

Sevier River near Gunnison, Utah, 1900-

Sevier River at Clarks bridge, near Fayette, Utah, 1914-1916.

Sevier River at McArtie's Ford, near Fayette, Utah, 1914; 1915.

Sevier Bridge reservoir near Juab, Utah, 1914-

Sevier River near Juab, Utah, 1911-

Sevier River near Mills, Utah, 1914-

Sevier River at Leamington, Utah, 1889-1898; 1912-1914.

Sevier River near Lynndyl, Utah, 1914-

Delta and Melville reservoir near Delta, Utah, 1914-

Sevier River near Delta, Utah, 1912; 1913-

Gunnison Bend reservoir near Delta, Utah, 1914-

Sevier River at Oasis, Utah, 1913-

Hatch Bench canal near Hatch, Utah, 1914; 1916-

Assay Creek near Hatch, Utah, 1912; 1913-14.

State canal near Panguitch, Utah, 1913; 1914-

Long canal near Panguitch, Utah, 1914-

East Panguitch canal near Panguitch, Utah, 1914-

Panguitch Creek above canals near Panguitch, Utah, 1915-

Panguitch Creek below canals at Panguitch, Utah, 1915; 1917-

Barton and LeFevre canal near Panguitch, Utah, 1915-

McEwen canal near Panguitch, Utah, 1914-

Old Houston canal near Panguitch, Utah, 1915-

Fox canal near Circleville, Utah, 1914-

Circleville canal near Circleville, Utah, 1914-

Old Kingston canal near Circleville, Utah, 1914-

Dalton canal at Circleville, Utah, 1914-

Mitchels Slough:

Mitchels Slough canal near Junction, Utah, 1914-

Junction middle canal near Junction, Utah, 1915-

East Fork of Sevier River at Coyoto, Utah, 1914-

East Fork of Sevier River above Otter Creek, near Coyoto, Utah, 1915-16.

East Fork of Sevier River near Kingston, Utah, 1912-

## Sevier River tributaries—Continued.

## East Fork of Sevier River, tributaries—Continued.

- Coyoto canal near Coyoto, Utah, 1916—
- Otter Creek above reservoir, near Coyoto, Utah, 1915—
- Otter Creek reservoir near Coyoto, Utah, 1914.
- Otter Creek near Coyoto, Utah, 1913—
- Otter Creek reservoir feeder canal at head near Coyoto, Utah, 1914—
- Otter Creek reservoir feeder canal at mouth near Coyoto, Utah, 1915—
- Kingston canal at Kingston, Utah, 1914—
- Pine Creek at Marysvale, Utah, 1914.
- Clear Creek at Sevier, Utah, 1912—
- Cove canal at Sevier, Utah, 1914—
- Monroe South Bend canal near Joseph, Utah, 1914—
- Sevier Valley canal near Joseph, Utah, 1912—
- Sevier Valley canal at Elsinore, Utah, 1913.
- Sevier Valley canal near Richfield, Utah, 1912—
- State canal near Vermilion, Utah, 1913.
- State canal near Aurora, Utah, 1913.
- State canal near Salina, Utah, 1918.
- State canal near Redmond, Utah, 1913—
- Joseph canal near Joseph, Utah, 1914—
- Wells canal near Joseph, Utah, 1914—
- Monroe canal near Elsinore, Utah, 1914—
- Elsinore canal near Elsinore, Utah, 1914—
- Brooklyn canal near Elsinore, Utah, 1914—
- Richfield canal near Elsinore, Utah, 1914—
- Annabella canal at Elsinore, Utah, 1914—
- Vermilion canal near Richfield, Utah, 1914—
- Rockyford canal near Vermilion, Utah, 1914—
- Salina Creek at Salina, Utah, 1914—
- West View canal at Redmond, Utah, 1914—
- Fayette canal near Centerville, Utah, 1914—
- Dover canal near Gunnison, Utah, 1914—
- San Pitch River near Gunnison, Utah, 1900–1905; 1912—
- Manti Creek near Manti, Utah, 1900.
- Wellington canal near Mills, Utah, 1914—
- Sevier River Land & Water Co.'s canal near Leamington, Utah, 1914—
- Sevier River Land & Water Co.'s canal above Fool Creek reservoir, near Lynndyl, Utah, 1914.
- Sevier River Land & Water Co.'s by-pass near Lynndyl, Utah, 1914.
- Sevier River Land & Water Co.'s reservoir No. 1 (Fool Creek reservoir) near Lynndyl, Utah, 1914.
- McIntyre canal near Leamington, Utah, 1914—
- Leamington canal near Leamington, Utah, 1914—
- Delta and Melville canal (Canal A) near Delta, Utah, 1912—
- Canal B at intake, near Delta, Utah, 1912.
- Lyman's ditch near Delta, Utah, 1912.
- Melville West Side canal near Delta, Utah, 1912.
- Canal C at head gate near Delta, Utah, 1912.
- Melville Main canal near Delta, 1912.
- Midland canal near Delta, Utah, 1914.
- Abraham canal near Delta, Utah, 1913; 1914.
- Deseret High-Line canal near Delta, Utah, 1913; 1914.
- Deseret canal near Delta, Utah, 1913; 1914.
- Smith canal near Delta, Utah, 1914.

## STREAMS IN PAVANT VALLEY.

Chalk Creek near Fillmore, Utah, 1914.  
Pine Creek near Fillmore, Utah, 1914.  
Meadow Creek near Meadow, Utah, 1914.  
Corn Creek near Kanosh, Utah, 1914.

## BEAVER RIVER BASIN.

Beaver River near Beaver, Utah, 1906; 1914-  
Beaver River at Adamsville, Utah, 1913-  
Beaver River at Rockyford dam, near Minersville, Utah, 1913-  
Beaver River at Minersville, Utah, 1909-1913.  
Beaver River at Milford, Utah, 1914.  
South Creek near Beaver, Utah, 1906.  
North Fork of North Creek (head of North Creek) near Beaver, Utah, 1906.  
South Fork of North Creek near Beaver, Utah, 1906.  
Indian Creek at Adamsville, Utah, 1906; 1914-  
Minersville canal at Minersville, Utah, 1906; 1914.  
Coal Creek near Cedar City, Utah, 1915-

## MINOR BASINS IN NEVADA.

Thousand Springs Creek near Tecoma, Nev., 1910-1913.  
Overland Creek near Ruby Valley, Nev., 1917-  
Snake Creek near Baker, Nev., 1913-1915; 1916-17.  
Baker Creek near Baker, Nev., 1913-1915.  
Cleveland Creek near Osceola, Nev., 1914-1916.  
White River near Preston, Nev., 1914.  
Currant Creek at Ranger Station near Currant, Nev., 1913.  
Currant Creek near Currant, Nev., 1913; 1914-1917.  
Big Warm Spring near Duckwater, Nev., 1915-16.  
Duckwater Creek near Duckwater, Nev., 1915-1917.  
Lees Creek near Pahrump, Nev., 1916.  
Intermittent Springs near Pahrump, Nev., 1916.  
Birch Creek near Austin, Nev., 1913; 1914.

## SALTON SINK BASIN.

Salton Sea near Salton, Calif., 1904-  
Alamo River near Brawley, Calif., 1909-1912.  
New River near Brawley, Calif., 1909-1911.

## OWENS LAKE BASIN.

Owens River near Round Valley, Calif., 1903-  
Owens River near Big Pine [Tinemaha], Calif., 1906-  
Owens River near Lone Pine, Calif., 1909-  
Owens River near Citrus, Calif., 1903-1906.  
Owens Lake near Lone Pine (Olancho), Calif., 1908-  
Rock Creek near Round Valley, Calif., 1903-  
Pine Creek near Round Valley, Calif., 1903-  
Owens River canal near Bishop, Calif., 1903-1905.  
McNally canal near Bishop, Calif., 1903-1905.  
Farmers canal near Bishop, Calif., 1903-1905.  
Bishop Creek near Bishop, Calif., 1903-1911.  
Hillside (North) canal near Bishop, Calif., 1903-1905.  
Hillside (South) canal near Bishop, Calif., 1903-1905.

## Owens Lake tributaries—Continued.

- Powers canal near Bishop, Calif., 1903-1905.
- Bishop Creek canal near Bishop, Calif., 1903-1905.
- Collins (George) canal near Bishop, Calif., 1903-1906.
- Collins (A. O.) canal near Bishop, Calif., 1903-1906.
- Dell canal near Bishop, Calif., 1903-1906.
- Big Pine and Owens River canal near Bishop, Calif., 1903-1905.
- Rawson canal near Bishop, Calif., 1903-1905.
- Sanger canal near Alvord, Calif., 1903-1905.
- Baker Creek near Big Pine, Calif., 1908-1911.
- Big Pine Creek near Big Pine, Calif., 1903-1911.
- Tinemaha Creek near Big Pine [Tinemaha], Calif., 1906-1911.
- Birch Creek near Big Pine [Tinemaha], Calif., 1905; 1906-1911.
- Taboose Creek near Aberdeen, Calif., 1906-1911.
- Goodale Creek near Aberdeen, Calif., 1906-1911.
- Division Creek near Independence, Calif., 1906-1910.
- Eightmile (Sawmill) Creek near Independence, Calif., 1906-1910.
- Thibaut Creek near Independence, Calif., 1908-1911.
- East Side canal near Citrus, Calif., 1903-1906.
- Stevens canal near Citrus, Calif., 1903-1905.
- Oak Creek near Independence, Calif., 1905-1911.
- Little Pine (Independence) Creek near Independence, Calif., 1905-1911.
- Shepard Creek near Theve, Calif., 1906-1910.
- Bairs Creek near Thebe, Calif., 1906-1911.
- George Creek near Thebe, Calif., 1906-1911.
- Lone Pine Creek near Lone Pine, Calif., 1906-1911.
- Tuttle Creek near Lone Pine, Calif., 1906-1911.
- Cottonwood Creek near Olancho, Calif., 1906-1911.
- Ash Creek near Olancho., Calif., 1907-1911.

## ANTELOPE VALLEY BASIN.

- Littlerock Creek near Palmdale, Calif., 1896-1898.

## MOHAVE RIVER BASIN.

- Mohave River near Victorville, Calif., 1899-1906.

## MONO LAKE BASIN.

- Mono Lake near Mono Lake, Calif., 1912-
- Rush Creek near Mono Lake, Calif., 1910-1914.
- Leevining Creek near Mono Lake, Calif., 1910-1916.

## WALKER LAKE BASIN.

- East Walker River (head of Walker River), Bridgeport, Calif., 1911-1914.
- East Walker River above Mason Valley near Mason, Nev., 1916-
- East Walker River near Yerington, Nev., 1902-1908.
- East Walker River near Mason, Nev., 1910-1912; 1913-1916.
- Walker River near Nördyke, Nev., 1895.
- Walker River at Mason, Nev., 1910-1912; 1913-1916.
- Walker River at Schurz, Nev., 1913-
- Walker River near Wabuska, Nev., 1902-1908.
- Robinson Creek near Bridgeport, Calif., 1910-1914.
- Buckeye Creek near Bridgeport, Calif., 1910-1914.
- Swagger Creek near Bridgeport, Calif., 1911-1915.

## Walker River tributaries—Continued.

- West Walker River near Coleville, Calif., 1902-1908; 1909-1910; 1915-
- West Walker River near Wellington, Nev., 1910.
- West Walker River at Smith, Nev., 1910.
- West Walker River at Hudson, Nev., 1914-
- East Fork of West Walker River near Bridgeport, Calif., 1910.

## HUMBOLDT-CARSON SINK.

## Carson River basin:

- Carson River, East Fork (head of Carson River), at Silver King Valley, near Markleeville, Calif., 1910-1913..
- Carson River, East Fork, near Markleeville, Calif., 1910-
- Carson River, East Fork at Rodenbah's ranch, near Gardnerville, Nev., 1900-1906.
- Carson River, East Fork, at Horseshoe Bend, near Gardnerville, Nev., 1908-1910; 1917.
- Carson River, East Fork at California-Nevada State line, 1911-1914.
- Carson River near Empire, Nev., 1895; 1900-
- Carson River near Fort Churchill, Nev., 1911-
- Carson River near Hazen, Nev., 1908-1910.
- Silver Creek near Markleeville, Calif., 1910-1913.
- Markleeville Creek above Markleeville, Calif., 1911-
- Markleeville Creek at Markleeville, Calif., 1910-
- Pleasant Valley Creek near Markleeville, Calif., 1910-1911.
- West Fork of Carson River at Woodfords, Calif., 1890-1892; 1900-

## Humboldt River basin:

- Humboldt River near Elko, Nev., 1895-1902.
- Humboldt River at Palisade, Nev., 1902-1906; 1911-
- Humboldt River at Battle Mountain, Nev., 1896-7.
- Humboldt River near Golconda, Nev., 1894-1909; 1910-1917.
- Humboldt River near Oreana, Nev., 1896-1909; 1910-
- Humboldt River near Lovelocks, Nev., 1912-
- Bishop Creek near Wells, Nev., 1910.
- Marys River at Marys River Cabin, near Deeth, Nev., 1913-14.
- Marys River at Buena Vista ranch, near Deeth, Nev., 1913-14.
- Starr Creek near Deeth, Nev., 1913-
- Marys River near Deeth, Nev., 1902-3; 1912-
- Hanks Creek near Deeth, Nev., 1913-14.
- Lamoille Creek near Lamoille, Nev., 1915-
- Lamoille Creek near Halleck, Nev., 1913-
- Secret Creek near Halleck, Nev., 1917-
- North Fork of Humboldt River near Peko, Nev., 1898-1900.
- North Fork of Humboldt River at Devils Gate, near Halleck, Nev.; 1913-
- North Fork of Humboldt River near Halleck, Nev.; 1902-1909; 1910-1913.
- South Fork of Humboldt River near Elko, Nev., 1896-1909; 1910-
- Maggie Creek at Carlin, Nev., 1913-
- Pine Creek at Palisade, Nev., 1902-1904; 1912-1914.
- Rock Creek at Rock Creek ranch, near Battle Mountain, Nev., 1915-1917.
- Rock Creek near Battle Mountain, Nev., 1896.
- Reese River near Berlin, Nev., 1913-1916.
- Big Creek near Austin, Nev., 1913-14; 1916.
- Humboldt-Lovelocks Irrigation Light & Power Co.'s feeder canal near Mill City, Nev., 1914-
- Humboldt-Lovelocks Irrigation Light & Power Co.'s outlet canal near Humboldt, Nev., 1914-

## PYRAMID AND WINNEMUCCA LAKE BASINS.

- Lake Tahoe at Tahoe, Calif., 1900-
- Truckee River at Tahoe, Calif., 1895-96; 1900-
- Truckee River near Boca, Calif., 1890.
- Truckee River at Iceland, Calif., 1912-
- Truckee River at Nevada-California State line, 1890-1912.
- Truckee River at Laughton, Nev., 1890.
- Truckee River at Reno, Nev., 1906-
- Truckee River near Essex, Nev., 1889.
- Truckee River at Vista, Nev., 1899-1908.
- Truckee River at Clarks, Nev., 1907-1915.
- Truckee River at Derby dam, Nev., 1907-1910.
- Truckee River near Wadsworth, Nev., 1902-1905.
- Lake Winnemucca inlet near Wadsworth, Nev., 1902-1905.
  - Donner Creek at Donner Lake, near Truckee, Calif., 1909-10.
  - Donner Creek near Truckee, Calif., 1902-1914.
  - Prosser Creek near Hobart Mills (Truckee), Calif., 1903-4; 1907-1912.
  - Prosser Creek near Boca, Calif., 1899-90; 1902-3.
  - South Fork of Prosser Creek near Truckee, Calif., 1909-10.
  - Little Truckee River near Truckee, Calif., 1909-10.
  - Little Truckee River near Boca, Calif., 1890.
  - Little Truckee River at Boca, Calif., 1911-1914.
  - Little Truckee River at Pine Station and Starr, Calif., 1903-1910.
  - Webber Creek near Truckee, Calif., 1909-10.
  - Independence Creek below Independence Lake, Calif., 1902-1907.
  - Independence Creek near Truckee, Calif., 1909-10.
  - Steamboat Creek at Steamboat Springs, Nev., 1900-1901.
  - Galena Creek near Washoe, Nev., 1913-14.

## HONEY LAKE BASIN.

- Long Valley Creek near Scotts, Calif., 1917-
- Long Valley Creek near Doyle, Calif., 1917-
- Susan River at Susanville, Calif., 1900-1905; 1917-
  - Gold Run Creek near Susanville, Calif., 1913; 1915-16.
  - Lassen Creek near Susanville, Calif., 1913; 1915-16.
  - Willow Creek at Merrillville, Calif., 1904-5.
  - Willow Creek near Standish, Calif., 1900-1901; 1905.
- Baxter Creek near Janesville, Calif., 1913-1916.
- Schloss Creek at Janesville, Calif., 1915.
- Janesville Creek at Janesville, Calif., 1913; 1915.

## RED ROCK CREEK BASIN.

- Red Rock Creek near Red Rock, Calif., 1917-

## SURPRISE VALLEY DRAINAGE BASIN.

- Bidwell Creek near Fort Bidwell, Calif., 1912.

## WARNER LAKES BASIN.

- Cowhead Lake near Fort Bidwell, Calif., 1911-1913.
- Twentymile Creek near Warner Lake, Oreg., 1910-1916.
  - Fifteenmile Creek above Twelvemile Creek, near Fort Bidwell, Calif., 1913.
  - Fifteenmile Creek below Rock Creek, near Fort Bidwell, Calif., 1913.
  - Twelvemile Creek near Fort Bidwell, Calif., 1912-13.
  - Rock Creek near Fort Bidwell, Calif., 1913.

- Deep Creek near Fort Bidwell, Calif., 1913.
- Deep Creek at Big Valley, near Lakeview, Oreg., 1911-1915.
- Deep Creek at Adel, Oreg., 1909-1916.
  - Dismal Creek near Fort Bidwell, Calif., 1913.
  - Camas Creek near Plush, Oreg., 1911-12.
  - Camas Creek below Blue Creek, near Lakeview, Oreg., 1912-1915.
  - Mud Creek near Plush, Oreg., 1911-12; 1915.
  - Crane Creek near Lakeview, Oreg., 1914.
  - Drake Creek near Adel, Oreg., 1915.
  - M. C.-Givan ditch near Adel, Oreg., 1915.
  - Company ditch near Adel, Oreg., 1915.
  - M. C. ditch at Adel, Oreg., 1915.
- Fish Creek near Plush, Oreg., 1914.
- Honey Creek at Chalstrand's ranch, near Plush, Oreg., 1910-11.
- Honey Creek near Plush, Oreg., 1909-1914; 1915.
  - Twelvemile Creek near Plush, Oreg., 1911.
  - Snyder Creek near Plush, Oreg., 1911.
- Pelican Lake near Adel, Oreg., 1913-1915.
- Crump Lake near Adel, Oreg., 1910-1912; 1913; 1914; 1915.
- Hart Lake near Plush, Oreg., 1910-1915.
- Flagstaff Lake inlet near Plush, Oreg., 1914.
- Flagstaff Lake near Plush, Oreg., 1910-1915.
- Lower Campbell Lake near Plush, Oreg., 1914; 1915.
- Stone Corral Lake near Plush, Oreg., 1914; 1915.
- Bluejoint Lake near Plush, Oreg., 1911-1915.

## ABERT LAKE BASIN.

- Chewaucan River at dam site, near Paisley, Oreg., 1912-1916.
- Chewaucan River above Mill Creek, near Paisley, Oreg., 1912-1914.
- Chewaucan River near Paisley, Oreg., 1914-
- Chewaucan River above Conn's ditch, near Paisley, Oreg., 1912.
- Chewaucan River at Paisley, Oreg., 1905-1907; 1909-1912; 1913.
- Chewaucan River at Narrows, near Paisley, Oreg., 1914-
- Chewaucan River at Hotchkiss Ford, near Paisley, Oreg., 1914-
  - Conn ditch near Paisley, Oreg., 1914-
  - Smalls Creek at Paisley, Oreg., 1914-
  - Bagley ditch at Paisley, Oreg., 1914-
  - Jones-Innis-ZX ditch near Paisley, Oreg., 1914-
  - Crooked Creek near Valley Falls, Oreg., 1912-13.

## SUMMER LAKE BASIN.

- Ana River near Summer Lake, Oreg., 1905; 1909-10.

## SILVER LAKE BASIN.

- Silver Creek near Silver Lake, Oreg., 1904-1907; 1909-
  - Bridge Creek near Silver Lake, Oreg., 1905-6; 1911-12.
- Buck Creek near Silver Lake, Oreg., 1905-6; 1909-1911.
- Silver Lake near Silver Lake, Oreg., 1917-

## MALHEUR AND HARNEY LAKES BASIN.

- Malheur Lake outlet at Narrows, Oreg., 1903-1906; 1911-12; 1913; 1914; 1916.  
Mud Lake outlet near Narrows, Oreg., 1916-  
    Silvies River near Silvies, Oreg., 1903-1905; 1909-1912; 1916.  
    Silvies River near Burns, Oreg., 1903-1906; 1909-1915; 1916-  
    West Fork of Silvies River near Lawen, Oreg., 1916-  
    East Fork of Silvies River near Lawen, Oreg., 1916.  
    Donner und Blitzen River near Diamond, Oreg., 1909-  
    Donner und Blitzen River near Narrows, Oreg., 1915; 1916-  
    Donner und Blitzen River near Voltage, Oreg., 1916-  
    Mud Creek near Diamond, Oreg., 1911-1916.  
    Bridge Creek near Diamond, Oreg., 1911; 1912-1916.  
    Krumbo Creek near Diamond, Oreg., 1911; 1913.  
    Buena Vista canal near Narrows, Oreg., 1915-  
    Keiger Creek near Diamond, Oreg., 1909-10; 1911; 1912-13; 1916-  
    Cucamonga Creek near Diamond, Oreg., 1911-1913; 1916.  
    McCoy Creek near Diamond, Oreg., 1909-1914; 1916-  
    Riddle Creek near Smith, Oreg., 1911.  
    Riddle Creek near Diamond, Oreg., 1917-  
    Silver Creek above Riley, Oreg., 1904-1906; 1909; 1910; flood periods 1911-  
    1915; 1916-  
    Silver Creek below Riley, Oreg., 1912; 1913; 1914.  
    Silver Creek near Narrows, Oreg., 1917-  
    Chickahominy Creek near Riley, Oreg., 1917-  
    Dunn Field ditch near Narrows, Oreg., 1917-

## ALVORD LAKE BASIN.

- Trout Creek near Denio, Oreg., 1911-12.  
Little Cottonwood Creek near Denio, Oreg., 1911-12.

## TUMTUM LAKE BASIN.

- Van Horn Creek near Denio, Oreg., 1911.

## CATLOW VALLEY, DRAINAGE BASIN.

- Home Creek near Beckley (Narrows), Oreg., 1911; 1912; 1915-



## REPORTS ON WATER RESOURCES OF THE GREAT BASIN.

### PUBLICATIONS OF THE UNITED STATES GEOLOGICAL SURVEY.

#### WATER-SUPPLY PAPERS.

Water-supply papers are distributed free by the Geological Survey as long as its stock lasts. An asterisk (\*) indicates that this stock has been exhausted. Many of the papers marked in this way may, however, be purchased (at price noted) from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Omission of the price indicates that the report is not obtainable from Government sources. Water-Supply Papers are of octavo size.

- \*7. Seepage water of northern Utah, by Samuel Fortier. 1897. 50 pp., 3 pls. 10c.  
Describes Cache Valley and its water supply and seepage waters in Ogden Valley.
- \*43. Conveyance of water in irrigation canals, flumes, and pipes, by Samuel Fortier. 1901. 86 pp., 15 pls. 15c.  
Describes the location and construction of various types of canals for irrigation.
- \*44. Profiles of rivers in the United States, by Henry Gannett. 1901. 100 pp., 11 pls. 15c.  
Gives elevations and distances along Sevier, Bear, and Humboldt rivers; also brief descriptions.
- \*57. Preliminary list of deep borings in the United States, Part I (Alabama-Montana), by N. H. Darton. 1902. 60 pp. 10c.
- \*61. Preliminary list of deep borings in the United States, Part II (Nebraska-Wyoming), by N. H. Darton. 1902. 67 pp. 5c.  
A second, revised, edition of Nos. 57 and 61 was published in 1905 as Water-Supply Paper 149 (q. v.).
68. Water storage in the Truckee basin, California-Nevada, by L. H. Taylor. 1902. 90 pp., 8 pls. 10c.  
Discusses reservoir sites, water rights for power and irrigation, irrigable lands, duty of water, and necessity for national control of water.
- \*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 govern the use of artesian waters; gives list of publications bearing on artesian waters.
- \*81. California hydrography, by J. B. Lippincott. 1903. 488 pp., 1 pl. 25c.  
A collection of published records of stream flow "hitherto much scattered, some of them out of print and difficult to secure," brought together as a book of reference.
- \*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 130 pp. Superseded by Water-Supply Paper 152.  
Cites statutory restrictions of water pollution in California, Idaho, Nevada, Oregon, Utah, and Wyoming.
- \*122. Relation of the law to underground waters, by D. W. Johnson. 1905. 55 pp. 5c.  
Cites legislative acts affecting ground waters in California, Idaho, Nevada, Oregon, Utah, and Wyoming.

140. Field measurements of the rate of movement of underground waters, by C. S. Slichter. 1905. 122 pp., 15 pls. 15c.  
Discusses flow in Rio Hondo, San Gabriel, and Mohave River valleys, Calif.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.
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 Reclamation Service.] Contains:  
A brief report on "Hydrographic investigations in Nevada," by A. E. Chandler. Gives notes concerning fluctuations and average discharge at stations on Truckee, Humboldt, Carson, and Walker rivers.  
A report on "Underground waters of southern California," by W. C. Mendenhall. Discusses the origin, distribution, and character of the artesian waters; the causes of fluctuations in the supply, and the need of moderation in use.
- \*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 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 California, Idaho, Nevada, Oregon, Utah, and Wyoming.
- \*157. Underground water in the valleys of Utah Lake and Jordan River, Utah, by G. B. Richardson. 1906. 81 pp., 9 pls. 20c.  
Discusses the source, distribution, recovery, and quality of waters; contains list of typical wells.
- \*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 of flood flow and frequency of Bear River at Collinston, Utah, and Humboldt River at Golconda, Nev. (p. 85).
- \*181. Geology and water resources of Owens Valley, Calif., by W. T. Lee. 1906. 28 pp., 6 pls. 15c.  
Discusses artesian conditions, utilization of ground waters by pumping and power plants, and undrained lakes as registers of climate. See also Water-Supply Paper 294.
- \*199. Underground water in Sanpete and central Sevier valleys, Utah, by G. B. Richardson. 1907. 63 pp., 6 pls. 25c.  
Describes topography and geology of the area, the sources, distribution, recovery, and quality of the ground waters; presents tabulated data concerning springs and wells.
- \*217. Water resources of Beaver Valley, Utah, by W. T. Lee. 1908. 57 pp., 1 pl. 10c.  
Describes possible development of surface and ground waters, and quality of waters; contains field assays of well water, and sanitary and other exact analyses.
- \*220. Geology and water resources of a portion of south-central Oregon, by G. A. Waring, 1908. 86 pp., 10 pls. 20c.  
Describes the rocks, streams, lakes and lake valleys, deep and shallow wells, climate, soils, vegetation, industries, and reclamation projects in Lake County; gives analyses of soils and waters.
- \*224. Some desert watering places in southeastern California and southwestern Nevada, by W. C. Mendenhall. 1909. 98 pp., 4 pls. 20c.  
Describes physical features of the Colorado and Mohave deserts and the Death Valley region, mineral resources and industrial development, climate, rivers, springs, and camping places; gives hints on desert traveling; describes main routes of travel, and gives details concerning the springs.

- \*225. Ground waters of the Indio region, California, with a sketch of the Colorado Desert, by W. C. Mendenhall. 1909. 56 pp., 12 pls. 20c.  
Describes the structural features and deposits of the Colorado Desert, rainfall, and drainage, the origin, source, character, and development of ground waters; gives history of development of the Indio region, and discusses soils, crops, and cost of reclamation.
- \*231. Geology and water resources of the Harney Basin region, Oregon, by G. A. Waring. 1909. 93 pp., 5 pls. 25c.  
Describes topography, climate, vegetation, settlements and industries, the rocks and their succession, lakes, springs, and streams, and artesian conditions; discusses conservation of water supply, temperature of ground waters, and well-drilling methods; describes in detail Harney, Catlow, Alvord, and Whitehorse basins, and Malheur River basin.
- \*237. The quality of the surface waters of California, by Walton Van Winkle and F. M. Eaton. 1910. 142 pp., 1 pl. 20c.  
Describes geography, climate, industrial development, and drainage, and gives results of mineral analyses of the river waters.
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 Carson, Truckee, and Owens rivers.
277. Ground water in Juab, Milliard, and Iron counties, Utah, by O. E. Meinzer. 1911. 162 pp., 5 pls. 25c.  
Describes the physiographic features, geologic formations, and history, the rainfall, soil, vegetation, streams, and industrial development; discusses the occurrence of ground water in the bedrock and in unconsolidated sediments, artesian conditions and springs, the quality of the ground waters, irrigation, construction of wells, and watering places on routes of travel; describes in detail Juab Valley and Round, Little, Sage, Dog, and Fernow valleys, Tintic Valley and Tintic mining district, Pavant and Lower Beaver valleys, Old River Bed and Cherry Creek region, Drum and Swasey Wash region, Sevier Desert, Wah Wah Valley, Sevier Lake bottoms, White, Fish Springs, Snake, Parowan, and Rush Lake valleys, and Escalanite Desert; analyses.
278. Water resources of Antelope Valley, Calif., by H. R. Johnson. 1911. 92 pp. 7 pls. 25c.  
Describes topography, drainage, climate, physiography, and the water-bearing and non-water-bearing rocks of areas in Kern, Los Angeles, and San Bernardino counties; discusses the influence of rainfall on the surface and ground waters, the artesian water and nonartesian water, bedrock springs, chemical character (analyses, alkali, dissolved solids, hygienic conditions), fallacies as to origin and quantities of artesian water, and the present and future development of the underground supplies.
- \*294. An intensive study of the water resources of a part of Owens Valley, Calif., by C. H. Lee. 1912. 135 pp., 30 pls. 55c.  
Describes topography, drainage, and structure of the valley, and discusses precipitation, stream flow, evaporation, percolation, and ground waters; bibliography.
- \*297. Gazetteer of surface waters of California, Pt. III: Pacific coast and Great Basin streams, by B. D. Wood. 1913. 244 pp. 20c.  
Contains description of streams and lakes of the Great Basin in California.
- \*300. Water resources of California, Pt. III: Stream measurements in the Great Basin and Pacific coast river basins, by H. D. McGlashan and H. J. Dean. 1913. 956 pp., 4 pls. 55c.  
Describes the general features of the Great Basin in California, the Great Basin lakes in California and Nevada and gives results of stream-flow investigations available up to September 30, 1912.
- \*333. Ground water in Box Elder and Tooele counties, Utah, by Everett Carpenter. 1913. 90 pp., 2 pls. 10c.

338. Springs of California, by Gerald A. Waring. 1915. 410 pp., 13 pls. 60c.

Describes briefly the physical features of California, including the coast ranges, Great Central Valley, the lava-covered region, the Sierra Nevada, the southeastern desert, and faults; defines "mineral water" and "pure water"; discusses source and amount of substances in waters, degree of concentration of natural waters and their properties, and the therapeutic value, temperature, and classification of mineral waters. The springs are described under the headings "hot," "carbonated," "sulphur," "saline," "magnesian," "iron," "artesian," "large cold," and "minor perennial" springs.

350. Profile surveys in Bear River basin, Idaho, prepared under the direction of R. B. Marshall, chief geographer. 1914. 7 pp., 6 pls. 10c.

Contains a brief description of Bear River basin and a list of the gaging stations that have been maintained and mentions publications containing the results of measurements of stream flow in the basin. The maps show not only the outlines of the river banks, the islands, the positions of rapids, falls, shoals, and existing dams, and the crossings of all ferries and roads but the contours of banks to an elevation high enough to indicate the possibility of using the stream for the development of power by low or medium heads.

363. Quality of the surface waters of Oregon, by Walton Van Winkle. 1914. 137 pp., 2 pls. 20c.

Gives the results of an investigation made in cooperation with the State of Oregon "to determine the chemical composition of the waters of said State for a period of 14 months from" July 1, 1911. Describes the natural features of Oregon, discusses water for domestic and industrial uses, purification of water, and gives the results of analyses of waters of streams tributary to the Pacific and of a number of those discharging into the Great Basin; gives an outline of the geological history of the Great Basin, and brief descriptions of the general features of the Harney, Warner Lakes, Alkali Lake, Christmas Lake, and Chewaucan basins.

- \*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 of rivers, lakes, wells, and springs in Utah, Nevada, California, and Oregon, and of mine waters from Tintic, Utah, and Tonopah and Kimberly, Nev.

- \*365. Ground water in southeastern Nevada, by Everett Carpenter. 1915. 86 pp. 5 pls. 15c.

Describes an area in Clark, Lincoln, White Pine, and Nye counties drained in part by streams tributary to Colorado River and in part by streams discharging into the Great Basin. Discusses stream, lake, and wind topography, vegetation, crops, and industrial development, rainfall, occurrence of water in bedrock and unconsolidated sediments, source and permanence of artesian waters, and character and distribution of springs; also the quality of waters for domestic use and for irrigation, and gives analyses. Gives details of water supply by areas in Las Vegas and Virgin river basins and the Great Basin. Gives information in regard to watering places on routes of travel.

370. Surface water supply of Oregon, 1878-1910, by F. F. Henshaw and H. J. Dean. 1915. 829 pp., 1 pl. 45c.

Contains information pertaining to the surface waters of Oregon collected by the United States Geological Survey and cooperating parties from 1878 to September 30, 1910.

- \*375. Contributions to the hydrology of the United States, 1915; Nathan C. Grover, chief hydraulic engineer. 1916. 181 pp., 19 pls. 15c. Contains:

(d) Ground water in Big Smoky Valley, Nev., by O. E. Meinzer, pp. 85-116, pls. 6-7. Describes a typical Nevada desert valley—a plain hemmed in by mountain ranges and underlain by porous rock waste eroded from these ranges and saturated with water discharged from them. This valley was selected for investigation not because it afforded exceptional opportunity for the utilization of ground waters, but because it was considered more or less typical of the undeveloped valleys of the State. Preliminary report. See 423.

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.

Contains a brief description of the general features of Logan River basin and a list of the gaging stations that have been maintained in the basin. The maps show not only the outlines of the river banks, the islands, the positions of rapids, falls, shoals, and existing dams, and the crossings of all ferries and roads, but the contours of banks to an elevation high enough to indicate the possibility of using the stream for the development of power by low or medium heads.

423. *Geology and water resources of Big Smoky, Clayton, and Alkali Spring valleys, Nevada*, by Oscar E. Meinzer. 1917. 167 pp., 15 pls. 30c.  
Covers in detail the area described briefly in *Water-Supply Paper 375 (d)* and two small adjoining areas.
- \*425. *Contributions to the hydrology of the United States, 1917*; N. C. Grover, chief hydraulic engineer. 1918. Contains:  
(d) *Ground water in Reese River basin and adjacent parts of Humboldt River basin, Nevada*, by G. A. Waring.

## 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.

- \**Third Annual Report of the United States Geological Survey, 1881-82*, J. W. Powell, Director. 1883. xviii, 564 pp., 67 pls. \$2.35. Contains:  
\*Sketch of the geological history of Lake Lahontan, by I. C. Russell, pp. 189-235, pls. 18-23. Describes the physical features of the Great Basin.

- \**Fourth Annual Report of the United States Geological Survey, 1882-83*, J. W. Powell, Director. 1884. xxxii, 473 pp., 85 pls. \$1.65. Contains:  
\*A geological reconnaissance in southern Oregon, by I. C. Russell, pp. 431-464, pls. 83-85. Describes the interior drainage of southern Oregon; discusses the area, extent, quality of waters, and recent changes in the existing lakes.

- \**Eighth Annual Report of the United States Geological Survey, 1886-87*, J. W. Powell, Director. 1889. 2 parts. \*Part I, xix, 474, xii pp., 76 pls. \$1.50. Contains:  
\*The Quaternary history of Mono Valley, Cal., by I. C. Russell, pp. 261-394, pls. 16-44. Describes the physiographic features and drainage of the Mono Lake basin, the sources of water supply of the present lake, including streams and springs, and discusses the chemical composition of the water and the fluctuations in lake level.

- \**Tenth Annual Report of the United States Geological Survey, 1888-89*, J. W. Powell, Director. 1890. 2 parts. \*Pt. II. Irrigation, viii, 123 pp. 35 c.  
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 plates and maps. \$1.25. Contains:

\*Hydrography, pp. 1-110. Discusses scope of work, methods of stream measurement, rainfall and evaporations, 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.

\*The arid lands, pp. 201-289. Includes statements of the Director to the House Committee on Irrigation and extracts from the constitutions of States relating to irrigation.

\*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 United States Geological Survey, 1890-91*, J. W. Powell, Director. 1891. 2 parts. \*Pt. II. Irrigation, xviii, 576 pp., 93 pls. \$2.00. Contains:

\*Report upon the location and survey of reservoir sites during the fiscal year ending June 30, 1891, by A. H. Thompson, pp. 1-212, pls. 54-57. Describes reservoir sites in Carson River basin at Red Lake, Pleasant Valley, Mountain Bullion, Indian Pool, Heenan Lake, Silver King Valley, Wolf Creek, Dumonts Meadow, all in Alpine County, along Rush Creek, in Hells Meadow on Little Truckee River, at Twin Valley on the North Fork of Prosser Creek, at Monument Peak, at Grass Lake, and at Hope Valley, in California, and on Truckee River, Nev.; for each reservoir site gives the location, height of dam, area inclosed by contour, approximate contents of reservoir, position of irrigable lands, and areas of segregated lands.

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 pl. \$1.85. Contains:

\*Engineering results of irrigation survey, by H. M. Wilson, pp. 351-427, pls. 147-182. Describes Donner Lake, Independence Lake, and Webber Lake reservoirs, also Truckee canal in the Truckee River system, and Long Valley and Hope Valley reservoirs in the Carson River basin, Nev.

\*Report upon the location and survey of reservoir sites during the fiscal year ending June 30, 1892, by A. H. Thompson, pp. 451-478. Describes Bear Lake reservoir site (Utah-Idaho), Silver Lake, Twin Lakes, and Marys Lake sites, and sites on Sanpitch, Sevier, East Fork of Sevier Otter Creek, Panquitch Lake, and at Blue Spring, Utah.

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. 34-39. Describes general character of the public lands, the lands disposed of (railroad lands grant, and swamp lands, and private miscellaneous entries), land 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.

Eighteenth Annual Report of the United States Geological Survey, 1896-97, Charles D. Walcott, Director. 1897. (Pts. II and III, 1898.) 5 parts in 6 vols. \*Pt. IV, Hydrography, x, 756 pp., 102 pls. \$1.75. Contains:

\*Reservoirs for irrigation, by J. D. Schuyler, pp. 617-740, pls. 47-102. Discusses proposed Rock Creek reservoir in Humboldt River, Nev.; gives tables of reservoir capacities and areas; describes proposed reservoir of Antelope Valley Water Co., California, and on Rock Creek, Humboldt River basin, Nev.

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 San Gabriel Forest Reserve, by J. B. Leiberger, pp. 411-428, pls. 143-146.

\*The San Bernardino Forest Reserve, by J. B. Leiberger, pp. 429-454, pls. 147-153.

\*The San Jacinto Forest Reserve, by J. B. Leiberger, pp. 455-478, pls. 154-159.

Describes general topographic features of forest reserves and drainage, part of which is by streams tributary to the Pacific, and part by streams that are lost in the sands of the Mohave and other deserts.

#### MONOGRAPHS.

Monographs are of quarto size. They are not distributed free but may be obtained from the Geological Survey at the prices indicated. An asterisk (\*) indicates that the Survey's stock of paper is exhausted.

1. Lake Bonneville, by G. K. Gilbert. 1890. xx, 438 pp., 51 pls., 1 map. \$1.50.

Contains in the introduction a description of the Great Basin; describes the present lakes and their oscillations, and gives analyses of the waters of Great Salt Lake and of fresh waters in the Salt Lake Basin.

11. Geological history of Lake Lahonton, a Quaternary lake of northwestern Nevada, by I. C. Russell. 1885. xiv, 288 pp., 46 pls. \$1.75.

Contains descriptions of the present rivers and lakes; discusses the chemical deposits of the area and gives analysis showing the composition of the principal rivers and lakes of the Lahontan basin.

#### PROFESSIONAL PAPERS.

Professional 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 with an asterisk may, however, be purchased from the SUPERINTENDENT OF DOCUMENTS, WASHINGTON, D. C. Professional papers are of quarto size.

95. Shorter contributions to general geology, 1915; David White, chief geologist. 1916. 120 pp., 7 pls. 20c.

Issued also in separate chapters. The following paper relates in part to ground water:

\*The composition of muds from Columbus Marsh, Nev., by W. B. Hicks (pp. 1-11). Gives data in regard to shallow wells on Columbus Marsh.

## BULLETINS.

An asterisk (\*) indicates that the Geological Survey's stock of 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.

- \*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 and sedimentary rock formations, and discusses, by counties, the geology and topography, the surface and underground 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. Veach. 1895. 106 pp. 10c.

Discusses the importance of accurate well records to the driller, to owners of oil, gas, and water wells, and to geologists; describes the general methods of work; gives tabulated records of wells in Utah.

- \*298. Record of deep-well drilling for 1905, by M. L. Fuller and Samuel Sanford. 1906. 299 pp. 25c.

Gives an account of progress in the collection of well records and samples; contains tabulated records of wells in California, Idaho, Nevada, Oregon, and Utah; and detailed record of well at Salt Lake City, Utah. The well of which a detailed section is given was selected because it affords valuable stratigraphic information.

- \*540. Contributions to economic geology, 1912, Part I, Metals and nonmetals except fuel; David White, chief geologist. 1914. 563 pp., 11 pls. 45c.

Issued also in separate chapters. The following papers contain information on ground water:

\*(*n*) Prospecting for potash in Death Valley, Calif., by H. S. Gale (pp. 407-415). Included detailed sections of five wells, 30 to 70 feet deep, with data in regard to their waters, practically all of which are salty, as is shown by the analyses given.

Potash tests at Columbus Marsh, Nev., by H. S. Gale (pp. 422-427). Includes detailed sections of two wells, 32 and 82 feet deep, respectively, with data in regard to their waters, some of which are not salty.

\*(*p*) Potash in western saline deposits, by J. H. Hance (pp. 457-469). Gives total solids in waters from various wells and springs in the drainage basins of Railroad Valley, Fourmile Flat and Dixie Salt Marsh, in Nevada, and the record of a 305-foot well at Adamana, Ariz.

## 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. 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 80 or 90 per cent of the folios are usable. They will be 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, also to the library edition of folio 186. The library edition of folios 185, 187, and higher numbers sell for 25 cents a copy, except that some folios which contain an unusually large amount of matter sell for 50 cents a copy. The octavo edition of folio 185 and higher numbers sells for 50 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 folios contain descriptions of the drainage of the quadrangles.

\*39. Truckee folio, California.

Describes the general and economic geology of an area extending westward and northward from Truckee Lake, drained by streams a part of which flow through Yuba and American rivers to the Sacramento, and part through Lake Tahoe to the Great Basin, discusses the topography and geology, and under "Economic geology" the mineral springs which occur abundantly throughout the area.

#### 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 Great Basin are the reports of the Reclamation Board, the State engineer and surveyor, the State Conservation Commission of California, the reports of the State engineers of Idaho, Oregon, Utah, and Wyoming, the biennial reports of the Bureau of Industry, Agriculture, and Irrigation of Nevada, and the annual reports of the United States Reclamation Service.

The following reports deserve special mention:

Oregon system of water titles, by John H. Lewis: Oregon State Engineer Bull. 2, 1912.

State and national water laws, with detailed statement of the Oregon system of water titles, by John H. Lewis, with a discussion by Messrs. Clarence T. Johnston and L. J. Conte: Am. Soc. Civil Eng. Trans., vol. 76, pp. 637-758, 1913.

Irrigation pumping in Nevada, etc., by Charles Norcross: Nevada Bureau of Industry, Agriculture, and Irrigation Bull. 8, 1913.

Report of irrigation investigations in Utah, under the direction of Elwood Mead: U. S. Dept. Agr. Office Exper. Sta. Bull. 124, 1903.

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.



## GEOLOGICAL SURVEY HYDROLOGIC REPORTS OF GENERAL INTEREST.

The following list comprises reports not readily classifiable by drainage basins and covering a wide range of hydrologic investigations:

### WATER-SUPPLY PAPERS.

- \*1. Pumping water for irrigation, by D. M. Wilson. 1896. 57 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. 10c. (See Water-Paper 22.)  
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 flows and recovery of water 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 effect 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 Reclamation Service, with accompanying papers, compiled by F. H. Newell, chief engineer. 1904. 361 pp. 25c. [Requests for this report should be addressed to the U. S. Reclamation Service.]  
Contains the following papers of more or less general interest:  
Limits of an irrigation project, by D. W. Ross.  
Relation of Federal and State laws to irrigation, by Morris Bien.  
Electrical transmission of power for pumping, by H. A. Storrs.  
Correct design and stability of high masonry dams, by Geo. Y. Wisner.  
Irrigation surveys and the use of the plane table, by J. B. Lippincott.  
The use of alkaline waters for irrigation, by Thomas H. Means.
- \*94. Hydrographic manual of the United States Geological Survey, prepared by E. C. Murphy, J. C. Hoyt, and G. B. Hollister. 1904. 76 pp., 3 pls. 10c.  
Gives instruction for field and office work relating to measurements of stream flow by current meters. See also No. 95.
- \*95. Accuracy of stream measurements (second, enlarged, edition), by E. C. Murphy. 1904. 169 pp., 6 pls.  
Describes methods of measuring and computing stream flow and compares results derived from different instruments and methods. See also No. 94.
- \*103. A review of the laws forbidding pollution of inland waters in the United States, by E. B. Goodell. 1904. 120 pp. (See No. 152.)  
Explains the legal principles under which antipollution statutes become operative, quotes court decisions to show authority for various deductions, and classifies according to scope the statutes enacted in the different States.
110. Contributions to the hydrology of eastern United States. 1904. M. L. Fuller, geologist in charge. 1905. 211 pp., 5 pls. 10c.  
Contains the following reports of general interest. The scope of each paper is indicated by its title.  
Description of underflow meter used in measuring the velocity and direction of underground water, by Charles S. Slichter.  
The California or "stovepipe" method of well construction, by Charles S. Slichter.  
Approximate methods of measuring the yield of flowing wells, by Charles S. Slichter.  
Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot.  
Experiment 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 water," 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 underground 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.  
Scope indicated by title.

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.  
Scope indicated by title.
- \*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, Calif., and on Long Island, N. Y.; gives results of tests of wells and pumping plants, and describes stovepipe method of well construction.
143. Experiments of 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.  
Siltng 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 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 areas 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 fluctuations 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 underground 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, \* \* \* with a history of the sewage-disposal problem, 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 of resulting litigation; discusses effect of acid-iron liquors on sewage purification processes, recovery of copperas from acid-iron wastes, and other processes for removal of pickling liquor.
- \*187. Determination of stream flow during the frozen season, by H. K. Barrows and R. E. Horton. 1907. 93 pp., 1 pl. 15c.  
Scope indicated by title.
- \*189. The prevention of stream pollution by strawboard waste, by E. B. Phelps. 1906. 29 pp., 2 pls.  
Describes manufacture of strawboard, present and proposed methods of disposal of waste liquors, laboratory investigations of precipitation and sedimentation, and field studies of amounts 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. 3639 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 improvement 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, and 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 title) 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. Scope indicated by title.
- \*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 water-stage recorders and other gages and of constructing gage wells, shelters, 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 three papers presented at the conference of engineers of the water-resources branch in December, 1914, as follows:  
\*(e) Relation of stream gaging to the science of hydraulics, by C. H. Pierce and R. W. Davenport, pp. 77-84.  
(e) A method for 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.
- \*400. Contributions to the hydrology of the United States, 1916; N. C. Grover, chief hydraulic engineer. 1917. 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 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 to 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, H. M. Wilson, pp. 363-561, pls. 107 to 146. See Water-Supply Paper 87.

Thirteenth Annual Report of the United States Geological Survey, 1891-92, J. W. Powell, Director. 1892. (Pts. II and III, 1893.) 3 parts. \*Pt. III, Irrigation, xi, 486 pp., 77 pls. \$1.85. Contains:

\*American irrigation engineering, by H. M. Wilson, pp. 101-349, pls. 111-145.

Discusses the economic aspects of irrigation, alkaline drainage, silt and sedimentation; gives brief history of legislation; describes perennial canals in Idaho-California, Wyoming, and Arizona; discusses water storage at reservoirs of the California and other projects, subsurface sources of supply, pumping, and subirrigation.

Fourteenth Annual Report of the United States Geological Survey, 1892-93, J. W. Powell, Director. 1893. (Pt. II, 1894.) 2 parts. \*Pt. II, Accompanying papers, xx, 597 pp., 73 pls. \$2.10. Contains:

\*The potable waters of eastern United States, by W. J. McGee, pp. 1-47. Discusses cistern water, stream waters, and ground waters, including mineral springs and artesian wells.

\*Natural mineral waters of the United States, by A. C. Peale, pp. 49-88, pls. 3 and 4. Discusses the origin and flow of mineral springs, the source of mineralization, thermal springs, the chemical composition and analysis of spring waters, geographic distribution, and the utilization of mineral waters; gives a list of American mineral spring resorts; contains also some analyses.

Nineteenth Annual Report of the United States Geological Survey, 1897-98, Charles D. Walcott, Director. 1898. (Parts II, III, and V, 1899.) 6 parts in 7. vols. and separate case for maps with Pt. V. \*Pt. II, Papers chiefly of a theoretic nature, v, 958 pp., 172 pls. \$2.65. Contains:

\*Principles and conditions of the movements of ground water, by F. H. King, pp. 59-294, pls. 6-16. Discusses the amount of water stored in sandstone, in soil, and in other rocks, 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 sands, 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, Chattoohoe, 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, Calif., 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."

A highly technical report.

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.
- \*319. Summary of the controlling factors of artesian flows, by M. 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 analysis, 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 waters 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, ochreous, and alliceous materials made by water, vadose and juvenile waters, and thermal springs in relation to volcanism. Describes the different kinds of ground water and given typical analyses. Includes a brief bibliography of paper containing water analyses.



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