DEPARTMENT OF THE INTERIOR
HUBERT WORK, Secretary

UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, Director

Water-Supply Paper 514

SURFACE WATER SUPPLY OF THE UNITED STATES

1919–1920

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS

C. LOWER COLUMBIA RIVER BASIN AND PACIFIC SLOPE DRAINAGE BASINS IN OREGON

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

Prepared in cooperation with the States of
OREGON AND WASHINGTON

WASHINGTON
GOVERNMENT PRINTING OFFICE
1924

ADDITIONAL COPIES

OF THIS PUBLICATION MAY BE PROCURED FROM
THE SUPERINTENDENT OF DOCUMENTS
GOVERNMENT PRINTING OFFICE
WASHINGTON, D. C.

AT

25 CENTS PER COPY

CONTENTS.

ILLUSTRATIONS.

SURFACE WATER SUPPLY OF LOWER COLUMBIA RIVER AND PACIFIC SLOPE DRAINAGE BASINS IN OREGON, 1919–1920.

AUTHORIZATION AND SCOPE OF WORK.

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the years ending September 30, 1919 and 1920.

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 items 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 ended June 30, 1895–1921.

1895	$12,500.00
1896	20,000.00
1897 to 1900, inclusive	50,000.00
1901 to 1902, inclusive	100,000.00
1903 to 1906, inclusive	200,000.00
1907	150,000.00
1908 to 1910, inclusive	100,000.00
1911 to 1917, inclusive	150,000.00
1918	175,000.00
1919	148,244.10
1920	175,000.00
1921	180.000.00

In the execution of the work many private and State organizations have cooperated either by furnishing data or by assisting in collecting data. Acknowledgments for cooperation of the first kind are made in connection with the description of each station affected; cooperation of the second kind is acknowledged on page 9.

Measurements of stream flow have been made at about 5,000 points in the United States and also at many points in Alaska and

the Hawaiian Islands. In July, 1920, 1,350 gaging stations were being maintained by the Survey and the cooperating organizations. Many miscellaneous discharge measurements are made at other points. In connection with this work data were also collected in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in water-supply papers from time to time.

DEFINITION OF TERMS.

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

"Second-feet" is an abbreviation for "cubic feet per second." A second-foot is the rate of discharge of water flowing in a channel of rectangular cross section 1 foot wide and 1 foot deep at an average velocity of 1 foot per second. It is generally used as a fundamental unit from which others are computed.

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

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

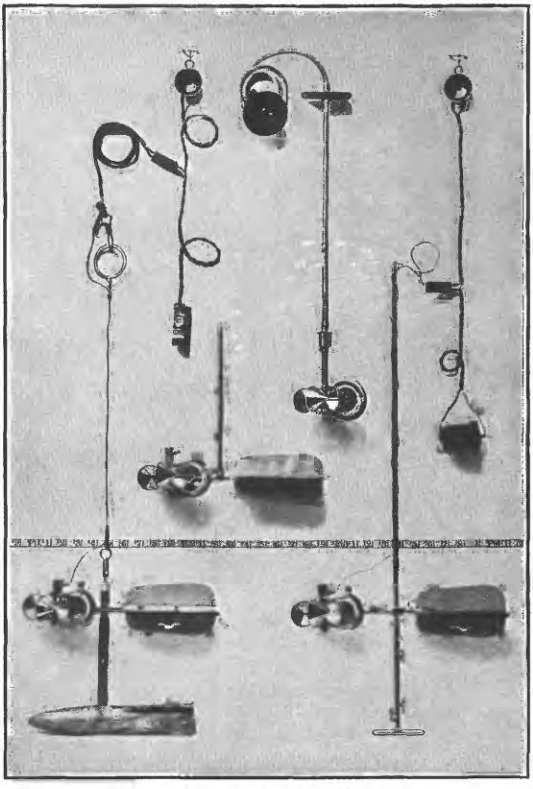
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

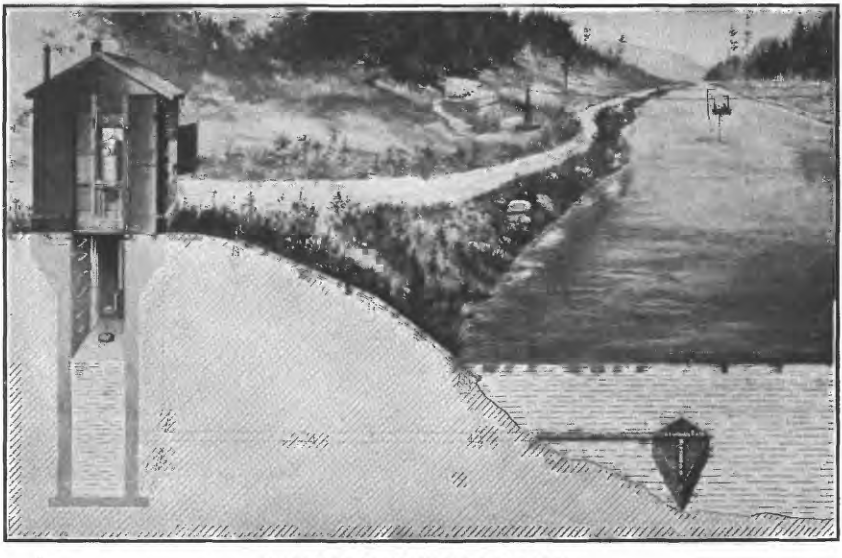
"Stage-discharge relation," an abbreviation for the term "relation of gage height to discharge."

"Control," a term used to designate the section or sections of the stream 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.

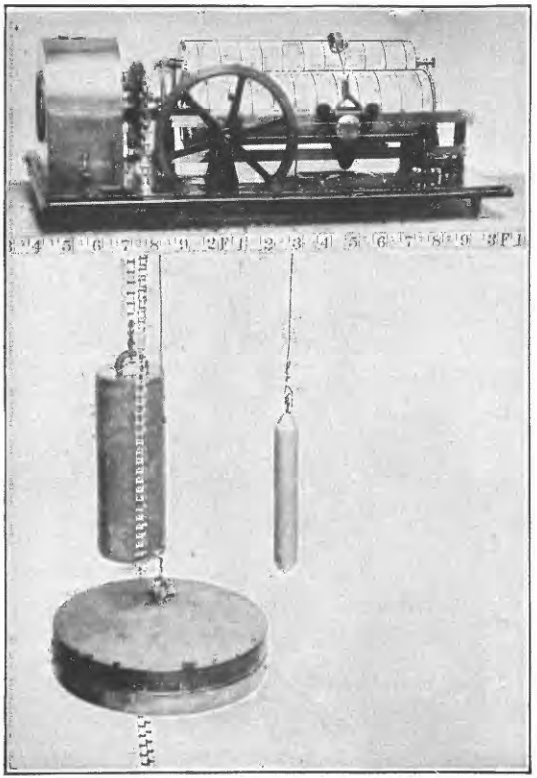
The "point of zero flow" for a gaging station is that point on the gage—the gage height—at which water ceases to flow over the control.



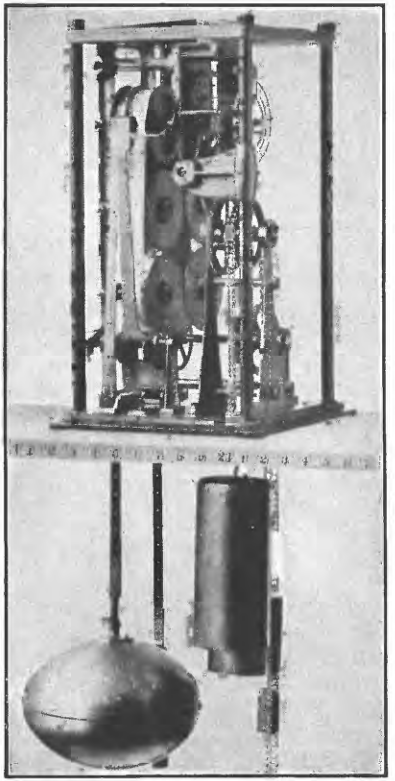
A. PRICE CURRENT METERS.



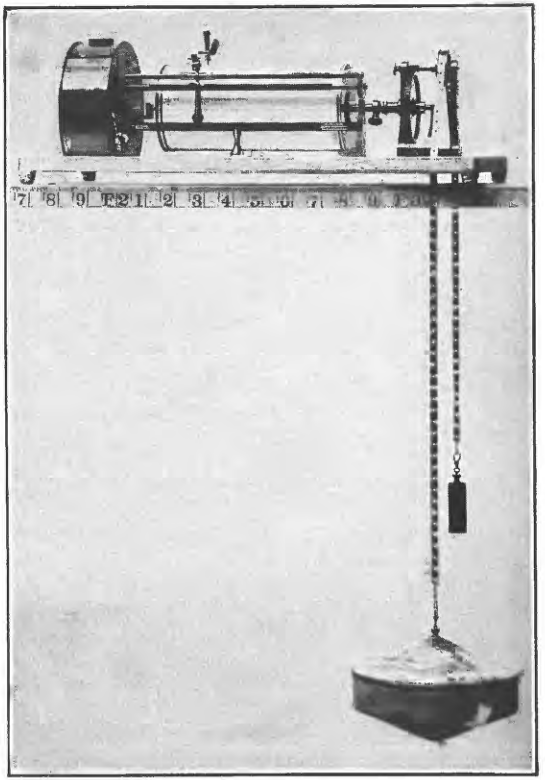
B. TYPICAL GAGING STATION.



A. STEVENS CONTINUOUS.



B. GURLEY PRINTING.



C. FRIEZ.

WATER-STAGE RECORDERS.

EXPLANATION OF DATA.

The data presented in this report cover two years beginning October 1, 1918, and ending September 30, 1920. At the beginning of January in most parts of the United States much of the precipitation in the preceding three months is stored as ground water in the form of snow or ice, or in ponds, lakes, and swamps, and this stored water passes off in the streams during the spring break-up. At the end of September, on the other hand, the only stored water available for run-off is possibly a small quantity in the ground; therefore the run-off for the year beginning October 1 is practically all derived from precipitation within that year.

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

From the discharge measurements rating tables are prepared that give the discharge for any stage. The application of the daily gage heights to these rating tables gives the daily discharge from which the monthly and yearly mean discharge is computed.

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

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

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

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

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

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this average flow computations recorded in the remaining columns, which are defined on page 2, are based.

ACCURACY OF FIELD DATA AND COMPUTED RESULTS.

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

A paragraph in the description of the station gives information regarding 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 heights to the rating table to obtain the daily discharge.[1]

For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the main 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 run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "Run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining

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

areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "Run-off in inches" published in earlier reports by the Survey should be used with caution because of possible inherent sources of error not known to the Survey.

Many gaging stations on streams in the irrigated areas of the United States are situated above most of the diversions from those streams, and the discharge recorded does not show the water supply available for further development, as prior appropriations below the stations must first be satisfied. To give an idea of the amount of prior appropriations, a paragraph on diversions is presented in each station description. The figures given can not be considered exact but represent the best information available.

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.

PUBLICATIONS.

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 subject as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, professional papers, annual reports, and monographs.

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 basins.
II. South Atlantic 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 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.

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., 704 Journal Building.
Trenton, N. J., Statehouse.
Asheville, N. C., 6 Government Street.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Brown Hall, Ohio State University.
Chicago, Ill., 1404 Kimball Building.
Madison, Wis., care of Railroad Commission of Wisconsin.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Helena, Mont., 52 Montana National Bank Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Boise, Idaho, 615 Idaho Building.
Tacoma, Wash., 406 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 328 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., 210 Agricultural Building; University of Arizona.
Austin, Tex., State Capitol.
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 records have been obtained at about 5,000 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey.

[A=Annual Report; B=Bulletin; W=Water-Supply Paper.]

Report.	Character of data.	Year.
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to Sept., 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Description, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896.
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
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	Description, 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.
W 471 to 484	do	1918.
W 501 to 514	do	1919-20.

The records at most of the stations discussed in these reports extend over a series of years, and miscellaneous measurements at many points other than regular gaging stations have been made each year. An index of the reports containing records obtained prior to 1904 has been published in Water-Supply Paper 119.

The table following gives, by years and drainage basins, the numbers of the papers on surface-water supply published from 1899 to 1920. 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 1920, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, and 501, which contains records for the New England streams from 1903 to 1920. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899-1920.

Year.	North Atlantic slope (St. John River to York River).	South Atlantic coast and eastern Gulf of Mexico (James River to the Mississippi).	Ohio River.	St. Lawrence River and Great Lakes.	Hudson Bay and upper Mississippi River.	Missouri River.	Lower Mississippi River.	Western Gulf of Mexico.	Colorado River.	Great Basin.	Pacific coast. in California.	North Pacific drainage basins.		
												Pacific basins in Washington and upper Columbia River.	Snake River basin.	Lower Columbia River and Pacific basins in Oregon.
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47 [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	84	[l] 82, 83	[k] 83, 85	84	[k] 83, 84	84	85	85	85	85	85	85
1903	97	[b] 97, 98	98	97	[k] 98, 99, [m] 100	99	[k] 98, 99	99	100	100	100	100	100	100
1904	[n] 124, [o] 125, [p] 126	[p] 126, 127	128	129	[k] 128, 130	130, [q] 131	[k] 128, 131	132	133	133, [r] 134	134	135	135	135
1905	[n] 165, [o] 166, [p] 167	[p] 167, 168	169	170	171	172	[k] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332A	332B	332C
1913	351	352	353	354	355	356	357	358	359	360	361	362A	362B	362C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514

[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] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific coast 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 for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers
[r] Great Basin in California except Truckee and Carson river basins.
[s] Below junction with Gila.
[t] Rogue, Umpqua, and Siletz rivers only.

COOPERATION.

The work in Oregon and Washington was carried on under cooperative agreements between the United States Geological Survey and the respective States.

Cooperation with the States is effected under contracts which are made between the Director of the United States Geological Survey and the State engineers or other officials and are authorized by legislative acts appropriating moneys.

Acknowledgments are due to Percy A. Cupper, State engineer of Oregon, and to Henry Landes, State geologist of Washington, for the efficient manner in which they represented their States in the cooperative investigations.

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

Special acknowledgments are due for financial assistance rendered by municipalities, corporations, and individuals, as follows: Water masters for Umatilla, Crook, and Deschutes counties; water bureau of the city of Portland; Tumalo project of the State of Oregon; Ochoco Irrigation District; Suttle Lake Irrigation District; East Fork Irrigation District; Talent Irrigation District; Medford Irrigation District; Horse Heaven Irrigation District; Pacific Power & Light Co.; Central Oregon Irrigation Co.; Arnold Irrigation Co.; Northwestern Electric Co.; Portland Railway, Light & Power Co.; Waldo Lake Irrigation & Power Co.; North Coast Power Co.; California-Oregon Power Co.; Rogue River Valley Canal Co.; M. A. Moody; and J. G. Kelley.

DIVISION OF WORK.

Data for stations in Oregon and Washington, except those in the Cowlitz River basin in Washington, were collected and prepared for publication under the direction of F. F. Henshaw, district engineer, assisted by C. L. Batchelder, R. C. Briggs, J. J. Dirzulaitis, K. N. Phillips, J. W. Bones, and Wendell Dawson.

The data for the stations in the Cowlitz River basin in Washington were collected and prepared for publication under the direction of G. L. Parker, district engineer, assisted by Lasley Lee, D. J. Calkins, R. B. Kilgore, and John McCombs.

The records were reviewed and the manuscript assembled by B. J. Peterson.

GAGING-STATION RECORDS.

COLUMBIA RIVER AT THE DALLES, OREG.

LOCATION.—In sec. 34, T. 2 N., R. 13 E., 2,000 feet below ferry at The Dalles, 18 miles below Deschutes River and above Hood and Klickitat rivers.

DRAINAGE AREA.—237,000 square miles.

RECORDS AVAILABLE.—June 1, 1878, to September 30, 1920. Maximum stages 1858 to 1877.

GAGE.—Two gages at The Dalles: The Government or Brooks gage, used by the United States Geological Survey, made up of several sections attached to the piling of viaduct connecting Regulator Dock with the warehouse; the United States Army engineers' gage, similar in form but with a datum of 8.9 feet lower than the Brooks gage. Gage at Cascade Locks, about 40 miles below The Dalles, which was used in working up early records, has been situated at various points but is at present attached to side of wooden fender of upper locks' chamber between upper guard and lock gates. Elevation of datum of Brooks gage, 46.36 feet (adjustment of primary level net, 1912).

DISCHARGE MEASUREMENTS.—In 1903 measurements made by the United States Army engineers with rod floats and meter from a steamer; in 1907, by United States Geological Survey engineers with meter from a launch; in 1908, flood measurements by the United States Geological Survey engineers 2,000 feet below gage at The Dalles; in 1910 and 1913 measurements made by United States Geological Survey engineers on Columbia River above Snake River and on Snake River referred to The Dalles gage, allowance being made for intervening tributaries.

CHANNEL AND CONTROL.—Rocky and permanent at the rapids at Cascade Locks, the control for all three gages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 32.5 feet June 1 (discharge, 553,000 second-feet); minimum stage, somewhat less than −0.2 foot January 7–9, when gage was not read (discharge estimated 60,000 second-feet).

Maximum stage recorded during year ending September 30, 1920, 26. 3 feet June 26 (discharge, 428,000 second-feet); minimum stage −4.0 feet at Cascade Locks, December 17 (discharge, 41,500 second-feet).

1857–1920: Maximum stage recorded, 59.6 feet at 2 p. m. June 6, 1894 (discharge, 1,170,000 second-feet); minimum stage, that of December 17, 1919.

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

DIVERSIONS.—Quantity of water diverted for irrigation is large in the aggregate but constitutes only a small proportion of the total flow; the low-water flow, which comes in the winter, is little affected.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent, except as affected by ice. Rating curve well defined between 80,000 and 900,000 second-feet. Gage read to tenths daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage readings furnished by United States Weather Bureau.

No discharge measurements made during years ending September 30, 1919 and 1920.

Daily discharge, in second-feet, of Columbia River at The Dalles, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	110,000	92,000	77,000	72,200	103,000	82,900	163,000	320,000	553,000	374,000	205,000	137,000
2	106,000	91,000	77,000	69,800	101,100	84,700	173,000	322,000	522,000	368,000	201,000	135,000
3	106,000	90,100	77,000	67,600	99,000	86,500	184,000	325,000	503,000	363,000	197,000	132,000
4	105,000	90,100	77,000	65,500	97,000	88,300	192,000	316,000	479,000	358,000	192,000	130,000
5	105,000	90,100	76,200	64,100	96,000	93,000	202,000	308,000	469,000	350,000	190,000	128,000
6	106,000	89,200	76,200	62,700	95,000	98,000	216,000	302,000	457,000	344,000	187,000	125,000
7	107,000	88,300	76,200	60,000	94,000	103,000	233,000	310,000	447,000	335,000	185,000	123,000
8	105,000	88,300	76,200	60,000	92,000	99,000	229,000	289,000	441,000	327,000	185,000	121,000
9	105,000	87,400	76,200	60,000	90,100	95,000	222,000	283,000	441,000	316,000	185,000	118,000
10	108,000	86,500	75,400	62,000	91,000	93,000	216,000	281,000	433,000	308,000	183,000	117,000
11	107,000	86,500	75,400	63,400	93,000	89,200	209,000	278,000	422,000	303,000	187,000	116,000
12	107,000	85,600	75,400	66,900	94,000	87,400	202,000	279,000	409,000	299,000	184,000	115,000
13	106,000	85,600	75,400	67,600	94,000	85,600	206,000	281,000	395,000	292,000	181,000	114,000
14	104,000	85,600	75,400	69,000	93,000	83,800	202,000	272,000	381,000	286,000	178,000	113,000
15	103,000	85,600	75,400	69,800	93,000	87,400	198,000	269,000	374,000	281,000	174,000	112,000
16	101,000	86,500	75,400	70,600	94,000	93,000	195,000	266,000	363,000	276,000	170,000	110,000
17	100,000	85,600	75,400	67,600	94,000	85,600	191,000	263,000	358,000	272,000	169,000	107,000
18	103,000	84,700	75,400	83,800	94,000	90,100	191,000	273,000	349,000	267,000	168,000	105,000
19	103,000	83,800	75,400	83,800	92,000	95,000	187,000	283,000	349,000	264,000	165,000	103,000
20	103,000	83,800	75,400	79,400	91,000	95,000	194,000	286,000	340,000	261,000	164,000	101,000
21	103,000	82,900	75,400	77,800	91,000	106,000	204,000	295,000	339,000	258,000	161,000	99,000
22	103,000	82,900	74,600	99,000	90,100	115,000	212,000	318,000	335,000	255,000	165,000	97,000
23	103,000	82,900	74,600	116,000	88,300	124,000	220,000	349,000	347,000	252,000	151,000	95,000
24	102,000	82,000	74,600	111,000	86,500	130,000	226,000	386,000	356,000	248,000	150,000	92,000
25	100,000	81,100	74,600	105,000	84,700	132,000	232,000	424,000	361,000	243,000	148,000	91,000
26	98,000	80,200	74,600	112,200	82,900	135,000	237,000	437,000	367,000	236,000	147,000	90,100
27	99,000	79,400	74,600	118,000	82,000	135,000	252,000	445,000	372,000	229,000	147,000	89,200
28	99,000	78,600	74,600	113,000	81,100	134,000	267,000	459,000	374,000	220,000	144,000	88,300
29	98,000	77,800	73,800	110,000	.....	134,000	275,000	471,000	376,000	216,000	142,000	86,500
30	95,000	77,000	73,800	107,000	.....	148,000	287,000	503,000	377,000	212,000	138,000	85,600
31	93,000	.....	73,800	107,000	.....	163,000	.....	532,000	.....	209,000	138,000	.....
1919–20.												
1	84,700	59,900	64,400	75,400	114,000	60,600	85,600	144,000	315,000	385,000	311,000	146,000
2	83,800	62,000	64,400	73,000	105,000	62,700	87,400	148,000	311,000	385,000	294,000	143,000
3	82,900	65,500	64,400	70,600	99,000	65,400	86,500	152,000	300,000	385,000	286,000	142,000
4	82,000	68,300	63,600	68,300	104,000	64,100	84,700	157,000	292,000	388,000	275,000	137,000
5	81,100	72,200	63,600	66,900	90,100	64,800	84,700	155,000	286,000	392,000	267,000	132,000
6	79,400	68,300	61,200	64,800	86,500	63,400	83,800	151,000	284,000	388,000	264,000	128,000
7	78,600	68,300	59,600	61,300	86,500	63,400	87,400	151,000	289,000	388,000	257,000	124,000
8	82,000	69,000	58,100	59,200	83,800	61,300	99,000	157,000	295,000	394,000	249,000	121,000
9	80,200	72,200	56,700	56,800	81,100	62,000	107,000	180,000	308,000	394,000	245,000	117,000
10	77,800	68,300	54,200	55,600	80,200	62,700	115,000	192,000	328,000	392,000	251,000	113,000
11	75,400	66,900	51,200	55,600	77,800	61,300	121,000	211,000	340,000	386,000	232,000	111,000
12	73,000	65,500	49,400	55,600	80,200	61,300	130,000	226,000	347,000	367,000	226,000	110,000
13	71,400	64,100	47,300	58,600	75,400	64,800	132,000	237,000	356,000	381,000	219,000	110,000
14	69,800	62,000	45,800	58,000	71,400	69,800	132,000	242,000	359,000	399,000	213,000	113,000
15	67,600	59,900	43,500	63,400	70,600	75,400	132,000	246,000	359,000	385,000	208,000	114,000
16	67,600	59,200	42,300	68,300	69,800	82,000	147,000	257,000	370,000	386,000	202,000	111,000
17	69,800	58,600	41,500	78,600	69,000	100,000	143,000	275,000	385,000	388,000	198,000	117,000
18	69,000	59,900	42,700	87,400	69,000	96,000	140,000	292,000	399,000	390,000	195,000	118,000
19	68,300	64,800	45,300	94,000	69,000	94,000	137,000	307,000	414,000	383,000	192,000	116,000
20	68,300	67,600	51,200	92,000	66,900	91,000	134,000	323,000	414,000	381,000	190,000	114,000
21	68,300	69,000	59,600	91,000	66,200	87,400	128,000	328,000	414,000	379,000	187,000	112,000
22	69,000	69,000	77,000	87,400	65,500	84,700	128,000	334,000	411,000	374,000	185,000	110,000
23	66,900	70,600	85,600	81,100	64,800	83,800	128,000	335,000	411,000	370,000	184,000	111,000
24	65,500	71,400	91,600	72,200	64,800	83,800	126,000	339,000	412,000	368,000	181,000	113,000
25	63,400	68,300	101,000	72,200	64,100	87,400	125,000	342,000	422,000	367,000	176,000	115,000
26	64,100	66,900	98,000	92,000	63,400	93,000	123,000	339,000	428,000	358,000	169,000	117,000
27	64,800	65,500	91,600	97,000	63,400	97,000	120,000	332,000	416,000	352,000	163,000	120,000
28	65,500	64,800	89,200	111,000	62,700	96,000	122,000	323,000	403,000	347,000	159,000	121,000
29	66,200	66,900	86,800	130,000	62,000	94,000	125,000	315,000	395,000	337,000	155,000	122,000
30	64,100	67,600	84,500	123,000	.....	95,000	135,000	315,000	390,000	330,000	152,000	121,000
31	61,300	.....	81,200	120,000	.....	87,400	.....	315,000	.....	325,000	146,000	.....

NOTE.—Stage-discharge relation affected by ice Dec. 6–25, 1919; discharge determined from gage readings at Cascade Locks.

Monthly discharge of Columbia River at The Dalles, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 237,000 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
1918–19.						
October	110,000	93,000	103,000	0.435	0.50	6,330,000
November	92,000	77,000	85,000	.359	.40	5,060,000
December	77,000	73,800	75,400	.318	.37	4,640,000
January	118,000	60,000	82,000	.346	.40	5,040,000
February	103,000	81,100	92,000	.388	.40	5,110,000
March	163,000	82,900	106,000	.447	.52	6,520,000
April	287,000	163,000	214,000	.903	1.01	12,700,000
May	532,000	263,000	336,000	1.42	1.64	20,700,000
June	553,000	335,000	403,000	1.70	1.90	24,000,000
July	374,000	209,000	285,000	1.20	1.38	17,500,000
August	205,000	138,000	170,000	.717	.83	10,400,000
September	137,000	85,600	109,000	.460	.51	6,490,000
The year	553,000	60,000	172,000	.726	9.85	124,000,000
1919–20.						
October	84,700	61,300	72,000	.304	.35	4,430,000
November	72,200	58,600	66,100	.279	.31	3,930,000
December	101,000	41,500	65,000	.274	.32	4,000,000
January	130,000	55,600	78,700	.332	.38	4,840,000
February	114,000	62,000	76,800	.324	.35	4,420,000
March	100,000	60,600	77,900	.329	.38	4,790,000
April	147,000	83,800	118,000	.498	.56	7,020,000
May	342,000	144,000	252,000	1.06	1.22	15,500,000
June	428,000	284,000	362,000	1.53	1.71	21,500,000
July	399,000	325,000	376,000	1.59	1.83	23,100,000
August	311,000	146,000	214,000	.903	1.04	13,200,000
September	146,000	110,000	120,000	.506	.56	7,140,000
The year	428,000	41,500	157,000	.662	9.01	114,000,000

TRIBUTARIES OF COLUMBIA RIVER BELOW MOUTH OF SNAKE RIVER.

WALLA WALLA RIVER BASIN.

WALLA WALLA RIVER NEAR MILTON, OREG.

LOCATION.—In sec. 21, T. 5 N., R. 36 E., half a mile below junction of North and South forks of Walla Walla River and 4 miles above Milton, Umatilla County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 13, 1903, to May 29, 1906; March 17, 1918, to September 30, 1919; and March 19 to September 30, 1920.

GAGE.—Friez water-stage recorder referred to vertical staff, used 1918 to 1920; staff gage in sec. 11, T. 5 N., R. 35 E., used 1903 to September 30, 1905; staff gage in sec. 14, T. 5 N, R. 35 E., used August 12, 1905, to May 29, 1906.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Channel straight at cable; curved about 150 feet above and below. Current makes considerable angle with cable at low water, but not at high water. Two channels at extreme high water, with some discharge passing around cable to south where bank is low and brush covered; right bank high and rocky. Control, 100 feet below gage, is composed of gravel and small boulders; shifts at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, indicated by recorder (clock stopped) 2.0 feet probably on April 4 (discharge, estimated from extension of rating curve, 710 second-feet); minimum stage from water-stage recorder, 0.05 foot at 1 p. m. August 24 (discharge, 101 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.49 feet at 8 p. m. April 5 (discharge, 1,370 second-feet); minimum stage recorded, 0.32 foot at 6 p. m. August 20 (discharge, 98 second-feet).

1903–1906 and 1918–1920: Highest flood ever known occurred May 30, 1906, discharge estimated from observation of cross sections and slope, after flood had subsided, as 8,130 second-feet; minimum discharge recorded, 95 second-feet, July 18, 1918.

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

DIVERSIONS.—A few small canals take water out above station; total area irrigated, only few hundred acres; some small diversions between sites of present and former gaging stations.

REGULATION.—The Pacific Power & Light Co.'s power plant about 5 miles above this station affects the flow somewhat, especially at low water. Water is ponded in fore bay to some extent.

ACCURACY.—Stage-discharge relation changed each spring during high water. Three fairly well-defined rating curves used. Operation of recorder satisfactory except July 11 to August 12, 1919, when fluctuation was small. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

COOPERATION.—Most of data obtained under direction of A. E. Perry, water master for Umatilla County.

Discharge measurements of Walla Walla River near Milton, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919		*Feet.*	*Sec.-ft.*	9120		*Feet.*	*Sec.-ft.*
Mar. 27	A. E. Perry	1.11	421	July 4	A. E. Perry	0.44	120
June 29	do	.19	134	Aug. 6	H. B. Schminky	.42	111

Daily discharge, in second-feet, of Walla Walla River near Milton, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	130	135	135	140	182	230	600	560	303	134		117
2	128	138	138	140	179	322	540	502	288	134		127
3	130	135	140	145	173	375	540	450	276	132	112	124
4	130	138	140	145	164	322	640	415	276	130		130
5	132	138	142	142	155	305	680	380	264	130		134
6	135	138	145	142	155	290	560	362	261	127	112	134
7	130	135	145	142	152	275	432	380	252	127		143
8	130	135	142	142	155	260	415	398	240	124		151
9	128	132	148	145	158	245	380	415	234	124		145
10	125	135	145	142	155	230	432	415	225	122	111	137
11	120	148	140	145	206	245	520	415	219	120		137
12	122	140	140	148	275	245	468	415	219			132
13	122	130	140	150	260	290	415	380	213		110	132
14	125	130	150	148	230	322	380	398	198		110	134
15	125	155	209	142	215	322	380	432	195	118	110	132
16	125	135	200	145	200	305	362	450	192		112	130
17	125	132	173	152	191	275	415	432	192		110	127
18	125	130	158	163	240	410	485	450	186	117	110	124
19	125	130	152	174	290	620	502	485	170		108	124
20	120	135	148	185	260	520	520	502	154	120	108	120
21	115	135	145	215	245	485	468	502	154		108	120
22	118	135	142	260	230	468	468	520	154	122	103	117
23	120	135	135	245	203	468	502	485	154		103	114
24	125	135	130	305	194	468	580	450	148		103	112
25	128	135	132	340	197	415	600	432	140		103	112
26	130	135	132	305	215	398	520	432	143	117	103	117
27	132	135	132	275	230	432	520	432	145		108	120
28	142	135	135	245	215	485	580	432	140		110	
29	138	135	135	230	.....	540	600	398	137	112	108	120
30	132	135	132	197	.....	680	580	380	140	112	108	
31	132	.....	125	188	.....	680	.....	330	.....	112	110	.....

Daily discharge, in second-feet, of Walla Walla River near Milton, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.							
1		217	529	228	124		112
2		200	468	224	117		
3		184	382	217	119	107	102
4		266	382	217	117		
5		1,260	489	253	114		91
6		1,120	566	270	112	108	91
7		887	678	261	108	108	93
8		994	780	313	108	114	93
9		1,070	870	286	107	119	94
10		1,090	838	257	106	117	97
11		862	790	253	108	117	102
12		829	700	261	117	110	124
13		1,080	686	266	117		128
14		913	700	266	117	102	143
15		744	664	274	119	102	123
16		644	657	238	117	104	112
17		566	651	228	115	104	112
18		489	617	214	115	100	110
19	207	506	610	207	114	101	110
20	197	489	578	197	115	100	108
21	210	412	524	191	112	100	110
22	242	359	442	181	110	101	123
23	231	331	412	172	107	101	141
24	224	318	359	167		101	146
25	224	442	345	146		108	158
26	210	417	313	153		117	164
27	220	529	322	150	107	126	156
28	220	578	322	141		135	143
29	214	630	318	132		164	135
30	224	630	300	128		135	128
31	228	.....	217	.....		121	.....

NOTE.—Discharge estimated or interpolated for following periods when gage was not read: Jan. 18, 19. Feb. 18, Apr. 3–6, June 19, July 12–17, 19–21, 23–28, 30, 31, Aug. 1–5, 7–12, Sept. 28–30, 1919, July 24–31, Aug, 1–5, 12, 13, 26, 27, and Sept. 2–4, 1920. Braced figures show mean discharge for periods included.

Monthly discharge of Walla Walla River near Milton, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	142	115	127	7,810
November	155	130	136	8,090
December	209	125	145	8,920
January	340	140	187	11,500
February	290	152	204	11,300
March	680	230	385	23,700
April	680	362	503	29,900
May	560	330	433	26,600
June	303	137	200	11,900
July	134	112	121	7,440
August	112	103	109	6,700
September	151	112	127	7,560
The year	680	103	223	161,000
1920.				
March 19–31	242	197	219	5,650
April	1,260	184	635	37,800
May	870	217	533	32,800
June	313	128	216	12,900
July	124	.....	112	6,890
August	164	100	112	6,890
September	164	91	118	7,020
The period	.....	.....	.....	110,000

UMATILLA RIVER BASIN.

UMATILLA RIVER ABOVE FURNISH RESERVOIR, NEAR YOAKUM, OREG.

LOCATION.—In NW. ¼ sec. 17, T. 2 N., R. 31 E., at Oregon-Washington Railroad & Navigation Co.'s bridge, one-fourth mile above Campbell flag station, 5 miles by river above Yoakum and old gaging station and 10 miles west of Pendleton, Umatilla County; just above backwater from Furnish reservoir.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 18 to August 28, 1915; July 5, 1916, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder on right side of main channel at downstream end of bridge pier, installed July, 1916; inspected by J. M. Bilton. Temporary gage used in 1915.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel straight at bridge; current even; overflow channel extends under west span of bridge. Left bank high and rocky; right bank low, with some cottonwood trees and brush. Control is at almost right angle turn to right, about 250 feet below gage and below deep pool and is composed of gravel and free of vegetation; subject to slight shifts.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 8.25 feet at midnight April 4 (discharge, 6,200 second-feet); minimum stage from recorder, 0.50 foot August 23–25 (discharge, 23 second-feet).

Maximum stage during year ending September 30, 1920, observed from high-water mark April 5 or 6, 9.5 feet, estimated backwater 0.8 foot (discharge, 7,000 second-feet); minimum stage, 0.05 foot August 19 (discharge, 16 second-feet).

1916–1920: Maximum stage from water-stage recorder 9.03 feet May 13, 1917 (discharge, 7,940 second-feet); minimum discharge, occurred August 19, 1920.

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

DIVERSIONS.—780 acres irrigated on Umatilla River above station and some on tributaries.

REGULATION.—At low stages water is ponded in the power canals of two flouring mills at Pendleton and released at intervals to obtain sufficient power for operating mills. This may cause considerable fluctuation at the station, but the effect has been much less noticeable during 1919 and 1920 than formerly. There is practically no effect at medium and high stages. The backwater from the Furnish reservoir extends to within a few hundred yards below the control and is believed to have affected stage-discharge relation during high water in April, 1920.

ACCURACY.—Stage-discharge relation practically permanent during 1919; changed during high water in 1920; backwater from Furnish reservoir at flood stages. Rating curve used to December, 1919, well defined for high water; curve used thereafter fairly well defined. Operation of water-stage recorder unsatisfactory owing to frequent stopping of clock and accumulation of sediment in stilling well. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph; shifting-control method used April 11–22 and 27–30, 1920. Records fair.

COOPERATION.—Data collected under direction of A. E. Perry, water master for Umatilla County.

Discharge measurements of Umatilla River above Furnish reservoir near Yoakum, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 26	A. E. Perry [a]	4.45	1,710	Apr. 11	Perry and Bilton	7.47	3,980
Apr. 19	do	6.11	3,350	June 2	do	2.19	348
June 15	Perry and Luper [b]	1.32	118	25	A. E. Perry	1.50	189
27	A. E. Perry	.94	52	26	Perry and Pearson	1.32	150
1920				29	A. E. Perry	1.12	111
Mar. 18	Perry and Snyder	3.46	1,170				

[a] Water master. [b] Assistant to State engineer.

Daily discharge, in second feet, of Umatilla River above Furnish reservoir, near Yoakum, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	45		92			475	4,230	2,030	305	48	31	
2	44		98	120		755	3,580	1,670	290	49	30	
3	44		92			1,650	3,840	1,430	260	45	29	
4	56		92	120		1,410	4,910	1,130	245	43	29	
5	51		95			1,120	5,470	950	230	42	29	
6	56		94			1,090	3,680	830	218	41	29	
7	56		92			1,000	3,090	770	205	42	28	40
8	56		95			855	2,650	770	205	41	26	
9	57	80	103	140		755	2,230	770	192	39	25	
10	57		104		a 525	655	2,330	770	180	37	25	
11	58		103			630	a3,440	720	168	34	25	
12	53		107			655	a3,440	770	155	33	25	
13	52		106	160		705	2,980	720	144	33	25	
14	52		104			1,000	2,430	645	125	33	25	50
15	54		126			1,090	2,130	620	113	32	24	51
16	78		208	180		1,030	2,030	720	104	31	24	50
17	77	110	232			855	2,330	720	95	29	25	47
18	74	107	220			1,330	3,200	670	85	27	25	44
19	72	104	195	195	705	3,340	3,320	720	78	27	25	44
20	68	104	195	245	590	2,520	3,200	720	78	28	25	41
21	65	101	182		530	2,410	2,760	720	75	29	25	43
22	65	101	170		475	2,200	2,540	720	b 71	29	24	45
23	64	100	160	900	440	2,410	2,540	670	b 67	29	24	43
24	64	95	150		422	2,410	2,870	580	b 63	27	24	42
25	66	95	142		388	2,000	3,090	500	b 60	b 27	24	41
26	67	95	134	630	440	1,730	2,540	442	b 57	b 26	25	39
27	63	94	134		475	1,910	2,330	425	55	26	26	38
28		92	130		440	2,520	2,540	390	54	26	31	
29	65	92	130	550	.....	a2,900	2,430	372	49	27	29	40
30		92	128		.....	a3,300	2,230	338	48	32	30	
31		.....	126		.....	a3,700	.....	322	.....	34	31	.....

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.											
1			680	1,200	255	1,060	2,580	435	94	21	53
2	50	600	590	1,060	255	1,000	2,360	400	88	25	49
3			510	1,000	270	880	2,060	382	85	25	50
4			470	940	255	1,090	2,060	348	81	25	38
5	a1,000		470	880	255	a3,400	2,160	330	81	27	36
6	a 750	300	400	830	270	a6,000	2,260	330	86	32	36
7	a 700			755	270	a3,500	2,470		86	30	38
8	500			680	285	a3,500	2,690	374	81	27	38
9	425			610	285	a4,000	2,800		63	26	38
10	355		300	590	315	a4,000	3,020	418	40		47
11	320			570	330	3,950	2,580	418	33	23	48
12	320				348	3,830	2,260	418	34		52
13	290				570	5,100	1,960	418	44		62
14	260		198		2,690	4,720	1,870	418	48		68
15	230	200	285	500	1,960	3,830	1,690	418	47	20	65
16	275		1,170		1,430	3,240	1,510	418	46	19	62
17	372		4,580		1,130	2,800	1,430	382	43	18	58
18	408		2,910	418	1,000	2,470		348	41	17	53
19	425		2,060	418	880	2,470		300	38	16	53
20	580	a3,000	1,600	400	780	2,470	1,100	270	34	17	54
21	442	a5,000	1,200	400	755	2,260		240	34	17	53
22	290	a3,200	1,000	382	1,060	2,160		225	35	18	59
23	260	2,800	830	365	1,130	1,870	780	198	36		74
24	230	2,360	780	365	1,060	1,780	780	185	35		83
25	205	2,580	780	348	1,060	1,780	730	179	32		91
26	180	2,060	2,690	330	1,000	2,160	680	149	26	20	91
27	168	1,600	3,350	330	940	2,470	610	137	24		92
28	144	1,270	2,580	300	880	2,800	550	124	22		89
29	245	1,000	2,060	285	880	2,580	550	112	21	56	86
30	408	830	1,690	.....	1,060	2,580	470	102	20	58	81
31	.....	780	1,430	.....	1,130	.....	352	.....	20	58	.....

a Estimated from gage readings at diversion dam of Umatilla project feed canal. b Interpolated.

NOTE.—Mean discharge for periods of no gage-height record estimated as shown by braced figures.

Monthly discharge of Umatilla River above Furnish reservoir, near Yoakum, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	78	44	60.5	3,720
November	.....	.....	88.7	5,280
December	232	92	134	8,240
January	[a] 1,200	.....	354	21,800
February	[a] 760	.....	513	28,500
March	[a] 3,700	475	1,630	100,000
April	5,470	2,030	3,010	179,000
May	2,030	322	762	46,900
June	305	48	136	8,090
July	49	26	33.7	2,070
August	31	24	26.5	1,630
September	.....	.....	41.9	2,490
The year	5,470	24	563	408,000
1919–20.				
October	.....	.....	[b] 40	2,460
November	1,000	.....	333	19,800
December	5,000	.....	1,040	64,000
January	4,580	198	1,180	72,600
February	1,200	285	567	32,600
March	2,690	255	800	49,200
April	6,000	880	2,860	170,000
May	3,020	352	1,570	96,500
June	435	102	308	18,300
July	94	20	48.3	2,970
August	58	16	25.4	1,560
September	92	36	59.9	3,560
The year	6,000	16	735	534,000

[a] Estimated from record at feed canal dam. [b] Estimated.

UMATILLA RIVER NEAR UMATILLA, OREG.

LOCATION.—In NW. ¼ sec. 21, T. 5 N., R. 28 E., near main line of Oregon-Washington Railroad & Navigation Co.'s track, 1 mile below diversion point of Oregon Land & Water Co's canal, and 1½ miles above Umatilla, Umatilla County, and mouth of river.

DRAINAGE AREA.—2,130 square miles.

RECORDS AVAILABLE.—October 21, 1903, to September 30, 1920.

GAGE.—Inclined staff in two sections; lower section 1.2 to 3.5 feet, upper 3.5 to 10.8 feet. Read by employees of United States Reclamation Service.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Solid rock overlain with some gravel or sand. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.90 feet at diversion dam of West Extension at 5 p. m. April 15 (discharge, 5,050 second-feet); minimum stage recorded, 1.95 feet on several days in December, January, August, and September (discharge, 6.5 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.8 feet April 14 (discharge, 6,790 second-feet); minimum discharge estimated 1 second-foot March 1–6.

1903–1920: Maximum stage recorded, 11.0 feet May 31, 1906 (discharge, 19,600 second-feet); no flow July 25 and August 1–9, 1906.

ICE.—Occasionally shore and floating ice, but stage-discharge relation not materially affected.

DIVERSIONS.—Large part of total flow of river diverted for irrigation above station. The Umatilla project feed canal also diverts water during winter for storage in the Cold Springs reservoir. The main canal of the West Umatilla project of the United States Reclamation Service diverts just above the station. The low-water flow is return water from the Hermiston project and other irrigated tracts.

REGULATION.—Discharge is occasionally affected by pondage at the West Extension dam.

ACCURACY.—Stage-discharge relation shifted slightly for low stages during 1919; permanent during 1920. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records fair.

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

The following discharge measurement was made September 17, 1919: Gage height, 2.23 feet; discharge, 31.9 second-feet.

Daily discharge, in second-feet, of Umatilla River near Umatilla, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	40	71	78	6.5	274	.....	3,600	1,240	22	17	6.5	22
2	45	71	78	6.5	281	.....	3,060	1,120	22	17	22	22
3	45	73	34	6.5	281	.....	2,560	995	17	17	6.5	31
4	43	73	18	7.0	260	.....	2,720	670	28	17	20	35
5	43	65	17	7.0	239	.....	4,680	580	28	22	22	39
6	64	65	11	9	204	.....	3,600	670	28	17	32	42
7	86	92	6.5	12	140	.....	2,560	580	17	17	28	42
8	97	65	6.5	12	66	.....	2,080	260	17	17	28	42
9	103	92	6.5	12	45	.....	1,550	260	35	17	17	45
10	110	65	7.0	15	295	.....	1,320	140	19	28	17	39
11	103	65	6.5	15	281	.....	1,930		22	9	17	22
12	53	65	6.5	15	370	.....	3,060		17	17	15	22
13	53	65	31	14	370	430	2,080		13	17	15	22
14	53	92	27	15	330	.....	1,970		9	17	17	28
15	53		23	17	281	.....	1,520	123	17	28	17	32
16	53		9	31	225	.....	1,380		17	22	15	42
17	53		9	31	246	.....	1,240		17	22	17	35
18	57		75	6.5	295	2,400	1,660	106	17	22	17	32
19	71		122	10	410	.....	2,130	123	17	35	15	22
20	97		37	31	450	.....	2,290	93	17	35	17	22
		80										
21	110		103	66	450	.....	2,130	190	17	35	17	22
22	118		48	122	370	.....	1,970	106	17	42	17	22
23	118		33	204	295	.....	1,820	22	17	39	17	32
24	118		45	490	225	.....	1,820	50	17	35	17	28
25	110		30	770	178	.....	2,290	28	17	17	17	22
26	64		17	625	118	.....	1,970	28	17	28	13	17
27	64	47	17	450	118	.....	1,970	28	17	17	9	6.5
28	62	86	20	370	133	.....	1,520	22	17	22	31	13
29	64	81	17	288	.....	.....	1,820	22	17	17	28	15
30	66	78	17	260	.....	.....	1,520	22	17	17	26	13
31	71	.....	13	253	.....	.....	.....	22	.....	13	28	.....
1919–20.												
1	20	146	720	825	1,380	1	880	1,570	42	17	13	39
2	32	226	825	770	1,240	1	880	1,310	42	17	13	28
3	32	252	770	720	995	1	580	1,180	42	17	13	28
4	32	330	535	670	825	1	580	1,060	42	17	13	28
5	35	426	410	670	670	1	995	1,060	42	17	17	22
6	35	1,520	330	625	670	1	6,060	1,060	42	17	17	22
7	39	1,000	302	625	580	28	4,680	1,120	39	26	22	17
8	39	780	302	580	580	17	2,620	1,380	45	28	17	19
9	39	626	580	625	580	13	4,260	1,520	45	17	17	17
10	39	626	490	535	580	13	5,370	2,050	69	17	17	17
11	35	524	580	535	580	15	5,830	1,970	42	26	17	17
12	35	426	580	535	535	15	4,460	1,380	69	22	17	28
13	35	410	490	490	450	42	4,910	1,060	69	31	17	35
14	35	370	580	490	625	42	6,790	880	80	17	17	35
15	39	316	580	490	580	1,820	4,910	770	123	17	17	4
16	39	316	580	825	580	1,120	3,490	720	80	35	31	35
17	22	309	580	2,160	580	995	3,310	720	75	17	9	35
18	22	370	410	3,310	316	720	2,130	580	106	17	9	69
19	22	490	370	2,290	150	670	2,050	580	75	13	17	58
20	26	720	410	1,660	150	580	2,130	450	31	17	19	58
21	26	770	6,300	1,380	113	490	1,820	580	28	17	17	35
22	15	720	2,960	1,380	85	490	1,520	410	3	13	17	22
23	10	580	2,290	938	69	670	1,310	410	17	13	17	22
24	6	535	2,790	938	39	670	1,180	260	31	13	17	22
25	6	370	2,290	720	34	580	995	140	39	13	17	28
26	6	330	2,290	720	34	580	1,060	101	17	13	17	42
27	4	316	1,660	3,140	19	490	1,380	93	28	17	22	69
28	4	316	1,590	2,790	28	720	1,820	55	28	17	28	69
29	4	316	1,240	2,130	28	490	2,050	50	26	35	28	69
30	4	316	1,180	1,820	.....	490	1,820	50	17	13	34	69
31	4	.....	995	1,590	.....	995	.....	50	.....	13	39	.....

NOTE.—Braced figures show estimated mean discharge for periods when gage was not read. Discharge, Dec. 14, 1918, Apr. 21, and June 13, 1919, interpolated.

Monthly discharge of Umatilla River near Umatilla, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	River.	Canals.	Total.
1918-19.						
October	118	40	73.8	4,540	2,520	7,060
November	92	47	75.7	4,500	0	4,500
December	122	6.5	31.2	1,920	0	1,920
January	770	6.5	135	8,300	0	8,300
February	450	45	258	14,300	0	14,300
March	.....	.....	[a] 1,300	79,900	0	79,900
April	4,680	1,240	2,190	130,000	8,390	138,000
May	1,240	22	266	16,400	10,500	26,900
June	35	9	18.9	1,120	7,140	8,260
July	42	9	22.3	1,370	6,760	8,130
August	32	6.5	18.7	1,150	5,610	6,760
September	45	6.5	27.6	1,640	4,390	6,030
The year	4,680	6.5	367	265,000	45,300	310,000
1919-20.						
October	39	4	23.9	1,470	.....	.....
November	1,520	146	492	29,300	0	29,300
December	6,300	302	1,160	71,300	0	71,300
January	3,310	490	1,190	73,200	0	73,200
February	1,380	19	452	26,000	0	26,000
March	1,820	1	412	25,300	322	25,600
April	6,790	580	2,730	162,000	5,550	168,000
May	2,050	50	794	48,800	6,760	55,600
June	123	3	47.8	2,840	6,660	9,500
July	35	13	18.7	1,150	6,820	7,970
August	39	9	18.8	1,160	6,760	7,920
September	69	4	34.9	2,080	6,070	8,150
The year	6,790	1	668	445,000	.....	.....

[a] Estimated from record above Yoakum.

NOTE.—Run-off given for canals is sum of run-off of main canal of West Umatilla project and Oregon Land & Water Co.'s canal which diverted around the station. Record of total run-off furnished by United States Reclamation Service.

McKAY CREEK NEAR PENDLETON, OREG.

LOCATION.—In sec. 34, T. 2 N., R. 32 E., at proposed dam site 5 miles south of Pendleton, Umatilla County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 31, 1918, to September 30, 1920; also May 23, 1903, to July 6, 1904, at a station about 4 miles downstream, in section 8.

GAGE.—Vertical staff in pool near ditch headgates used since April 3, 1919; read by Harry Jones. Vertical staff at Holmes Bridge, in sec. 11, T. 1 N., R. 32 E., read October 30, 1918, to April 15, 1919, by Albert Anderson.

DISCHARGE MEASUREMENTS.—Made from highway bridge or, at low stages, by wading.

CHANNEL AND CONTROL.—Control for gage at Holmes Bridge composed of gravel, somewhat shifting. Control for gage near ditch headgates is concrete diversion dam at dam site; changes in headgate of a small canal will affect stage-discharge relation only during irrigation season.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year ending September 30, 1919, 1,460 second-feet, March 31; water standing in pools in August; gage not read.

Maximum stage recorded during year ending September 30, 1920, 3.8 feet during night of April 5 from high-water marks observed the next morning (discharge, 2,500 second-feet); creek dry at times.

1903–4 and 1919–20: Maximum discharge recorded, that of April 5, 1920; no flow at times.

ICE.—Practically none.

DIVERSIONS.—A considerable number of small ditches divert above the station, using practically all the summer flow.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent. Rating curves used as follows: For station at bridge November 1 to March 2, well defined; March 25 to April 15, well defined below 900 second-feet; shifting-control method used March 3–24. For station at dam site, April 16, 1919, to April 5, 1920, well defined below 800 second-feet; April 6 to July 4, 1920, well defined below 800 second-feet; April 6 to July 4, 1920, well defined below 1,400 second-feet. Gage read to half-tenths in 1919 and to hundredths in 1920, once a day at low stages, twice a day at medium and high stages. Readings considered reliable except those for May 22 to July 19, 1920, which are too uncertain to warrant determination of discharge. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for 1919; good for 1920.

Discharge measurements of McKay Creek near Pendleton, Oreg., during the years ending Sept. 30, 1919 and 1920.

[Made by engineers of United States Reclamation Service.]

Date.	Gage height (feet).		Discharge.	Date.	Gage height (feet).		Discharge.
	At Holmes Bridge.	At dam site.			At Holmes Bridge.	At dam site.	
1918.			*Sec.-ft.*				*Sec.-ft.*
Oct. 30	0.55	.....	6.0	Apr. 7	2.50	2.04	551
Dec. 6	.58	.....	8.9	13	2.65	2.13	704
1919.				23	.....	1.70	400
Jan. 22	1.49	.....	322	23	.....	1.70	367
22	1.51	.....	347	26	.....	1.58	334
28	1.02	.....	76	May 8	.....	.80	81
Feb. 1	.91	.....	51	22	.....	.49	27.6
7	.85	.....	38.5	June 2	.....	.46	20.2
Mar. 4	1.63	.....	305	1920.			
11	1.33	.....	183	Apr. 7	.....	2.47	1,110
17	1.38	.....	228				
25	2.30	.....	405				
29	2.45	.....	562				

Daily discharge, in second-feet, of McKay Creek near Pendleton, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1918–19.							
1	6.5	6.5	10	50	145	880	210
2	6.5	6.5	6.5	45	394	670	187
3	6.5	6 5	6.5	40	490	880	161
4	6.5	6.5	6.5	37	323	1,220	138
5	6.5	6.5	6.5	40	254	990	125
6	6.5	7.6	6.5	40	288	670	116
7	7.2	6.5	6.5	40	274	670	90
8	7.2	6.5	6.5	40	248	506	81
9	7.2	6.5	6.5	70	212	474	57
10	6.5	6.5	6.5	136	194	825	50
11	6.5	6.5	6.5	156	178	935	38
12	6.5	6.5	6.5	128	184	670	61
13	6.5	6.5	6.5	102	260	670	45
14	6.5	6.5	6.5	96	295	530	37
15	6.5	32	6.5	86	330	410	33
16	6.5	48	6.5	86	260	470	38
17	6.5	32	6.5	230	230	500	40
18	6.5	26	6.5	236	670	710	33
19	6.5	26	15	194	1,400	630	29
20	6.5	26	26	156	990	560	26
21	6.5	20	59	124	770	470	26
22	6.5	15	346	111	670	415	26
23	6.5	10	295	102	670	415	.....
24	6.5	10	200	86	580	390	.....
25	6.5	10	136	86	442	440	.....
26	6.5	10	76	111	410	365	.....
27	6.5	10	86	128	426	340	.....
28	6.5	10	81	102	530	320	.....
29	6.5	10	70	.....	720	300	.....
30	6.5	10	59	.....	1,160	249	.....
31	.....	10	48	.....	1,220	.....	.....

Daily discharge, in second-feet, of McKay Creek near Pendleton, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1919–20.									
1	.....	390	193	242	40	238	380	34	2.0
2	47	260	152	204	41	214	354	25	1.6
3	390	217	136	187	40	207	327	22	1.4
4	600	161	130	171	43	280	317	36	1.2
5	500	138	111	144	43	2,100	298	25	.....
6	300	119	90	136	45	1,590	269	25	.....
7	214	83	77	130	40	990	256	28	.....
8	158	65	63	130	50	1,210	233	35	.....
9	138	50	61	125	61	1,390	264	36	.....
10	125	50	65	116	67	1,490	298	38	.....
11	138	48	61	103	81	1,210	251	36	.....
12	147	35	73	94	125	990	242	35	.....
13	136	29	79	88	224	2,020	233	35	.....
14	130	33	83	83	470	1,390	208	38	.....
15	133	47	111	81	340	1,080	166	41	.....
16	136	50	320	75	280	870	145	36	.....
17	138	52	530	71	231	676	105	35	.....
18	141	56	470	67	214	605	99	31	.....
19	147	73	390	61	197	605	93	28	.....
20	152	710	340	57	184	570	86	26	.....
21	164	755	300	56	200	536	81	23	.....
22	168	530	224	48	260	470	79	22	.....
23	127	630	177	47	260	380	58	19	.....
24	114	560	144	47	253	354	54	18	.....
25	103	630	141	45	242	354	50	18	.....
26	90	560	231	45	193	354	46	17	.....
27	71	500	300	43	210	409	42	7	.....
28	67	470	300	41	184	503	41	6	.....
29	63	440	280	40	174	503	38	5	.....
30	390	340	260	.....	204	380	38	2	.....
31	.....	280	253	.....	200	.....	35	.....	.....

NOTE.—Creek practically dry Oct. 1 to Nov. 1, 1919, and July 5 to Sept. 30, 1920.

Monthly discharge of McKay Creek near Pendleton, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
November	7.2	6.5	6.57	391
December	48	6.5	13.1	806
January	346	6.5	52.2	3,210
February	236	37	102	5,660
March	1,400	145	491	30,200
April	1,220	249	586	34,900
May 1–22	210	26	74.9	3,270
The period	.....	.....	.....	78,400
1919–20.				
November 2–30	600	47	180	10,400
December	755	29	270	16,600
January	530	61	198	12,200
February	242	40	95.8	5,510
March	470	40	168	10,300
April	2,100	207	799	47,500
May	380	35	167	10,300
June	41	2	26.0	1,550
July 1–4	2.0	1.2	1.55	12
The period	2,100	1.2	234	114,000

NOTE.—See footnote to daily-discharge table.

JOHN DAY RIVER BASIN.

JOHN DAY RIVER NEAR DAYVILLE, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 13 S., R. 27 E., at a private wagon bridge 3 miles above mouth of South Fork and Dayville, Grant County

DRAINAGE AREA.—1,000 square miles.

RECORDS AVAILABLE.—November 23, 1908, to September 30, 1914; June 23 to September 30, 1920.

GAGE.—Vertical staff in two sections; lower section nailed to overhanging willow 30 feet above bridge; upper section nailed to bridge abutment. Gage read by L. V. Stewart. Gage installed June 23, 1920, set at independent datum.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of sand and gravel; shifting. Control 200 yards below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 23 to September 30, 1920, 5.65 feet June 23 (discharge, 290 second-feet); minimum stage, 3.50 feet July 28 and 29 (discharge estimated, 1 second-foot).

1908–1914 and 1920: Maximum stage recorded, 6.3 feet (old datum) March 20, 1910 (discharge, 3,090 second-feet); minimum discharge, that of July 28 and 29, 1920.

DIVERSIONS.—A number of canals above this point divert water from John Day River and tributaries for irrigation and for domestic use.

REGULATIONS.—Flow affected by diversions.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined above 60 second-feet; extended below that point. Gage read to tenths once daily. Discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Field data furnished by John H. Lewis, engineer for John Day Irrigation District.

Discharge measurements of John Day River near Dayville, Oreg., during the year ending Sept. 30, 1920.

[Made by H. B. Schminky.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 23	5.65	296
Sept. 20	4.41	71

Daily discharge, in second-feet, of John Day River near Dayville, Oreg., for the year ending Sept. 30, 1920.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1		150	4	70	16		7	12	85
2		115	4	70	17		7	7	73
3		115	2	70	18		4	7	78
4		100	2	70	19		4	7	70
5		100	7	70	20		4	7	70
6		85	7	70	21		4	7	70
7		85	12	70	22		4	4	85
8		70	12	70	23	290	4	4	85
9		70	12	70	24	190	2	4	100
10		55	20	70	25	190	2	7	115
11		30	30	70	26	190	2	100	115
12		30	20	70	27	190	2	100	115
13		20	20	85	28	180	1	70	115
14		20	20	85	29	150	1	70	115
15		7	12	85	30	150	2	70	100
					31		2	70	

Monthly discharge of John Day River near Dayville, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
June 23–30	290	150	191	3,030
July	150	1	35.7	2,200
August	100	2	23.6	1,450
September	115	70	82.9	4,930
The period				11,600

JOHN DAY RIVER AT McDONALD, OREG.

LOCATION.—In NW. ¼ sec. 11, T. 1 N., R. 19 E., at ferry at McDonald post office, Sherman County, half a mile below mouth of Rock Creek, 16 miles above junction with Columbia River, and 18 miles southwest of Arlington.

DRAINAGE AREA.—7,800 square miles.

RECORDS AVAILABLE.—December 16, 1904, to September 30, 1920.

GAGE.—Inclined staff in two sections on left bank, 183 feet above ferry cable; read by William G. McDonald.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of clean gravel and sand; shifts slightly. Banks high. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 8.5 feet at 4.30 p. m. April 5 (discharge, 17,200 second-feet); minimum stage recorded, 1.02 feet August 29, 30, September 4, 10, and 11 (discharge, 71 second-feet).

Maximum stage recorded during year ending September 30, 1920, 6.6 feet April 10, 11, 14, and May 11 (discharge, 10,500 second-feet); minimum stage recorded, 1.25 feet August 26–29 (discharge, 103 second-feet).

1905–1920: Maximum stage recorded, 10.38 feet February 6, 1907 (discharge, 22,800 second-feet). A flood, probably in 1894, is said to have reached a stage of 12.8 feet (discharge estimated from extension of rating curve, 33,000 second-feet). Minimum stage, 1.02 feet September 8–11, 1915 (discharge, 63 second-feet).

ICE.—Stage-discharge relation affected by ice during extremely cold periods.

DIVERSIONS.—Large part of natural low-water flow of stream diverted in the upper John Day Valley for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly, apparently during rise, February 10–11, 1919, and April 14, 1920; affected by ice January 8–18 and December 2–19, 1919. Rating curves well defined. Gage read to quarter-tenths twice a day, and more frequently during floods; readings reliable. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during periods of ice effect.

Discharge measurements of John Day River at McDonald, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919		*Feet.*	*Sec.-ft.*	1920		*Feet.*	*Sec.-ft.*
Mar. 15	M. S. Kelley	2.62	1,200	Feb. 28	J. J. Dirzulaitis	2.32	878
July 2	J. J. Dirzulaitis	1.74	421	Sept. 16	R. C. Briggs	1.57	257
Sept. 13	do	1.20	127				

Daily discharge, in second-feet, of John Day River at McDonald, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	210	400	330	300	640	1,030	10,500	9,240	2,940	510	103	79
2	222	430	318	300	640	980	10,200	8,600	2,580	510	100	79
3	240	438	358	344	640	1,030	9,880	7,960	2,420	470	100	76
4	240	468	475	400	598	1,300	10,500	7,060	2,260	454	100	76
5	270	438	460	415	640	1,810	15,400	6,180	1,880	406	100	79
6	300	438	438	330	555	1,670	14,000	5,620	1,670	390	100	79
7	344	415	438	330	555	1,540	11,200	4,580	1,600	384	100	71
8	400	415	475		640	1,540	9,240	4,580	1,540	377	96	73
9	365	400	475		685	1,420	7,360	4,340	1,420	344	93	79
10	400	400	475		1,770	1,360	6,460	4,340	1,360	338	93	71
11	438	400	438	300	2,940	1,360	6,760	4,340	1,300	265	93	71
12	415	400	430		2,260	1,240	11,200	4,120	1,240	254	93	100
13	386	400	408		2,260	1,240	9,240	3,300	1,190	238	93	135
14	365	408	400		1,600	1,300	8,280	3,900	1,190	221	93	146
15	372	415	386	400	1,300	1,300	7,360	3,700	1,080	210	93	127
16	386	400	400	400	1,300	1,420	6,460	3,500	1,080	210	93	157
17	358	400	430	700	1,190	1,420	6,180	3,700	980	210	93	146
18	415	438	475	500	1,190	1,420	6,180	3,700	1,030	188	93	165
19	460	445	475	865	1,190	1,540	8,920	3,500	980	188	87	157
20	386	460	475	1,320	1,190	2,940	9,560	3,500	935	170	82	165
21	445	475	400	1,100	1,080	3,120	9,240	3,700	845	157	79	157
22	400	475	300	1,210	980	3,300	8,920	4,120	800	157	79	165
23	386	438	270	1,440	980	3,500	8,600	4,580	710	150	79	165
24	365	415	330	1,440	980	3,900	9,240	4,580	710	146	79	165
25	365	400	386	1,920	980	4,120	9,880	4,120	710	146	79	165
26	344	386	400	1,500	935	3,900	10,900	2,100	710	146	79	165
27	344	365	400	1,160	935	3,500	9,880	3,900	630	146	79	165
28	330	365	344	1,050	980	4,120	8,920	4,120	630	138	79	174
29	330	358	330	820	.....	5,900	9,240	3,900	550	127	71	170
30	372	344	318	730	.....	6,760	9,560	3,700	550	120	71	165
31	393	.....	300	730	.....	9,880	.....	3,300	.....	110	79	.....
1919–20.												
1	165	430	470	1,810	3,300	980	2,260	8,280	3,200	1,260	170	318
2	165	454		1,740	2,940	980	2,260	7,360	3,200	1,210	160	318
3	170	470		1,480	2,940	980	2,260	6,760	3,000	1,160	152	300
4	174	510		1,300	2,580	980	2,100	6,460	2,810	1,100	140	270
5	201	550		980	2,580	1,030	1,950	6,180	3,000	1,050	140	270
6	201	630	440	1,030	2,420	980	2,580	6,460	3,200	1,000	140	222
7	221	1,080		1,080	2,260	980	5,620	7,060	3,200	955	140	210
8	277	1,080		1,080	2,260	980	7,060	7,960	3,420	910	140	222
9	265	980		935	1,950	980	9,240	8,600	3,000	820	140	240
10	265	845		755	1,810	980	10,500	10,200	3,200	640	140	222
11	254	710		890	1,670	1,140	10,500	10,500	3,420	640	140	222
12	254	630		800	1,420	1,420	8,280	9,240	3,200	598	128	222
13	238	590		1,140	1,300	1,420	7,960	7,960	3,200	555	120	240
14	254	590		1,080	1,420	1,540	10,500	7,660	3,000	555	128	210
15	254	630	200	1,240	1,420	2,760	10,200	7,360	3,000	515	128	240
16	254	630		980	1,300	3,300	8,920	7,360	3,000	475	128	270
17	254	590		1,360	1,300	2,580	8,920	7,060	3,640	515	120	300
18	265	590	470	1,670	1,240	2,260	7,360	6,760	3,640	555	120	365
19	265	590	630	2,260	1,190	2,100	6,180	7,360	3,200	515	120	365
20	271	590	4,420	1,810	1,190	1,950	6,180	6,760	2,810	438	120	318
21	277	590	8,280	1,670	1,190	1,810	6,180	6,180	2,810	393	120	300
22	295	590	5,360	1,540	1,080	1,950	6,180	6,180	2,460	365	120	270
23	313	755	6,180	1,480	1,030	3,300	5,620	5,620	2,140	330	120	270
24	313	755	6,760	1,540	980	3,300	5,100	5,100	2,140	344	120	270
25	313	755	7,060	1,600	935	3,120	4,580	4,580	1,920	300	120	282
26	325	710	7,360	1,480	1,080	2,940	4,340	4,580	1,700	270	103	300
27	338	670	4,580	2,580	980	2,580	4,840	4,340	1,640	258	103	330
28	377	670	3,120	5,900	935	2,260	5,900	4,100	1,570	222	103	438
29	384	590	2,580	4,580	980	2,100	7,660	3,640	1,440	210	103	438
30	390	470	2,260	4,120	.....	2,100	8,280	3,640	1,320	200	270	438
31	390	.....	1,950	3,500	.....	2,180	.....	3,420	.....	185	344	.....

NOTE.—Discharge, Jan. 8–18 and Dec. 2–19, 1919, estimated because of ice. Braced figures show discharge for periods included.

Monthly discharge of John Day River at McDonald, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Mimimum.	Mean.	
1918–19.				
October	460	210	356	21,900
November	475	344	414	24,600
December	475	270	398	24,500
January	1,920	300	703	43,200
February	2,940	555	1,130	62,800
March	9,880	980	2,610	160,000
April	15,400	6,180	9,310	554,000
May	9,240	2,100	4,580	282,000
June	2,940	550	1,250	74,400
July	510	110	254	15,600
August	103	71	88.7	5,450
September	174	71	126	7,500
The year	15,400	71	1,760	1,280,000
1919–20.				
October	390	165	270	16,600
November	1,080	430	657	39,100
December	8,280	.....	2,160	133,000
January	5,900	755	1,790	110,000
February	3,300	935	1,640	94,300
March	3,300	980	1,870	115,000
April	10,500	1,950	6,320	376,000
May	10,500	3,420	6,600	406,000
June	3,640	1,320	2,750	164,000
July	1,260	185	598	36,800
August	344	103	140	8,610
September	438	210	289	17,200
The year	10,500	103	2,090	1,520,000

SOUTH FORK OF JOHN DAY RIVER AT DAYVILLE, OREG.

LOCATION.—In NW. ¼ sec. 7, T. 13 S., R. 27 E., 1 mile above mouth and half a mile above highway bridge in Dayville, Grant County.

DRAINAGE AREA.—600 square miles.

RECORDS AVAILABLE.—November 21, 1908, to September 30, 1914; July 1 to September 30, 1920.

GAGE.—Vertical staff spiked to alder tree on left bank; read by J. Campbell-Martin. Datum of gage changed by an unknown amount when station was reestablished July 1, 1920.

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

CHANNEL AND CONTROL.—Bed composed of stone and gravel; likely to shift in flood. Changes in control are sometimes caused by beaver dams in summer.

EXTREMES OF DISCHARGE.—Maximum stage during period July 1 to September 30, 1920, 5.63 feet July 1 (discharge, 46 second-feet); minimum stage, 4.96 feet August 17 (discharge, 2 second-feet).

1908–1914 and 1920: Maximum stage recorded, 5.1 feet (old datum) during night of March 2, 1910 (discharge, 2,390 second-feet); minimum stage recorded, that of August 17, 1920.

ICE.—None during period of record.

DIVERSIONS.—Dayville ditch carries water around gage. Large part of natural flow of South Fork of John Day River and tributaries diverted for irrigation and domestic use.

REGULATIONS.—Only by diversion.

ACCURACY.—Stage-discharge relation assumed permanent during year. Rating curve fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

COOPERATION.—Field data furnished by John H. Lewis, engineer for John Day Irrigation District.

Discharge measurements of South Fork of John Day River at Dayville, Oreg., during the year ending Sept. 30, 1920.

[Made by H. B. Schminky.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
June 23	5.70	54
Sept. 20	5.15	6.1

Daily discharge, in second-feet, of South Fork of John Day River at Dayville, Oreg., for the year ending Sept. 30, 1920.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1	46	6	9	11	15	6	13	21	8	3	8
2	43	4	2	12	17	4	13	22	12	2	12
3	43	6	7	13	21	3	19	23	15	2	21
4	43	4	2	14	19	3	19	24	12	2	21
5	46	6	3	15	17	6	19	25	10	7	18
6	29	6	4	16	17	3	15	26	8	13	16
7	24	6	5	17	16	2	13	27	8	13	13
8	23	5	10	18	16	2	13	28	4	15	13
9	21	5	8	19	13	5	13	29	4	12	13
10	20	7	12	20	15	6	6	30	4	12	13
								31	8	10	.....

Monthly discharge of South Fork of John Day River at Dayville, Oreg., for the year ending Sept. 30, 1920

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
July	46	4	19.3	1,190
August	15	2	6.0	369
September	21	2	11.8	702
The period	.....	.....	.....	2,260

CAMAS CREEK ABOVE CABLE CREEK, NEAR UKIAH, OREG.

LOCATION.—In SE. ¼ sec. 4, T. 5 S., R. 32 E., at highway bridge 200 feet above mouth of Cable Creek and 6 miles east of Ukiah, Umatilla County.

DRAINAGE AREA. Not measured.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1917; November 1, 1919, to July 31, 1920.

GAGE.—Enameled vertical staff on abutment of highway bridge.

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

CHANNEL AND CONTROL.—Bed composed of rock and gravel; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1917, 4.5 feet May 13 and 14 (discharge, 1,790 second-feet); minimum discharge probably occurred during winter and was very small.

Maximum stage recorded during year ending September 30, 1920, 3.92 feet April 9 (discharge, 1,270 second-feet); minimum stage recorded, 1.0 foot August 10 (discharge, 7 second-feet).

1914–1917 and 1920: Maximum stage recorded that of May 13 and 14, 1917; minimum discharge estimated to have become as low as 2 second-feet in December, 1914.

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

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed probably during high water on May 9, 1917; permanent during 1920. Rating curves fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating tables. Open-water records for year ending September 30, 1917, fair; those for year ending September 30, 1920, good; and those for periods of ice effect, poor.

Discharge measurements of Camas Creek above Cable Creek, near Ukiah, Oreg., during the years ending Sept. 30, 1917 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1916.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 1	C. L. Batchelder	0.80	5.4	Apr. 15	Teel and Dick	3.15	669
				21	Teel and Beaman	2.78	489
1917.				25	Hinkle and Teel	2.50	314
Aug. 3	R. C. Briggs	.94	4.5	28	Teel and Beaman	3.43	892
				30	do	3.20	723
1920.				May 14	Hinkle and Schlarbaum	2.93	556
Feb. 17	F. F. Henshaw	[a] 2.00	78				
24	R. D. Cooper [b]	[a] 1.60	17.0				

[a] Stage-discharge relation affected by ice. [b] Assistant to State engineer.

NOTE.—Measurements Apr. 15 to May 14, 1920, made by employees of Teel Irrigation District.

Daily discharge, in second-feet, of Camas Creek above Cable Creek, near Ukiah, Oreg., for the years ending Sept. 30, 1917 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916-17.												
1	5.0	7.2					20	640	590	90	7.0	6.2
2	5.0	6.0					78	580	530	44	5.0	5.4
3	5.0	7.2					78	770	475	44	5.0	5.4
4	5.0	6.0					64	910	475	34	5.4	5.4
5	5.0						158	840	365	34	4.6	5.4
6	5.6						250	1,050	365	25	4.6	5.4
7	5.0						350	1,350	475	25	4.6	5.4
8	5.6						700	1,270	530	25	4.6	3.0
9	5.0						520	1,350	660	25	5.4	3.0
10	5.0						370	1,350	530	25	3.8	6.2
11	5.0						640	1,350	365	25	3.8	6.2
12	5.0						520	1,350	270	18	3.0	3.0
13	5.0						370	1,700	230	18	3.0	3.0
14	5.0						395	1,700	230	15	3.0	3.0
15	5.6				5		250	1,270	475	12	3.0	4.6
16	5.6		5	4		5	186	950	475	12	3.0	4.6
17	5.0	4					186	730	420	12	3.0	4.6
18	5.0						172	730	315	12	7.0	3.0
19	5.0						158	730	230	12	6.2	3.0
20	5.0						250	530	230	12	6.2	3.0
21	5.6						520	530	230	12	5.4	6.2
22	5.6						910	530	135	7	3.0	3.0
23	5.6						1,190	530	135	7	5.0	6.2
24	6.0						1,120	660	122	7	3.0	18
25	5.6						1,190	730	110	7	3.0	125
26	5.6						1,350	730	100	7	6.2	12
27	5.0						1,190	660	90	7	6.2	7.0
28	6.0						1,050	730	90	7	6.2	6.2
29	6.0				-------		840	835	90	7	6.2	5.4
30	7.2				-------		770	870	90	7	6.2	5.4
31	7.2	-------			-------		-------	730	-------	7	6.2	-------

Daily discharge, in second-feet, of Camas Creek above Cable Creek, near Ukiah, Oreg., for the years ending Sept. 30, 1917 and 1920—Continued.

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1919–20.									
1	50					270	730	130	30
2	50					230	625	135	27
3	56					230	590	130	30
4	115				30	210	625	148	27
5	100					590	625	130	30
		20							
6	86					660	590	135	25
7	63				54	800	660	135	25
8	54				59	1,030	730	130	25
9	44			70	70	1,270	730	135	22
10	42				90	870	730	135	22
11	42				80	730	730	130	22
12	34				94	870	660	135	22
13	39		20		475	800	590	130	22
14	36				448	730	530	130	22
15	36				315	660	530	110	22
		20							
16	39				230	660	530	106	22
17	39			78	230	730	560	80	22
18	50				190	695	530	70	25
19	126				270	625	420	59	22
20	160				230	590	340	70	22
				50					
21	100				420	475	392	59	17
22	80				530	420	340	63	18
23	90				420	392	392	46	18
24	70			17	365	365	365	48	18
25	70				315	365	270	46	18
		50							
26	54				292	230	210	44	15
27	46			20	250	1,190	148	36	15
28	42				230	1,110	160	36	15
29	35		100		270	1,190	160	34	12
30	35				292	765	210	32	12
31	.....			.....	315	.....	210	.....	12

NOTE.—Discharge for following periods estimated because of ice effect: Nov. 5, 1916, to Mar. 31, 1917, and Nov. 29, 1919, to Mar. 6, 1920. Discharge, Nov. 1 and 2, 1919, estimated; May 10, 1920, interpolated. Braced figures show mean discharge for periods included.

Monthly discharge of Camas Creek above Cable Creek, near Ukiah, Oreg., for the years ending Sept. 30, 1917 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	7.2	5.0	5.41	333
November	7.2	.....	4.33	258
December	.....	.....	5.0	307
January	.....	.....	4.0	246
February	.....	.....	5.0	278
March	.....	.....	5.0	307
April	1,350	20	528	31,400
May	1,700	530	925	56,900
June	660	90	314	18,700
July	90	7.0	19.4	1,190
August	7.0	3.0	4.77	293
September	125	3.0	9.44	562
The year	1,700	3.0	153	111,000
1919–20.				
November	100	34	62.8	3,740
December	.....	.....	30.6	1,890
January	.....	.....	35.5	2,180
February	.....	.....	55.7	3,200
March	530	.....	217	13,300
April	1,270	210	658	39,200
May	730	148	481	29,600
June	148	32	93.6	5,570
July	30	12	21.2	1,300
The period	1,270	12	138	100,000

CABLE CREEK NEAR UKIAH, OREG.

LOCATION.—In NE. ¼ sec. 9, T. 5 S., R. 32 E., at highway bridge 1,000 feet above mouth of creek, and 6 miles east of Ukiah, Umatilla County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1917; November 3, 1919, to July 31, 1920.

GAGE.—Vertical staff on abutment of bridge.

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

CHANNEL AND CONTROL.—Bed composed of gravel and rock; slightly shifting.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1917, 2.7 feet at 8 a. m. May 15 (discharge, 590 second-feet); no flow for periods during winter.

Maximum stage recorded during year ending September 30, 1920, 1.82 feet May 10 and 11 (discharge, 270 second-feet); minimum stage occurred during period of ice effect.

1914–1917 and 1920: Extremes same as for 1917.

ICE.—Stream freezes over and may go almost dry in extremely cold weather.

DIVERSIONS.—Probably none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed probably on May 15, 1917; permanent during 1920. Rating curves fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Open-water records fair; records for periods of ice effect poor.

Discharge measurements of Cable Creek near Ukiah, Oreg., during the years ending Sept. 30, 1917 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1916.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Nov. 1	C. L. Batchelder	0.20	1.6	Apr. 15	Teel and Dick	1.30	163
1917.				25	Hinkle and Teel	.90	69
Aug. 3	R. C. Briggs	.07	3.0	28	Teel and Beaman	1.45	177
1920.				30	do	1.26	144
Feb. 17	F. F. Henshaw	.44	8.2	May 14	Hinkel and Schlarbaum	1.60	206
				19	Hinkel and Beaman	1.40	172

NOTE.—Measurements Apr. 15 to May 19, 1920, made by employees of Teel Irrigation District.

Daily discharge in second-feet, of Cable Creek near Ukiah, Oreg., for the years ending Sept. 30, 1917 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1916–17.												
1	1.8	2.8						88	300	20	4.6	2.0
2	1.8	2.0					4	110	270	17	3.8	2.0
3	1.8	2.0			0	0		110	215	11	3.4	2.0
4	1.8	2.0					12	132	190	11	3.6	2.0
5	1.8						110	132	178	17	3.6	2.0
6	2.0						156	180	190	11	4.0	2.0
7	1.8						180	240	215	11	3.6	2.0
8	1.8						270	255	215	14	3.6	2.0
9	1.8						144	300	270	17	3.6	2.0
10	1.8		1				88	330	215	11	3.2	2.0
11	1.5						180	365	190	11	3.2	2.4
12	1.5						88	400	145	10	3.2	2.8
13	1.5				1		70	510	145	10	2.8	2.8
14	1.5						70	550	145	9.0	2.8	2.8
15	1.8					1	57	550	145	9.0	2.8	2.8
16	1.2			0.5			70	400	145	9.0	2.8	2.8
17	1.5	1					42	300	125	9.0	2.8	2.8
18	1.5						37	240	105	7.0	4.0	2.8
19	1.5						37	215	85	7.0	3.2	2.4
20	1.5						57	215	85	7.0	2.8	2.4
21	1.8						132	215	68	7.0	2.8	2.4
22	1.5						240	202	53	11	2.8	2.0
23	1.5						270	202	53	9.0	2.8	6.4
24	1.8						210	240	53	9.0	2.4	9.4
25	1.8				0		270	240	41	9.0	2.4	9.4
26	1.8		0				240	240	28	7.8	2.0	4.0
27	1.5						225	240	17	7.8	2.0	2.8
28	1.8					3	156	300	24	7.0	2.0	3.2
29	2.0				------		144	400	24	7.0	2.0	3.2
30	2.8				------		110	400	17	6.4	2.0	3.2
31	2.0	------			------		------	330	------	5.5	2.0	------

Day.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1919–20.									
1	7					41	165	53	11
2	7					41	145	53	10
3	7				10	41	145	56	11
4	28					41	145	65	10
5	20				11	85	145	56	11
6	18				11	105	155	47	9.0
7	17				24	170	170	51	7.0
8	17			2	14	190	170	43	7.0
9	14				20	215	270	41	5.5
10	12	2			23	141	270	43	5.5
11	12				23	115	270	43	5.5
12	11				30	109	215	51	5.5
13	11				105	141	215	43	5.5
14	12				76	125	215	41	7.0
15	12			7	60	135	170	32	6.4
16	14				47	125	161	30	7.0
17	14			32	43	178	155	26	7.0
18	14				43	135	149	28	9.0
19					47	87	161	26	7.8
20					41	89	161	32	7.0
21	8				65	78	155	28	4.6
22					71	75	135	28	4.0
23					65	68	135	26	4.0
24					51	64	149	28	4.0
25		8		7	51	34	95	26	4.0
26					43	36	101	17	4.0
27					41	135	85	16	4.0
28	2				41	155	89	16	4.0
29					51	168	76	14	4.0
30				------	43	125	65	23	4.0
31	------			------	41	------	65	------	4.0

NOTE.—Discharge for following periods estimated because of ice effect: Nov. 5, 1916 to Apr. 3, 1917, Nov. 7, 10, 11, 14, 1919, and Nov. 19, 1919, to Apr. 4, 1920. Gage not read Nov. 1 and 2, 1919; discharge estimated. Braced figures show mean discharge for periods included.

Monthly discharge of Cable Creek near Ukiah, Oreg., for the years ending Sept. 30, 1917 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1916–17.				
October	2.8	1.2	1.73	106
November			1.16	69
December			.81	49
January			.5	31
February			.52	29
March			1.23	77
April	270		123	7,320
May	550	88	278	17,100
June	300	17	132	7,860
July	20	5.5	10.1	621
August	4.6	2.0	2.99	184
September	9.4	2.0	3.09	184
The year	550		46.4	34,200
1919–20.				
November	28		10.4	619
December			4.52	278
January			8.77	539
February			7.0	403
March	105		39.4	2,420
April	215	34	108	6,430
May	270	65	155	9,530
June	65	14	36.1	2,150
July	11	4.0	6.43	395
The period	270		41.9	22,800

DESCHUTES RIVER BASIN.

DESCHUTES RIVER BELOW BEND, OREG.

LOCATION.—In SE. ¼ sec. 20, T. 17 S., R. 12 E., half a mile below North canal dam and 2 miles north of Bend, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 27, 1914, to September 30, 1920.

GAGE.—Stevens water-stage recorder on right bank; inspected by W. L. Beebe.

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

CHANNEL AND CONTROL.—Coarse gravel and boulders. Logs, drift, and aquatic plants lodged on the wide shallow control may affect stage-discharge relation at times.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.28 feet at 10 a. m. April 5 (discharge, 1,680 feet); minimum stage, 0.33 foot on July 12, 17, and 18 (discharge, 120 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.75 feet (caused by failure of dam at mill pond above gage) at noon February 1 (discharge, 2,320 second-feet); minimum stage, 0.23 foot August 21 (discharge, 70 second-feet).

1915–1920: Maximum and minimum stages same as for 1920.

1905–1920: Maximum stage recorded, 3.45 feet at pumping plant at Bend at 7.45 a. m. November 27, 1909 (discharge, 4,820 second-feet; no diversions).

ICE.—Stage-discharge relation affected by ice for short time during extremely cold weather in December, 1919; recorder not operating.

DIVERSIONS.—Station is below intakes of the five large canals (Arnold, Central Oregon, Pilot Butte, North, and Swalley canals) which divert water from Deschutes River near Bend; only small diversions below station.

REGULATION.—Flow regulated by a hydroelectric plant at North canal dam and one at Bend.

ACCURACY.—Stage-discharge relation apparently permanent during 1919 and 1920. Rating curve used for year ending September 30, 1919, well defined above 400 second-feet; curve used for year ending September 30, 1920, well defined below 400 second-feet and fairly well defined above that point. Operation of recorder satisfactory except during cold weather. Staff gage above North canal dam read to hundredths twice a day, January 4 to April 7, 1920. Daily discharge ascertained by use of discharge integrator October 1–13, 1918; for remainder of period by applying to rating table the mean gage height obtained by inspecting recorder graph. Records excellent up to November 30, 1919; good thereafter, except December, 1918, January and December, 1919, and January and February, 1920, which are somewhat uncertain on account of imperfect gage-height records.

Discharge measurements of Deschutes River below Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	C. L. Batchelder	1.85	1,080	Mar. 13	J. J. Dirzulaitis	[a] 1.82	1,320
1919.				Apr. 7	do	2.02	1,410
Mar. 7	R. C. Briggs	2.00	1,320	June 30	Phillips and Henshaw	.28	76
Apr. 24	do	1.92	1,200	July 8	do	.53	155
May 4	J. J. Dirzulaitis	1.72	968	17	K. N. Phillips	.76	294
June 20	do	1.40	659	23	do	.72	231
Aug. 20	do	.73	264	24	do	.82	282
Sept. 12	do	1.49	785	Aug. 22	do	.44	125
Oct. 31	do	1.82	1,180	29	do	.57	173
Dec. 29	do	1.78	976				

[a] Gage height uncertain.

Daily discharge, in second-feet, of Deschutes River below Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	637	1,190	1,080	1,160	1,160	940	1,360	1,020	820	450	261	228
2	645	1,080	1,020	1,130	1,140	770	1,360	1,020	800	450	261	249
3	660	1,020	970	1,120	1,140	790	1,360	1,020	800	411	238	430
4	695	970	979	1,100	1,140	830	1,360	970	850	392	269	277
5	761	1,140	1,080	1,080	1,140	960	1,420	950	850	380	265	312
6	790	1,240	1,240	1,080	1,140	1,190	1,420	960	850	358	346	336
7	795	1,190	1,190	1,080	1,080	1,140	1,420	1,190	770	358	265	352
8	812	1,190	1,190	1,090	1,140	1,140	1,430	1,240	734	330	269	411
9	802	1,190	1,200	1,090	1,190	1,190	1,440	1,240	707	336	238	471
10	800	1,190	1,200	1,070	1,020	1,140	1,450	1,080	648	330	253	513
11	788	1,240	1,210	1,060	870	1,140	1,440	880	640	330	269	544
12	790	1,240	1,190	1,080	970	1,140	1,420	820	624	341	257	680
13	790	1,190	1,070	970	1,190	1,140	1,300	830	632	316	253	640
14	792	1,240	1,070	910	1,140	1,140	1,190	830	689	374	253	698
15	840	1,240	1,080	900	1,140	1,190	1,080	780	672	316	253	568
16	1,080	1,240	1,180	910	1,190	1,140	1,020	734	664	321	253	576
17	1,080	1,080	1,230	960	1,240	1,140	1,080	698	680	321	238	600
18	1,080	1,080	1,230	1,140	1,190	1,080	1,080	680	743	330	273	616
19	1,080	1,190	1,230	1,140	1,190	1,140	1,080	656	640	321	352	600
20	1,080	1,240	1,240	1,140	1,190	1,190	1,190	664	584	358	269	600
21	1,080	1,240	1,240	1,080	1,140	1,190	1,190	698	520	341	257	600
22	1,080	1,240	1,240	1,190	1,140	1,140	1,190	640	506	321	249	592
23	1,080	1,190	1,240	1,360	1,140	940	1,190	743	492	330	249	584
24	1,080	1,240	1,240	1,300	1,140	770	1,080	970	478	321	242	584
25	1,020	1,220	1,240	1,240	1,190	840	1,080	830	464	312	261	568
26	1,020	1,190	1,220	1,240	1,190	1,090	1,080	680	471	303	257	576
27	1,080	1,240	1,200	1,190	1,140	1,250	1,140	689	536	269	261	560
28	1,080	1,270	1,150	1,240	1,190	1,280	1,300	698	536	281	253	600
29	1,140	1,300	850	1,190	.....	1,320	1,300	698	485	285	253	506
30	1,140	1,240	970	1,140	.....	1,360	1,080	680	471	265	257	608
31	1,140	.....	1,160	1,190	.....	1,360	.....	820	.....	269	298	.....

Daily discharge, in second-feet, of Deschutes River below Bend, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	520	1,240	1,480	1,190	1,610	1,020	1,190	920	450	300	140	238
2	520	1,240	1,360	1,140	1,300	1,140	1,240	860	398	270	145	278
3	520	1,240	1,360	1,190	1,260	1,140	1,190	820	372	248	120	300
4	520	1,240	1,360	1,190	1,220	1,140	1,140	761	382	248	215	325
5	528	1,300	1,360	1,170	1,180	1,140	1,190	752	437	248	120	250
6	513	1,300	1,350	1,170	1,150	1,140	1,240	840	339	265	125	235
7	499	1,360	1,300	1,150	1,260	1,190	1,300	970	334	260	115	212
8	492	1,360	1,150	1,140	1,300	1,190	1,300	920	328	215	135	234
9	492	1,300	1,000	1,140	1,260	1,080	1,360	870	360	226	190	262
10	485	1,300		1,240	1,040	1,080	1,360	752	398	228	138	285
11	485	1,300		1,190	1,040	1,020	1,240	632	370	230	125	292
12	492	1,300	1,000	1,080	1,040	970	1,190	560	365	244	119	300
13	499	1,300		1,080	1,040	1,020	1,190	536	373	208	128	290
14	516	1,300		970	1,180	1,240	1,190	506	390	221	100	337
15	520	1,240	1,200	970	1,220	1,300	1,360	492	411	248	118	398
16	516	970	1,730	1,020	1,180	1,300	1,420	478	424	221	78	355
17	552	920	1,600	1,020	1,150	1,300	1,360	478	420	212	100	385
18	576	1,020	1,700	1,080	1,150	1,240	1,360	478	437	221	90	373
19	1,080	1,360	1,500	1,140	1,080	1,240	1,300	418	398	212	85	397
20	1,140	1,360	1,500	1,140	1,080	1,240	1,300	520	380	205	80	361
21	1,140	1,360	1,610	1,140	1,080	1,240	1,240	420	373	205	70	385
22	1,140	1,420	1,540	1,130	1,140	1,240	1,240	450	337	180	120	392
23	1,190	1,420	1,420	1,150	1,190	1,190	1,190	506	343	190	80	450
24	1,190	1,420	1,300	1,160	1,190	1,140	1,080	485	331	194	86	506
25	1,190	1,420	1,360	1,140	1,140	1,240	1,080	437	320	221	80	536
26	1,240	1,360	1,240	1,220	1,140	1,140	1,190	424	285	153	85	568
27	1,300	1,140	1,190	1,480	1,020	1,140	1,080	437	290	170	90	536
28	1,240	1,020	1,300	1,480	1,020	1,080	1,020	513	295	175	115	560
29	1,300	1,240	1,240	1,480	1,080	1,140	970	513	295	158	157	568
30	1,240	1,680	1,190	1,480	.....	1,190	920	492	290	146	170	560
31	1,240	.....	1,190	1,540	.....	1,190	.....	464	.....	125	213	.....

NOTE.—Discharge interpolated for following periods, taking into account diversions: Nov. 25, 28, Dec. 9–14, 16–21, 23, 26–28, 31, 1918, Jan. 1–4, 7–11, Mar. 25–29, Apr. 8–12, Dec. 8, 1919, May 20, 21, and Sept 11, 1920. Discharge, Dec. 6 and 9, 1919, determined from readings of old gage at former pumping plant. Discharge for following periods determined from readings of gage above North canal dam: Dec. 16–20, 1919, Jan. 5–7, 20–24, 26, 28, 29, and Feb. 2–21, 1920.

Monthly discharge of Deschutes River below Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,140	637	927	57,000
November	1,300	970	1,190	70,800
December	1,240	850	1,150	70,700
January	1,360	900	1,120	68,900
February	1,240	870	1,130	62,800
March	1,360	770	1,100	67,600
April	1,450	1,020	1,250	74,400
May	1,240	680	852	52,400
June	850	464	645	38,400
July	450	265	336	20,700
August	352	238	264	16,200
September	698	228	516	30,700
The year	1,450	228	871	631,000
1919–20.				
October	1,300	485	802	49,300
November	1,680	920	1,280	76,200
December	1,730	1,000	1,310	80,600
January	1,540	970	1,190	73,200
February	1,610	1,020	1,160	66,700
March	1,300	970	1,160	71,300
April	1,420	920	1,210	72,000
May	970	418	603	37,100
June	450	285	364	21,700
July	300	125	214	13,200
August	215	70	120	7,380
September	568	212	372	22,100
The period	1,730	70	814	591,000

Daily discharge, in second-feet, of Deschutes River, including canals, near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,300	1,280	1,220	1,180	1,190	1,230	1,400	1,680	1,750	1,430	1,280	1,260
2	1,310	1,250	1,200	1,150	1,160	1,120	1,400	1,710	1,750	1,430	1,290	1,250
3	1,330	1,270	1,150	1,140	1,160	1,140	1,400	1,740	1,750	1,380	1,280	1,300
4	1,320	1,210	1,160	1,120	1,160	1,120	1,400	1,680	1,790	1,370	1,280	1,240
5	1,340	1,240	1,170	1,100	1,160	1,070	1,460	1,670	1,790	1,380	1,280	1,250
6	1,340	1,280	1,270	1,100	1,160	1,220	1,470	1,650	1,800	1,360	1,280	1,240
7	1,340	1,230	1,220	1,100	1,100	1,170	1,470	1,760	1,700	1,370	1,290	1,250
8	1,340	1,230	1,220	1,100	1,160	1,170	1,470	1,720	1,690	1,340	1,290	1,280
9	1,330	1,230	1,230	1,100	1,230	1,220	1,480	1,710	1,660	1,350	1,270	1,300
10	1,330	1,230	1,230	1,100	1,320	1,170	1,490	1,740	1,610	1,340	1,270	1,290
11	1,320	1,280	1,240	1,100	1,170	1,210	1,490	1,690	1,590	1,340	1,280	1,350
12	1,320	1,280	1,240	1,100	1,130	1,180	1,500	1,650	1,580	1,350	1,270	1,320
13	1,320	1,230	1,250	1,090	1,240	1,170	1,500	1,660	1,560	1,330	1,260	1,290
14	1,320	1,280	1,250	1,080	1,180	1,170	1,470	1,680	1,590	1,390	1,270	1,350
15	1,340	1,280	1,260	1,050	1,170	1,220	1,470	1,650	1,580	1,330	1,270	1,320
16	1,340	1,280	1,260	1,090	1,220	1,170	1,420	1,620	1,570	1,340	1,270	1,260
17	1,340	1,290	1,260	1,130	1,270	1,170	1,470	1,590	1,540	1,330	1,270	1,270
18	1,340	1,280	1,260	1,200	1,220	1,110	1,470	1,580	1,590	1,330	1,250	1,280
19	1,340	1,290	1,260	1,160	1,220	1,170	1,480	1,510	1,560	1,320	1,310	1,260
20	1,290	1,270	1,260	1,160	1,220	1,220	1,590	1,470	1,520	1,300	1,310	1,260
21	1,290	1,270	1,260	1,100	1,170	1,220	1,600	1,520	1,470	1,320	1,290	1,260
22	1,290	1,270	1,260	1,200	1,170	1,250	1,620	1,550	1,480	1,290	1,290	1,250
23	1,290	1,220	1,260	1,370	1,170	1,230	1,680	1,550	1,460	1,340	1,290	1,240
24	1,290	1,270	1,260	1,320	1,170	1,160	1,620	1,560	1,460	1,330	1,280	1,250
25	1,230	1,250	1,260	1,260	1,220	1,210	1,640	1,640	1,460	1,330	1,300	1,240
26	1,230	1,220	1,240	1,260	1,220	1,240	1,640	1,610	1,450	1,320	1,290	1,250
27	1,290	1,270	1,220	1,200	1,180	1,280	1,700	1,630	1,460	1,300	1,290	1,240
28	1,280	1,280	1,200	1,260	1,220	1,310	1,700	1,640	1,460	1,300	1,290	1,280
29	1,330	1,300	1,150	1,210	.....	1,350	1,740	1,630	1,470	1,310	1,280	1,180
30	1,330	1,260	1,210	1,160	.....	1,390	1,710	1,600	1,460	1,290	1,290	1,270
31	1,330	.....	1,170	1,220	.....	1,390	.....	1,580	.....	1,300	1,320	.....
1919–20.												
1	1,160	1,340	1,480	1,380	1,730	1,130	1,190	1,280	1,360	1,280	1,150	1,180
2	1,200	1,340	1,380	1,330	1,430	1,200	1,240	1,270	1,310	1,260	1,160	1,210
3	1,210	1,340	1,390	1,270	1,430	1,170	1,190	1,290	1,320	1,230	1,150	1,230
4	1,210	1,340	1,370	1,220	1,380	1,180	1,160	1,300	1,230	1,250	1,190	1,250
5	1,220	1,420	1,370	1,190	1,330	1,190	1,200	1,320	1,270	1,240	1,150	1,180
6	1,210	1,420	1,360	1,200	1,240	1,190	1,240	1,260	1,260	1,230	1,150	1,160
7	1,190	1,460	1,310	1,180	1,320	1,220	1,320	1,340	1,280	1,250	1,150	1,140
8	1,200	1,460	1,160	1,160	1,360	1,260	1,310	1,460	1,270	1,220	1,160	1,150
9	1,200	1,400	1,010	1,160	1,340	1,240	1,370	1,350	1,310	1,230	1,190	1,160
10	1,200	1,400	1,000	1,280	1,240	1,250	1,390	1,310	1,340	1,230	1,160	1,170
11	1,200	1,400	1,000	1,270	1,250	1,190	1,380	1,300	1,310	1,230	1,140	1,170
12	1,210	1,400	1,000	1,180	1,250	1,140	1,350	1,290	1,320	1,210	1,140	1,180
13	1,220	1,340	1,000	1,210	1,190	1,100	1,370	1,290	1,300	1,220	1,120	1,160
14	1,240	1,340	1,000	1,140	1,240	1,270	1,350	1,280	1,330	1,240	1,120	1,190
15	1,240	1,390	1,200	1,140	1,280	1,330	1,360	1,290	1,350	1,250	1,110	1,200
16	1,230	1,360	1,730	1,170	1,240	1,330	1,430	1,270	1,360	1,210	1,100	1,190
17	1,240	1,350	1,620	1,150	1,220	1,330	1,380	1,300	1,330	1,200	1,110	1,200
18	1,270	1,280	1,740	1,180	1,190	1,270	1,380	1,350	1,350	1,210	1,090	1,190
19	1,340	1,400	1,560	1,180	1,110	1,280	1,360	1,260	1,320	1,200	1,100	1,210
20	1,310	1,400	1,570	1,160	1,110	1,280	1,360	1,320	1,310	1,200	1,100	1,170
21	1,320	1,400	1,670	1,160	1,110	1,270	1,300	1,320	1,160	1,200	1,090	1,200
22	1,320	1,460	1,660	1,160	1,170	1,270	1,300	1,320	1,300	1,180	1,120	1,150
23	1,370	1,460	1,540	1,160	1,220	1,260	1,300	1,350	1,310	1,190	1,100	1,190
24	1,370	1,460	1,400	1,160	1,220	1,260	1,250	1,360	1,300	1,190	1,110	1,240
25	1,360	1,460	1,460	1,140	1,170	1,280	1,160	1,330	1,310	1,200	1,100	1,260
26	1,390	1,400	1,370	1,220	1,180	1,200	1,230	1,340	1,280	1,140	1,110	1,240
27	1,420	1,160	1,340	1,480	1,130	1,230	1,200	1,320	1,280	1,160	1,100	1,200
28	1,360	1,030	1,400	1,480	1,150	1,180	1,230	1,340	1,280	1,160	1,110	1,220
29	1,420	1,250	1,350	1,490	1,200	1,200	1,260	1,340	1,270	1,150	1,140	1,230
30	1,350	1,680	1,330	1,500	.....	1,190	1,230	1,320	1,260	1,140	1,140	1,230
31	1,350	.....	1,390	1,590	.....	1,190	.....	1,320	.....	1,100	1,170	.....

NOTE.—See "Diversions" for names of the five canals, the flow of which is included in the above table.

Monthly discharge of Deschutes River, including canals, near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,340	1,230	1,310	80,600
November	1,300	1,210	1,260	75,000
December	1,270	1,150	1,230	75,600
January	1,370	1,050	1,160	71,300
February	1,320	1,100	1,190	66,100
March	1,390	1,070	1,210	74,400
April	1,740	1,400	1,530	91,000
May	1,760	1,470	1,630	100,000
June	1,800	1,450	1,590	94,600
July	1,430	1,290	1,340	82,400
August	1,320	1,250	1,280	78,700
September	1,350	1,180	1,270	75,600
The year	1,800	1,050	1,330	965,000
1919–20.				
October	1,420	1,160	1,270	78,100
November	1,680	1,030	1,380	82,100
December	1,740	1,000	1,360	83,600
January	1,590	1,140	1,250	76,900
February	1,730	1,110	1,260	72,500
March	1,330	1,190	1,230	75,600
April	1,430	1,160	1,290	76,800
May	1,460	1,260	1,320	81,200
June	1,360	1,160	1,300	77,400
July	1,280	1,100	1,210	73,800
August	1,190	1,090	1,130	69,500
September	1,260	1,140	1,200	71,400
The year				919,000

DESCHUTES RIVER AT MECCA, OREG.

LOCATION.—In SW. ¼ sec. 20, T. 9 S., R. 13 E., at bridge at Mecca station on Oregon Trunk Railway, Jefferson County, 1½ miles below mouth of Shitike Creek and 12 miles above mouth of Warm Springs River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 7, 1911 to September 30, 1920.

GAGE.—Vertical staff fastened to trees on right bank 75 feet above bridge; read by H. E. Massey.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; subject to seasonal shifts.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.2 feet April 6 (discharge, 10,300 second-feet); minimum stage recorded, 2.15 feet August 11, 12, 17–23, and September 2–4 (discharge, 3,840 second-feet). Maximum stage recorded during year ending September 30, 1920, 5.1 feet January 27 (discharge, 10,100 second-feet); minimum stage recorded, 1.95 feet August 27–30 (discharge, 3,170 second-feet).

1911–1920: Maximum stage recorded, 5.75 feet March 21, 1916 (discharge, 11,700 second-feet); minimum discharge, that of August 27–30, 1920.

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

DIVERSIONS.—Flow affected by diversions from upper Deschutes River, near Bend, Laidlaw, and Cline Falls. Summer flow of Crooked River above head of lower canyon near Terrebonne practically all diverted.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of April, 1919, and January, 1920. Well-defined rating curves used, identical above gage height 4.2 feet. (7,800 second-feet). Gage read to half-tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Deschutes River near Mecca, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 4	R. C. Briggs	2.74	4,700	Mar. 12	J. J. Dirzulaitis	2.65	4,750
Apr. 11	M. S. Kelly	4.10	7,390	July 26	K. N. Phillips	2.12	3,650
May 27	R. C. Briggs	3.20	5,550	27	do	2.05	3,560
June 27	J. J. Dirzulaitis	2.57	4,570	Sept. 15	do	2.24	3,690
Aug. 16	do	2.20	3,900	23	R. C. Briggs	2.27	3,490
Oct. 28	do	2.62	4,740				

Daily discharge, in second-feet, of Deschutes River at Mecca, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	3,970	4,400	4,400	4,220	4,760	4,760	7,800	6,470	4,900	4,220	4,060	3,910
2	3,970	4,580	4,400	4,400	4,760	4,760	7,800	6,050	4,900	4,220	4,060	3,840
3	4,050	4,580	4,400	4,400	4,760	4,580	7,800	6,050	4,900	4,220	4,060	3,840
4	4,050	4,580	4,400	4,400	4,760	4,760	8,520	5,850	4,900	4,220	4,060	3,840
5	4,140	4,580	4,400	4,400	4,760	4,760	9,820	5,650	4,900	4,220	3,980	3,910
6	4,220	4,400	4,400	4,400	4,760	4,760	10,300	5,650	4,900	4,220	3,980	3,910
7	4,220	4,400	4,580	4,400	4,760	4,760	8,520	5,260	4,900	4,220	3,980	3,910
8	4,140	4,580	4,580	4,400	4,760	4,760	7,340	5,450	4,720	4,220	3,980	3,980
9	4,140	4,580	4,580	4,400	4,760	4,760	6,900	5,650	4,550	4,220	3,980	4,060
10	4,140	4,580	4,580	4,400	4,760	4,760	6,900	5,450	4,550	4,220	3,910	4,060
11	4,220	4,580	4,580	4,400	4,580	4,760	7,570	5,260	4,550	4,550	3,840	4,220
12	4,220	4,580	4,580	4,400	4,760	4,760	8,780	5,080	4,380	4,220	3,840	4,220
13	4,220	4,580	4,580	4,400	4,760	4,760	8,780	4,900	4,550	4,220	3,910	4,220
14	4,220	4,760	4,400	4,400	4,760	4,760	7,800	4,900	4,550	4,220	3,910	4,220
15	4,220	4,760	4,400	4,580	4,760	4,760	6,900	4,900	4,550	4,220	3,910	4,220
16	4,580	4,760	4,400	5,140	4,760	4,760	6,680	4,900	4,550	4,220	3,910	4,220
17	4,580	4,760	4,580	5,140	4,760	4,760	6,680	4,900	4,550	4,220	3,840	4,220
18	4,400	4,400	4,580	5,140	4,760	4,760	6,900	4,900	4,550	4,060	3,840	4,220
19	4,400	4,400	4,580	5,140	4,760	4,760	7,570	4,900	4,550	4,060	3,840	4,220
20	4,400	4,580	4,580	5,140	4,760	4,760	7,340	4,900	4,550	4,060	3,840	4,220
21	4,400	4,580	4,580	5,140	4,760	4,950	7,120	4,900	4,550	4,060	3,840	4,220
22	4,400	4,760	4,580	5,520	4,760	5,140	7,120	4,900	4,550	4,220	3,840	4,220
23	4,400	4,580	4,580	5,920	4,760	5,140	6,900	4,900	4,550	4,220	3,840	4,220
24	4,400	4,580	4,400	5,520	4,760	5,140	7,340	5,260	4,380	4,220	3,910	4,220
25	4,400	4,400	4,400	5,520	4,760	4,950	7,340	5,260	4,550	4,220	3,910	4,220
26	4,400	4,400	4,400	5,330	4,760	5,140	7,120	5,450	4,550	4,220	3,910	4,220
27	4,400	4,400	4,580	5,140	4,760	5,520	6,900	5,650	4,550	4,060	3,910	4,220
28	4,400	4,580	4,580	5,140	4,760	5,520	6,900	5,650	4,380	4,060	3,910	4,220
29	4,400	4,580	4,400	4,950	.....	5,920	6,470	5,650	4,380	4,060	3,910	4,220
30	4,400	4,580	4,220	4,760	.....	6,840	6,470	5,080	4,220	4,060	3,910	4,060
31	4,580	.....	4,050	4,760	.....	7,320	.....	4,900	.....	4,060	3,910	.....

Daily discharge, in second-feet, of Deschutes River at Mecca, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	4,060	4,550	4,550	4,720	6,430	4,530	4,940	5,360	3,950	3,580	3,380	3,250
2	4,060	4,720	4,550	4,900	6,210	4,530	5,150	5,150	3,850	3,580	3,380	3,380
3	4,220	5,450	4,550	4,720	5,990	4,530	4,730	5,150	3,760	3,580	3,380	3,410
4	4,220	7,120	4,550	4,900	5,570	4,330	4,730	4,730	3,760	3,580	3,380	3,410
5	4,220	5,450	4,550	4,900	5,570	4,330	4,940	4,730	3,670	3,490	3,410	3,410
6	4,060	5,080	4,720	4,900	5,570	4,530	4,940	4,730	3,760	3,490	3,380	3,410
7	4,060	4,900	4,720	4,720	5,570	4,530	5,360	4,730	3,950	3,490	3,380	3,410
8	4,060	4,900	4,550	4,550	5,360	4,730	5,570	5,150	3,950	3,490	3,380	3,410
9	4,060	4,900	4,550	4,550	5,360	4,530	5,570	5,150	3,760	3,490	3,380	3,410
10	4,060	4,900	4,550	4,550	5,150	4,330	5,780	5,150	3,850	3,490	3,380	3,410
11	4,060	4,900	4,550	4,550	5,150	4,330	5,570	5,150	3,760	3,490	3,380	3,410
12	4,060	4,900	4,550	4,550	4,940	4,330	5,360	4,940	3,950	3,490	3,380	3,410
13	4,060	4,900	4,550	4,550	4,730	4,730	5,150	4,730	3,850	3,580	3,380	3,490
14	4,060	4,900	4,550	4,550	4,940	4,730	5,360	4,730	3,950	3,580	3,380	3,850
15	4,060	4,900	4,550	4,550	4,940	4,730	5,570	4,530	3,950	3,490	3,380	3,850
16	4,060	4,900	4,720	4,550	4,730	5,150	5,780	4,530	3,950	3,580	3,380	3,670
17	4,060	4,900	4,900	4,900	4,730	5,150	5,990	4,330	4,140	3,580	3,380	3,670
18	3,980	4,900	5,080	4,900	4,730	4,940	5,990	4,330	4,330	3,580	3,250	3,670
19	4,220	4,900	5,080	4,900	4,730	4,940	5,570	4,330	4,040	3,490	3,250	3,670
20	4,380	4,900	5,450	5,080	4,730	4,730	5,570	4,330	3,950	3,490	3,250	3,670
21	4,550	4,900	5,650	5,080	4,730	4,940	5,360	4,140	3,850	3,490	3,380	3,670
22	4,550	4,900	5,650	4,900	4,730	5,150	5,360	4,140	3,850	3,580	3,380	3,670
23	4,550	4,900	5,650	4,900	4,730	5,150	5,150	4,140	3,950	3,490	3,250	3,670
24	4,550	4,900	6,050	4,900	4,730	4,940	5,150	4,040	3,850	3,490	3,250	3,760
25	4,550	4,720	6,050	4,900	4,730	4,940	5,150	4,140	3,850	3,490	3,250	3,760
26	4,550	4,720	6,050	8,780	4,730	4,730	5,150	4,040	3,760	3,490	3,250	3,760
27	4,550	4,550	5,650	10,100	4,530	4,730	5,150	3,950	3,760	3,380	3,170	3,760
28	4,550	4,550	5,260	8,280	4,330	4,730	5,360	3,760	3,760	3,380	3,170	3,760
29	4,550	4,550	5,260	7,340	4,330	4,730	5,570	3,950	3,670	3,380	3,170	3,760
30	4,550	4,550	5,080	6,880	.....	4,730	5,570	4,040	3,580	3,380	3,170	3,760
31	4,550	.....	4,900	6,430	.....	4,940	.....	3,950	.....	3,380	3,250	.....

Monthly discharge of Deschutes River at Mecca, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	4,580	3,970	4,290	264,000
November	4,760	4,400	4,560	271,000
December	4,580	4,050	4,480	275,000
January	5,920	4,220	4,820	296,000
February	4,760	4,580	4,750	264,000
March	7,320	4,580	5,050	311,000
April	10,300	6,470	7,550	449,000
May	6,470	4,900	5,310	326,000
June	4,900	4,220	4,600	274,000
July	4,550	4,060	4,180	257,000
August	4,060	3,840	3,920	241,000
September	4,220	3,840	4,120	245,000
The year	10,300	3,840	4,800	3,470,000
1919–20.				
October	4,550	3,980	4,260	262,000
November	7,120	4,550	4,940	294,000
December	6,050	4,550	5,000	307,000
January	10,100	4,550	5,380	331,000
February	6,430	4,330	5,060	291,000
March	5,150	4,330	4,720	290,000
April	5,990	4,730	5,350	318,000
May	5,360	3,760	4,520	278,000
June	4,330	3,580	3,870	230,000
July	3,580	3,380	3,500	215,000
August	3,410	3,170	3,320	204,000
September	3,850	3,250	3,590	214,000
The year	10,100	3,170	4,460	3,230,000

DESCHUTES RIVER AT MOODY, NEAR BIGGS, OREG.

LOCATION.—In SE. ¼ sec. 26, T. 2 N., R. 15 E., opposite Moody railroad station, 1¼ miles above bridge of Oregon-Washington Railroad & Navigation Co., 1½ miles above mouth of river, and 5 miles southwest of Biggs, Sherman County.

DRAINAGE AREA.—About 9,180 square miles.

RECORDS AVAILABLE.—July 7, 1906, to September 30, 1920; October 19, 1897, to December 31, 1899, for a station near Moro, 10 miles above mouth of river in NE. ¼ sec. 5, T. 1 S., R. 16 E. Records for 1908 and 1910 somewhat fragmentary.

GAGE.—Staff in two sections, the lower inclined, the upper vertical; read by Glen Stockton.

DISCHARGE MEASUREMENTS.—Made from a cable about 450 feet above gage.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; shifting only in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.6 feet April 16 (discharge, 13,500 second-feet); minimum discharge, about 4,100 second-feet in October.

Maximum stage recorded during year ending September 30, 1920, 5.2 feet at 4 p. m. January 27 (discharge, 16,900 second-feet); minimum stage recorded, 1.9 feet, August 23–28 (discharge, 3,510 second-feet).

1906–1920: Maximum stage recorded, 7.50 feet February 6, 1907 (discharge, 30,600 second-feet); minimum discharge recorded, that of August 23–28, 1920.

ICE.—Stage-discharge relation never affected by ice.

DIVERSIONS.—Summer discharge at this station has been progressively reduced since about 1904 or 1905 by diversions from the upper river. Some of the water returns, but the net reduction during midsummer is now probably 15 to 20 per cent.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly during high water of April 6, 1919, and January 27, 1920. Well-defined rating curves used. Gage read once a day, generally to nearest tenth. Daily discharge ascertained by applying daily gage height to rating table except for short periods of missing gage heights, for which discharge was estimated. Records good.

Discharge measurements of Deschutes River at Moody, near Biggs, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918. Nov. 14	F. F. Henshaw	2.42	4,870	Aug. 13	J. J. Dirzulaitis	2.10	4,060
				Sept. 14	do	2.24	4,290
1919. July 1	J. J. Dirzulaitis	2.30	4,870	1920. Sept. 29	R. C. Briggs	2.20	4,160

Daily discharge, in second-feet, of Deschutes River at Moody, near Biggs, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1		4,610	4,750	4,470	5,320	5,320	9,200	8,100	6,400	4,660	4,150	4,150
2		4,610	4,750	4,470	5,320	5,320	9,600	7,750	6,100	4,530	4,150	4,150
3		4,610	4,750	4,340	5,320	5,940	9,600	7,750	5,800	4,530	4,400	4,150
4		4,610	4,750	4,340	5,320	5,620	10,500	7,400	5,800	4,530	4,150	4,150
5		4,610	4,750	4,340	5,320	5,320	11,500	7,050	5,800	4,530	4,150	4,150
6	4,240	4,610	4,750	4,470	5,320	5,620	13,500	7,050	5,800	4,660	4,150	4,150
7		4,610	4,750	4,470	5,320	5,620	12,500	6,720	5,800	4,660	4,150	4,150
8		4,610	4,890	4,470	5,320	5,620	10,000	7,050	5,800	4,660	4,150	4,150
9		4,610	4,890	4,470	5,320	5,320	8,000	7,050	5,510	4,400	4,150	4,150
10		4,610	4,890	4,470	6,950	5,320	8,000	6,720	5,510	4,660	4,150	4,150
11		4,750	4,890	4,470	6,600	5,320	8,400	6,720	5,220	4,800	4,150	4,150
12		4,750	4,890	4,610	5,620	5,320	9,600	6,720	5,220	4,660	4,150	4,660
13		4,750	4,890	4,610	5,620	5,620	10,500	6,400	5,510	4,660	4,150	4,660
14		4,750	4,890	4,610	5,620	5,320	9,200	6,100	5,800	4,660	4,150	4,660
15	4,660	4,750	4,890	4,610	5,940	5,320	8,800	6,100	5,510	4,660	4,150	4,400
16		4,750	4,890	5,030	5,940	5,320	8,100	6,100	5,220	4,400	4,150	4,400
17		4,890	4,890	7,300	6,600	5,620	7,750	6,100	5,220	4,400	4,150	4,400
18	4,750	4,890	4,890	7,300	6,260	5,940	8,100	5,800	5,220	4,400	4,150	4,400
19	4,610	4,750	4,890	5,940	5,940	5,940	9,200	5,800	5,220	4,400	4,150	4,400
20	4,470	4,750	4,890	5,940	5,620	5,940	9,600	6,100	5,220	4,400	4,150	4,400
21	4,470	4,750	4,890	5,940	5,780	6,260	9,200	6,100	5,220	4,400	4,150	4,400
22	4,470	4,750	4,890	8,400	5,940	5,940	8,450	6,100	5,220	4,400	4,150	4,400
23	4,470	4,750	4,890	9,200	5,320	5,940	8,450	6,100	5,220	4,400	4,150	4,400
24	4,470	4,750	4,750	9,600	5,320	5,940	8,800	6,400	5,220	4,400	4,150	4,400
25	4,470	4,750	4,750	7,300	5,320	6,260	8,800	6,400	4,940	4,400	4,150	4,400
26	4,470	4,750	4,610	6,600	5,940	6,260	8,800	6,400	4,940	4,400	4,150	4,400
27	4,470	4,750	4,610	6,600	5,620	6,260	8,800	7,050	4,940	4,400	4,150	4,400
28	4,470	4,750	4,610	5,940	5,620	6,600	8,450	7,400	4,940	4,400	4,150	4,400
29	4,610	4,750	4,750	5,940	.....	6,950	8,450	7,050	4,940	4,400	4,150	4,400
30	4,750	4,750	4,750	5,620	.....	7,300	8,450	6,720	4,660	4,150	4,150	4,400
31	4,750	.....	4,610	5,320	.....	8,000	.....	6,400	.....	4,150	4,150	.....
1919–20.												
1	4,400	5,800	5,510	5,800	8,000	5,030	5,620	6,600	4,470	4,200	3,720	3,720
2	4,400	5,800	5,510	5,800	8,000	5,030	5,940	6,600	4,470	4,080	4,720	3,720
3	4,400	5,800	5,510	5,800	7,650	5,320	5,940	5,940	4,340	3,950	3,720	3,720
4	4,400	8,100	5,510	5,800	7,300	5,320	5,940	5,940	4,340	4,080	3,720	3,720
5	4,400	8,450	5,510	5,800	7,300	5,320	5,940	5,940	4,200	4,200	3,720	
6	4,400	5,800	5,510	5,800	6,950	5,320	6,260	5,940	4,470	4,080	3,720	
7	4,400	5,510	5,220	5,800	6,600	5,030	6,260	5,940	4,750	3,950	3,720	
8	4,400	5,220	5,220	5,510	6,600	5,030	6,950	5,940	4,610	3,950	3,720	3,720
9	4,400	5,800	5,220	5,220	6,600	5,320	7,300	5,940	4,470	3,840	3,720	
10	4,400	5,510	4,660	5,220	6,260	5,320	7,300	6,260	4,470	3,840	3,720	
11	4,400	5,510	4,400	5,220	6,260	5,320	6,950	6,600	4,610	3,720	3,720	
12	4,400	5,510	4,400	5,220	5,620	5,620	6,950	6,600	4,470	3,720	3,720	3,720
13	4,400	5,510	4,400	5,220	5,620	5,620	6,950	5,940	4,470	3,840	3,720	3,720
14	4,400	5,220	4,400	5,220	5,940	5,940	7,300	6,260	4,610	3,840	3,720	3,720
15	4,400	5,220	4,400	5,510	5,940	5,620	7,300	6,260	4,610	3,950	3,720	3,720
16	4,400	5,220	4,400	7,400	5,940	5,940	7,300	5,620	4,470	3,950	3,720	3,720
17	4,400	5,220	5,220	7,400	5,940	5,940	6,950	5,620	4,610	3,950	3,720	3,950
18	4,400	4,940	5,800	7,050	5,620	5,940	6,950	5,320	4,470		3,720	3,950
19	4,400	5,220	5,800	6,720	5,620	5,940	6,950	5,320	4,470		3,720	3,950
20	4,400	5,510	6,100	6,720	5,620	6,260	6,600	5,320	4,470		3,720	3,950
21	4,400	5,510	11,000	6,720	5,620	6,260	6,600	5,320	4,470	3,950	3,720	3,950
22	4,400	5,510	8,450	6,100	5,620	5,940	6,600	5,030	4,340		3,720	3,950
23	4,400	5,510	9,200	6,100	5,620	6,260	6,600	5,030	4,340		3,510	3,950
24	4,400	5,220	10,500	5,800	5,320	6,260	6,260	4,890	4,470		3,510	3,950
25	4,400	5,220	10,500	5,800	5,320	6,260	6,260	4,890	4,200	3,950	3,510	3,950
26	4,400	5,220	8,800	12,500	5,320	5,940	5,940	4,750	4,200	3,720	3,510	3,950
27	4,660	4,940	7,400	16,300	5,030	5,940	5,940	4,610	4,470	3,720	3,510	3,950
28	4,660	4,940	6,720	14,000	5,030	5,940	6,260	4,470	4,470	3,720	3,510	3,950
29	4,940	4,940	6,100	10,500	5,030	5,620	6,600	4,610	4,340	3,720	3,720	4,200
30	4,940	5,510	6,100	9,600	.....	5,620	6,600	4,750	4,340	3,720	3,720	4,200
31	5,220	.....	6,100	9,600	.....	5,620	.....	4,610	.....	3,720	3,720	.....

Monthly discharge of Deschutes River at Moody, near Biggs, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	a 4,900	a 4,100	4,450	274,000
November	4,890	4,610	4,710	280,000
December	4,890	4,610	4,800	295,000
January	9,600	4,340	5,650	347,000
February	6,950	5,320	5,700	317,000
March	8,000	5,320	5,880	362,000
April	13,500	7,750	9,280	552,000
May	8,100	5,800	6,670	410,000
June	6,400	4,660	5,400	321,000
July	4,800	4,150	4,490	276,000
August	4,400	4,150	4,160	256,000
September	4,660	4,150	4,330	258,000
The year	13,500	a 4,100	5,460	3,950,000
1919–20.				
October	5,220	4,400	4,480	275,000
November	8,450	4,940	5,580	332,000
December	11,000	4,400	6,240	384,000
January	16,300	5,220	7,140	439,000
February	8,000	5,030	6,110	351,000
March	6,260	5,030	5,670	349,000
April	7,300	5,620	6,580	392,000
May	6,600	4,470	5,580	343,000
June	4,750	4,200	4,450	265,000
July	4,200	3,720	3,900	240,000
August	3,720	3,510	3,680	226,000
September	4,200	3,720	3,840	228,000
The year	16,300	3,510	5,270	3,820,000

a Estimated from record at Mecca.

EAST FORK AT MORSON INTAKE, NEAR LAPINE, OREG.

LOCATION.—In NE. ¼ sec. 34, T. 23 S., R. 9 E., at private road bridge half a mile from river road to Crescent, 1 mile below intake of canal of Morson project, and 12 miles southwest of Lapine, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 26, 1914, to September 14, 1917 (except winter periods) May 7 to August 31, 1919; April 5 to September 13, 1920.

GAGE.—Vertical staff nailed to bent of bridge. Vertical staff nailed to a tree root in section 33, just below mouth of Crescent Creek used prior to July 27, 1915, and May 15 to September 14, 1917. Gage reader, Mrs. J. L. Howard.

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

CHANNEL AND CONTROL.—Bed composed of gravel and sand, with steep banks of silt, overgrown with brush; may shift in floods. Channel divided by an island just below bridge.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period May 7 to August 31, 1919, 4.2 feet May 31 and June 1 (discharge, 616 second-feet); minimum stage recorded, 0.70 foot August 13 (discharge, 65 second-feet).

Maximum stage recorded during period April 5 to September 13, 1920, 2.4 feet May 10 and 11 (discharge, 309 second-feet); minimum stage recorded, 0.42 foot September 9–10 (discharge, 34 second-feet).

1914–1917 and 1919–20: Maximum stage, 6.73 feet June 12, 1917 (discharge, 835 second-feet) flood of November 25, 1909, may have reached 1,800 second-feet (estimated from records at Allen's ranch). Minimum stage, that of September 9 and 10, 1920.

ICE.—Stream is frozen two or three months; no winter records have been obtained.

DIVERSIONS.—A few small ditches and the Morson canal divert water above the station. Water was diverted in Morson canal past the gage during a portion of 1919 and 1920.

From discharge measurements and information furnished by John Dubuis, project engineer, Morson irrigation project, and by the observer on East Fork of Deschutes River, monthly diversion has been estimated for the purpose of determining the total flow of East Fork at intake.

REGULATION.—None.

ACCURACY.—Stage-discharge relation assumed to have changed May 10, 1920. Rating curves poorly defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of East Fork at Morson intake, near Lapine, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
May 7	Briggs and Dirzulaitis.	3.70	523	Apr. 5	J. J. Dirzulaitis.....	1.60	189
June 19	J. J. Dirzulaitis.....	2.40	318	July 5	K. N. Phillips.....	1.38	139
Aug. 21	.....do.....	.98	102	31	.....do.....	.76	64
				Aug. 21	.....do.....	.54	41.7

Discharge measurements of Morson canal at intake, near Lapine, Oreg., during the year ending Sept. 30, 1920.

[Made by K. N. Phillips.]

Date.	Gage height.	Discharge.
	Feet.	*Sec.-ft.*
July 5	.....	29.4
Aug. 1	0.68	25.6
21	.62	24.7

Daily discharge, in second-feet, of East Fork at Morson intake, near Lapine, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919.				1920.					
	May.	June.	July.	Aug.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	616	245	91	.....	277	187	149	67	45
2	.....	580	230	91	.....	277	179	142	67	46
3	.....	495	230	91	.....	261	171	142	65	43
4	.....	461	215	84	.....	277	171	142	65	42
5	.....	444	215	84	185	261	171	142	65	42
6	.....	444	215	78	215	277	171	115	65	40
7	529	427	200	78	200	277	179	156	65	37
8	512	427	185	74	215	293	203	115	65	37
9	512	410	185	65	230	277	220	115	65	34
10	512	410	230	72	215	309	203	115	61	34
11	495	410	200	72	215	309	203	108	59	37
12	512	393	200	68	215	291	203	108	57	42
13	495	376	200	65	277	273	203	108	57	40
14	478	376	185	72	245	273	237	115	55	.....
15	461	376	185	78	245	273	237	122	55	.....
16	444	376	185	91	230	309	220	115	53	.....
17	444	359	185	98	215	273	220	108	53	.....
18	461	359	185	104	215	273	203	102	52	.....
19	444	342	171	104	230	273	203	96	50	.....
20	427	325	171	104	215	273	203	90	46	.....
21	427	293	171	104	215	273	187	90	43	.....
22	427	293	185	98	215	273	187	90	42	.....
23	444	293	171	98	185	273	187	90	43	.....
24	444	277	164	91	185	255	187	90	42	.....
25	529	277	157	91	185	255	187	84	42	.....
26	529	277	150	91	215	237	171	78	40	.....
27	546	277	143	91	230	220	164	76	40	.....
28	563	261	136	91	245	203	164	69	42	.....
29	580	245	104	91	261	203	156	67	42	.....
30	598	245	98	91	277	203	149	67	43	.....
31	616	.....	91	91	.....	187	.....	67	43	.....

Monthly discharge of East Fork at Morson intake, near Lapine, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May 7–31	616	427	497	24,600
June	616	245	371	22,100
July	245	91	180	11,100
August	104	65	86.8	5,340
The period				63,100
1920.				
April 5–30	277	185	222	11,400
May	309	187	264	16,200
June	237	149	191	11,400
July	156	67	106	6,520
August	67	40	53.2	3,270
September 1–13	46	34	39.9	1,030
The period				49,800

Monthly discharge of East Fork including Morson canal, Lapine, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May 7–31	616	427	496	24,600
June			378	22,400
July			203	12,500
August			107	6,580
The period				66,100
1920.				
April 5–30	277	185	222	11,400
May	319	197	272	16,700
June	257	169	211	12,600
July	179	97	135	8,300
August	92	64	77.2	4,750
September 1–13	70	58	63.9	1,650
The period				55,400

ARNOLD CANAL NEAR BEND, OREG.

LOCATION.—In SW. ¼ sec. 23, T. 18 S., R. 11 E., 1 mile below intake of canal and 9 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—April 10, 1914, to September 30, 1920; information sufficient for an approximate estimate, October, 1912, to March, 1914.

GAGE.—Vertical staff on right side of flume 400 feet below a spillway, installed May 12, 1917; staff on left side just below spillway used May 1, 1915, to December 2, 1916. A gage half a mile above, in NE. ¼ sec. 27, was used up to April 30, 1915. Gage readers employed during 1919 and 1920, B. Tokampe, H. B. Caldwell, Joe Markee, and M. J. Griswold.

DISCHARGE MEASUREMENTS.—Made from collar of flume near gage.

CHANNEL AND CONTROL.—Flume 12 to 14 feet wide; fairly steep gradient.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year ending September 30, 1919, 120 second-feet July 26, 28, and 30; canal dry at various times during year.

Maximum stage recorded during year ending September 30, 1920, 2.5 feet June 1–3 (discharge, 134 second-feet); canal dry at various times.

1914–1920: Maximum discharge that of June 1–3, 1920.

ICE.—Canal dry during winter.

ACCURACY.—Stage-discharge relation changed in 1919 and 1920. Well-defined rating curves used; applicable October 1, 1918, to August 6, 1919; August 7 to October 31, 1919; and May 12 to September 30, 1920. Gage read to hundredths about three times a week during 1919, and generally once daily May 12 to September 30, 1920. Daily discharge ascertained by applying mean daily gage height to rating table, and by interpolating for days of missing gage height. Records good.

Arnold canal diverts water from the right bank of Deschutes River at the head of Lava Island, in the SW. ¼ sec. 27, T. 18 S., R. 11 E., and irrigates land south and east of Bend lying above the Central Oregon Irrigation Co.'s Carey Act segregation.

Discharge measurements of Arnold canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 15	C. L. Batchelder	1.27	47.2	July 3	Phillips and Henshaw	2.28	109
1919.				Aug. 2	K. N. Phillips	2.20	110
Apr. 30	R. C. Briggs	1.40	55	Sept. 11	do	2.16	104
June 19	J. J. Dirzulaitis	1.98	103	11	do	2.16	106
Sept. 11	do	1.83	85				
Oct. 31	do	1.60	68				

Daily discharge, in second-feet, of Arnold canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.								
1	80			58	110	100	120	110
2	80			60	111	100	120	110
3	82			34	112	100	111	110
4	66			0	113	100	102	102
5	49			0	111	100	102	94
6	49			0	109	101	102	94
7	49			44	113	102	104	94
8	49			60	112	103	106	94
9	49			66	111	104	114	86
10	49			73	112	106	114	86
11	48			72	113	108	114	86
12	48			71	113	111	112	86
13	48			71	113	112	110	86
14	49		43	79	113	113	114	86
15	49		43	85	112	112	114	86
16	49		43	87	111	111	114	86
17	49		43	89	62	111	114	86
18	49		43	90	46	111	57	86
19	49		43	43	107	111	31	86
20			44	0	111	111	110	85
21			45	0	111	111	110	84
22			52	92	110	112	110	83
23			53	92	108	113	114	82
24			53	92	108	115	112	82
25			53	92	108	117	110	82
26			52	92	76	120	108	82
27			52	100	16	120	106	81
28			59	101	95	120	106	80
29			58	102	102	120	106	78
30			57	105	100	120	106	78
31				108		120	108	

Daily discharge, in second-feet, of Arnold canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.								
1	74				134	116	107	
2	72				134	114	107	
3	70				134	114	112	
4					34	125	114	
5						123	114	
	68							106
6		60		50	107	90	111	
7					107	107	112	
8	67				107	107	112	
9	66				116	107	114	
10	65				116	109	112	
11	64				116	107	112	104
12	65			54	116	107	112	104
13	67			54	125	111	112	104
14				70	129	114	112	104
15				81	132	111	114	104
	66							
16				81	132	107	114	104
17				99	114	107	112	104
18	64			107	116	109	112	104
19				62	115	107	112	104
20				13	114	111	112	104
21				107	114	109	112	104
22				107	116	109		64
23				109	125	107		64
24				114	125	107		68
25	66		40	116	123	107		68
26				116	123	107		68
27				117	120	105	110	64
28				118	116	104		64
29				118	114	105		64
30				120	116	105		64
31	67			120		104		

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Arnold canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October (19 days)	82	48	54.7	2,060
April (17 days)	59	43	49.2	1,660
May (26 days)	108	34	79.1	4,080
June	113	16	102	6,070
July	120	100	110	6,760
August	120	31	106	6,520
September	110	78	88.4	5,260
The year				32,400
1919–20.				
October	74	64	66.7	4,100
November (12 days)			60.0	1,430
April (12 days)			40.0	952
May	120	13	78.5	4,830
June (29 days)	134	34	117	6,730
July	125	90	109	6,700
August	114	107	111	6,820
September		64	93.1	5,540
The year				37,100

CENTRAL OREGON CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 7, T. 18 S., R. 12 E., at flume section half a mile below point where waters in main diversion canal are divided between this canal and Pilot Butte canal, 2 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—May 11, 1905, to September 30, 1920.

GAGE.—Vertical enameled staff nailed to inside of flume on right side. Gage read by J. A. Watson during year ending September 30, 1919, and by W. G. Wallace during year ending September 30, 1920.

DISCHARGE MEASUREMENTS.—Made from yoke of flume at gage section.

CHANNEL AND CONTROL.—A plank flume of rectangular cross section with battened seams. Flume rather unstable, but the rating does not change appreciably.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.1 feet at time of measurement August 20 (discharge, 459 second-feet); canal dry at various times during year.

Maximum stage recorded during year ending September 30, 1920, 4.0 feet, practically throughout August (discharge, 432 second-feet).

1905–1920: Maximum stage that of August 20, 1919.

ICE.—Canal operated in winter only for a few days during periods of moderately cold weather for furnishing water for domestic use. The gradient of the flume below the gage is sufficient to maintain open channel at all times.

ACCURACY.—Stage-discharge relation changed slightly during winter of 1918–19, and for stages above 3.0 feet during winter of 1919–20, Well-defined rating curves used, applicable October 1, 1918, to March 26, 1919, April 13 to October 19, 1919, and November 15, 1919, to September 30, 1920. Gage read to half-tenths twice daily. Discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height records furnished by Central Oregon Irrigation Co.

Central Oregon canal diverts water from the right bank of Deschutes River in the NE. ¼ sec. 13, T. 18 S., R. 12 E., and irrigates land lying east of Bend and in the vicinity of Powell Buttes.

Discharge measurements of Central Oregon canal near Bend, Oreg., during years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 24	R. C. Briggs	3.00	294	May 19	F. F. Henshaw	3.80	411
June 21	J. J. Dirzulaitis	3.80	415	July 3	Phillips and Henshaw	3.90	409
Aug. 20	do	4.10	454	19	Phillips and Cooper	4.00	418
				Aug. 18	R. D. Cooper	4.10	455

Daily discharge, in second-feet, of Central Oregon canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	246	.....	119	.....	.....	114	.....	292	397	427	427	443
2	246	113	158	.....	.....	182	.....	292	412	427	443	406
3	246	194	158	.....	.....	182	.....	322	412	427	443	285
4	233	194	158	.....	.....	182	.....	337	412	427	443	412
5	220	57	59	.....	.....	76	.....	352	412	427	443	397
6	194	.....	.....	.....	.....	.....	.....	352	412	427	264	382
7	194	.....	.....	.....	.....	.....	.....	137	412	427	443	382
8	194	.....	.....	.....	.....	.....	.....	22	412	427	443	352
9	194	.....	.....	.....	10	.....	.....	16	412	427	443	322
10	194	.....	.....	.....	124	.....	.....	208	412	427	443	322
11	194	.....	.....	.....	182	.....	.....	352	412	427	443	382
12	194	.....	.....	.....	125	.....	.....	367	412	427	443	264
13	194	.....	.....	38	.....	.....	6	367	397	427	443	264
14	194	.....	.....	92	.....	.....	34	367	367	427	443	264
15	194	.....	.....	74	.....	.....	156	382	367	427	443	264
16	81	.....	.....	102	.....	.....	182	397	367	427	443	264
17	.....	.....	.....	102	.....	.....	169	397	367	427	443	264
18	.....	.....	.....	38	.....	.....	169	397	367	427	443	264
19	.....	.....	.....	.....	.....	.....	182	397	367	427	443	264
20	.....	.....	.....	.....	.....	.....	169	397	382	427	443	264
21	.....	.....	.....	.....	.....	.....	169	412	397	412	443	264
22	.....	.....	.....	.....	.....	76	169	412	412	412	443	264
23	.....	.....	.....	.....	.....	182	222	412	412	427	443	264
24	.....	.....	.....	.....	.....	182	264	412	412	427	443	264
25	.....	.....	.....	.....	.....	182	292	412	412	427	443	264
26	.....	.....	.....	.....	.....	57	292	412	427	427	443	264
27	.....	.....	.....	.....	.....	.....	292	412	427	427	443	264
28	.....	.....	8	.....	.....	.....	110	412	427	427	443	264
29	.....	.....	126	.....	.....	.....	134	412	427	427	443	264
30	.....	.....	159	.....	.....	.....	292	208	427	427	443	264
31	.....	22	.....	.....	.....	.....	.....	223	.....	427	427	.....
1919–20.												
1	247	.....	.....	156	.....	.....	.....	169	376	418	432	404
2	271	.....	.....	156	.....	.....	.....	182	376	418	432	390
3	271	.....	.....	52	.....	.....	.....	208	404	418	432	390
4	271	.....	.....	.....	.....	.....	.....	250	404	418	376	390
5	271	.....	.....	.....	.....	.....	.....	278	418	418	432	390
6	278	.....	.....	.....	.....	.....	.....	97	404	418	432	390
7	271	.....	.....	.....	.....	.....	8	.....	418	418	432	390
8	278	.....	.....	.....	.....	36	8	146	418	432	432	376
9	278	.....	.....	.....	29	126	9	90	418	432	432	376
10	292	.....	.....	.....	144	144	22	169	404	432	432	376
11	292	.....	.....	37	156	144	120	264	404	432	432	376
12	292	.....	.....	78	156	144	144	306	418	418	432	376
13	292	.....	.....	98	98	46	169	334	404	432	404	376
14	292	.....	.....	104	.....	.....	146	334	404	432	432	376
15	292	34	.....	83	.....	.....	.....	348	404	432	432	334
16	292	182	.....	38	.....	.....	.....	348	404	432	432	362
17	264	208	.....	44	.....	.....	.....	348	404	432	432	348
18	271	130	.....	44	.....	.....	.....	376	404	432	432	348
19	85	.....	.....	16	.....	.....	.....	376	404	432	432	348
20	.....	.....	.....	.....	.....	.....	.....	390	404	432	432	348
21	.....	.....	.....	.....	.....	.....	.....	390	404	432	432	348
22	.....	.....	58	.....	.....	.....	.....	362	418	432	432	348
23	.....	.....	62	.....	.....	.....	.....	334	418	432	432	348
24	.....	.....	34	.....	.....	.....	.....	362	404	432	432	348
25	.....	.....	44	.....	.....	.....	.....	376	418	432	432	348
26	.....	.....	74	.....	.....	.....	.....	404	418	432	432	292
27	.....	.....	74	.....	.....	.....	77	376	418	432	432	292
28	.....	.....	.....	.....	.....	.....	150	362	418	432	432	292
29	.....	.....	.....	.....	.....	.....	150	362	418	432	432	292
30	.....	.....	24	.....	.....	.....	150	362	418	432	432	292
31	.....	.....	120	.....	.....	.....	.....	362	.....	432	418	.....

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Central Oregon canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October (16 days)	246	81	201	6,380
November (5 days)	194	22	116	1,150
December (5 days)	159	8	118	1,870
January (6 days)	102	38	74.3	884
February (4 days)	182	10	110	873
March (10 days)	182	57	142	2,820
April (18 days)	292	6	184	6,570
May	412	16	332	20,400
June	427	367	403	24,000
July	427	412	426	26,200
August	443	264	436	26,800
September	443	264	303	18,060
The year				136,000
1919–20.				
October (19 days)	292	85	268	10,100
November (4 days)	208	34	138	1,090
December (8 days)	120	24	61.2	971
January (12 days)	156	16	75.5	1,800
February (5 days)	156	29	117	1,160
March (6 days)	144	36	107	1,270
April (12 days)	169	8	96.1	2,290
May (30 days)	404	90	302	18,000
June	418	376	408	24,300
July	432	418	428	26,300
August	432	376	429	26,400
September	404	292	355	21,100
The year				135,000

PILOT BUTTE CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 7, T. 18 S., R. 12 E., directly opposite gaging station on Central Oregon canal, half a mile below point where waters are divided between this canal and the Central Oregon canal, and 2 miles south of Bend, Deschutes County.

RECORDS AVAILABLE.—March 6, 1905, to September 30, 1920.

GAGE.—Vertical staff on right bank; read by J. A. Watson, W. G. Wallace, and Frank Slattery.

DISCHARGE MEASUREMENTS.—Made by wading at the gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Control partly solid rock; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.7 feet, June 20 (discharge, 29 second-feet); canal dry at various times.

Maximum stage recorded during year ending September 30, 1920, 1.75 feet July 24–26 (discharge, 28 second-feet); canal dry at various times.

1905–1920: Maximum stage recorded, 3.10 feet June 8, 11–16, July 19–21, 1913 (discharge, 244 second-feet); canal dry at various times.

ICE.—Canal dry during freezing weather.

ACCURACY.—Stage-discharge relation changed during each winter. Rating curves fairly well defined, applicable October 1, 1918, to March 26, 1919, April 14 to October 18, 1919, and November 15, 1919, to September 30, 1920. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Pilot Butte canal diverts water from the right bank of Deschutes River in the NE. ¼ sec. 13, T. 18 S., R. 12 E., in a flume common to it and the Central Oregon canal, irrigating lands lying mostly north of Bend and extending nearly to Crooked River. North canal also diverts water into the Pilot Butte.

Discharge measurements of Pilot Butte canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Apr. 24	R. C. Briggs	1.34	11.6	May 19	F. F. Henshaw	1.61	23.4
June 21	J. J. Dirzulaitis	1.60	22.7	July 3	Phillips and Henshaw	1.70	25.4
Aug. 20	do	1.65	27.7	19	Phillips and Cooper	1.72	27.6

Daily discharge, in second-feet, of Pilot Butte canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	18		18			9		11	18	22	22	23
2	18	10	18			15		14	18	23	23	23
3	18	20	10			15		18	18	23	23	23
4	18	11				15		18	18	23	23	23
5	18					7		18	18	23	23	23
6	18							18	18	23	23	23
7	18							20	18	23	23	23
8	15							23	18	23	23	23
9	15							10	18	23	23	23
10	15							6	18	23	23	23
11	15							20	18	23	23	23
12	15				15			18	18	23	23	23
13	15				27			18	18	23	23	23
14	15				11		8	18	18	20	23	23
15	15						17	18	18	22	23	23
16	6						14	18	18	23	23	23
17							11	18	18	15	23	23
18							11	18	18		23	23
19							11	18	18		23	23
20							11	18	24		23	23
21							11	18	20		23	23
22						9	11	18	20	5	23	23
23						15	7	18	20	23	23	23
24						15	12	18	20	23	23	23
25						15	12	18	20	23	23	23
26						4	12	18	23	23	23	23
27							12	18	23	23	23	23
28							15	18	23	23	23	23
29			14				17	18	23	23	23	23
30		2	16				14	18	23	23	23	23
31								18		23	21	

Daily discharge, in second-feet, of Pilot Butte canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	22			8	8			18	21	24	26	26
2	23		5	8	14			18	20	24	26	26
3	23		10	3	14	5		18	22	24	26	26
4	23		10		5	16		18	22	24	22	26
5	23		10			5		18	22	24	26	26
6	23		10					18	22	24	26	26
7	23		10				2	10	22	25	26	26
8	23		10					20	21	25	26	26
9	23		5					20	22	24	26	26
10	23							18	22	24	26	26
11	22						6	18	22	24	26	26
12	23						4	18	22	24	26	26
13	23						5	18	22	24	26	26
14	23						6	18	23	24	26	26
15	23	2						19	24	24	26	26
16	23	8						18	24	24	26	24
17	22	12						18	24	25	26	22
18	15	6						17	24	26	26	22
19			5					20	24	26	26	22
20			10					22	24	26	26	22
21			10					20	24	26	26	22
22			10					18	24	26	26	22
23			10					17	24	27	26	22
24			10					18	24	28	26	22
25			2					18	24	28	26	22
26			5					17	24	28	26	22
27			8				6	20	24	26	26	22
28							18	20	24	26	26	22
29							18	20	24	26	26	22
30			10				18	19	24	26	26	22
31			18					19		26	26	

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Pilot Butte canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October (16 days)	18	6	15.8	501
November (4 days)	20	2	10.8	86
December (5 days)	18	10	15.2	151
February (3 days)	27	11	17.7	105
March (10 days)	15	4	11.9	236
April (17 days)	17	7	12.1	408
May	23	6	17.3	1,060
June	24	18	19.4	1,150
July (27 days)	23	5	21.9	1,170
August	23	21	22.9	1,410
September	23	23	23.0	1,370
The year				7,650
1919-20.				
October (18 days)	23	15	22.4	800
November (4 days)	12	2	7.0	56
December (19 days)	18	2	8.84	333
January (3 days)	8	3	6.33	38
February (4 days)	14	5	10.2	81
March (3 days)	16	5	8.67	52
April (9 days)	18	2	9.22	165
May	22	10	18.3	1,130
June	24	20	23.0	1,370
July	28	24	25.2	1,550
August	26	22	25.9	1,590
September	26	22	24.1	1,430
The year				8,600

NORTH CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 13 E., 500 feet below bridge on road to Tumalo, one-fourth mile below intake, and 1 mile north of Bend, Deschutes County.

RECORDS AVAILABLE.—June 14, 1913, to September 30, 1920.

GAGE.—Inclined staff painted on left side of concrete lining of flume; read by W. L. Beebe.

DISCHARGE MEASUREMENTS.—Made from plank across canal.

CHANNEL AND CONTROL.—Concrete-lined section extends about 1,000 feet below gage; below this point the canal is unlined and sides and bottom are very rough. Changes in unlined section affect stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.1 feet August 20 to September 2 (discharge, 376 second-feet); canal dry at various times.

Maximum stage recorded during year ending September 30, 1920, 6.1 feet August 5–14 and 16–27 (discharge, 365 second-feet); canal dry at various times.

1913–1920: Maximum stage recorded, 6.1 feet August 20 to September 2, 1919 (discharge, 376 second-feet); canal dry at various times.

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

ACCURACY.—Stage-discharge relation changed during winter and during early part of irrigating season for 1919; permanent during 1920. Well-defined rating curves used. Gage read to tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

North canal diverts water from the right bank of Deschutes River at a concrete dam about 60 feet high, in the NE. ¼ sec. 29, T. 17 S., R. 13 E., and extends eastward for about a mile, where it discharges the water into Pilot Butte canal.

Discharge measurements of North canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	C. L. Batchelder	3.58	164	May 19	Henshaw and Cooper	5.52	320
21	do	3.56	158	June 30	Phillips and Henshaw	5.73	340
1919.				July 3	do	5.98	347
Apr. 24	R. C. Briggs	3.59	180	17	K. N. Phillips	6.04	367
May 26	do	5.50	330	23	do	6.03	355
June 21	J. J. Dirzulaitis	5.86	350	23	do	6.03	361
Aug. 19	do	6.00	365				
Sept. 11	do	4.80	257				

Daily discharge, in second-feet, of North canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	277	50	.....	.....	16	143	.....	277	340	367	367	376
2	277	.....	.....	.....	.....	136	.....	303	340	367	367	376
3	277	.....	.....	.....	.....	136	.....	312	340	367	367	367
4	260	.....	.....	.....	.....	68	.....	312	340	367	367	349
5	252	.....	.....	.....	.....	.....	.....	312	340	367	367	340
6	244	.....	.....	.....	.....	.....	.....	321	349	367	367	331
7	236	.....	.....	.....	.....	.....	.....	330	349	367	367	331
8	228	.....	.....	.....	.....	.....	.....	330	349	367	367	313
9	228	.....	.....	.....	13	.....	.....	330	349	367	367	313
10	228	.....	.....	16	157	.....	.....	330	349	367	367	268
11	228	.....	.....	16	102	43	.....	330	349	367	367	260
12	228	.....	16	.....	.....	13	38	330	349	367	367	242
13	228	.....	150	60	.....	.....	154	330	331	367	367	228
14	228	.....	150	60	.....	.....	147	340	331	367	367	228
15	196	.....	150	60	.....	.....	133	340	340	367	367	331
16	164	90	56	55	.....	.....	126	340	340	367	367	252
17	164	180	.....	51	.....	.....	126	340	340	367	367	244
18	164	157	.....	.....	.....	.....	126	340	340	367	367	236
19	164	78	.....	.....	.....	.....	126	340	349	367	367	236
20	164	.....	.....	.....	.....	.....	133	340	349	367	376	236
21	164	.....	.....	.....	.....	.....	147	340	349	367	376	236
22	164	.....	.....	.....	.....	.....	161	340	349	367	376	236
23	164	.....	.....	.....	.....	70	175	.....	349	367	376	236
24	164	.....	.....	.....	.....	168	175	.....	358	367	376	236
25	164	.....	.....	.....	.....	154	175	221	367	367	376	244
26	164	.....	.....	.....	.....	51	175	340	367	367	376	252
27	164	.....	.....	.....	16	.....	175	340	367	367	376	252
28	157	.....	20	.....	.....	.....	182	340	367	367	376	252
29	150	.....	150	.....	.....	.....	197	340	367	367	376	252
30	150	.....	42	.....	.....	.....	237	340	367	367	376	252
31	150	.....	.....	16	.....	.....	.....	340	.....	367	376	.....
1919–20.												
1	252	.....	.....	.....	51	80	.....	106	332	348	360	332
2	264	.....	8	.....	57	30	.....	143	332	353	360	332
3	276	.....	16	.....	97	.....	.....	176	332	356	360	332
4	276	.....	.....	.....	97	.....	.....	204	336	356	363	332
5	276	14	.....	.....	97	16	.....	204	340	358	365	332
6	276	13	.....	.....	40	23	.....	220	336	360	365	332
7	284	.....	.....	.....	.....	.....	.....	264	340	360	365	332
8	292	.....	.....	.....	.....	.....	.....	276	340	360	365	332
9	292	.....	.....	.....	.....	.....	.....	276	340	360	335	320
10	292	.....	.....	17	.....	.....	.....	280	340	360	365	308
11	292	.....	.....	19	.....	.....	11	300	340	358	365	308
12	292	.....	.....	.....	.....	.....	6	308	340	346	365	308
13	292	.....	.....	14	.....	.....	.....	308	340	360	365	292
14	292	.....	.....	55	.....	.....	.....	308	332	360	365	276
15	292	68	.....	78	.....	.....	.....	308	324	360	344	276
16	292	157	.....	103	10	.....	.....	308	324	360	365	276
17	292	164	15	72	16	.....	.....	312	324	358	365	276
18	292	82	32	27	.....	.....	.....	320	324	356	356	276
19	55	.....	51	.....	.....	9	.....	324	324	356	365	276
20	55	.....	55	.....	.....	9	.....	324	332	356	365	276
21	55	.....	47	.....	.....	.....	.....	324	184	356	365	276
22	55	.....	47	.....	.....	.....	.....	328	348	356	365	264
23	55	.....	47	.....	.....	42	57	332	348	356	365	248
24	55	.....	47	.....	.....	91	129	332	348	356	365	236
25	55	.....	47	.....	.....	27	43	332	356	352	365	228
26	28	.....	47	.....	12	61	.....	332	356	356	365	228
27	.....	.....	68	.....	82	91	.....	332	356	356	363	228
28	.....	.....	91	.....	103	103	4	332	356	356	356	228
29	.....	.....	91	.....	91	62	76	332	348	356	342	228
30	.....	.....	82	.....	.....	.....	91	332	340	356	332	228
31	.....	.....	38	14	.....	.....	.....	332	.....	358	332	.....

NOTE.—No flow during periods for which no discharge is given.

Monthly discharge of North canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	277	150	200	12,300
November (5 days)	180	50	111	1,100
December (8 days)	150	16	91.8	1,460
January (8 days)	60	16	41.8	663
February (5 days)	157	13	60.8	603
March (10 days)	168	13	98.2	1,950
April (19 days)	237	38	153	5,770
May (29 days)	340	221	326	18,800
June	367	331	349	20,800
July	367	367	367	22,600
August	376	367	370	22,800
September	376	212	276	16,400
The year				125,000
1919–20.				
October (26 days)	292	28	213	11,000
November (6 days)	164	13	83.0	988
December (17 days)	91	8	48.8	1,640
January (9 days)	103	14	44.3	791
February (12 days)	103	10	62.8	1,490
March (13 days)	103	9	49.5	1,280
April (8 days)	129	4	52.1	827
May	332	106	287	17,600
June	356	184	334	19,900
July	360	346	357	22,000
August	365	332	360	22,100
September	332	228	284	16,900
The year				117,000

SWALLEY CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 12 E., 100 yards above road crossing, one-fourth mile below intake of canal at North canal dam, and 1½ miles north of Bend, Deschutes County.

RECORDS AVAILABLE.—June 1, 1913, to September 30, 1920.

GAGE.—Vertical staff on right bank at lower end of intake flume; read by W. L. Beebe.

DISCHARGE MEASUREMENTS.—Made from plank across flume.

CHANNEL AND CONTROL.—Earth canal of regular cross section and practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.4 feet at 7 a. m. July 31 and August 3 (discharge, 105 second-feet); canal dry at various times.

Maximum stage recorded during year ending September 30, 1920, 2.3 feet August 3 and 4 (discharge, 97 second-feet); canal dry at various times.

1913–1920: Maximum stage recorded, that of July 31 and August 3, 1919.

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

ACCURACY.—Stage-discharge relation changed slightly about October 1, 1918; permanent thereafter. Well-defined rating curve used, differing slightly from that of 1918. Gage read to half tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair for year ending September 30, 1919, good for year ending September 30, 1920.

Swalley canal diverts water from the right bank of Deschutes River at the North canal dam, in the NE. ¼ sec. 29, and irrigates the Carey Act segregation of the Deschutes Reclamation & Irrigation Co. north of Bend and west of the Pilot Butte tract.

Discharge measurements of Swalley canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	C. L. Batchelder	1.55	44.6	Mar. 15	J. J. Dirzulaitis	1.20	27.8
1919.				Apr. 7	do	.45	3.5
Mar. 7	R. C. Briggs	1.19	30.4	May 19	F. F. Henshaw	1.74	57
Apr. 24	do	1.20	29.3	July 1	Phillips and Henshaw	2.00	72
May 6	Dirzulaitis and Briggs	1.37	36.6	17	K. N. Phillips	1.92	68
26	R. C. Briggs	1.95	71	23	do	1.95	73
June 21	J. J. Dirzulaitis	2.00	75	23	do	1.95	73
Aug. 19	do	2.25	91				
Sept. 11	do	1.65	48.9				
Oct. 30	do	1.50	43.3				

Daily discharge, in second-feet, of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	44	44	0.6	21	17	25	44	25	67	27	85	81
2	44	44	2.4	21	21	21	44	25	67	67	78	85
3	44	39	15	21	17	25	44	39	64	55	101	89
4	44	39	29	25	21	25	44	39	61	61	81	74
5	44	39	29	25	21	23	44	39	61	78	81	81
6	44	39	29	21	17	27	46	39	64	89	89	74
7	44	39	29	21	19	29	46	44	61	89	85	70
8	44	42	29	13	17	29	44	49	61	89	81	85
9	42	39	29	13	17	29	44	46	58	89	81	85
10	44	39	29	13	17	29	44	44	67	89	74	78
11	42	39	29	21	17	29	46	39	61	81	64	52
12	44	39	34	21	21	29	46	42	64	85	64	52
13	44	39	29	21	19	32	44	49	70	89	67	52
14	44	39	29	21	29	29	46	44	74	89	70	52
15	42	39	29	13	29	29	39	44	74	89	70	49
16	44	39	29	21	29	29	39	49	74	89	70	55
17	44	34	29	21	29	32	42	49	70	89	89	55
18	44	44	29	23	29	34	39	55	78	97	89	55
19	44	25	25	21	29	34	39	55	78	93	93	55
20	44	29	21	21	25	32	44	55	74	39	85	55
21	44	34	23	25	29	34	42	55	74	89	81	55
22	44	32	21	15	27	29	39	52	78	81	85	55
23	44	32	21	11	27	25	34	61	74	81	89	55
24	44	29	21	15	29	21	34	70	81	78	89	58
25	44	34	23	17	29	21	32	70	89	81	85	58
26	44	34	21	17	29	34	32	70	85	78	81	55
27	44	29	21	15	25	34	34	70	93	97	81	55
28	44	11	21	15	29	34	34	70	9.5	81	85	61
29	44	1.0	13	17	.....	32	32	64	67	89	81	52
30	44	.6	21	17	.....	29	27	67	70	85	85	46
31	44	.....	13	15	.....	29	.....	74	.....	89	89	.....

Daily discharge, in second-feet, of Swalley canal near Bend, Oreg., for the year ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	42	44	4.2	21	61	29	.....	17	44	74	81	74
2	46	44	4.2	25	61	29	.....	17	49	74	89	74
3	49	44	5.4	25	55	29	.....	17	55	74	97	74
4	49	44	3.3	25	55	29	23	17	55	78	97	74
5	52	44	4.2	21	55	29	6.5	22	55	70	89	74
6	55	44	4.2	25	52	29	5.4	34	55	74	89	74
7	49	44	4.2	25	55	29	5.4	44	55	78	97	74
8	46	44	2.4	25	55	29	4.2	44	55	81	85	74
9	44	42	3.3	25	55	29	4.2	44	55	81	59	74
10	46	44	2.4	25	55	29	4.2	44	55	81	89	70
11	44	44	2.4	25	55	29	4.2	39	55	78	81	67
12	44	44	2.4	25	52	29	4.2	42	55	74	81	67
13	44	42	2.4	17	49	29	4.2	44	39	81	81	67
14	46	44	2.4	9.5	55	29	4.2	44	49	85	81	67
15	49	44	2.4	6.5	55	29	4.2	44	55	78	74	64
16	44	44	2.4	13	55	29	11	39	49	67	81	67
17	44	44	4.2	13	49	29	21	49	44	67	78	67
18	49	42	5.4	25	44	29	21	55	44	67	74	67
19	49	44	4.2	25	34	29	21	61	58	70	81	64
20	49	44	4.2	25	34	29	21	55	58	74	81	61
21	55	44	4.2	25	34	29	21	55	61	74	85	61
22	55	44	6.5	25	34	29	21	55	61	74	70	61
23	58	44	5.4	12	29	29	11	49	55	74	89	61
24	55	44	4.2	.....	29	29	.....	49	64	70	89	58
25	52	42	4.2	2.1	29	14	.....	49	67	61	89	58
26	55	42	4.2	4.2	29	.....	1.2	44	70	67	89	61
27	52	16	4.2	4.2	29	.....	2.4	41	67	67	81	61
28	52	6.5	6.5	4.2	29	.....	2.4	.....	67	67	74	58
29	49	8.0	17	13	29	.....	5.4	.....	67	74	74	58
30	44	4.2	25	23	.....	.....	11	.....	70	78	74	61
31	46	.....	25	39	.....	.....	.....	22	.....	74	74	.....

NOTE.—Canal dry during periods for which no discharge is given.

Monthly discharge of Swalley canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	44	42	43.8	2,690
November	44	.6	33.5	1,990
December	34	.6	23.3	1,430
January	25	11	18.6	1,140
February	29	17	23.7	1,320
March	34	21	28.8	1,770
April	46	27	40.3	2,400
May	74	25	51.4	3,160
June	93	9.5	69.0	4,110
July	97	27	80.7	4,960
August	101	64	81.5	5,010
September	89	46	62.8	3,740
The year	.....	.....	.....	33,700
1919-20.				
October	58	42	48.8	3,000
November	44	4.2	39.0	2,320
December	25	2.4	5.7	350
January (30 days)	39	2.1	19.3	1,150
February	61	29	45.2	2,600
March (25 days)	29	14	28.4	1,410
April (25 days)	23	1.2	9.8	484
May (28 days)	61	17	40.6	2,250
June	70	39	56.3	3,350
July	85	61	73.7	4,530
August	97	59	82.4	5,070
September	74	58	66.4	4,080
The year	.....	.....	.....	30,500

TUMALO CREEK NEAR BEND, OREG.

LOCATION.—In SE. ¼ sec. 23, T. 17 S., R. 11 E., one-fourth mile above diversion dam of feed canal of Tumalo project, half a mile below highway bridge on old Bend Sisters road, 4 miles above mouth, and 4 miles northwest of Bend, Deschutes County.

DRAINAGE AREA.—57 square miles.

RECORDS AVAILABLE.—November 1, 1913, to September 30, 1920; also during winters from October 6, 1906, to April 30, 1913, except 1909–10.

GAGE.—Stevens continuous water-stage recorder referred to outside staff gage, used April 27, 1915, to September 80, 1917, October 16, 1918, to June 23, 1919, and October 31, 1919, to July 24, 1920. Staff gage read November, 1910, to April 26, 1915, and during 1918; W. H. Simpson, gage reader. Records previous to November, 1910, obtained at different site.

DISCHARGE MEASUREMENTS.—At ordinary stages, made by wading near the gage or from footbridge across canal when all water is diverted; at flood stages, from a large tree fallen across stream about 200 yards below gage, or by wading below diversion dam and adding measured canal flow.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; one channel at all stages; fairly straight above and below gage; fairly permanent. Gage in canal is in concrete-lined section and apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.83 feet at 9 p. m. May 27 and 28 (discharge, 540 second-feet); minimum discharge, 35 second-feet, March 7.

Maximum stage recorded during year ending September 30, 1920, 2.18 feet at 2. a. m. June 23 (discharge, 290 second-feet); minimum stage from water-stage recorder, 0.84 foot at 2 p. m. October 31 (discharge, 19 second-feet).

1906–1920: Maximum stage recorded, 3.8 feet at old gage, November 14, 1906 (discharge, estimated from extension of rating curve, 820 second-feet). The peak of the flood of November, 1909, was probably considerably greater. Minimum stage recorded, 0.84 foot at 2 p. m. October 31, 1920 (discharge, 19 second-feet).

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

DIVERSIONS.—Columbia Southern canal diverts water above the station. From July 26 to September, 1919, and July 18 to August 31, 1920, water was diverted into the head of Tumalo Creek from Crater Creek, tributary of Deschutes River. Data available on amount of water so diverted from Crater Creek is presented below.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent at both stations. Rating curves well defined below 300 second-feet. Operation of water-stage recorder satisfactory when employed. Discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or by adding estimated overflow at diversion dam to measured flow of feed canal except for periods when stage-discharge relation was affected by backwater from ice. Records good, except for estimated periods.

Discharge measurements of Tumalo Creek near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 21	F. F. Henshaw	1.26	54	Dec. 29	J. J. Dirzulaitis	1.37	69
1919.				1920.			
Mar. 7	R. C. Briggs	1.25	35.4	Mar. 14	do	1.38	70
Apr. 25	do	1.62	115	Apr. 9	do	1.36	71
June 23	J. J. Dirzulaitis	1.94	211	July 2	Phillips and Henshaw	1.80	161
Aug. 19	do	1.35	66	24	K. N. Phillips	1.47	84
19	do	1.35	65	Aug. 24	do	1.34	59

Daily discharge, in second-feet, of Tumalo Creek near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1		70	59		44	50	55	160	222	172	74	47
2		68	59		44	40	57	160	255	178	65	65
3		71	47		44	40	60	152	255	178	65	65
4		71	47		44	40	78	150	238	204	61	61
5		70	47		39	40	71	145	255	258	61	65
6		68	47			40	60	145	272	215	65	65
7		66	47			35	62	155	238	154	70	65
8	60	68	47			40	62	166	219	154	74	65
9		66	47			50	60	166	203	169	74	61
10		68	47		40	50	72	152	155	242	74	61
11		70	47			50	72	150	137	298	74	
12		72	47			50	71	142	130	154	74	
13		72	47	35		50	71	140	138	143	74	
14		78	47		39		70	150	121	138	70	
15		74	47		44		68	148	117	143	70	
16	60	71	47		44		70	138	117	138	65	
17	59	68	47		44		79	119	121	132	65	
18	58	65	47		44		90	128	152	121	54	
19	58	60	47		44		88	155	196	101	61	
20	57	58	45		44		83	193	209	101	65	
21	53	58	42		44		85	222	216	92	70	60
22	54	58	42		44	40	90	272	206	96	74	
23	54	58			36		98	272	209	101	74	
24	55	68			39		114	272	216	92	74	
25	55	64			39		117	308	235	83	74	
26	57	66	35		39		108	380	241	83	74	
27	92	62			44		119	460	270	83	74	
28	87	60			50		135	460	238	83	70	
29	74	60		45	.....		142	420	196	83	65	
30	72	59			.....		152	290	178	92	70	
31	79	.....			.....		.....	238	.....	88	57	
1919–20.												
1		30		70	90	54	74	52	90	166	78	50
2		27		70	104	53	74	48	96	172	78	50
3		65			98	57	74	47	108	155	78	50
4		110	50	64	94	52	71	49	124	135	74	50
5		55			90	52	68	57	128	119	83	50
6		42		59	88	62	70	60	156	119	78	47
7		47		64	85	64	68	70	184	128	74	44
8		62			85	65	66	85	169	130	88	
9		62			87	66	68	92	138	140	88	44
10		60		55	83	64	68	79	140	128	74	
11	50	59	35		104	64	68	85	138	117	78	
12		55			104	66	70	92	140	98	88	
13		53			71	74	74	94	152	94	83	
14		53		46	68	78	71	102	216	104	83	
15		55		46	66	72	70	110	209	102	83	70
16		59		47	66	74	70	126	166	106	83	
17		55		48	65	70	66	155	172	102	78	
18		57		51	65	78	66	160	166	92	70	
19		59		54	64	78	59	148	160	98	74	
20		53		54	64	78	46	135	169	104	57	74
21		55		58	65	76	36	145	169	104	57	74
22		55	60	65	62	78	35	128	238	90	61	70
23		54		71	59	78	33	130	209	90	61	57
24		57		72	71	78	34	110	104	97	61	57
25		55		76	81	78	35	96	87	92	57	61
26	30			172	70	76	57	100	88	92	65	70
27				238	76	78	62	114	117	92	70	74
28		50		169	55	76	64	117	135	92	70	83
29			71	150	54	76	62	112	166	92	78	96
30			70	130	.....	74	54	102	169	88	65	101
31	21	.....	70	119	.....	76	.....	90	.....	78	61	.....

NOTE.—Records of flow in creek obtained Oct. 1 to Dec. 22, 1918, Apr. 1 to June 23, 1919, and Oct. 31, 1919, to July 23, 1920; records for canal, Feb. 1 to Mar. 31, June 24 to Sept. 10, 1919, and July 24 to Sept. 30, 1920. Discharge for periods indicated by braces, interpolated or estimated by comparison with records of flow of Squaw Creek near Sisters.

Monthly discharge of Tumalo Creek near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	92		62.1	3,820
November	78	58	66.2	3,940
December	59		48.9	2,700
January			36.9	2,270
February	50	36	41.8	2,330
March	50	35	41.8	2,570
April	152	55	85.3	5,080
May	460	119	213	13,100
June	270	117	198	11,800
July	298	83	141	8,670
August	74	54	68.7	4,220
September		47	60.7	3,610
The year	460	35	88.3	64,100
1919–20.				
October			42.6	2,620
November	110	27	54.8	3,260
December			52.3	3,220
January	238	46	79.1	4,860
February	104	59	77.0	4,430
March	78	53	69.8	4,290
April	74	33	61.1	3,640
May	160	47	99.7	6,130
June	238	87	150	8,930
July	172	78	110	6,760
August	88	57	73.4	4,510
September	101	44	64.0	3,810
The year	238		77.8	56,500

Combined monthly discharge of Tumalo Creek and Columbia Southern canal, less Crater Creek canal, near Tumalo, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	104		74.1	4,560
November	90	70	78.2	4,650
December	71		55.9	3,440
January			47.9	2,950
February	60	46	51.8	2,880
March	60	45	51.8	3,190
April	164	65	96.1	5,720
May	482	133	228	14,000
June	302	139	222	13,200
July	318	68	153	9,410
August	76	52	66.0	4,060
September			65.1	3,870
The year	482	45	99.2	71,900
1919–20.				
October			59.7	3,670
November	149		72.1	4,290
December			62.3	3,830
January	248		89.1	5,480
February	114	54	82.2	4,730
March	78	53	69.8	4,290
April	78	57	68.4	4,070
May	194	63	127	7,810
June	283	117	204	12,100
July	219	71	122	7,500
August	91	55	69.2	4,250
September			67.0	3,990
The year	283		91.0	66,000

COLUMBIA SOUTHERN CANAL NEAR TUMALO, OREG.

LOCATION.—In sec. 1, T. 18 S., R. 10 E., 200 feet below highway bridge across canal on Tumalo Creek road, 1 mile below head gates, 9 miles west of Bend, and 12 miles southwest of Tumalo, Deschutes County.

RECORDS AVAILABLE.—May 15, 1906, to May 23, 1914; May 5 to July 28, 1916; October 1, 1917, to September 30, 1920; also estimates in connection with Tumalo Creek station, beginning October 24, 1916.

GAGE.—Stevens continuous water-stage recorder on left bank referred to vertical staff; inspected by F. N. Wallace.

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

CHANNEL AND CONTROL.—Canal is earth cut about 30 feet wide and 4 feet deep. Control not well defined but fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 1.23 feet June 26 and 27 (discharge, 32 second-feet); minimum stage recorded, 0.82 foot, March 31, April 1, August 24–28, and September 2–13 (discharge, 9.8 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.81 feet, June 17 (discharge, 80 second-feet); canal dry at times.

1906–1914 and 1916–1920: Maximum discharge recorded, 126 second-feet during July and August, 1907; canal dry at times.

ICE.—None during period of record.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation practically permanent during 1919; changed during winter of 1920 when record was suspended. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good except for estimated periods.

Columbia Southern canal diverts water from Tumalo Creek in the SE. ¼ sec. 2, T. 18 S., R. 10 E. It has been operated since 1916 primarily to furnish water to a sawmill; most of the water eventually finds its way to the canals of Tumalo project.

Discharge measurements of Columbia Southern canal near Tumalo, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	C. L. Batchelder	0.90	12.3	July 2	Phillips and Henshaw	1.46	45.8
1919.				24	K. N. Phillips	.98	15.9
Apr. 25	R. C. Briggs	.87	11.2	Aug. 24	do	.88	11.4
June 24	J. J. Dirzulaitis	1.44	46.6				
Aug. 18	do	.91	15.4				

Daily discharge, in second-feet, of Columbia Southern canal near Tumalo, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Apr.	May.	June.	July.	Aug.	Sept.	Day.	Apr.	May.	June.	July.	Aug.	Sept.
1919.							1919.						
1	9.8	12	20	20	13	16	16	11	14	22	15	13	11
2	10	12	20	20	13	9.8	17	11	14	20	14	14	11
3	10	12	21	19	13	9.8	18	11	14	20	15	16	11
4	10	12	21	19	13	9.8	19	11	14	22	14	14	11
5	10	13	21	19	13	9.8	20	11	14	29	14	14	12
6	11	14	22	20	13	9.8	21	11	14	30	14	13	12
7	11	15	22	19	13	9.8	22	11	16	30	14	11	12
8	11	14	22	19	13	9.8	23	11	16	31	14	10	13
9	10	15	22	19	11	9.8	24	11	16	30	14	9.8	13
10	10	15	22	19	10	9.8	25	11	16	30	14	9.8	14
11	11	15	21	20	10	9.8	26	11	16	32	13	9.8	14
12	11	14	21	20	11	9.8	27	11	17	32	13	9.8	14
13	10	14	21	19	13	9.8	28	12	22	31	13	9.8	14
14	11	14	22	17	13	10	29	12	22	22	13	12	14
15	11	14	22	17	13	10	30	12	20	20	13	12	14
							31	.....	20	.....	13	14	.....

Day.	Oct.	Nov.	Apr.	May.	June	July.	Aug.
1919-20.							
1	14	30	0	16	50	48	12
2	14	31	0	16	50	47	12
3	13	32	0	16	50	54	13
4	13	39	0	16	50	59	14
5	12	37	0	12	50	44	14
6	12	35	0	12	50	32	16
7	11	34	0	12	60	24	17
8	10	16	0	12	67	23	18
9	10		0	12	65	20	21
10	9.4		0	12	63	16	21
11	9.0		0	12	62	16	15
12	8.4		0	11	61	16	1
13	8.1		0	11	63	16	0
14	8.1		0	12	67	16	0
15	7.5		0	12	68	15	0
16	7.5		0	12	69	15	0
17	7.5		0	12	80	15	0
18	7.5		0	12	74	15	0
19	7.8		10	23	74	15	0
20	24	12	32	49	74	15	10
21	25		32	49	80	15	12
22	26		33	50	33	15	11
23	29		33	50	18	15	11
24	29		33	50	59	15	10
25	29		25	50	55	14	
26	29		0	50	29	10	
27	30		0	50	14	10	10
28	31		0	50	14	10	
29	30		6	50	26	10	
30	30		16	50	41	11	
31	29		.....	50	.....	12	

NOTE.—Canal dry Feb. 16 to Apr. 18, Apr. 26-28, and Aug. 13-19, 1920.

55862—24—WSP 514——5

Monthly discharge of Columbia Southern canal near Tumalo, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October			[a] 12	738
November			[a] 12	714
December			[a] 12	738
January			[a] 11	676
February			[a] 10	555
March			[a] 10	615
April	12	9.8	10.8	643
May	22	12	15.2	935
June	32	20	24.0	1,430
July	20	13	16.3	1,000
August	16	9.8	12.2	750
September	16	9.8	11.5	684
The year				9,480
1919–20.				
October	31	7.5	17.1	1,050
November	39		17.3	1,030
December			[a] 10.0	615
January			[a] 10.0	615
February (15 days)			[a] 10.0	298
March	0	0	0	0
April (9 days)	33	6	24.4	436
May	50	11	27.4	1,680
June	80	14	53.9	3,210
July	59	10	21.2	1,300
August (24 days)	21	1	12.4	589
September			[a] 10.0	595
The year				11,400

[a] Estimated.

TUMALO FEED CANAL NEAR BEND, OREG.

LOCATION.—In SE. ¼ sec. 23, T. 17 S., R. 11 E., in concrete-lined section, 300 feet, below diversion dam, half a mile below bridge across Tumalo Creek on old road from Bend to Sisters, and 4 miles from Bend, Deschutes County.

RECORDS AVAILABLE.—May 21, 1914, when water was first diverted, to September 30, 1919. During 1920, canal carried full capacity whenever available. See Tumalo Creek near Bend (p. 56).

GAGE.—Painted on sloping concrete lining. Stevens continuous recorder used June 24 to September 30, 1919, and July 24 to September 30, 1920. Gage reader, W. H. Simpson.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Trapezoidal concrete section; the control is the sand trap just above the intake to a steel flume.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.70 feet at midnight July 1 (discharge, 204 second-feet); canal dry at various times.

1914–1920: Maximum stage recorded, 3.80 feet May 4, 5, and 6, 1916 (discharge, 219 second-feet).

ICE.—Water has to be turned out in extremely cold weather.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage height record fair. Discharge ascertained October 1, 1918, to June 23, 1919, by applying to rating table the mean of the two daily gage readings; June 24 to September 30, 1919, and July 24 to September 30, 1920, by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records October, 1918, to January, 1919, fair; remainder good.

Tumalo feed canal diverts water from Tumalo Creek in the SE. ¼ sec. 23, T. 17 S., R. 11 E., for irrigation on the Tumalo project.

Discharge measurements of Tumalo feed canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 16	C. L. Batchelder	2.30	53	Mar. 14	J. J. Dirzulaitis.	2.45	68
21	F. F. Henshaw	2.25	54	Apr. 9	do	2.45	71
1919.				July 2	Phillips and Henshaw	3.18	135
Mar. 7	R. C. Briggs	1.95	35.4	24	K. N. Phillips	2.68	84
Apr. 25	do	2.80	103	Aug. 2	do	2.52	72
June 23	J. J. Dirzulaitis.	3.48	176	24	do	2.34	59
Aug. 19	do	2.40	66				

Daily discharge, in second-feet, of Tumalo feed canal near Bend, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	57		42		44	50	.....	143	166	172	74	47
2	57		39		44		.....	143	166	178	65	65
3	57		44		44		.....	143	166	178	65	65
4	65		44		44	40	10	143	166	178	61	61
5	74		44		39		54	143	166	184	61	65
6	57		44		32		65	138	166	178	65	65
7	54		44		30	35	61	68	166	154	70	65
8	54		44		21	40	61	126	166	154	74	65
9	54		44		14	50	65	148	166	160	74	61
10		60	44		14	50	70	138	148	172	74	61
11			44		14	50	65	138	143	172	74	
12	55		44	10	23	50	65	126	132	154	74	
13			47		34	50	70	121	132	143	74	
14			50		39	39	65	138	116	138	70	
15			50		44	39	65	132	111	143	70	
16	57		47		44	39	65	126	111	138	65	
17	56		44		44	39	74	111	154	132	65	
18	54		44		44	39	74	121	154	121	54	
19	54	57	44		44	39	74	143	166	101	61	
20	54		44		44	39	74	148	178	101	65	60
21	54	55	42		44	39	74	160	178	92	70	
22			39		44	39	74	166	178	96	74	
23			39		36	39	88	166	178	101	74	
24		54	25	34	39	39	111	166	166	92	74	
25		54	.....	34	39	39	106	166	190	83	74	
26	60	61	.....	44	39	39	101	166	197	83	74	
27		44	.....	44	44	39	101	166	190	83	74	
28		54	.....	44	50	39	106	166	178	83	70	
29		44	.....	44	.....	39	121	166	178	83	65	
30		42	.....	44	.....	.....	132	166	178	92	70	
31		.....	.....	44	.....	.....	.....	166	.....	88	57	.....

NOTE.—Braced figures show estimated mean discharge for periods when gage was not read. Discharge interpolated Oct. 2, 8, 17, 19, and 20.

Monthly discharge of Tumalo feed canal near Bend, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			
	Maximum.	Minimum.	Mean.	Run-off in acre-feet.
October	74	.....	57.7	3,550
November	.....	42	57.0	3,390
December (24 days)	50	25	43.2	2,060
January	.....	.....	18.1	1,110
February	50	14	37.0	2,050
March (29 days)	50	35	41.3	2,380
April (27 days)	132	10	77.4	4,140
May	166	68	144	8,850
June	197	111	162	9,640
July	184	83	130	7,990
August	74	54	68.7	4,220
September	.....	.....	60.7	3,610
The year	.....	.....	.....	53,000

CRATER CREEK CANAL NEAR BEND, OREG.

LOCATION.—In sec. 4, T. 18 S., R. 9 E., at lower end of canal where it discharges into Tumalo Creek drainage basin.

RECORDS AVAILABLE.—Seasons of 1917, 1919, and 1920.

Record for 1917 published supplementary to Tumalo Creek near Bend, Oreg.

GAGE.—Vertical staff read once daily by employees of Tumalo project.

CHANNEL AND CONTROL.—Control is an 8-foot Cippoletti weir.

DISCHARGE MEASUREMENTS.—Made by wading above weir.

ACCURACY.—Stage-discharge relation changed during winter. Rating curves fairly well defined. Gage read to hundredths once daily during 1919 and twice daily during 1920. Daily discharge ascertained by applying mean daily gage height to rating table. Records for 1919, fair; for 1920, good.

Discharge measurements of Crater Creek canal near Bend, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920		*Feet.*	*Sec.-ft.*
Aug. 2	H. K. Donnelly [a]	0.52	10.8	Aug. 24	K. N. Phillips	0.80	19.0
7	do	.84	25.3	25	do	.39	6.7

[a] Assistant to State engineer.

Daily discharge, in second-feet, of Crater Creek canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919.			1920.		Day.	1919.			1920.	
	July.	Aug.	Sept.	July.	Aug.		July.	Aug.	Sept.	July.	Aug.
1	.....	16	6.0	.....	17	18	.....	14	14	11	15
2	.....	12	6.0	.....	19	19	.....			17	14
3	.....	8.3	4.4	.....	19	20	.....	18		26	12
4	.....	10	4.0	.....	18						
5	.....	9.4	4.0	.....	18	21	.....			23	7.6
						22	.....	23		20	7.6
6	.....	26	4.0	.....	16	23	.....	14		19	7.3
7	.....	25	4.0	.....	17	24	.....	11		21	16
8	.....	12	3.0	.....	23	25	.....	7.8	7.0	19	7.9
9	.....		3.0	.....	18						
10	.....		3.0	.....	16	26	20	11		20	6.5
						27	20	14		20	6.5
11	.....		2.7	.....	16	28	28	19		22	4.7
12	.....	15	3.0	.....	16	29	18	16		24	15
13	.....		3.0	.....	18	30	20	13		20	6.5
14	.....		5.0	.....	17	31	20	10	.....	19	5.2
15	.....		7.0	.....	17						
16	.....		7.2	.....	16						
17	.....		10	.....	15						

NOTE.—Daily discharge for September, 1920, estimated at 7 second-feet.

Monthly discharge of Crater Creek canal near Bend, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			
	Maximum.	Minimum.	Mean.	Run-off in acre-feet.
1919.				
July 26–31	28		21.0	250
August			14.9	919
September			[a]6.0	357
The period				1,520
1920.				
July 18–31	26	11	20.1	558
August	23	4.7	13.8	848
September			[a]7.0	417
The period				1,820

[a] Estimated.

SQUAW CREEK NEAR SISTERS, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 15 S., R. 10 E., immediately above intake of McCallister ditch and 5 miles by road above Sisters, Deschutes County.

DRAINAGE AREA.—63 square miles.

RECORDS AVAILABLE.—May 30 to December 31, 1913; April 7 to September 13, 1914; March 24 to December 13, 1916; April 5 to December 5, 1917; March 1 to October 17, 1918; June 25 to August 23, 1919; and March 17 to September 30, 1920. From July 1, 1906, to May 23, 1913, in section 29, at station below the intake of McCallister ditch and about 700 feet farther downstream.

GAGE.—Stevens 8-day water-stage recorder on right bank; inspected by water master.

DISCHARGE MEASUREMENTS.—Made from a cable about 100 yards above gage or by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, from water-stage recorder, 3.60 feet at 6 p. m. July 10 (discharge, 540 second-feet); minimum stage from recorder 2.24 feet at noon October 17 (discharge, 57 second-feet). Stage may have been greater or less than these extremes during year.

Maximum stage recorded during year ending September 30, 1920, from water-stage recorder, 3.25 feet at 8 a. m. September 14 (discharge, 375 second-feet); minimum stage from recorder, 2.17 feet at 9 a. m. March 27 (discharge, 62 second-feet).

1906–1920: Maximum stage recorded, 7.5 feet at old station, November 22, 1909 (discharge, estimated from extension of rating curve, 1,940 second-feet); minimum stage recorded, 2.65 feet at old station, March 19, 1912 (discharge, 32 second-feet).

DIVERSIONS.—Pole Creek, a tributary of Squaw Creek from the west, has been diverted for irrigation. The diversion canal has been eroded until it carries the entire flow of this creek. Low-water flow entirely diverted below the station.

REGULATION.—None.

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

Discharge measurements of Squaw Creek near Sisters, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 17	C. L. Batchelder	2.24	56	Mar. 17	Dirzulaitis and Hunt	2.20	60
				May 7	D. D. Hunt	2.30	87
1919.				18	Fisher and Hunt	2.58	152
Apr. 26	Briggs and Hunt	2.40	94	June 8	....do	2.80	204
June 25	J. J. Dirzulaitis	3.02	263	July 1	Phillips and Henshaw	2.90	221
July 11	D. D. Hunt [a]	3.25	365	25	Phillips and Hunt	2.62	145
Aug. 18	J. J. Dirzulaitis	2.65	143	Aug. 23	.....do	2.63	152

[a] Manager, Squaw Creek Irrigation District.

Daily discharge, in second-feet, of Squaw Creek near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1918	1919			1920						
	Oct.	June.	July.	Aug.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	99	.....	255	190	.....	60	74	106	248	162	112
2	91	.....	275	169	.....	60	69	115	248	162	117
3	97	.....	275	157	.....	62	69	125	248	158	123
4	91	.....	318	160	.....	69	73	143	230	152	115
5	160	.....	365	163	.....	71	76	148	200	168	110
6	108	.....	295	175	.....	66	83	143	197	155	104
7	91	.....	238	205	.....	66	92	182	200	155	102
8	87	.....	238	190	.....	66	110	191	200	170	97
9	83	.....	275	178	.....	66	110	152	215	165	92
10	103	.....	415	172	.....	65	102	148	215	160	87
11	105	.....	365	178	.....	66	104	152	191	155	98
12	95	.....	295	184	.....	69	115	152	170	152	117
13	93	.....	255	181	.....	74	121	179	165	158	170
14	93	.....	255	169	.....	69	125	248	158	168	152
15	93	.....	255	169	.....	68	134	215	170	176	148
16	69	.....	295	178	.....	67	136	179	200	165	102
17	57	.....	295	178	68	66	179	194	200	140	108
18	.....	.....	220	178	68	65	145	185	197	123	
19	.....	.....	190	184	65	66	138	185	188	117	
20	.....	.....	187	181	62	66	145	194	185	125	
21	.....	.....	212	172	65	66	145	215	176	130	100
22	.....	.....	238	172	62	65	134	230	162	140	
23	.....	.....	255	175	62	65	123	191	165	140	
24	.....	.....	255	.....	62	65	112	170	170	138	
25	.....	295	238	.....	63	66	102	158	158	123	
26	.....	340	205	.....	63	68	106	152	165	106	87
27	.....	340	190	.....	58	74	115	155	176	123	85
28	.....	295	205	.....	60	78	112	170	176	106	87
29	.....	275	205	.....	62	80	106	200	182	170	92
30	.....	255	220	.....	60	76	100	230	170	108	96
31	.....	.....	205	.....	59	.....	98	.....	165	106	.....

NOTE.—Discharge, Apr. 16, 17, Sept. 8 and 9, 1920, interpolated; Sept. 18–25, 1920, estimated.

Monthly discharge of Squaw Creek near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October 1–17	160	57	95.0	3,200
June 25–30	340	255	300	3,570
July	415	187	258	15,900
August 1–23	205	157	176	8,030
1920.				
March 17–31	68	58	62.6	1,860
April	80	60	67.7	4,030
May	179	69	111	6,820
June	248	106	174	10,400
July	248	158	190	11,700
August	176	106	144	8,850
September	170	85	107	6,430
The period	248	60	127	50,100

SQUAW CREEK CANAL NEAR SISTERS, OREG.

LOCATION.—In SW. ¼ sec. 28, T. 15 S., R. 10 E., half a mile below intake and 4 miles by road south of Sisters, Deschutes County.

RECORDS AVAILABLE.—Irrigating seasons, 1916 to 1920.

GAGE.—Stevens 8-day water-stage recorder with inside and outside gage, installed on upper or right side of canal, a short distance below a wasteway used in 1919. New diversion dam and intake section built early in 1920, gage moved to a point about 100 yards below new intake; inspected by D. D. Hunt.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from footbridge 200 feet above.

CHANNEL AND CONTROL.—Channel is excavated in a gravelly soil; not likely to shift. Gage location changed to point where artificial control was constructed in new section in April, 1920. Artificial control washed out June 7 or 8, leaving natural control which appears permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period in 1919, from water-stage recorder, 2.12 feet at 8 p. m. July 9 (discharge, 164 second-feet); canal dry during winter.

Maximum stage during period in 1920, from water-stage recorder, 1.91 feet at 10 p. m. July 8 (discharge, 168 second-feet); minimum stage recorded 0.81 foot at 11 a. m. July 5 (discharge, 34 second-feet).

1916–1920: Maximum stage recorded, 2.22 feet, July 10, 1917 (discharge, 182 second feet).

ACCURACY.—Stage-discharge relation shifted between two well-defined curves during 1919; changed owing to relocation of station May 2, 1920, and owing to washing out of artificial control June 7 or 8, 1920. Rating curves well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent.

Squaw Creek canal diverts water from Squaw Creek in the SE. ¼ sec. 29, T. 15 S., R. 10 E., and irrigates land east and north of Sisters; 8,328 acres have been adjudicated a water right under it.

Discharge measurements of Squaw Creek canal near Sisters, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 17	C. L. Batchelder	0.91	6.2	May 14	D. D. Hunt	1.35	53
				18	do	1.50	67
1919.				June 16	do	1.57	117
Apr. 26	R. C. Briggs	1.25	37.9	July 1	Henshaw and Phillips	1.64	123
June 25	J. J. Dirzulaitis	1.78	106	1	do	1.64	125
July 11	Brewster and Hunt	1.62	74	1	do	1.54	109
11	do	1.40	47	2	do	1.72	136
Aug. 18	J. J. Dirzulaitis	1.65	91	24	D. D. Hunt	1.55	113
				25	Phillips and Hunt	1.40	86
1920.				Aug. 23	do	1.39	95
May 7	Hunt and Kline	1.10	37.6				

Daily discharge, in second-feet, of Squaw Creek canal near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919.				1920.				
	May.	June.	July.	Aug.	May.	June.	July.	Aug.	Sept.
1	0	96	126	105	.....	47	136	78	59
2	0	110	116	98	34	47	144	87	61
3	8	115	123	88	35	50	146	86	64
4	24	116	128	88	36	64	135	95	70
5	39	122	142	91	36	86	79	103	66
6	44	100	135	99	36	88	71	96	64
7	46	94	126	115	37	89	135	95	58
8	49	93	136	113	37	90	146	105	.....
9	50	93	143	104	38	91	156	114	.....
10	48	91	149	97	38	92	146	109	.....
11	46	75	140	99	39	107	142	99	.....
12	51	76	116	99	42	112	135	96	.....
13	49	80	132	108	47	120	128	92	.....
14	51	79	132	107	49	124	122	105	.....
15	51	69	128	102	52	132	128	114	.....
16	49	72	135	107	54	116	146	109	.....
17	46	83	133	113	63	124	142	88	.....
18	46	94	121	107	68	126	135	81	.....
19	49	100	119	105	67	124	129	88	.....
20	56	76	124	100	68	116	113	88	.....
21	72	96	128	105	75	140	124	93	.....
22	91	98	113	102	82	140	103	99	.....
23	89	96	110	105	79	122	106	109	.....
24	88	108	102	118	68	123	102	102	.....
25	108	105	113	113	61	117	99	80	.....
26	104	113	99	102	52	114	106	65	.....
27	99	119	98	.....	51	114	117	74	.....
28	108	115	100	.....	51	126	103	77	.....
29	105	102	116	.....	50	135	102	99	.....
30	101	107	118	.....	47	136	82	63	.....
31	97	.....	113	.....	47	.....	80	62	.....

Monthly discharge of Squaw Creek canal near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May (29 days)	108	8	64.3	3,700
June	122	69	96.4	5,740
July	149	98	123	7,560
August 1–26	118	88	103	5,310
The period				22,300
1920.				
May 2–31	82	34	51.3	3,050
June	140	47	107	6,370
July	156	71	121	7,440
August	114	62	92.0	5,660
September 1–7	70	58	63.1	876
The period				23,400

CROOKED RIVER NEAR CULVER, OREG.

LOCATION.—In NW. ¼ sec. 11, T. 12 S., R. 12 E., one-eighth mile below Cove power plant and 6 miles west of Culver, Jefferson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1920.

GAGE.—Inclined staff on left bank 100 feet below highway bridge. Surge of current makes accurate reading impossible. A. K. McAlpine, observer.

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

CHANNEL AND CONTROL.—Banks rocky; bed and control composed of boulders; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.3 feet at 1 p. m. April 5 (discharge, 5,200 second-feet); minimum stage, 1.60 feet July 22 and 29 (discharge, 1,050 second-feet).

Maximum stage recorded during year ending September 30, 1920, 3.3 feet April 14 and 15 (discharge, 2,270 second-feet); minimum stage recorded, 1.7 feet, which was reported for large part of year (discharge, 1,060 second-feet).

1917–1920: Maximum and minimum stages same as those for 1919.

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

DIVERSIONS.—Practically all the summer flow of Crooked River above Prineville is diverted for irrigation. Low-water flow at this station is from springs within a few miles above.

REGULATION.—Slight regulation by power plant above gage and storage reservoir on Ochoco project.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read once a day to tenths; gage record fair. Daily discharge ascertained by applying daily gage reading to rating table. Records good.

Discharge measurements of Crooked River near Culver, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 14	C. L. Batchelder	1.80	1,140	June 26	J. J. Dirzulaitis	1.65	1,100
1919.				Oct. 29	do	1.70	1,020
Mar. 5	R. C. Briggs	2.05	1,300	1920.			
Apr. 12	M. S. Kelly	5.90	4,840	July 26	K. N. Phillips	1.80	1,120
29	R. C. Briggs	4.00	2,850				

Daily discharge, in second-feet, of Crooked River near Culver, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,100	1,150	1,150	1,150	1,210	1,210	3,600	2,360	1,150	1,100	1,100	1,100
2	1,100	1,150	1,150	1,150	1,210	1,210	3,600	2,180	1,150	1,100	1,100	1,100
3	1,100	1,150	1,150	1,150	1,210	1,210	3,600	2,010	1,150	1,100	1,100	1,100
4	1,100	1,150	1,150	1,150	1,210	1,210	4,100	1,850	1,150	1,100	1,100	1,100
5	1,100	1,150	1,150	1,150	1,210	1,270	5,200	1,770	1,150	1,100	1,100	1,100
6	1,100	1,150	1,150	1,150	1,210	1,270	4,900	1,610	1,150	1,100	1,100	1,100
7	1,100	1,150	1,150	1,150	1,210	1,270	3,900	1,610	1,100	1,100	1,100	1,100
8	1,100	1,150	1,150	1,150	1,210	1,270	3,200	1,530	1,100	1,100	1,100	1,150
9	1,100	1,150	1,150	1,150	1,210	1,270	2,900	1,460	1,100	1,100	1,100	1,150
10	1,100	1,150	1,150	1,150	1,210	1,210	2,810	1,390	1,100	1,100	1,100	1,150
11	1,100	1,150	1,150	1,150	1,210	1,210	3,600	1,390	1,100	1,100	1,100	1,150
12	1,100	1,150	1,150	1,150	1,390	1,210	4,700	1,330	1,100	1,100	1,100	1,150
13	1,100	1,150	1,150	1,150	1,390	1,210	3,900	1,330	1,100	1,100	1,100	1,150
14	1,150	1,150	1,150	1,150	1,330	1,210	3,600	1,330	1,100	1,100	1,100	1,150
15	1,150	1,150	1,150	1,150	1,270	1,210	3,100	1,330	1,100	1,100	1,100	1,150
16	1,150	1,150	1,150	1,150	1,270	1,210	2,810	1,330	1,100	1,100	1,100	1,100
17	1,150	1,150	1,150	1,150	1,270	1,210	2,810	1,330	1,100	1,100	1,100	1,100
18	1,150	1,150	1,150	1,150	1,270	1,270	3,100	1,270	1,100	1,100	1,100	1,100
19	1,100	1,150	1,150	1,150	1,270	1,270	3,800	1,270	1,100	1,050	1,100	1,100
20	1,100	1,150	1,150	1,210	1,270	1,330	3,700	1,270	1,100	1,100	1,100	1,100
21	1,100	1,150	1,150	1,330	1,270	1,390	3,100	1,270	1,100	1,100	1,100	1,100
22	1,100	1,150	1,150	1,390	1,270	1,460	3,000	1,210	1,100	1,050	1,100	1,100
23	1,100	1,150	1,150	1,330	1,270	1,610	3,000	1,210	1,100	1,050	1,100	1,100
24	1,100	1,150	1,150	1,330	1,270	1,770	3,100	1,210	1,100	1,050	1,100	1,100
25	1,100	1,150	1,150	1,330	1,270	1,770	3,200	1,210	1,100	1,050	1,100	1,100
26	1,100	1,150	1,150	1,330	1,270	1,770	3,300	1,210	1,100	1,050	1,100	1,100
27	1,100	1,150	1,150	1,330	1,270	1,690	3,000	1,150	1,100	1,050	1,100	1,100
28	1,100	1,150	1,150	1,330	1,210	1,930	2,900	1,150	1,100	1,050	1,100	1,100
29	1,150	1,150	1,150	1,270	.....	2,270	2,720	1,150	1,100	1,050	1,100	1,100
30	1,150	1,150	1,150	1,270	.....	2,630	2,540	1,150	1,100	1,100	1,100	1,100
31	1,150	.....	1,150	1,210	.....	3,200	.....	1,150	.....	1,100	1,100	.....
1919–20.												
1	1,060	1,120	1,060	1,250	1,770	1,250	1,390	2,090	1,060	1,060	1,060	1,060
2	1,060	1,120	1,060	1,180	1,770	1,250	1,390	1,930	1,060	1,060	1,060	1,060
3	1,060	1,120	1,060	1,120	1,770	1,250	1,390	1,850	1,060	1,060	1,060	1,060
4	1,060	1,120	1,060	1,120	1,770	1,250	1,390	1,690	1,060	1,060	1,060	1,060
5	1,060	1,120	1,060	1,120	1,610	1,250	1,390	1,690	1,060	1,060	1,060	1,060
6	1,060	1,120	1,060	1,120	1,610	1,250	1,390	1,610	1,060	1,060	1,060	1,060
7	1,060	1,120	1,060	1,180	1,530	1,250	1,850	1,610	1,060	1,060	1,060	1,060
8	1,060	1,120	1,120	1,180	1,460	1,250	1,770	1,610	1,060	1,060	1,060	1,060
9	1,060	1,120	1,120	1,180	1,460	1,250	2,010	1,610	1,060	1,060	1,060	1,060
10	1,060	1,120	1,120	1,120	1,390	1,250	2,010	2,180	1,060	1,060	1,060	1,060
11	1,060	1,120	1,120	1,120	1,390	1,250	2,010	2,010	1,060	1,060	1,060	1,060
12	1,060	1,120	1,120	1,120	1,390	1,250	1,850	1,850	1,060	1,060	1,060	1,060
13	1,060	1,120	1,120	1,120	1,390	1,250	1,770	1,690	1,060	1,060	1,060	1,060
14	1,060	1,120	1,120	1,120	1,320	1,250	2,270	1,530	1,060	1,060	1,060	1,060
15	1,060	1,120	1,120	1,120	1,320	1,690	2,270	1,460	1,060	1,060	1,060	1,180
16	1,060	1,120	1,120	1,120	1,320	1,610	2,090	1,390	1,060	1,060	1,600	1,060
17	1,060	1,120	1,120	1,120	1,320	1,530	2,090	1,390	1,060	1,120	1,060	1,060
18	1,060	1,120	1,120	1,120	1,250	1,460	2,010	1,320	1,060	1,060	1,060	1,060
19	1,060	1,120	1,120	1,320	1,250	1,460	1,850	1,250	1,060	1,060	1,060	1,120
20	1,060	1,120	1,120	1,460	1,250	1,390	1,850	1,180	1,060	1,060	1,060	1,120
21	1,060	1,120	1,120	1,460	1,250	1,390	1,690	1,120	1,060	1,060	1,060	1,120
22	1,060	1,120	1,120	1,390	1,250	1,460	1,690	1,120	1,060	1,060	1,060	1,120
23	1,060	1,120	1,610	1,320	1,250	1,460	1,690	1,120	1,060	1,060	1,060	1,120
24	1,060	1,120	2,010	1,320	1,250	1,530	1,610	1,120	1,060	1,060	1,060	1,120
25	1,060	1,120	2,010	1,320	1,250	1,530	1,530	1,120	1,060	1,060	1,060	1,120
26	1,060	1,120	1,930	1,250	1,250	1,460	1,530	1,120	1,060	1,060	1,060	1,120
27	1,060	1,120	1,850	4,100	1,250	1,460	1,770	1,120	1,060	1,060	1,060	1,120
28	1,060	1,120	1,530	3,100	1,250	1,460	2,010	1,120	1,060	1,060	1,060	1,120
29	1,060	1,060	1,390	2,540	1,250	1,460	2,180	1,120	1,060	1,060	1,060	1,120
30	1,060	1,060	1,320	2,270	.....	1,390	2,090	1,120	1,060	1,060	1,060	1,120
31	1,060	.....	1,320	1,930	.....	1,390	.....	1,120	.....	1,060	1,060	.....

Monthly discharge of Crooked River near Culver, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,150	1,100	1,110	68,200
November	1,150	1,150	1,150	68,400
December	1,150	1,150	1,150	70,700
January	1,390	1,150	1,210	74,400
February	1,390	1,210	1,260	70,000
March	3,200	1,210	1,490	91,600
April	5,200	2,540	3,430	204,000
May	2,360	1,150	1,420	87,300
June	1,150	1,100	1,110	66,000
July	1,100	1,050	1,080	66,400
August	1,100	1,100	1,100	67,600
September	1,150	1,100	1,110	66,000
The year	5,200	1,050	1,380	1,000,000
1919–20.				
October	1,060	1,060	1,060	65,200
November	1,120	1,060	1,120	66,600
December	2,010	1,060	1,260	77,500
January	4,100	1,120	1,460	89,800
February	1,770	1,250	1,400	80,500
March	1,690	1,250	1,380	84,800
April	2,270	1,390	1,790	107,000
May	2,180	1,120	1,460	89,800
June	1,060	1,060	1,060	63,100
July	1,120	1,060	1,060	65,200
August	1,060	1,060	1,060	65,200
September	1,180	1,060	1,090	64,900
The year	4,100	1,060	1,270	920,000

OCHOCO CREEK ABOVE MILL CREEK, NEAR PRINEVILLE, OREG.

LOCATION.—In SW. ¼ sec. 36, T. 14 S., R. 17 E., on Dobb's ranch, 1½ miles above mouth of Mill Creek and 12 miles east of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 8, 1917, to September 30, 1920.

GAGE.—Stevens 8-day recorder on right bank with inside and outside staff gages; inspected by S. B. Ellis, water master.

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

CHANNEL AND CONTROL.—Bed composed of gravel; may shift slightly. Control is a riffle about 60 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.75 feet at 3 a. m. April 4 (discharge, 600 second-feet); minimum stage, 0.39 foot August 15 and 17 (discharge, 0.7 second-foot). Low-water record incomplete.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.72 feet at 10 a. m. April 13 (discharges, 260 second-feet); minimum stage, 0.35 foot at 1 a. m. August 20 (discharge, 0.7 second-foot).

1917-1920: Maximum stage recorded, that of April 4, 1919; mimimum stage, that of August 20, 1920.

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

DIVERSIONS.—Many small private ditches divert water for a distance of about 30 miles above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed for low stages in 1920. Rating curves well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Monthly discharge estimated for periods not covered by records. Records good, except for estimated periods.

Discharge measurements of Ochoco Creek above Mill Creek, near Prineville, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Mar. 8	R. C. Briggs	1.12	20.3	Aug. 17	J. J. Dirzulaitis	0.39	0.7
28	Kennard and Ellis[a]	2.37	176				
Apr. 4	S. B. Ellis	3.57	520	1920.			
28	Briggs and Ellis	2.31	196	Apr. 11	do	2.03	121
May 2	F. F. Henshaw	2.03	132				

[a] Water master.

Daily discharge, in second-feet, of Ochoco Creek above Mill Creek, near Prineville, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Mar.	Apr.	May.	June.
1918-19.							
1		14	12		275	128	29
2		15	.....		305	128	26
3		19	.....		350	120	25
4		21	.....		500	104	16
5	1.5	.....	.....	20	410	97	13
6		.....	.....		305	90	9.2
7		.....	.....		235	81	9.2
8	1.7	.....	.....	23	200	74	12
9	1.6	.....	.....	21	181	65	16
10	1.5	.....	.....	19	248	69	9.2
11	1.4	.....	.....	24	335	66	8.8
12		.....	.....	21	290	62	8.0
13		.....	.....	25	260	51	7.6
14		.....	.....	25	210	44	
15		.....	14	25	200	43	
16		.....	.....	23	200	44	7.0
17	1.6	15	.....	25	222	45	
18		.....	.....	43	275	47	
19		.....	.....	42	260	42	
20		.....	.....	46	235	38	6.4
21		.....	.....	62	210	34	6.4
22	1.7	.....	.....	74	222	30	6.0
23	1.6	.....	.....	90	222	27	6.0
24	1.8	.....	.....	97	222	27	5.3
25	2.8	.....	.....	90	210	32	4.8
26	4.1	.....	.....	112	190	36	3.8
27	4.7	.....	.....	145	172	29	3.8
28	7.2	.....	.....	200	172	26	3.6
29	8.8	.....	.....	222	154	26	3.4
30	11	.....	.....	275	136	26	3.6
31	13	.....	.....	275	.....	27	.....

Daily discharge, in second-feet, of Ochoco Creek above Mill Creek, near Prineville, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1		0.9	6.4	24	74	17	36	104	16	5.5	2.3	0.8
2		.9	6.0	25	56	17	36	97	10	5.5	1.9	1.0
3		1.2	4.8		50	13	31	71	9.8	5.5	1.8	1.2
4		1.2	4.6		49	19	34	69	9.2	6.0	1.8	1.2
5		1.8	4.8	22	47	17	42	76	9.8	5.8	2.0	1.3
6		3.1	4.6		46	17	65	83	9.2	5.5	1.5	1.2
7		5.5	4.6		43	19	74	83	8.6	5.3	2.2	1.3
8		5.3	4.5		42	21	112	120	12	4.9	1.9	1.2
9		5.8		9	40	27	136	97	14	4.3	1.8	1.3
10		6.4			40		128	75	11	4.1	1.3	1.5
11		7.2	3.0		40	30	120	70	11	3.5	1.2	
12		7.6			37		136	64	11	3.4	1.0	
13				15	33	34	235	58	12	3.7	1.5	
14	0.9	6.0			30	41	200	50	16	3.7	1.4	
15				18	30	33	181	45	29	3.4	.8	
16				19	28	32	210	41	17	3.4	.8	
17		5.0		26	25	23	145	36	13	3.4	.8	
18		5.2	15	27	26	27	128	34	12	3.2	.8	
19		5.5		26	25	25		35	11	3.0	.7	
20		5.8		20	19	30		33	10	3.0	.7	2.0
21		5.5			20	36	104	30	10	3.2	1.0	
22		5.3	32		21	56		30	9.5	3.4	1.4	
23		5.0		18	19	50		30	8.9	3.2	1.4	
24		4.5	76		16	52		31	8.6	3.2	1.5	
25		4.8	84	76	16	47	79	33	8.0	3.2	1.2	
26			57	136	16	35	112	31	7.5	3.0	.8	
27	.9		56	128	19	37	163	23	7.0	3.0	.7	
28	.9	3.0	37	104	18	33	190	14	7.2	3.0	.7	
29	.9		36	90	17	31	181	7.0	6.8	3.0	.9	
30	.9	6.0	33	80	.....	38	136	4.3	6.2	2.9	.9	
31	.9	.....	30	79	.....	37	.....	10	.....	2.9	.8	.....

NOTE.—Discharge, Nov. 26-29, 1919, Jan. 3-6, 11-14, and 21-24, 1920, estimated because of ice. Braced figures for other periods show mean discharge for periods when gage was not read, estimated by comparison with records for Squaw Creek near Sisters, Tumalo Creek near Bend, and McKay Creek near Prineville.

Monthly discharge of Ochoco Creek above Mill Creek, near Prineville, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	13	.....	2.88	177
November	.....	.....	15.3	910
December	.....	.....	[a] 15.0	922
January	.....	.....	[a] 15.0	922
February	.....	.....	[a] 15.0	833
March	275	.....	69.2	4,250
April	500	136	247	14,700
May	128	26	56.7	3,490
June	29	3.4	9.27	552
July	.....	.....	[a] 2.0	123
August	.....	.....	[a] 1.0	61
September	.....	.....	[a] 1.0	60
The year	500	.....	37.3	27,000
1919-20.				
October	.....	.....	.90	55
November	7.6	.9	1.18	70
December	84	.....	20.7	1,270
January	136	.....	36.6	2,250
February	74	17	32.5	1,870
March	56	13	30.8	1,890
April	235	31	118	7,020
May	120	4.3	51.2	3,150
June	29	6.2	11.0	654
July	6.0	2.9	3.87	238
August	2.3	.7	1.27	78
September	.....	.8	1.73	103
The year	235	.7	25.7	18,600

[a] Estimated.

MILL CREEK NEAR PRINEVILLE, OREG.

LOCATION.—In SE. ¼ sec. 22, T. 14 S., R. 17 E., on Dill ranch, 1 mile above mouth and 10 miles east of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 14 to September 5, 1916; December 8, 1917, to July 4, 1918; December 21, 1919, to June 30, 1920.

GAGE.—Stevens 8-day recorder on left bank referred to vertical staff braced to gage house; inspected by S. B. Ellis. Vertical staff gage 1 mile above read during 1916.

DISCHARGE MEASUREMENTS.—Made by wading or from foot log at gage.

CHANNEL AND CONTROL.—Bed and control composed of gravel; subject to shift at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.32 feet at 6 a. m. December 24 (discharge, 84 second-feet); minimum stage occurred during summer when water was below inlet.

1916, 1918, and 1920: Maximum stage recorded, 3.0 feet at 7 a. m. March 20, 1916 (discharge, 184 second-feet); stream dry during summer of 1918.

DIVERSIONS.—Many small ditches above station. Two diverted some water around gage during year; probably not over a few hundred acre-feet.

REGULATION.—None.

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

Discharge measurements of Mill Creek near Prineville, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 28	Kennard and Ellis	2.69	109	Jan. 29	R. C. Briggs	0.88	43.8
Apr. 28	Briggs and Ellis	2.50	124	Apr. 11	J. J. Dirzulaitis	.84	47.0

Daily discharge, in second-feet, of Mill Creek near Prineville, Oreg., for the year ending Sept. 30, 1920.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	20	35	16	18	58	19
2	.....	20	33	15	18	53	18
3	.....	18	32	12	16	52	14
4	.....	17	35	14	17	51	11
5	.....	16	32	14	16	53	10
6	.....	16	31	13	19	56	10
7	.....	12	30	13	21	60	10
8	.....	12	27	14	24	65	15
9	.....	12	24	15	35	72	13
10	.....	12	24	15	45	66	10
11	.....	10	25	14	46	62	8
12	.....	9	25	14	49	57	8
13	.....	9	24	18	62	51	9
14	.....	9	22	20	60	47	14
15	.....	9	22	18	63	45	16
16	.....	10	20	18	68	41	13
17	.....	16	19	16	67	40	10
18	.....	12	19	17	69	40	9
19	.....	13	17	16	71	36	8
20	.....	12	14	17	67	33	7
21	24	12	14	18	60	29	
22	26	12	15	20	56	28	
23	44	12	16	20	52	28	
24	61	14	16	20	49	27	
25	59	24	16	20	46	27	
26	44	48	16	20	46	24	5
27	35	54	16	20	50	22	
28	28	48	16	18	54	21	
29	26	44	16	18	59	20	
30	24	43	.....	18	60	20	
31	23	37	.....	18	.....	20	

NOTE.—Discharge, Jan. 6 to Feb. 3, estimated because of ice.

Monthly discharge of Mill Creek near Prineville, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December 21-31	61	23	35.8	781
January	54	9	19.7	1,210
February	35	14	22.4	1,290
March	20	12	16.7	1,030
April	71	16	46.1	2,740
May	72	20	42.1	2,590
June	19	.....	9.4	559
The period	.....	.....	.....	10,200

McKAY CREEK NEAR PRINEVILLE, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 14 S., R. 16 E., 1,000 feet east of McKay Creek road and 6 miles north of Prineville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 17 to June 30, 1918; March 8 to May 30, 1919; and 1920 (fragmentary) at present site. February 25, 1915, to June 21, 1916, at old location (see "Gage").

GAGE.—Stevens 8-day water-stage recorder on left bank; inspected by H. W. Neal. Present gage is about 1½ miles above old station used prior to July, 1916.

DISCHARGE MEASUREMENTS.—Made from private bridge 150 feet above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel. Gravel riffle 100 feet below gage acts as control; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded, during 1919, from water-stage recorder during period, 2.64 feet at noon April 4 (discharge approximately, 180 second-feet); stream dry at times.

1915, 1916, 1918, and 1919: Maximum stage recorded, 2.5 feet on former staff gage March 20, 1916 (discharge, 202 second-feet).

ICE.—Stage-discharge relation not seriously affected by ice during period of record.

DIVERSIONS.—Five small ditches divert water above gage to irrigate not more than 1,000 acres.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed on April 4, 1919, and during winter of 1919-20 when recorder was not operating. Two fairly well-defined rating curves used. Operation of recorder fairly satisfactory during 1919; unsatisfactory during 1920. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days. Records fair.

Discharge measurements of McKay Creek near Prineville, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Mar. 8	Ellis and Briggs	1.27	16.3	Jan. 29	R. C. Briggs	1.67	41.0
Apr. 28	do	1.50	53.0	Apr. 10	J. J. Dirzulaitis	1.62	35.9
Dec. 30	J. J. Dirzulaitis	1.18	11.7	11	do	1.70	39.6

Daily discharge, in second-feet, of McKay Creek near Prineville, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919				1920					
	Mar.	Apr.	May.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1		33	50							
2		29	49							
3		32	42							
4	12	131	39							2.0
5		160								
6		90	29		12	17				
7		67					3.5			
8	16	55								
9	15	48	19							
10	14	63						37	55	
11	15	82						43		
12	14	66	15					39		
13	14	57				8.6		43		
14	13	44			4.8			43		
15	14	40						43	12	
16	14	38	12					41		
17	14	41						41		
18	17	49								
19	20	47								
20	25	41	10				14			
21		49							1.0	
22		50			6.8	6.2				
23	35	59	8.8							
24		71								
25		70					14			
26	30	61	7.5							
27	30	56								
28	35	58			48	6.2		20	1.2	
29	45	55			39					
30	62	53	6.2	11	38					
31	41		6.0		34					

Monthly discharge of McKay Creek near Prineville, Oreg., for the period Feb. 1 to June 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February			[a] 10.0	556
March	62		22.8	1,400
April	160	29	59.8	3,560
May	50	6.0	17.5	1,080
June			[a] 5.0	298
The period				6,890

[a] Estimated.

NOTE.—Data for 1920 too meager for determination of monthly discharge.

LAKE CREEK NEAR SISTERS, OREG.

LOCATION.—In SE. ¼ sec. 24, T. 13 S., R. 8 E., one-fourth mile below outlet of Suttle Lake, 6 miles from mouth of creek and 15 miles northwest of Sisters, Jefferson County, Oreg.

DRAINAGE AREA.—20.5 square miles.

RECORDS AVAILABLE.—April 7, 1915, to August 31, 1920. Occasional readings May to November, 1911; March to September, 1912; and May to October, 1913.

GAGE.—Stevens continuous water-stage recorder on left bank October 16, 1917, to June 5, 1919; vertical staff to which recorder is referred used May 11, 1916, to October 15, 1917, and beginning June 7, 1919, to August 31, 1920. Gage about 20 feet above a 15-foot weir read April 7, 1915, to April 30, 1916. Gage in natural channel near site of weir used 1911 to 1913. Gage reader, O. K. Olson.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 1.65 feet at 9 a. m. May 30 (discharge, 156 second-feet); minimum stage from recorder, 0.54 foot October 24–26 (discharge, 31 second-feet).

Maximum stage during year ending September 30, 1920, probably occurred during latter part of January when recorder was out of order; minimum stage from water-stage recorder, 0.44 foot from 5 p. m. August 4 to 6 a. m. August 5 (discharge, 24 second-feet).

1911–1913 and 1915–1920: Maximum stage recorded, 2.24 feet December 30, 1917 (discharge, 247 second-feet); minimum stage, 0.31 foot October 18, 1916 (discharge, 20 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly during winter of 1919, when no record was obtained; low-water curve changed during 1920. Rating curves well defined. Gage-height record fragmentary. Daily discharge ascertained by applying to rating table daily gage reading, or mean daily gage height obtained by inspecting recorder graph, except for days of missing gage height, when discharge was estimated. Records fair except for estimated periods.

Discharge measurements of Lake Creek near Sisters, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 17	C. L. Batchelder	0.60	34.4	Apr. 8	J. J. Dirzulaitis	0.80	49.0
1919.				July 2	Phillips and Henshaw	.70	41.4
Apr. 27	Briggs and Hunt	1.27	103	25	K. N. Phillips	.62	34.4
Aug 17	J. J. Dirzulaitis	.58	36.8				
Oct. 30	do	.60	37.4				

Daily discharge, in second-feet, of Lake Creek near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Apr.	May.	June.	July.	Aug.
1918-19.							
1	35	35		111	135	.....	.....
2	36	34		114	126	55	.....
3	36	34		115	116	.....	38
4	36	35		116	111	53	.....
5	36	35		117	104	.....	.....
6		35		117	98	51	37
7		34		116	93	.....	.....
8		34		114		51	37
9		34		112		.....	.....
10		36		112	86	.....	35
11	35	36		112		50	.....
12		36		114		.....	34
13		36		115	80	47	.....
14		38	80	114	79	.....	34
15		45		111	77	.....	.....
16		44		111	75	45	.....
17	35			112	74	.....	37
18	35			110	73	45	.....
19	35			110	72	.....	.....
20	34			108	70	45	.....
21	33			108	68	.....	37
22	32			110	67	.....	.....
23	32			112	66	44	.....
24	31	40		115	65	.....	38
25	31			120	64	.....	.....
26	31			123	63	.....	.....
27	36		103	127	61	42	.....
28	36		103	137	60	.....	.....
29	36		103	151	59	41	.....
30	35		107	152	58	.....	.....
31	35	.....	.....	141	.....	38	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1			51					50		41	31	
2								50		41	30	
3								51		40	28	
4					70	50	50	51		39	25	
5				55				52		39	24	
6								53		38	25	
7						46		54		38	25	36
8		44	50		82	46	49	55		38	25	
9						46	50			38	27	
10						46	51			37	27	
11				51		46	51			36	27	
12				51		46	51			36	27	
13				51		47	54			36	27	
14				50		52	55			36	27	37
15	38			49		53	56		50	36	27	
16		50	50	51	68	53	57			36	28	
17			51	51		52	58			35	28	
18			49	50		51	57			35	28	
19			47	50			57			35	29	
20			47	51			58	60		35	30	
21			47	53			58			35	31	
22			47	54			57			36	31	37
23		50	47	54			55			36	32	
24			51	56	53		55			34	33	
25			52	68		50	54			34		
26			53	80			53			34		
27			55	89	50		51			34	34	
28			56				50			33		
29			58				49			33		
30	38	51	59	80			49			31		
31	38	.....	59		.....	.....			.....	31		.....

NOTE.—Braced figures show estimated mean discharge for periods for which gage-height records are not available. Discharge interpolated or estimated June 6, 8–12, 19–21, 23, 25, 26, 28, and 30, 1919.

Monthly discharge of Lake Creek near Sisters, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	36	31	34.5	2,120
November [a]	45	34	38.0	2,260
April [a]	107	.....	83.2	4,950
May	152	108	118	7,260
June	135	58	81.5	4,850
July	55	38	46.7	2,870
August	38	34	36.0	2,210
1919–20.				
October	.....	.....	38.0	2,340
November	.....	.....	47.0	2,800
December	59	47	50.9	3,130
January	89	49	59.0	3,630
February	82	.....	65.3	3,760
March	53	46	49.5	3,040
April	58	49	52.8	3,140
May	75	41	57.9	3,560
June	.....	.....	50.0	2,980
July	41	31	36.0	2,210
August	.....	24	29.4	1,810
September	.....	.....	36.6	2,180
The year	89	24	47.6	34,600

[a] Part of month estimated.

WARM SPRINGS RIVER NEAR WARMSPRING, OREG.

LOCATION.—In NE. ¼ sec. 19, T. 8 S., R. 13 E., at bridge on road between Warmspring and Simnasho, 9 miles from Warmspring and 15 miles from Simnasho, in Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 29, 1911, to September 30, 1919, when station was discontinued (fragmentary prior to 1914).

GAGE.—Stevens water-stage recorder since July 1, 1914; fastened to downstream side of right abutment. Gage reader, Mrs. Helen Massey. Vertical staff spiked to upstream side of right abutment of old bridge, July 29, 1911, to July 1, 1914.

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

CHANNEL AND CONTROL.—Control composed of gravel and small boulders about 100 yards below bridge; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.60 feet at midnight January 23 (discharge, 1,450 second-feet); minimum reliable stage recorded, 0.91 foot August 24 (discharge, 244 second-feet).

1911–1919: Maximum stage recorded, 4.0 feet at 10 p. m. March 9, 1916 (discharge, 2,930 second-feet); minimum stage recorded, 0.73 foot January 15, 1915 (discharge, 192 second-feet).

ICE.—River probably never freezes, as there are hot springs just above bridge.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory, except for periods during which it was stopped, and January 15 to February 24, when observer did not make proper notes and setting of pencil was somewhat questionable. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good except for February, for which they are fair.

Discharge measurements of Warm Springs River near Warmspring, Oreg., during 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Apr. 11	M. S. Kelly	1.82	766	Aug. 16	J. J. Dirzulaitis	0.96	253
May 27	R. C. Briggs	1.65	652	Oct. 28	do	.96	268
June 27	J. J. Dirzulaitis	1.10	373				

Daily discharge, in second-feet, of Warm Springs River near Warmspring, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	272	290	272		395	800	667	814	526	321	272	262
2	276		272		355	946	687	806	484	316	272	262
3	280		276		340	766	711	782	466	312	276	262
4	279		280		350	635	814	736	460	312	280	267
5	277		285		345	563	937	715	448	303	294	294
		280										
6	276		276		355	582	1,000	680	442	298	298	285
7	272		276	260	340	576	878	654	436	298	308	285
8	272		272		335	490	838	648	425	303	316	276
9	267		267		345	460	774	648	415	298	316	272
10	262	267	254		410	442	708	648	410	303	321	272
11	262		249		415	436	729	628	400	316	316	272
12	258		244		400	460	722	628	395	312	294	
13	258		244		370	484	694	602	390	308	280	
14	258		244		360	442	654	589	385	303	272	
15	272		262	228	385	436	628	582	375	298	272	
												265
16	335		262	236	400	425	622	576	365	298	272	
17	340	280	262	946	478	430	694	582	360	290	267	
18				708	454	502	774	576	345	290	262	
19				550	410	526	774	544	335	285	258	
20				508	375	508	766	538	330	285	258	
21				448	350	520	750	544	325	280	258	258
22	300			919	345	526	736	552	325	280	254	
23			280	1,160	330	532	736	602	325	276	249	
24		276		1,140	316	544	743	596	325	276	249	
25		272		822		538	758	596	325	280	245	258
26		267		715	500	538	729	628	321	280	254	
27	276	276		660		558	722	660	325	280	262	
28	330	276		538		577	766	680	325	280	267	258
29	312	272	276	478	.....	596	798	660	325	280	267	270
30	294	267	270	430	.....	622	806	628	325	276	267	
31	290	.....		410	.....	641	.....	556	.....	276	262	.....

NOTE.—Braced figures show estimated mean discharge for periods when gage did not operate.

Monthly discharge of Warm Springs River near Warmspring, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	340	258	288	17,700
November	.....	.....	278	16,500
December	.....	244	271	16,700
January	1,160	228	469	28,800
February	.....	316	391	21,700
March	946	425	552	33,900
April	1,000	622	754	44,900
May	814	538	635	39,000
June	526	321	381	22,700
July	321	276	294	18,100
August	321	245	275	16,900
September	294	258	267	15,900
The year	1,160	228	404	293,000

WHITE RIVER BELOW TYGH VALLEY, OREG.

LOCATION.—In NW. ¼ sec. 8, T. 4 S., R. 14 E., just below Pacific Power & Light Co.'s plant at White River Falls and 4½ miles below Tygh Valley, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 20, 1917, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder on left bank with vertical gage inside of well; inspected by M. F. Coberth.

DISCHARGE MEASUREMENTS.—Made from cable one-fourth mile below gage or by wading under cable.

CHANNEL AND CONTROL.—Control of rock overlain with sand deposits; somewhat shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.3 feet at 2 p. m. January 23 (discharge, 1,890 second-feet); minimum stage, 0.60 foot at 6 p. m. September 15 (discharge, 105 second-feet).

Maximum stage from water-stage recorder during year ending September 30, 1920, 5.6 feet at 1 a. m. January 26 (discharge, 3,000 second-feet); minimum stage occurred December 11–14 (discharge estimated, 10 second-feet).

1917–1920: Maximum stage from water-stage recorder, 8.24 feet December 19, 1917 (discharge not computed); minimum discharge that of December 11–14, 1919.

ICE.—Stage-discharge relation not seriously affected by ice, but operation of recorder prevented by formation of ice in well.

DIVERSIONS.—Numerous small irrigation canals take out above this station.

REGULATION.—Operation of power plant above regulates flow to some extent.

ACCURACY.—Stage-discharge relation changed on May 1, 1919, and during period of ice effect in December, 1919. Rating curves well defined. Gage-height record good except for a few gaps and during winter when stilling well was frozen over. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in times of considerable fluctuation by subdividing days. Records good, except for estimated periods.

Discharge measurements of White River below Tygh Valley, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 12	C. L. Batchelder	0.92	148	Oct. 26	Briggs and Dirzulaitis	0.89	153
				Dec. 28	J. J. Dirzulaitis	2.64	777
1919.				1920.			
Mar. 14	F. F. Henshaw	1.77	363				
June 30	J. J. Dirzulaitis	1.65	372	Mar. 11	....do	1.55	301
Aug. 14	....do	.99	180	July 29	K. N. Phillips	.94	134

Daily discharge, in second-feet, of White River below Tygh Valley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	140		194	184	490	490	800	1,390	790	352	215	150
2	140		194		470	690	800	1,320	710	334	208	154
3	149		208		430	690	890	1,180	790	324	208	156
4	151		225		410	565	1,160	1,120	790	324	296	154
5	166		233		390	490	1,160	1,060	790	320	279	158
		160										
6	162		242		390	640	1,040	1,060	790	313	248	198
7	157		231	180	370	515	920	1,060	735	292	228	190
8	151		225		350	450	830	1,060	685	285	215	188
9	146		220		370	410	770	1,120	660	279	198	180
10	148		214		490	390	860	1,060	635	285	202	172
11	152	208	212		515	370	890	1,060	610	302	202	162
12	149	191	214		470	390	830	1,060	565	276	202	164
13	144	185	252		430	390	800	970	565	270	195	172
14	152	206	330		430	370	800	940	565	316	178	156
15	149	280	410	400	450	350	740	910	520	338	170	146
16	240	265	350		490	330	690	850	484	310	170	164
17	218	240	312		590	330	800	850	434	288	170	154
18	185	231	280	715	515	390	980	850	434	264	168	158
19	173	222	280	740	450	390	1,040	850	475	252	168	162
20	173	216	280	715	430	390	980	940	493	240	172	158
21	173	210	265	690	390	390	980	1,030	484	238	172	154
22	164	214	252	1,650	390	390	980	1,120	484	230	176	156
23	156	204	242	1,810	350	430	1,040	1,090	498	228	178	148
24		204	236	1,370	350	450	1,100	1,060	484	228	178	150
25		214	227	1,100	370	410	1,100	1,060	448	218	182	148
26		208	225	980	470	390	1,040	1,150	418	212	170	146
27	210	206		830	430	430	1,100	1,220	412	208	150	146
28		200		715	410	470	1,230	1,220	386	220	136	144
29		200	204	590	.....	565	1,230	1,120	383	240	136	144
30		198		565	.....	665	1,230	1,000	369	232	146	146
31		.....		515	.....	770	.....	880	.....	225	150	.....
1919–20.												
1	160	457	565	574	1,000		368	780	491	225	127	129
2	220	552	498	530	910		398	725	394	219	125	127
3	198	1,260	434	480	860		386	725	394	211	125	119
4	174	1,900	416	437	810	300	437	700	398	211	125	116
5	164	1,080	398	417	835		780	700	398	211	125	110
6	174	710	398	386	750		725	725	386	200	127	112
7	162	588	414	349	725		700	810	421	198	129	112
8	158	480	330		650	298	675	910	445	192	129	106
9	160	426		340	612	274	675	960	402	190	133	108
10	142	398				294	700	910	383	188	136	110
11	142	402		332		281	650	860	375	185	133	153
12	134	369		346	530	281	675	810	368	180	133	165
13	154	348	20	346		375	725	780	360	206	136	208
14	156	338		342		310	725	750	383	195	129	222
15	150	344		379		357	675	700	402	180	123	195
16	152	386		1,510	449	364	650	725	364	175	123	170
17	152	383		1,120		346	593	780	357	172	117	153
18	154	369		860		353	574	780	350	172	110	143
19	140	422	250	750		339	640	700	328	156	112	127
20	150	414		650		346	636	675	311	170	108	131
21	144	383		588		364	593	650	301	180	110	136
22	182	376	355	543		402	607	602	294	180	110	175
23	190	366		491	360	421	538	574	284	172	110	206
24	170	362		454		413	543	552	274	163	110	228
25	160	352	800	1,070		425	556	534	268	156	110	246
26	166	331		2,600		410	570	516	262	148	102	240
27	166	336		1,600		394	700	516	249	144	106	225
28	164	341	750	1,400		379	810	491	252	144	119	206
29	210	415	700	1,300		375	835	470	252	136	144	195
30	190	490	650	1,200	.....	372	835	445	240	131	151	182
31	178	.....	616	1,100	.....	360	.....	429	.....	127	131	.....

NOTE.—Braced figures show estimated mean discharge for periods when gage was not read. Discharge interpolated Oct. 1, 7, 8, and 22, 1918, Nov. 27, 29, 30, and Dec. 4, 1919, Feb. 1, and Apr. 25, 1920.

Monthly discharge of White River below Tygh Valley, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	240	140	175	10,800
November	280	.....	197	11,700
December	410	.....	244	15,000
January	1,810	.....	553	34,000
February	515	350	432	24,000
March	770	330	464	28,600
April	1,230	690	960	57,100
May	1,390	850	1,050	64,600
June	790	369	563	33,500
July	352	208	272	16,700
August	296	136	189	11,600
September	198	144	159	9,460
The year	1,810	.....	438	317,000
1919–20.				
October	220	134	165	10,100
November	1,900	331	511	30,400
December	.....	.....	385	23,700
January	2,600	332	748	46,000
February	1,000	.....	533	30,700
March	425	274	343	21,100
April	835	368	632	37,600
May	960	429	687	42,200
June	491	240	346	20,600
July	225	127	178	10,900
August	151	102	123	7,560
September	246	106	162	9,640
The year	2,600	.....	400	290,000

CLEAR CREEK ABOVE INTAKE, NEAR WAPINITIA, OREG.

LOCATION.—In SW. ¼ sec. 10, T. 5 S., R. 9 E., 300 feet above intake of Wapinitia Irrigation Co.'s canal, 4 miles below outlet of Clear Lake, and 22 miles west of Wapinitia, Wasco County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16 to September 20, 1918; December 19, 1918, to September 30, 1920, fragmentary.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by W. J. Hickey and H. V. Retherford. New gage set at slightly different location on December 4, 1918, read 0.83 foot less than earlier gage.

DISCHARGE MEASUREMENTS.—Made by wading near canal intake.

CHANNEL AND CONTROL.—Sand, gravel, and small boulders. May shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 1.80 feet between January 1 and April 30, when clock was not running (discharge not determined). Minimum stage, 0.44 foot September 24–25 (discharge, 5.0 second-feet).

ICE.—No ice during period of record.

DIVERSIONS.—Wapinitia Irrigation Co. canal diverts water just below station. No diversion above.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 24 second-feet. Gage-height record fragmentary. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good below 30 second-feet; uncertain above. Monthly discharge not computed.

Discharge measurements of Clear Creek above intake, near Wapinitia, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 4	F. F. Henshaw	[a] 0.51	8.9	Oct. 27	J. J. Dirzulaitis	0.50	8.3
1919.				1920.			
June 29	J. J. Dirzulaitis	.68	21.9	July 29	K. N. Phillips	.52	10.0
Aug. 15	do	.50	12.0	Sept. 24	R. C. Briggs	.50	7.1

[a] Old gage read, 1.34 feet.

Daily discharge, in second-feet, of Clear Creek above intake, near Wapinitia, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Dec.	Jan.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.								
1		122		88	68		13	6.0
2				90	66		11	6.0
3				90	59		9.4	6.5
4	8.0			91	58		9.4	7.0
5	8.7			88	53		9.4	7.0
6	8.0			85	50		9.4	7.5
7	8.0			85	49		9.4	6.5
8	7.5			83	48		9.4	6.5
9	7.0			82	44		8.7	6.5
10	8.0			83			8.7	6.0
11				82	43		8.7	7.5
12				78			8.7	7.5
13				80			8.0	7.5
14				78		15	8.0	8.0
15				77		14	8.0	8.0
16				75		14	8.0	7.0
17						13	8.0	7.0
18						13	7.5	7.0
19				75		13	7.5	7.0
20						13	7.0	6.5
21						13	7.0	6.5
22				77		13	7.0	5.5
23						13	7.0	5.5
24				77		13	7.0	5.0
25				77		13	7.0	5.0
26				75		13	6.5	5.5
27	34			74		13	6.5	6.0
28	24			74		13	6.5	5.5
29	21			74	22	13	6.5	6.0
30	20		88	72		13	6.0	6.0
31	52			68		13	6.0	

Daily discharge, in second-feet, of Clear Creek above intake, near Wapinitia, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Feb.	Mar.	May.	July.	Aug.	Sept.
1919–20.									
1	6.5	15	26					9.4	5.5
2	6.5	12						9.4	
3	6.0	24						9.4	
4	6.5	34						9.4	
5	6.5	25						9.4	
6	6.0	22						9.4	
7	6.0	21				41		9.4	
8	6.5	20				38		9.4	
9	6.0	20				37		8.7	
10	6.2	19				36		8.7	
11	6.5	12				36		8.0	
12	7.0	18			40	35		8.0	
13	7.0	18			40	35		7.5	
14	7.0	18			40	34		7.5	
15	7.0	18			41	32		7.0	
16	7.0	19			41	33		7.0	
17	7.0	18			41	32		6.5	
18	7.5	17		28		32		6.5	
19	5.5	19		26		32	14	6.0	
20	5.5	19		24		33	12	6.0	
21	5.0	19		23		34	12	5.5	
22	4.5	19		22		35	12	6.0	
23	5.0	18		24		35	12	6.0	
24	5.5	18		23		36	11	6.5	8.0
25	5.0	19		23		36	10	6.5	8.0
26	5.5	20		22		38	9.4	6.5	7.5
27		36		21		40	9.4	6.5	7.5
28		31				40	9.4	6.5	7.0
29		27					9.4	6.5	6.5
30		28					9.4	6.5	6.5
31							9.4	6.0	

FIFTEENMILE CREEK BASIN.

FIFTEENMILE CREEK NEAR DUFUR, OREG.

LOCATION.—In NW. ¼ sec. 21, T. 2 S., R. 12 E., 10 miles south of Dufur, Wasco County, on Dufur-Friend road.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 1, 1918, to September 30, 1919, when station was discontinued.

GAGE.—Vertical staff on log abutment at left of creek; read by W. R. Ragsdale.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control is a gravel bar and brush foundation of old dam, 50 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 1.40 feet May 27–29 (discharge, 80 second-feet); minimum stage, 0.48 foot October 1 and 2 (discharge, 4.4 second-feet).

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

DIVERSIONS.—About 1,150 acres irrigated above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high stages. Well-defined rating curves used October 1 to May 29 and May 31 to September 30. Gage read once a day except Sundays. Daily discharge ascertained by applying daily gage reading to rating table. Records good.

Discharge measurements of Fifteenmile Creek near Dufur, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Mar. 13	F. F. Henshaw	0.88	26.1
June 30	J. J. Dirzulaitis	.80	28.0
Aug. 13	....do	.52	9.4

Daily discharge, in second-feet, of Fifteenmile Creek near Dufur, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	4.4	9.0	9.0			38	62	70	67	34	13	7.6
2	4.4	9.0	9.0			49	60	70	65	36	13	8.0
3	5.0	9.0	11			60	60	70	63	31	13	7.2
4	6.6	10	11			56	70	67	59	29	13	7.2
5	6.6	9.0	15		43	50	70	64	57	28	13	8.0
6	5.8	8.2	13	10		50	65	60	57	27	13	10
7	5.0	8.2	13			46	60	60	57	26	13	10
8	5.8	8.2	12			44	60	60	56	28	12	10
9	5.8	8.2	11			42	56	60	55	25	12	9.0
10	5.0	12	11		50	40	60	60	51	28	11	8.0
11	5.0	15	10		50	38	60	60	49	28	10	10
12	5.0	13	10		48	36	60	60	49	25	10	8.0
13	5.0	11	15		46	32	56	58	49	24	9.5	8.0
14	5.0	13	14		44	35	52	56	49	22	10	8.0
15	6.6	23	18	34	40	31	52	56	47	20	9.0	8.0
16	23	20	23		42	30	50	56	45	20	9.0	8.0
17	11	17	21		44	31	60	54	43	20	9.0	7.2
18	9.0	14	21		44	40	64	54	43	20	8.0	7.2
19	8.2	14	20		44	46	66	54	43	17	8.0	7.2
20	8.2	14	15		44	46	65	54	45	16	8.0	7.2
21	8.2	13	15		40	46	64	58	45	14	8.0	7.2
22	7.4	11	15		38	44	64	64	45	13	8.0	7.2
23	7.4	10	15		36	43	64	66	45	13	8.0	7.2
24	7.4	10	15	65	35	42	62	66	45	17	8.0	7.2
25	7.4	11	15		36	40	60	70	45	16	8.0	6.4
26	7.4	10	15		40	40	60	74	45	16	7.2	6.4
27	11	10	15		38	40	62	80	43	15	7.2	6.4
28	15	9.0	17		36	44	64	80	43	13	7.2	6.4
29	11	9.0	15		.....	46	66	80	38	13	7.2	6.4
30	9.0	9.0	14	50	.....	53	70	74	32	13	7.2	6.4
31	9.0	.....	7.4	50	.....	60	.....	69	.....	13	7.4	.....

NOTE.—Discharge, Jan. 1–29 and Feb. 1–9, estimated by comparison with records for White River. Gage not read on Sundays; discharge interpolated.

Monthly discharge of Fifteenmile Creek near Dufur, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	23	4.4	7.76	477
November	23	8.2	11.6	690
December	23	7.4	14.2	873
January	.....	.....	37.7	2,320
February	.....	.....	42.3	2,340
March	60	30	43.2	2,660
April	70	50	61.5	3,660
May	80	54	64.0	3,940
June	67	32	49.2	2,930
July	36	13	21.3	1,310
August	13	7.2	9.67	595
September	10	6.4	7.70	458
The year	80	4.4	30.8	22,300

KLICKITAT RIVER BASIN.

KLICKITAT RIVER NEAR GLENWOOD, WASH.

LOCATION.—In NE. ¼ sec. 14, T. 7 N., R. 12 E., just below Dairy Creek, 2½ miles below southern boundary of Yakima Indian Reservation, 3 miles below Big Muddy Creek, and 6 miles north of Glenwood, Klickitat County.

DRAINAGE AREA.—356 square miles.

RECORDS AVAILABLE.—December 16, 1910, to September 30, 1920; October 29,1909, to December 15, 1910, at a point 1 mile above, in section 11.

GAGE.—Stevens water-stage recorder referred to vertical staff on left bank, read by A. G. Hanson. Datum lowered 1.0 foot October 1, 1918. Prior to July, 1910, several vertical staffs were used.

DISCHARGE MEASUREMENTS.—Made from cable just below gage.

CHANNEL AND CONTROL.—Bed composed of heavy gravel, shifts in high water.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 4.26 feet at 7 a. m. January 23 (discharge, 4,600 second-feet); minimum stage from water-stage recorder, 0.93 foot at 1 p. m. January 1 (discharge, 355 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.58 feet at 8 p. m. May 17 (discharge, 1,840 second-feet); minimum stage occurred in winter when recorder was not operating.

1909–1920: Maximum stage recorded, 5.20 feet on original gage, November 24, 1909 (discharge, estimated by extension of rating curve, 6,250 second-feet); minimum discharge recorded, 285 second-feet at 1 p. m. November 13, 1915 (gage height, 0.63 foot).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 14, 1918, May 26, 1919, January 26 and May 9, 1920. Well-defined rating curves used. Operation of water-stage recorder satisfactory except for few periods when clock was out of order. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days. Estimates for periods of missing gage record based upon graphic comparison with records for White Salmon River at Husum. Records good except for estimated periods, for which they are fair.

Discharge measurements of Klickitat River near Glenwood, Wash., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Jan. 6	A. G. Hanson	0.99	386	Feb. 11	A. G. Hanson	1.45	542
Mar. 30	do	1.83	967	18	do	1.39	520
Apr. 13	do	2.03	1,160	Apr. 18	do	1.44	546
June 4	do	2.50	1,550	June 7	do	2.15	1,250
29	do	2.03	1,020	28	do	1.73	798
Aug. 18	do	1.55	630				
Sept. 1	do	1.33	518				

Daily discharge, in second-feet, of Klickitat River near Glenwood, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	565	605	535	365		672	1,140	2,240	1,510	972	688	515
2	565	585	610	400	1,000	700	1,220	2,240	1,460	972	667	505
3	555	595	752	400		700	1,310	2,030	1,520	981	648	500
4	595	585	784	395	948	686	1,470	1,890	1,560	1,020	642	490
5	716	595	764	390	948	679	1,410	1,750	1,640	1,030	636	481
6	575	560	728	390	914	679	1,310	1,740	1,630	981	630	477
7	535	550	674	400	882	672	1,230	1,780	1,510	900	642	472
8	530	545	645	400	890	672	1,190	1,890	1,400	891	648	468
9	530	530	635	400	1,000	665	1,140	1,960	1,350	936	642	468
10	600	615	615	400	948	658	1,230	1,890	1,270	1,050	636	468
11	630	590	610	400	890	651	1,220	1,820	1,190	1,040	630	468
12	600	550	605	400	850	651	1,150	1,780	1,150	936	630	472
13	595	540	728	400	838		1,160	1,720	1,140	927	624	472
14	575	570	948	400	826		1,120	1,700	1,120	927	618	468
15	590	615	874	400	786		1,110	1,720	1,110	936	612	468
16	575	615	749	400	774		1,110	1,760	1,120	1,020	612	468
17	560	610	679	1,030	762		1,400	1,740	1,120	918	618	468
18	535	600	642	1,890	749		1,590	1,680	1,130	837	636	468
19	520	590	623	1,890	737		1,640	1,720	1,230	819	642	468
20	515	580	602	1,390	725		1,520	1,890	1,370	828	630	472
21	510	570	567	1,280	714	830	1,540	2,170	1,370	819	624	472
22	500	565	506	2,410	707		1,570	2,560	1,290	810	618	472
23	500	545	482	4,100	700		1,620	2,480	1,270	828	612	468
24	500	540	470		679		1,700	2,240	1,210	794	600	468
25	500	540	470		679		1,740	2,400	1,210	738	600	468
26	500	530	476		686		1,720	2,640	1,280	716	594	468
27	674	530	482	1,800	679		1,890	2,710	1,220	702	558	463
28	819	525	488		672		2,030	2,550	1,130	709	530	454
29	686	535	476		.....		2,100	2,170	1,030	723	520	445
30	640	535	440		.....	1,000	2,170	1,890	1,010	716	515	445
31	620	.....	385		.....	1,030	.....	1,640	.....	702	525	.....
1919–20.												
1	445	495	530	612		480		864	900	960	539	441
2		525	463	582		480		855	900	971	539	429
3		495	450	540		470		846	940	930	539	445
4		520	450	520		475		873	1,040	910	544	445
5		495	450	552		470		945	1,150	852	550	445
6		472	450	505	750	470	550	1,040	1,150	788	544	445
7		458	450	436		470		1,200	1,230	788	556	465
8	450	427	445	432		475		1,480	1,210	788	556	455
9		440	435	436		490		1,620	1,110	779	556	433
10		440		515		470		1,670	1,020	779	562	437
11		454		510	587	466		1,470	982	762	562	512
12		445		505	580	505		1,450	960	698	568	568
13		450	400	505	562	1,280		1,470	960	666	574	568
14		458		495	538	778		1,480	1,210	666	574	690
15	450	530		490	538	674	600	1,510	1,260	674	562	592
16	454	624		702	532	615		1,400	1,130	674	562	592
17	454	636		882	515	562		1,700	1,070	682	534	574
18	450	636		746	520	562	556	1,640	1,020	682	500	556
19	450	636		819	515		622	1,470	960	666	495	517
20	445	606	900	674	505		601	1,400	950	658	500	506
21	445	594		624	500		562	1,300	960	626	506	512
22	445	588		525	470		550	1,170	1,040	586	517	528
23	440	594		535	470		544	1,110	930	568	522	550
24	440	594	1,430	505	480		562	1,020	850	562	512	544
25	422	582	1,190	1,110	480	500	622	982	815	562	470	534
26	418	535	945	1,550	480		730	960	797	556	445	534
27	414	472	837		480		900	960	770	562	465	580
28	427	472	738		466		963	940	770	562	450	634
29	432	520	695	1,100	456		972	930	880	568	455	598
30	427	540	681		.....		945	910	920	562	500	592
31	422	.....	642		.....		.....	890	.....	544	455	.....

NOTE.—Braced figures show mean discharge for periods of no gage-height record, estimated by comparison with records of flow of White Salmon River at Husum, no gage-height record Oct. 16, 1918, Feb. 13, 16, 17, 19, 20, and 22, 1919; discharge interpolated.

Monthly discharge of Klickitat River near Glenwood, Wash., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 356 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	819	500	578	1.62	1.87	35,500
November	615	525	568	1.60	1.78	33,800
December	948	385	614	1.72	1.98	37,800
January	4,100	365	1,120	3.15	3.63	68,900
February	.....	672	821	2.31	2.40	45,600
March	1,030	651	781	2.19	2.52	48,000
April	2,170	1,110	1,460	4.10	4.57	86,900
May	2,710	1,640	2,010	5.65	6.51	124,000
June	1,640	1,010	1,280	3.60	4.02	76,200
July	1,050	702	877	2.46	2.84	53,900
August	688	515	614	1.72	1.98	37,800
September	515	445	472	1.33	1.48	28,100
The year	4,100	365	934	2.62	35.58	676,000
1919–20.						
October	.....	414	442	1.24	1.43	27,200
November	636	427	524	1.47	1.64	31,200
December	1,430	.....	657	1.85	2.13	40,400
January	1,550	432	703	1.97	2.27	43,200
February	.....	456	592	1.66	1.79	34,100
March	1,280	466	538	1.51	1.74	33,100
April	972	.....	628	1.76	1.96	37,400
May	1,700	846	1,210	3.40	3.92	74,400
June	1,260	770	996	2.80	3.12	59,300
July	971	544	698	1.96	2.26	42,900
August	574	445	508	1.43	1.65	31,200
September	634	429	524	1.47	1.64	31,200
The year	1,700	.....	669	1.88	25.55	486,000

HOOD RIVER BASIN.

HOOD RIVER AT POWERDALE, NEAR HOOD RIVER, OREG.

LOCATION.—In NE. ¼ sec. 36, T. 3 N., R. 10 E., at Powderdale, three-fourths mile south of Hood River, Hood River County, above discharge of tailrace of Powerdale plant of Pacific Power & Light Co., and 1½ miles above mouth of stream.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 31, 1913, to September 30, 1920.

GAGE.—Water-stage recorder on right bank near power plant, about half a mile above railroad bridge since July 23, 1919. Vertical staff at gage location used March 31, 1913, to September 30, 1914, and December 21, 1915, to July 22, 1919. Vertical staff on left bank just below bridge of Mount Hood Railway, October 1, 1914, to July 26, 1915; water-stage recorder at same location July 27 to December 21, 1915. Gage readers, A. Rogers and R. E. Fewel.

DISCHARGE MEASUREMENTS.—Made from cable 100 feet above gage.

CHANNEL AND CONTROL.—Bed composed of rock and boulders; shifts slightly.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 6.5 feet at 7 a. m. January 22 (discharge, 9,000 second-feet); minimum stage recorded, 1.08 feet at midnight August 28 (discharge, 266 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 7.5 feet at 9 a. m. January 27 (discharge, 12,400 second-feet); minimum stage recorded, 0.80 foot at 6 p. m. August 26 (discharge, 170 second-feet).

1913–1920: Maximum stage determined from high-water marks, 8.9 feet December 18 or 19, 1917 (discharge, 17,200 second-feet); minimum stage recorded that of August 26, 1920.

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

DIVERSIONS.—Large diversions for irrigation above station; water for power plant is diverted around upper gage but is returned above the bridge gage. A record of this diversion has been kept (p. 103).

REGULATION.—Water stored at sawmill at Dee causes sudden fluctuations at low water.

ACCURACY.—Stage-discharge relation for low and medium stages changed slightly January 26, 1920. Rating curves well defined. Operation of water-stage recorder unsatisfactory prior to January 1, 1920, and record can be used only about half the time. Staff gage read to hundredths every hour October 1 to November 9, 1918, four times a day November 10, 1918, to February 21, 1919, and twice a day March 3 to December 31, 1919. Daily discharge ascertained by applying to rating table mean daily gage height obtained by averaging daily readings or inspecting the recorder graph except for periods indicated in footnote to daily-discharge table. Records good.

Discharge measurements of Hood River at Powerdale, near Hood River, Oreg., during the years ending Sept. 30, 1919, and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 10	C. L. Batchelder	1.45	390	July 24	R. C. Briggs	1.79	543
1919.				Aug. 12	J. J. Dirzulaitis	1.35	385
Nov. 13	F. F. Henshaw	1.98	659	31	F. F. Henshaw	1.40	365
16	do	3.09	1,610	Oct. 23	J. J. Dirzulaitis	1.54	466
Mar. 14	M. S. Kelly	2.50	1,130	1920.			
Apr. 9	do	2.90	1,500	May 8	F. F. Henshaw	2.87	1,350
July 3	J. J. Dirzulaitis	1.80	674	Sept. 30	W. Dawson	1.98	627

Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	370	470	580	520	1,250	1,400	1,530	1,740	1,070	580	420	330
2	370	495	580	550	1,160	1,900	1,630	1,740	1,070	640	370	315
3	395	520	760	520	1,070	2,370	1,740	1,530	990	640	370	520
4	370	550	730	495	1,070	2,370	3,140	1,530	1,070	610	370	330
5	700	470	1,050	580	990	1,740	2,510	1,430	990	550	370	350
6	495	445	910	495	910	2,100	2,100	1,340	990	520	350	640
7	420	420	700	445	870	1,740	1,740	1,340	990	470	395	760
8	370	470	760	420	990	1,540	1,530	1,340	990	550	370	470
9	350	610	700	420	1,250	1,340	1,430	1,340	910	550	370	445
10	470	1,250	700	420	1,250	1,250	1,970	1,340	910	795	420	395
11	470	1,070	670	420	1,070	1,160	1,850	1,340	910	795	350	420
12	445	760	700	495	1,070	1,160	1,740	1,340	830	700	350	520
13	445	700	1,740	470	990	1,160	1,530	1,250	910	640	350	370
14	420	1,250	2,650	445	1,250	1,250	1,430	1,160	830	640	350	470
15	420	1,850	1,970	495	1,070	990	1,430	1,160	760	640	350	470
16	795	1,630	1,430	520	1,070	1,070	1,340	1,250	760	640	350	395
17	550	1,160	1,070	5,540	1,070	1,070	1,740	1,160	670	640	350	420
18	420	910	1,070	3,140	990	1,740	2,100	1,250	670	640	330	420
19	395	795	990	2,800	990	1,530	2,100	1,160	760	550	350	420
20	370	760	830	2,230	950	1,430	1,740	1,250	910	520	370	420
21	370	700	760	2,510	910	1,430	1,740	1,340	795	550	370	470
22	370	670	700	7,740	900	1,340	1,630	1,430	795	520	370	420
23	370	640	670	5,800	900	1,340	1,630	1,340	830	520	330	370
24	370	700	670	3,320	900	1,250	1,740	1,160	700	495	315	370
25	445	610	700	2,510	900	1,250	1,740	1,430	700	495	350	370
26	370	580	670	2,370	900	1,250	1,740	1,970	700	445	350	370
27	795	550	640	1,970	900	1,250	1,630	2,100	700	445	350	370
28	1,160	610	610	1,740	900	1,250	1,740	1,850	700	445	300	370
29	730	550	700	1,530	.....	1,340	1,740	1,530	670	520	300	350
30	640	550	580	1,430	.....	1,340	1,740	1,430	640	495	370	350
31	610	.....	470	1,340	.....	1,250	.....	1,160	.....	495	370	.....

Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	470	2,960	1,070	1,250	1,890	541	920	1,100	456	320	305	290
2	610	2,230	990	1,160	1,480	512	1,100	965	456	305	320	290
3	470	4,340	830	1,070	1,480	512	1,010	920	512	290	340	260
4	395	5,800	870	950	1,480	570	1,190	920	512	290	340	275
5	370	2,370	730	950	1,100	570	2,430	920	484	305	340	281
6	395	1,740	670	870	1,100	541	1,780	1,010	541	305	360	281
7	370	1,160	700	830	1,190	541	1,780	1,190	840	305	339	266
8	350	950	610	760	1,010	541	1,680	1,380	840	320	383	263
9	350	795	610	760	1,010	600	1,480	1,380	662	320	383	275
10	330	670	610	730	920	630	1,280	1,190	570	320	360	570
11	370	700	600	730	880	570	1,190	1,010	600	340	340	512
12	395	670	600	700	840	840	1,190	920	600	360	360	1,100
13	330	610	600	700	804	2,590	1,380	880	570	360	383	1,280
14	330	495	600	700	804	1,890	1,280	840	765	320	340	804
15	330	1,160	600	760	765	1,380	1,280	804	840	320	305	695
16	330	990	670	2,510	730	730	1,190	880	630	340	290	600
17	330	760	750	2,510	695	965	1,100	1,190	662	360	269	570
18	330	730	1,900	1,850	695	880	1,010	1,100	662	360	225	541
19	330	1,340	2,000	1,630	662	804	1,100	965	570	305	215	541
20	370	730	3,400	1,430	630	765	1,100	880	570	340	215	484
21	330	550	3,700	1,250	600	804	1,010	920	541	320	222	541
22	395	445	3,000	1,160	600	765	920	765	570	305	228	840
23	420	550	2,600	990	600	730	920	804	456	305	240	1,100
24	370	730	3,900	1,070	570	730	880	695	431	305	240	1,280
25	330	520	2,960	5,800	541	840	920	600	406	320	228	1,380
26	395	470	2,510	10,280	570	730	965	570	383	305	206	1,280
27	370	470	1,740	4,780	512	730	1,190	630	360	290	215	1,010
28	370	445	1,530	3,110	512	695	1,280	600	339	290	266	840
29	350	990	1,340	2,430	541	730	1,190	570	305	340	383	730
30	370	2,100	1,340	2,060	.....	765	1,100	541	320	340	456	662
31	350	.....	1,340	1,680	.....	765	.....	456	.....	340	266	.....

NOTE.—No gage-height record for following periods: Feb. 22 to Mar. 2, 1919 (discharge estimated); Mar. 8, 1919, Jan. 30, Feb. 3, and Aug. 21, 1920 (discharge interpolated); and Dec. 10–23, 1919 (discharge estimated from study of weather records and graphic comparison with records of flow of nearby streams).

Monthly discharge of Hood River at Powerdale, near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	1,160	350	493	30,300
November	1,850	420	758	45,100
December	2,650	470	895	55,000
January	7,740	420	1,730	106,000
February	1,250	.....	1,020	56,600
March	2,370	990	1,440	88,500
April	3,140	1,340	1,780	106,000
May	2,100	1,160	1,410	86,700
June	1,070	640	841	50,000
July	795	445	572	35,200
August	420	300	357	22,000
September	760	315	423	25,200
The year	7,740	300	977	707,000
1919-20.				
October	610	330	374	23,000
November	5,800	445	1,280	76,200
December	3,900	600	1,460	89,800
January	10,300	700	1,850	114,000
February	1,890	512	869	50,000
March	2,590	512	815	50,100
April	2,430	880	1,230	73,200
May	1,380	456	890	54,700
June	840	305	548	32,600
July	360	290	321	19,700
August	456	206	302	18,600
September	1,380	260	661	39,300
The year	10,300	206	884	641,000

Combined daily discharge, in second-feet, of Hood River and Pacific Power & Light Co.'s tailrace at Powerdale, near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	456	556	675	554	1,250	1,400	1,530	1,740	1,180	703	543	453
2	456	590	675	610	1,160	1,900	1,630	1,740	1,190	763	391	438
3	481	615	855	615	1,070	2,370	1,740	1,530	1,110	763	391	627
4	465	645	825	590	1,070	2,370	3,140	1,530	1,160	627	493	437
5	795	565	1,140	597	1,020	1,740	2,510	1,430	1,110	567	493	457
6	590	540	910	581	1,000	2,100	2,100	1,340	1,110	537	473	700
7	515	515	795	540	977	1,740	1,740	1,340	1,110	593	518	787
8	465	565	766	515	1,080	1,540	1,530	1,340	990	673	493	530
9	445	705	706	515	1,340	1,340	1,430	1,340	1,030	673	427	552
10	565	1,340	706	515	1,360	1,250	1,970	1,340	1,030	918	543	502
11	565	1,160	704	515	1,160	1,160	1,850	1,410	1,030	918	473	527
12	540	846	795	512	1,160	1,160	1,740	1,430	953	823	473	627
13	540	786	1,750	565	1,080	1,160	1,530	1,340	1,030	680	473	477
14	515	1,320	2,690	540	1,340	1,250	1,430	1,260	953	763	473	577
15	515	1,920	2,060	590	1,160	990	1,430	1,260	773	763	473	577
16	890	1,700	1,500	615	1,070	1,070	1,340	1,340	883	763	473	502
17	645	1,160	1,130	5,640	1,160	1,070	1,740	1,260	793	763	473	527
18	515	1,000	1,080	3,240	1,100	1,740	2,100	1,250	793	763	437	527
19	490	881	1,020	2,850	1,080	1,530	2,100	1,260	832	673	457	527
20	465	846	925	2,250	1,060	1,430	1,740	1,340	1,000	554	477	527
21	465	786	794	2,530	1,020	1,430	1,740	1,440	918	673	477	482
22	465	756	795	7,760	1,000	1,340	1,630	1,520	918	643	477	456
23	465	719	765	5,810	1,000	1,340	1,630	1,390	902	643	437	477
24	465	700	679	3,330	1,000	1,250	1,740	1,260	769	618	422	477
25	531	670	709	2,540	1,000	1,250	1,740	1,450	769	618	457	477
26	456	675	704	2,380	1,000	1,250	1,740	2,060	823	502	457	477
27	812	645	735	1,980	1,000	1,250	1,630	2,160	823	568	457	477
28	1,230	619	705	1,740	900	1,250	1,740	1,940	772	568	407	406
29	802	645	709	1,530	.....	1,340	1,740	1,620	687	643	407	457
30	640	645	675	1,430	.....	1,340	1,740	1,470	719	618	477	457
31	696	.....	565	1,340	.....	1,250	.....	1,260	.....	618	477	.....
1919-20.												
1	577	3,070	1,180	1,370	2,010	648	1,030	1,200	551	399	305	385
2	717	2,340	1,100	1,280	1,600	619	1,210	1,040	535	400	320	385
3	577	4,390	937	1,190	1,600	619	1,120	1,000	591	362	340	355
4	502	5,900	977	1,070	1,600	677	1,280	1,020	591	290	340	370
5	430	2,480	837	1,070	1,220	677	2,540	1,030	563	305	340	376
6	502	1,850	785	993	1,220	648	1,890	1,100	541	412	360	376
7	477	1,270	823	937	1,310	607	1,890	1,280	919	384	339	361
8	457	1,060	733	883	1,130	648	1,790	1,460	912	392	383	358
9	457	902	733	883	1,130	707	1,590	1,420	741	392	383	370
10	437	777	717	853	1,040	737	1,390	1,280	642	386	360	665
11	477	807	707	853	1,000	677	1,280	1,100	679	340	404	607
12	395	777	707	823	963	947	1,300	999	695	432	424	1,100
13	437	717	707	823	927	2,700	1,490	966	570	426	447	1,380
14	437	602	707	823	927	1,980	1,380	935	834	386	404	899
15	437	1,270	707	883	888	1,490	1,390	899	912	392	369	790
16	437	1,100	777	2,630	853	837	1,300	880	702	406	385	695
17	437	867	857	2,600	818	1,070	1,210	1,280	734	439	364	665
18	437	837	2,010	1,940	818	987	1,120	1,210	734	360	320	636
19	384	1,450	2,110	1,740	769	911	1,210	1,070	642	412	310	541
20	477	837	3,510	1,540	737	872	1,210	987	570	412	310	579
21	437	657	3,810	1,360	707	911	1,100	1,030	541	392	317	636
22	502	552	3,110	1,270	707	872	1,030	872	570	371	323	935
23	527	657	2,710	1,100	707	837	1,030	804	522	377	335	1,200
24	477	837	4,010	1,180	677	837	975	790	431	384	335	1,380
25	437	627	3,070	5,920	648	947	920	695	406	320	323	1,480
26	395	577	2,570	10,300	677	837	965	656	383	371	301	1,280
27	477	577	1,860	4,900	619	837	1,190	709	360	376	310	1,100
28	477	552	1,650	3,230	619	777	1,280	679	399	362	361	935
29	457	1,100	1,460	2,550	648	837	1,190	642	377	340	465	825
30	477	2,210	1,460	2,180	.....	872	1,100	541	406	340	551	757
31	457	.....	1,460	1,800	.....	872	.....	500	.....	340	361	.....

Combined monthly discharge of Hood River and Pacific Power & Light Co.'s tailrace at Powerdale, near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,230	445	575	35,400
November	1,920	515	837	49,800
December	2,690	565	953	58,600
January	7,760	512	1,780	109,000
February	1,360	.....	1,090	60,500
March	2,370	990	1,440	88,500
April	3,140	1,340	1,780	106,000
May	2,160	1,250	1,460	89,800
June	1,190	687	939	55,900
July	918	502	677	41,600
August	543	407	464	28,500
September	787	406	517	30,800
The year	7,760	406	1,040	754,000
1919–20.				
October	717	384	472	29,000
November	5,900	552	1,390	82,700
December	4,010	707	1,570	96,500
January	10,300	823	1,970	121,000
February	2,010	619	985	56,700
March	2,700	607	919	56,500
April	2,540	920	1,310	78,000
May	1,460	500	970	59,600
June	919	360	602	35,800
July	439	290	377	23,200
August	551	301	361	22,200
September	1,480	355	747	44,400
The year	10,300	290	973	706,000

EAST FORK OF HOOD RIVER NEAR MOUNT HOOD, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 1 S., R. 10 E., 1,000 feet above intake of East Fork Irrigation District canal, three-fourths mile above highway bridge, and 2 miles south of Mount Hood post office, Hood River County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 22, 1915, to September 30, 1920.

GAGE.—Stevens water-stage recorder on left bank; inspected by C. H. Shaw and F. A. McDonald.

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

CHANNEL AND CONTROL.—Bed composed of heavy boulders; shifts at flood stages.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during period of record in year ending September 30, 1919, 2.2 feet May 26 (discharge, 520 second-feet); minimum stage from water-stage recorder, 0.80 foot at 9 a. m. September 29 (discharge, 140 second-feet).

Maximum stage from water-stage recorder during period of record in year ending September 30, 1920, 2.02 feet at 5 p. m. May 16 (discharge, 455 second-feet); minimum stage from water-stage recorder, 0.65 foot at 1 p. m. October 25 (discharge, 114 second-feet).

1915–1919: Maximum stage from water-stage recorder, 5.9 feet December 18, 1917 (discharge, 2,420 second-feet); minimum discharge recorded, 108 second-feet November 11, 1915 (gage height, 1.20 feet).

ICE.—No record during frozen period.

DIVERSIONS.—The Glacier canal and other small canals divert water for irrigation above station.

REGULATION.—None.

55862—24—WSP 514——7

ACCURACY.—Stage-discharge relation permanent during irrigation season of 1919; shifted during period of no records and again about May 16, 1920. Rating curves fairly well defined. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days. Records fair, except for estimated periods.

Discharge measurements of East Fork of Hood River near Mount Hood, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 10	C. L. Batchelder.....	0.88	172	Oct. 25	J. J. Dirzulaitis.....	0.65	114
1919.				1920.			
June 16	F. F. Henshaw.....	1.43	250	May 9	F. F. Henshaw.....	1.58	249
July 24	R. C. Briggs.....	1.23	245	July 8	R. C. Briggs.....	1.12	184
Sept. 1	F. F. Henshaw.....	.87	152	Sept. 30	.....do.....	1.04	171

Daily discharge, in second-feet, of East Fork of Hood River near Mount Hood, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1918–19.						1919–20.					
	Oct.	May.	June.	July.	Aug.	Sept.	Oct.	May.	June.	July.	Aug.	Sept.
1	157	.....	390	285	209	165	142	.....	213	229	176	160
2	154	.....	375	285	201	155	143	.....	222	222	176	160
3	156	.....	390	285	195	159	144	.....	236	220	176	158
4	149	.....	405	300	197	159	146	.....	248	206	176	158
5	210	315	405	300	199	193	148	.....	248	198	177	165
6	188	315	375	272	201	175	149	.....	241	192	177	163
7	184	315	345	260	203	150	149	.....	302	189	177	163
8	179	330	345	260	195	150	150	.....	274	192	172	161
9	175	330	330	285	191	150	150	258	258	192	174	156
10	170	315	315	345	187	154	152	248	246	192	194	196
11	170	315	300	315	187	152	152	236	258	185	183	170
12	182			272	187	155	152	236	251	179	177	253
13	188		290	272	191	150	.....	236	246		176	241
14	182			272	187	149	.....	234	302		176	241
15	182	300		285	189	150	.....	238	274		176	192
16	194		272	285	189	150	.....	260	253		174	181
17	.....		272	260	187	154	.....	302	258		168	172
18	.....	285	285	242	189	161	.....	302	243	166	168	
19	.....	300	315	240	185	161	.....	290	234		176	
20	.....	330	345	234	181	161	.....	279	241		176	
21	.....	360	345	227	179	154	.....	268	248		170	178
22	.....	390	330	225	179	155	.....	256	253		167	
23	.....	405	330	231	175	152	.....	258	226		170	
24	.....	375	315	233	181	150	.....	241	212	153	168	
25	.....	422	330	223	183	150	.....	226	298		158	
26	.....	520	360	211	177	149	.....	224	183		151	183
27	.....		345	207	165	149	.....	236	209	164	160	187
28	.....	500	315	215	163	144	.....	222	215		143	187
29	.....		300	219	177	140	.....	215	224		215	183
30	.....		285	217	187	142	.....	231	229		158	181
31	.....	405	.....	213	189	.....	.....	213	.....		151	.....

NOTE.—Discharge estimated or interpolated for following periods for which no gage-height records are available: Oct. 7–9 and 11, 1918; May 12–18, 27–30, June 6, 12–15, July 20, and Aug. 4–6, 1919; May 19–21, June 24, 25, July 13–23, 25–31, and Sept. 18–25, 1920.

Monthly discharge of East Fork of Hood River near Mount Hood, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October 1–16	210	149	176	5,590
May 5–31	520	285	364	19,500
June	405	272	329	19,600
July	345	207	257	15,800
August	209	163	187	11,500
September	193	140	155	9,220
1919–20.				
October 1–12	152	142	148	3,530
May 9–31	302	213	248	11,300
June	302	183	245	14,600
July	229	153	178	10,900
August	215	143	172	10,600
September	253	156	181	10,800

EAST FORK IRRIGATION DISTRICT CANAL NEAR MOUNT HOOD, OREG.

LOCATION.—In SE. ¼ sec. 33, T. 1 N., R. 10 E., 1 mile below point of diversion, 1½ miles south of Mount Hood post office, Hood River County, and 2 miles east of Parkdale station on Mount Hood Railroad.

RECORDS AVAILABLE. June 17, 1913, to September 30, 1920.

GAGE.—Stevens water-stage recorder on left side of canal just above road crossing; inspected by F. A. McDonald. Vertical staff on side of flume, 1,000 feet below, in SW. ¼ sec. 34, used up to October, 1914.

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

CHANNEL AND CONTROL.—Smooth earth section. Head of flume probably acts as control; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.42 feet 4 a. m. July 9 (discharge, 153 second-feet); canal dry at various times.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 3.38 feet at 7 p. m. August 10 (discharge, 144 second-feet); canal dry during winter.

1913–1920: Maximum stage occurred July 9, 1919.

ICE.—No water carried in cold weather.

ACCURACY.—Stage-discharge relation changed several times during 1919; practically permanent during 1920. Indirect method for shifting control used during 1919; well-defined rating curve, May 10 to September 30, 1920. Operation of water-stage recorder satisfactory, except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table, either directly or by the shifting-control method, the mean daily gage height obtained by inspecting recorder graph. Records for year ending September 30, 1919, fair; for year ending September 30, 1920, good.

The East Fork Irrigation District canal diverts water in the SW. ¼ sec. 4, T. 1 S., R. 10 E., and irrigates lands lying east of Hood River. Most of the return water reaches Neal Creek and the lower part of Hood River.

Discharge measurements of East Fork Irrigation District canal near Mount Hood, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 10	C. L. Batchelder	1.83	22.1	Sept. 1	F. F. Henshaw	2.98	114
10	do	1.83	21.2	Oct. 25	J. J. Dirzulaitis	1.75	32.1
1919.				1920.			
June 16	F. F. Henshaw	2.92	116	May 9	F. F. Henshaw	1.53	26.3
July 24	R. C. Briggs	3.20	124	July 8	R. C. Briggs	3.20	130
				Sept. 30	do	1.30	18.0

Daily discharge, in second-feet, of East Fork Irrigation District canal near Mount Hood, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1918–19.						1919–20.					
	Oct.	May.	June.	July.	Aug.	Sept.	Oct.	May.	June.	July.	Aug.	Sept.
1	30	.....	129	134	134	116	25	.....	112	124	130	84
2	32	.....	129	138	129	112	26	.....	113	124	130	82
3	27	.....	134	143	124	100	25	.....	116	128	130	79
4	23	.....	134	143	124	88	25	.....	122	128	130	78
5	23	44	134	143	124	92	25	.....	122	121	132	77
6	20	44	134	138	134	59		.....	120	122	132	77
7	20	44	129	138	138	52		.....	122	126	133	76
8	20	44	129	148	134	53	26	.....	119	130	132	77
9	19	44	124	148	134	53		.....	120	128	134	72
10	21	44	120	120	134	52	26	26	120	132	136	83
11	23		112	124	134	52	26	26	125	127	126	79
12	24		112	129	134	52	26	26	124	124	125	82
13	25		112	138	138	53	26	28	120	120	124	40
14	25	48	112	138	134	53	.....	38	124	118	124	0
15	26		116	138	134	55	.....	45	119	127	126	0
16	28		120	143	134	55	.....	54	104	131	126	0
17	27		124	134	138	56	.....	68	92	132	126	0
18	26	53	134	134	134	57	.....	83	0	130	125	9
19	26	53	143	134	129	58	.....	83	0	130	125	8
20	28	66	138	134	129	58	.....	82	58	127	126	8
21	28	88	129	129	124	55	.....	82	108	120	129	12
22	28	88	129	129	124	55	.....	84	108	117	130	14
23	28	92	134	134	120	40	.....	86	102	125	128	16
24	30	104	134	129	124	33	.....	90	102	132	127	13
25	30	116	138	124	129	34	.....	89	102	126	120	19
26	31	116	138	124	129	34	.....	93	107	132	120	19
27	.....	116	134	134	120	34	.....	102	109	130	124	19
28	.....	116	129	134	116	29	.....	98	115	132	116	19
29	.....	134	129	138	124	24	.....	96	124	135	106	19
30	.....	124	129	138	134	24	.....	100	127	133	95	18
31	.....	129	.....	134	124	.....	.....	110	.....	131	84	.....

NOTE.—Discharge estimated or interpolated May 11-17, June 15, Aug. 18, Sept. 28, and Oct. 7-9, 1919, Aug. 29-30, Sept. 13, 26, and 27, 1920. Water turned in Apr. 10, 1919.

Monthly discharge of East Fork Irrigation District canal near Mount Hood, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October 1–26	32	19	25.7	1,320
May 5–31	129	44	73.9	3,960
June	143	112	128	7,620
July	148	124	135	8,300
August	138	116	129	7,930
September	116	24	56.3	3,350
1919–20.				
October 1–12	26	25	25.7	612
May 10–31	110	26	72.2	3,150
June	127	0	105	6,250
July	135	117	127	7,810
August	136	84	124	7,620
September	84	0	39.3	2,340

MOUNT HOOD CANAL NEAR MOUNT HOOD, OREG.

LOCATION.—In NE. ¼ sec. 5, T. 1 N., R. 10 E., one-fourth mile below point of diversion, 2 miles south of Mount Hood post office, Hood River County, and 2 miles southeast of Parkdale railroad station.

RECORDS AVAILABLE.—Part of irrigation seasons of 1917–1920.

GAGE.—Vertical staff on right bank of ditch; read by C. H. Shaw and E. C. Miller.

DISCHARGE MEASUREMENTS.—Made from foot plank near gage.

CHANNEL AND CONTROL.—Bed composed of firm gravel; practically permanent for each season. Banks well defined and somewhat overhanging.

ACCURACY.—Stage-discharge relation practically permanent during each season. Rating curves fairly well defined. Gage read three times a week to hundredths in 1917, 1918, and 1920; daily to half tenths in 1919. Daily discharge ascertained by applying daily gage reading to rating table. Records fair.

Mount Hood canal diverts water from East Fork of Hood River in the NW. ¼ sec. 5, T. 1 N., R. 10 E., a short distance below the intake of East Fork canal, and irrigates land lying on the east side of East Fork.

Discharge measurements of Mount Hood canal near Mount Hood, Oreg., during the years ending Sept. 30, 1917–1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	Sec.-ft.
May 19	C. E. Stricklin [a]	0.72	4.0	July 24	R. C. Briggs	1.40	17.5
27	....do	.72	3.7	Oct. 25	J. J. Dirzulaitis	1.22	11.5
June 10	....do	.30	0				
21	....do	1.20	17.6	1920.			
Aug. 7	....do	.99	11.1	May 9	F. F. Henshaw	.41	.5
				July 8	R. C. Briggs	1.35	17.8
1918.				Sept. 30	....do	1.15	11.0
June 29	F. F. Henshaw	1.15	14.7				
Aug. 31	....do	.91	8.3				

[a] Assistant State engineer.

NOTE.—Point of zero flow determined June 10, 1917, by C. E. Stricklin as 0.3 foot.

Daily discharge, in second-feet, of Mount Hood canal near Mount Hood, Oreg., for the years ending Sept. 30, 1917–1920.

Day.	1917.					1918.			
	May.	June.	July.	Aug.	Sept.	June.	July.	Aug.	Sept.
1		14	18		10				
2				13	10				7.8
3				14				12	
4				14	10				
5		13	18					10	6.3
6					10			10	
7		13	14	11				7.8	5.3
8									
9			13	14			12		
10		0	14	14			13	10	
11		14	14				12	10	
12		16	16	13				7.8	
13		16	14				13		
14		14	14						
15		16	21	14			13	7.8	
16		19	21				16	7.8	
17			21					7.8	
18	4			14					
19		19	21				15	7.8	
20		18					13		
21	4	18	18	14			13		
22	4			14			16	8.3	
23		16	16						
24			16	12			12	7.8	
25	4	14	14				12		
26		14	16					7.8	
27	4	14		10			12		
28			16				12	7.8	
29		14	14	10		15			
30	11							7.8	
31			13				12	8.1	

Day.	1919.				1920.				
	June.	July.	Aug.	Sept.	May.	June.	July.	Aug.	Sept.
1		11	14	6		18	20	12	13
2		12	8.5	6		16	20	12	13
3		12	8.5	6		18	20	12	12
4		14	8.5	6		19	20	12	10
5		14	11	6		19	20	13	11
6		16	14	6		20	20	13	12
7		16	11			22	19	14	12
8		16	8.5			22	19	14	12
9		14	6		0.5	22	18	13	12
10		17	11	6		22	18	19	13
11		17	8.5			20	17	14	13
12		14	8.5			18	16	14	13
13		17	6	6		17	15	13	13
14		17	6			16	14	13	12
15	8.5	17	6			17	14	13	12
16	9.8	17	6			18	14	13	12
17	9.8	14	8.5		19	19	14	12	12
18	11	14	6		16	18	15	10	12
19	12	8.5	6		14	18	15	7	12
20	12	24	6		12	17	16	5	13
21	12	17	6		10	16	13	13	14
22	11	3	6		9	17	10	9	14
23	11	20	6		8	18	7	5	14
24	11	17	6		7	17	13	5	13
25	11	14	6		7	17	13	5	13
26	11	8.5	6		7	16	13	5	13
27	11	0	6		11	10	13	5	13
28	11	0	6		15	10	14	13	12
29	11	0	6		19	14	14	19	12
30	11	0	6		19	17	13	13	11
31		14	6		19		12	13	

Monthly discharge of Mount Hood canal near Mount Hood, Oreg., for the years ending Sept. 30, 1917–1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
May 18–31	11	4	5.2	144
June (29 days)	19	13	13.4	797
July	21	13	16.3	1,000
August	14	10	12.9	793
September 1–6	10	10	10.0	119
The period				2,850
1918.				
July 9–31	16	12	13.1	598
August	12	7.8	8.6	529
September 1–7	7.8	5.3	6.5	90
The period				1,220
1919.				
June 15–30	12	8.5	10.9	346
July (27 days)	24	3	14.6	782
August	14	6	7.56	465
September 1–13	6	6	6.0	155
The period				1,750
1920.				
May 17–31	19	7	12.8	381
June	22	10	17.6	1,050
July	20	7	15.5	953
August	19	5	11.4	695
September	14	10	12.4	701
The period				3,780

GREEN POINT CREEK NEAR DEE, OREG.

LOCATION.—In NE. ¼ sec. 9, T. 1 N., R. 9 E., just above Mount Hood Irrigation District canal diversion and 3½ miles west of Dee, Hood River County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—July 24 to September 7, 1919, and July 9 to September 9, 1920.

GAGE.—Enameled staff graduated to hundredths; read by H. Schlief.

DISCHARGE MEASUREMENTS.—Made by wading 150 feet above gage or in Mount Hood Irrigation District canal when all water is diverted.

CHANNEL AND CONTROL.—Diversion dam acts as control when water is spilling over dam. When all water is being diverted record is kept in canal, which has excavated channel; loam and gravel control.

DIVERSIONS.—All the water in creek during period for 1919 and nearly all during period for 1920 diverted into canal.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation permanent for creek during 1920 and for canal during both years. Rating curves fairly well defined. Staff gages read to hundredths once daily. Daily discharge for canal determined by applying daily gage height to rating table. Discharge of creek, when total flow was not diverted into the canal, determined by adding overflow over dam to discharge in canal. Records fair.

Discharge measurements of Green Point Creek near Dee, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 17	F. F. Henshaw	.....	38.4	July 9	R. C. Briggs	0.55	12.2
July 25	R. C. Briggs	0.52	12.4				
Oct. 24	J. J. Dirzulaitis	[a] .84	9.8				

[a] Stage-discharge relation affected by backwater.

Daily discharge, in second-feet, of Green Point Creek near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919			1920			Day.	1919			1920		
	July.	Aug.	Sept.	July.	Aug.	Sept.		July.	Aug.	Sept.	July.	Aug.	Sept.
1	.....	14	7.2	.....	10	6.7	16	.....	10	.....	13	6.4	.....
2	.....	14	7.4	.....	9.6	6.1	17	.....	10	.....	11	6.2	.....
3	.....	14	7.2	.....	9.4	6.1	18	.....	9.6	.....	11	6.2	.....
4	.....	14	7.2	.....	9.2	6.0	19	.....	9.4	.....	11	6.1	.....
5	.....	13	9.0	.....	9.0	5.8	20	.....	9.0	.....	10	6.0	.....
6	.....	13	11	.....	8.8	5.6	21	.....	8.8	.....	10	6.0	.....
7	.....	13	11	.....	8.4	5.5	22	.....	8.8	.....	10	5.8	.....
8	.....	13	.....	.....	8.4	5.4	23	.....	8.8	.....	10	5.6	.....
9	.....	12	.....	13	8.2	6.0	24	13	8.2	.....	10	5.6	.....
10	.....	12	.....	12	8.0	.....	25	13	8.2	.....	10	5.6	.....
11	.....	12	.....	12	7.4	.....	26	13	8.2	.....	10	5.6	.....
12	.....	11	.....	12	7.2	.....	27	13	7.8	.....	10	5.5	.....
13	.....	11	.....	13	7.0	.....	28	13	7.6	.....	10	5.6	.....
14	.....	11	.....	13	6.8	.....	29	13	7.4	.....	11	8.0	.....
15	.....	10	.....	12	6.7	.....	30	15	7.2	.....	11	11	.....
							31	15	7.2	.....	11	7.8	.....

NOTE.—The above table shows the combined discharge of the Mount Hood Irrigation District canal and the discharge over the diversion dam. See "Accuracy."

Monthly discharge of Green Point Creek near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
July 24–31	15	13	13.5	214
August	14	7.2	10.4	640
September 1–7	11	7.2	8.59	119
The period	.....	.....	.....	973
1920.				
July 9–31	13	10	11.1	506
August	11	5.5	7.33	451
September 1–9	6.7	5.4	5.91	117
The period	.....	.....	.....	1,070

MOUNT HOOD IRRIGATION DISTRICT CANAL NEAR DEE, OREG.

LOCATION.—In the NE. ¼ sec. 9, T. 1 N., R. 9 E., 30 feet below intake, and 3½ miles west of Dee, Hood River County.

RECORDS AVAILABLE.—July 24 to September 7, 1919, and July 9 to September 9, 1920.

GAGE.—One foot enameled section bolted to a stone; read by H. Schlief.

DISCHARGE MEASUREMENTS.—Made by wading below gage.

CHANNEL AND CONTROL.—Flume contraction acts as artificial control.

DIVERSIONS.—Above all diversions for canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve fairly well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying gage height to rating table. Records fair.

Mount Hood Irrigation District canal diverts water from the left bank of Green Point Creek in the NE. ¼ sec. 9, T. 1 N., R. 9 E., to irrigate lands lying south of Davenport mill.

Discharge measurement of Mount Hood Irrigation District canal near Dee, Oreg., during years ending Sept. 30, 1919 and 1920.

[Made by R. C. Briggs.]

Date.	Gage height.	Discharge.	Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*	1920.	*Feet.*	*Sec.-ft.*
July 25	0.48	12.4	July 9	0.33	9.2

Daily discharge, in second-feet, of Mount Hood Irrigation District canal near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919.			1920.			Day.	1919.			1920.		
	July.	Aug.	Sept.	July.	Aug.	Sept.		July.	Aug.	Sept.	July.	Aug.	Sept.
1	.....	14	7.2	.....	10	6.7	17	.....	10	.....	9.4	6.2	.....
2	.....	14	7.4	.....	9.6	6.1	18	.....	9.6	.....	9.4	6.2	.....
3	.....	14	7.2	.....	9.4	6.1	19	.....	9.4	.....	9.4	6.1	.....
4	.....	14	7.2	.....	9.2	6.0	20	.....	9.0	.....	9.2	6.0	.....
5	.....	13	9.0	.....	9.0	5.8	21	.....	8.8	.....	9.2	6.0	.....
6	.....	13	11	.....	8.8	5.6	22	.....	8.8	.....		5.8	.....
7	.....	13	11	.....	8.4	5.5	23	.....	8.8	.....		5.6	.....
8	.....	13	.....	.....	8.4	5.4	24	13	8.2	.....		5.6	.....
9	.....	12	.....	9.6	8.2	6.0	25	13	8.2	.....	10	5.6	.....
10	.....	12	.....	9.4	8.0	.....	26	13	8.2	.....		5.6	.....
11	.....	12	.....	9.4	7.4	.....	27	13	7.8	.....		5.5	.....
12	.....	11	.....	9.4	7.2	.....	28	13	7.6	.....		5.6	.....
13	.....	11	.....	9.4	7.0	.....	29	13	7.4	.....	11	5.0	.....
14	.....	11	.....	9.4	6.8	.....	30	15	7.2	.....	11	7.8	.....
15	.....	10	.....	9.4	6.7	.....	31	15	7.2	.....	11	7.8	.....
16	.....	10	.....	9.6	6.4	.....							

Monthly discharge of Mount Hood Irrigation District canal near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
July 24–31	15	13	13.5	214
August	14	7.2	10.4	640
September 1–7	11	7.2	8.59	119
The period	.....	.....	.....	973
1920.				
July 9–31	11	9.2	9.79	447
August	10	5.0	7.13	438
September 1–9	6.7	5.4	5.91	117
The period	.....	.....	.....	1,000

NORTH FORK OF GREEN POINT CREEK NEAR DEE, OREG.

LOCATION.—In SW. ¼ sec. 3, T. 1 N., R. 9 E., at crossing of Hood River Irrigation District low-line canal, a quarter of a mile above mouth and 3 miles west of Dee, Hood River County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 17 to September 7, 1919, and July 10 to August 5, 1920, when gage was destroyed.

GAGE.—Temporary vertical staff, just above intake of flume diverting North Fork into main canal.

DISCHARGE MEASUREMENTS.—Made by wading near gage or in flume.

CHANNEL AND CONTROL.—Bed composed of heavy boulders; subject to shift at high stages.

DIVERSIONS.—None above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter. Rating curves poorly defined. Gage read once a day, except for few scattered days and July 22 to 28, 1920. Daily discharge determined by applying daily gage reading to rating table except on days of missing gage height, when it was estimated. Records poor.

Discharge measurements of North Fork of Green Point Creek near Dee, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
June 17	F. F. Henshaw	1.55	24.3	July 9	R. C. Briggs	1.22	10.8
July 25	R. C. Briggs	1.09	12.7				
Oct. 24	J. J. Dirzulaitis	.87	5.5				

Daily discharge, in second-feet, of North Fork of Green Point Creek near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919.				1920.		Day.	1919.				1920.	
	June.	July.	Aug.	Sept.	July.	Aug.		June.	July.	Aug.	Sept.	July.	Aug.
1	.....	19	10	7.2	.....	6.7	16	.....	14	8.4	.....	12	.....
2	.....	18	10	7.4	.....	6.4	17	25	14	8.4	.....	11	.....
3	.....	18	10	7.0	.....	6.0	18	25	14	8.2	.....	10	.....
4	.....	17	10	7.0	.....	6.0	19	25	13	8.0	.....	10	.....
5	.....	17	10	7.0	.....	6.0	20	25	13	7.8	.....	9.8	.....
6	.....	17	10	10	.....	.....	21	24	13	7.8	.....	9.5	.....
7	.....	16	10	11	.....	.....	22	23	12	7.6	.....		.....
8	.....	16	9.6	.....	.....	.....	23	23	12	7.6	.....		.....
9	.....	16	9.3	.....	.....	.....	24	22	12	7.6	.....		.....
10	.....	16	9.3	.....	11	.....	25	21	12	7.6	.....	8.4	.....
11	.....	16	9.3	.....	11	.....	26	20	12	7.4	.....		.....
12	.....	16	8.8	.....	12	.....	27	20	11	7.2	.....		.....
13	.....	15	8.6	.....	12	.....	28	19	10	7.2	.....		.....
14	.....	15	8.6	.....	12	.....	29	19	10	7.0	.....	7.4	.....
15	.....	14	8.4	.....	12	.....	30	19	10	7.0	.....	7.2	.....
							31	.....	9.6	7.0	.....	7.0	.....

NOTE.—Discharge estimated July 18, 22–28, and Aug. 1, 1920.

Monthly discharge of North Fork of Green Point Creek near Dee, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
June 17–30	25	19	22.1	614
July	19	9.6	14.1	867
August	10	7.0	8.51	523
September 1–7	11	7.0	8.09	112
The period	.....	.....	.....	2,120
1920.				
July 10–31	12	7.0	9.67	422
August 1–5	6.7	6.0	6.22	61
The period	.....	.....	.....	483

FARMERS CANAL NEAR OAKGROVE, OREG.

LOCATION.—In SE. ¼ sec. 30, T. 2 N., R. 10 E., 30 feet below wasteway, three-fourths mile below canal heading, and 3 miles southwest of Oakgrove, Hood River County.

RECORDS AVAILABLE.—May 1 to August 30, 1917, and July 7 to September 30, 1920.

GAGE.—Enameled staff nailed to flume.

DISCHARGE MEASUREMENTS.—Made from plank at gage.

CHANNEL AND CONTROL.—Flume 7 feet wide; fairly steep gradient.

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates and wasteway.

ACCURACY.—Stage-discharge relation permanent during each period. Changed sometime between 1917 and 1919. Rating curves well defined. Staff gage read to hundredths once a day during irrigation season. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Canal diverts water from the right bank of Hood River in the SE. ¼ sec. 36, T. 2 N., R. 9 E. Water is used for irrigating west side of Hood River valley near Oakgrove and Rockford.

Discharge measurements of Farmers canal near Oakgrove, Oreg., during the years ending Sept. 30, 1917 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
May 1	C. E. Stricklin [a]	0.78	6.8	July 25	R. C. Briggs	1.82	55
10	do	.95	11.2	Sept. 1	F. F. Henshaw	1.85	60
22	do	1.42	22.3	Oct. 24	J. J. Dirzulaitis	.44	4.8
31	do	2.03	43.5				
June 1	do	2.30	59	1920.			
16	do	2.36	63	July 7	R. C. Briggs	1.86	62
July 13	do	2.30	58	Sept. 29	do	1.14	24.3

[a] Assistant State engineer.

Daily discharge, in second-feet, of Farmers canal near Oakgrove, Oreg., for the years ending Sept. 30, 1917 and 1920.

Day.	1917.					1920.		
	May.	June.	July.	Aug.	Sept.	July.	Aug.	Sept.
1	7.2	56	66	62	.....	.....	65	
2	6.8	56	66	62	.....	.....	66	
3	11	56	66	62	.....	.....	67	
4	10	53	66	62	.....	.....	67	
5	10	56	66	62	.....	.....	67	52
6	10	56	66	62	.....	.....	67	
7	11	53	66	62	.....	59	67	
8	11	59	66	62	.....	60	67	
9	11	59	66	62	.....	61	67	
10	11	59	66	62	.....	61	66	
11	11	59	66	62	.....	60	67	
12	11	59	66	62	30	60	66	
13	11	62	60	62	.....	60	63	
14	11	62	60	62	.....	65	66	
15	15	58	62	62	.....	66	65	40
16	16	64	62	62	.....	66	63	
17	16	64	62	62	.....	66	65	
18	16	64	62	62	.....	62	66	
19	16	64	62	62	.....	67	66	
20	18	64	62	62	.....	66	65	
21	21	66	62	62	.....	66	63	
22	22	66	62	62	.....	62	61	
23	22	66	62	62	.....	63	65	
24	28	54	62	62	.....	63	66	
25	34	66	62	59	.....	62	67	
26	34	66	62	62	.....	62	65	27
27	34	66	62	62	.....	63	67	
28	34	66	62	62	.....	63	66	
29	35	66	62	59	.....	63	61	
30	44	66	62	59	.....	66	52	
31	44	.....	62	59	.....	66	52	.....

Monthly discharge of Farmers canal near Oakgrove, Oreg., for the years ending Sept. 30, 1917 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1917.				
May	44	6.8	19.1	1,170
June	66	53	61.0	3,630
July	66	60	63.4	3,900
August	62	59	61.6	3,790
The period				12,500
1920.				
July 7–31	67	59	63.1	3,130
August	67	52	64.6	3,970
September			38.9	2,310
The period				9,410

PACIFIC POWER & LIGHT CO.'S TAILRACE NEAR HOOD RIVER, OREG.

LOCATION.—In SE. ¼ sec. 36, T. 3 N., R. 10 E., just below power house, opposite gage on Hood River, and three-fourths mile south of Hood River, Hood River County.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1914, and January 1, 1916, to September 30, 1920.

GAGE.—Vertical staff on right bank of tailrace; read by A. Rogers and R. E. Fewel. Similar gage at different datum used 1913 to 1914.

DISCHARGE MEASUREMENTS.—Made from footbridge just below gage.

CHANNEL AND CONTROL.—Flume 11 feet wide extends a few feet down from gage; below this the canal is excavated in gravel.

EXTREMES OF DISCHARGE.—Maximum stage recorded 1913–1920, 2.20 feet most of the time June 2 to September 2, 1919, and in December, January, and February, 1920 (discharge, 123 second-feet); no flow at times.

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

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

The Pacific Power & Light Co.'s pipe line diverts water from Hood River at a dam in the NE. ¼ sec. 1, T. 2 N., R. 10 E., to a power plant in the SE. ¼ sec. 36, T. 3 N., R. 10 E., and the tailrace empties into the river in the NE. ¼ sec. 36, below gage on Hood River at Powerdale and above former gage at bridge.

Discharge measurements of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., during the years ending Sept. 30, 1919, and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 13	F. F. Henshaw	1.87	84	Aug. 12	J. J. Dirzulaitis	2.18	120
1919.				Oct. 23	do	2.10	107
July 4	J. J. Dirzulaitis	.70	20.8	1920.			
24	R. C. Briggs	2.20	123	July 10	R. C. Briggs	1.83	79

Daily discharge, in second-feet, of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the years ending Sept. 30, 1919, and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	May.	June.	July.	Aug.	Sept.
1918–19.										
1	86	86	95	34	0	.....	107	123	123	123
2	86	95	95	60	0	.....	123	123	21	123
3	86	95	95	95	0	.....	123	123	21	107
4	95	95	95	95	0	.....	86	17	123	107
5	95	95	95	17	25	.....	123	17	123	107
6	95	95	0	86	95	.....	123	17	123	60
7	95	95	95	95	107	.....	123	123	123	27
8	95	95	6	95	95	.....	0	123	123	60
9	95	95	6	95	95	.....	123	123	57	107
10	95	95	6	95	107	.....	123	123	123	107
11	95	95	34	95	95	71	123	123	123	107
12	95	86	95	17	95	86	123	123	123	107
13	95	86	9	95	95	86	123	40	123	107
14	95	72	36	95	95	95	123	123	123	107
15	95	72	95	95	95	95	13	123	123	107
16	95	66	66	95	0	95	123	123	123	107
17	95	0	60	95	95	95	123	123	123	107
18	95	95	9	95	107	0	123	123	107	107
19	95	86	34	46	95	95	72	123	107	107
20	95	86	95	21	107	95	95	34	107	107
21	95	86	34	21	107	95	123	123	107	12
22	95	86	95	19		95	123	123	107	36
23	95	79	95	13		49	72	123	107	107
24	95	0	9	13		95	69	123	107	107
25	86	60	9	13	100	17	69	123	107	107
26	86	95	34	13		95	123	57	107	107
27	17	95	95	13		60	123	123	107	107
28	72	9	95	0	.....	95	72	123	107	36
29	72	95	9	0	.....	95	17	123	107	107
30	0	95	95	0	.....	36	79	123	107	107
31	86	.....	95	0	.....	95	.....	123	107	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	107	107	107	123	123	107	107	95	95	79	0	95
2	107	107	107	123	123	107	107	79	79	95	0	95
3	107	48	107	123	123	107	107	82	79	72	0	95
4	107	95	107	123	123	107	90	95	79	0	0	95
5	60	107	107	123	123	107	107	107	79	0	0	95
6	107	107	115	123	123	107	107	95	0	107	0	95
7	107	107	123	123	123	66	107	90	79	79	0	95
8	107	107	123	123	123	107	107	79	72	72	0	95
9	107	107	123	123	123	107	107	44	79	72	0	95
10	107	107		123	123	107	107	86	72	66	0	95
11	107	107		123	123	107	86	86	79	0	64	95
12	0	107		123	123	107	107	79	95	72	64	0
13	107	107		123	123	107	107	86	0	66	64	95
14	107	107		123	123	90	95	95	69	66	64	95
15	107	107		123	123	107	107	95	72	72	64	95
16	107	107	107	123	123	107	107	0	72	66	95	95
17	107	107		86	123	107	107	86	72	79	95	95
18	107	107		95	123	107	107	107	72	0	95	95
19	54	107		107	107	107	107	107	72	107	95	0
20	107	107		107	107	107	107	107	0	72	95	95
21	107	107		107	107	107	95	107	0	72	95	95
22	107	107		107	107	107	107	107	0	66	95	95
23	107	107		107	107	107	107	0	66	72	95	95
24	107	107	107	107	107	107	95	95	0	79	95	95
25	107	107	107	123	107	107	0	95	0	0	95	95
26	0	107	62	0	107	107	0	86	0	66	95	0
27	107	107	123	123	107	107	0	79	0	86	95	95
28	107	107	123	123	107	82	0	79	60	72	95	95
29	107	107	123	123	107	107	0	72	72	0	82	95
30	107	107	123	123	.....	107	0	0	86	0	95	95
31	107	.....	123	123	.....	107	.....	44	.....	0	95	.....

Note—Tailrace dry Feb. 28 to May 10, 1919.

Monthly discharge of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October (30 days)	95	17	89.1	5,300
November (28 days)	95	9	85.2	4,730
December (30 days)	95	6	59.5	3,540
January (27 days)	95	13	60.0	3,210
February (22 days)	107	25	95.9	4,180
May 11–31	95	17	82	3,250
June (29 days)	123	13	102	5,870
July	123	17	105	6,460
August	123	21	107	6,580
September	123	12	94.4	5,620
The year				48,700
1919–20.				
October (29 days)	107	54	103	6,040
November	107	48	105	6,250
December	123	62	110	6,760
January (30 days)	123	86	118	7,020
February	123	107	117	6,730
March	107	66	104	6,400
April (24 days)	107	86	104	4,950
May (29 days)	107	44	85	4,890
June (21 days)	95	60	76.2	3,100
July (23 days)	107	66	76.3	3,480
August (21 days)	95	64	87.0	3,620
September (27 days)	95	95	95.0	5,090
The year				64,300

WHITE RIVER BASIN.

WHITE SALMON RIVER AT HUSUM, WASH.

LOCATION.—In SE. ¼ sec 25, T. 4 N., R. 10 E., above falls and power house at Husum, Klickitat County, and three-fourths mile above Rattlesnake Creek.

DRAINAGE AREA.—293 square miles, measured on map of Columbia National Forest.

RECORDS AVAILABLE.—September 23, 1909, to October 31, 1919, when station was discontinued.

GAGE.—Vertical staff on right bank, 500 feet above the falls; read by Mrs. F. C. Wolf. Prior to October 9, 1918, station was 1,000 feet above falls, a Fuller water-stage recorder being used October, 1912, to February, 1915, and a vertical staff on right bank until October 8, 1918.

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

CHANNEL AND CONTROL.—Gravel and lava boulders; practically permanent. Control is near crest of falls, and is sometimes obstructed by logs and wing dam for diverting water into power plant, causing backwater.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1918, to October 31, 1919, 6.90 feet at 10 a. m. January 23 (discharge not computed); minimum stage, 0.8 foot October 5–10, 1919 (discharge, 460 second-feet).

1909–1919: Maximum stage recorded, 10.0 feet on old gage December 29, 1917 (discharge, 7,500 second-feet); minimum stage, 2.66 feet at 2 p. m. September 30, 1915 (discharge, 432 second-feet).

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

DIVERSIONS.—About 3,500 acres irrigated above station.

REGULATION.—None. Flow formerly affected at times by operation of splash dam 10 miles upstream.

ACCURACY.—Stage-discharge relation not permanent owing to logs on control. Fairly well defined rating curves used October 1–8 (applied to readings on old gage), October 9–26 and December 16 to April 15; curve used July 1 to October 31, fairly well defined by frequent measurements. Gage read once a day to hundredths. Daily discharge ascertained by applying daily gage readings to rating table. Records fair.

Discharge measurements of White Salmon River at Husum, Wash., during the period Oct. 1, 1918, to Oct. 31, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Oct. 9	C. L. Batchelder	[a] 0.63	545	Aug. 31	F. F. Henshaw	1.02	642
Nov. 15	F. F. Henshaw	2.48	964	Sept. 18	R. J. Shepard [b]	1.01	637
Mar. 13	M. S. Kelly	1.62	1,160	Oct. 23	J. J. Dirzulaitis	.90	548
Apr. 9	do	1.95	1,400	29	R. J. Shepard [b]	.90	532
July 26	R. C. Briggs	1.22	812				

[a] Reading on former gage 3.24 feet. [b] Engineer for Northwestern Electric Co.

Daily discharge, in second-feet, of White Salmon River at Husum, Wash., for the period Oct. 1, 1918, to Oct. 31, 1919.

Day.	Oct.	Dec.	Jan.	Feb.	Mar.	Apr.	July.	Aug.	Sept.	Oct.
1	525	.....	580	1,290	1,220	1,360	1,020	790	620	540
2	525	.....	580	1,220	1,520	1,360	990	745	620	540
3	525	.....	605	1,220	1,440	1,360	955	790	620	540
4	605	.....	580	1,220	1,360	1,680	955	790	620	500
5	628	.....	605	1,220	1,290	1,680	990	790	660	460
6	605	.....	605	1,150	1,290	1,600	920	790	700	460
7	565	.....	580	1,150	1,220	1,520	920	790	700	460
8	565	.....	580	1,150	1,220	1,440	920	790	700	460
9	558	.....	580	1,290	1,220	1,360	920	790	700	460
10	580	.....	580	1,290	1,150	1,520	920	790	700	460
11	558	.....	580	1,220	1,150	1,600	920	790	660	500
12	605	.....	580	1,220	1,150	1,520	920	790	700	520
13	580	.....	580	1,220	1,150	1,360	890	790	700	540
14	558	.....	580	1,150	1,150	1,290	920	790	660	540
15	558	.....	580	1,150	1,150	1,290	920	790	620	540
16	630	1,290	630	1,220	1,150	.....	920	745	620	540
17	605	1,080	1,010	1,220	1,220	.....	920	745	620	540
18	580	940	2,500	1,220	1,440	.....	860	745	620	540
19	605	870	3,300	1,220	1 360	.....	860	790	620	540
20	558	870	1,930	1,150	1,290	.....	860	745	620	540
21	535	810	1,680	1,150	1,290	.....	890	745	620	540
22	535	750	2,900	1,150	1,220	.....	890	700	580	540
23	535	690	4,800	1,150	1,220	.....	860	700	580	540
24	535	690	3,300	1,150	1,220	.....	830	700	580	540
25	558	690	2,400	1,220	1,220	.....	800	700	540	540
26	535	660	2,110	1,220	1,150	.....	790	700	540	540
27	.....	690	1,840	1,150	1,150	.....	790	620	540	500
28	.....	690	1,680	1,220	1,220	.....	790	620	540	540
29	.....	660	1,520	.....	1,220	.....	790	620	500	540
30	.....	630	1,440	.....	1,290	.....	790	620	540	500
31	.....	558	1,360	.....	1,360	.....	790	620	.....	540

Monthly discharge of White Salmon River at Husum, Wash., for the period Oct. 1, 1918, to Oct. 31, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918.				
October	.....	525	589	36,200
December, 16–31	1,290	558	786	24,900
1919.				
January	4,800	580	1,390	85,500
February	1,290	1,150	1,200	66,600
March	1,520	1,150	1,250	76,900
April 1–15	1,680	1,290	1,460	43,400
July	1,020	790	887	54,500
August	790	620	739	45,400
September	700	500	621	37,000
October	540	460	519	31,900

WHITE SALMON RIVER NEAR UNDERWOOD, WASH.

LOCATION.—In NW. ¼ sec. 14, T. 3 N., R. 10 E., about 200 yards below Northwestern Electric Co.'s Condit power plant, 2 miles north of Underwood, Skamania County.

DRAINAGE AREA.—384 square miles; measured on map of Columbia National Forest.

RECORDS AVAILABLE—March 1, 1915, to December 14, 1917, and June 1, 1918, to September 30, 1920; also October 18, 1912, to February 26, 1913, at dam about a mile above.

GAGE.—Gurley water-stage recorder on right bank since June 27, 1918; Friez and Fuller recorders on left bank prior to that date. Gage inspected by D. J. Shore, foreman of power plant.

DISCHARGE MEASUREMENTS.—Made from cable at gage; measuring conditions good.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 7.45 feet at 8 a. m. January 23 (discharge, 5,800 second-feet); minimum stage occurred on November 24 and 28, July 24, and September 1, when a shutdown of the power plant reduced the discharge practically to zero.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 5.83 feet at 2 p. m. January 26 (discharge, 3,820 second-feet); minimum stage recorded, 0.24 foot at 4 p. m. July 11 (discharge estimated by extending rating curve, 60 second-feet). Minimum may have been less as recorder does not work properly for extreme low stages.

1915–1920: Maximum stage from high-water marks, 9.5 feet, old gage datum December 29, 1917 (discharge about 9,700 second-feet).

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

DIVERSIONS.—About 3,500 acres irrigated above this station.

REGULATIONS.—At low and medium stages practically all the water is used through the wheels of the power plant. The pond above the dam covers about 80 acres; daily discharge has been corrected for storage.

ACCURACY.—Stage-discharge relation changed about April 6, 1919; unstable after June 30, 1920. Rating curves used October 1, 1918, to April 5, 1919, and April 6, 1919, to June 30, 1920, well defined between 300 and 3,000 second-feet. Operation of water-stage recorder satisfactory except for few days. Daily discharge ascertained by use of discharge integrator, by applying to rating table the mean daily gage height obtained by inspecting recorder graph, or from electrical output of power plant during periods when gage did not operate satisfactorily; shifting-control method used July 1 to September 30, 1920. Daily discharge as published has been corrected for effect of storage at the dam. Records good except those for extreme high water in January, 1919, which are fair.

Discharge measurements of White Salmon River near Underwood, Wash., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
1918.				July 26	R. C. Briggs	2.58	1,030
Oct. 9	C. L. Batchelder	1.54	574	Aug. 24	R. J. Shepard	1.92	696
9	do	2.18	880	25	do	2.50	1,070
10	do	1.28	460	Sept. 1	F. F. Henshaw	1.06	346
10	do	.95	333	Nov. 1	R. J. Shepard	2.16	847
1919.				1920.			
Mar. 13	M. S. Kelly	2.95	1,340	July 10	R. C. Briggs	2.56	1,010
14	do	3.12	1,500	Sept. 30	Wendell Dawson	2.49	932
July 26	R. C. Briggs	2.80	1,180				

Daily discharge, in second-feet, of White Salmon River near Underwood, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	620	631	589	636	1,280	1,560	1,590	1,820	1,370	1,030	812	690
2	628	616	619	644	1,350	2,040	1,560	1,790	1,330	1,020	814	700
3	640	610	851	652	1,350	1,950	1,650	1,720	1,300	1,000	814	696
4	636	620	935	644	1,280	1,870	1,890	1,640	1,310	1,010	811	691
5	704	584	958	644	1,220	1,710	1,980	1,570	1,310	1,060	789	697
6	630	598	920	644	1,220	1,710	1,840	1,490	1,310	1,050	826	808
7	640	582	843	624	1,220	1,560	1,740	1,490	1,300	996	780	734
8	613	573	798	612	1,220	1,560	1,620	1,480	1,170	970	800	744
9	573	690	762	608	1,350	1,510	1,540	1,480	1,210	958	758	756
10	616	690	742	630	1,490	1,470	1,570	1,490	1,150	966	778	726
11	640	878	719	600	1,420	1,420	1,640	1,470	1,160	974	797	736
12	678	806	744	600	1,350	1,420	1,540	1,440	1,130	973	790	784
13	600	728	1,000	623	1,350	1,350	1,480	1,420	1,140	948	785	728
14	588	700	1,350	618	1,350	1,350	1,430	1,390	1,040	936	788	718
15	568	1,270	1,540	639	1,350	1,350	1,390	1,370	1,050	932	790	706
16	645	1,070	1,280	665	1,350	1,350	1,340	1,440	1,060	944	766	680
17	616	800	1,100	1,400	1,420	1,420	1,490	1,420	1,050	919	780	720
18	604	958	988	2,670	1,350	1,790	1,720	1,340	1,040	883	815	696
19	592	726	942	3,500	1,350	1,790	1,740	1,380	1,050	926	734	718
20	565	718	902	2,130	1,350	1,710	1,810	1,400	1,060	884	780	696
21	602	704	859	1,870	1,280	1,630	1,740	1,480	1,050	924	748	658
22	575	650	816	3,000	1,280	1,630	1,650	1,560	1,090	877	760	654
23	566	640	800	5,010	1,280	1,560	1,660	1,580	1,100	859	770	692
24	564	600	762	3,470	1,220	1,560	1,660	1,510	1,100	840	731	686
25	561	669	738	2,770	1,280	1,490	1,690	1,480	1,070	869	758	682
26	576	624	754	2,400	1,420	1,490	1,670	1,630	1,100	858	758	660
27	661	619	720	2,130	1,350	1,420	1,670	1,730	1,110	873	730	662
28	928	613	743	1,950	1,420	1,420	1,800	1,720	1,030	867	718	613
29	840	621	717	1,710	.....	1,490	1,850	1,640	1,050	866	748	628
30	709	604	702	1,560	.....	1,560	1,820	1,510	950	848	754	628
31	660	.....	633	1,280	.....	1,630	.....	1,440	.....	862	723	.....
1919-20.												
1	670	648	746	1,000	1,310	814	880	1,130	836	724	608	624
2	672	752	660	984	1,250	766	958	1,290	850	726	620	604
3	639	751	606	884	1,330	760	872	1,160	836	678	574	618
4	652	774	594	930	1,250	814	920	1,180	824	674	584	634
5	588	740	586	914	1,150	810	1,080	1,090	786	622	584	546
6	584	672	614	874	1,120	858	1,090	1,060	774	638	594	544
7	527	670	576	806	1,160	722	1,060	1,120	946	638	560	542
8	612	652	566	742	1,010	734	1,110	1,290	1,070	622	558	550
9	592	580	550	740	986	748	1,150	1,380	980	628	546	558
10	584	590	552	716	968	838	1,080	1,340	898	610	590	568
11	608	586	460	650	972	844	1,140	1,230	924	574	570	572
12	540	584	530	698	1,060	882	1,080	1,190	916	624	594	646
13	619	646	544	674	914	1,270	1,130	1,070	862	644	584	772
14	552	490	514	662	898	1,570	1,120	1,070	1,010	648	578	1,000
15	535	614	518	734	838	1,320	1,090	1,050	1,110	656	584	892
16	578	800	486	888	856	1,160	1,090	1,020	1,010	646	574	712
17	570	856	624	1,250	822	1,060	1,020	1,170	992	744	564	622
18	568	792	788	1,080	806	1,030	996	1,260	964	628	564	652
19	571	784	730	1,020	814	1,030	1,020	1,170	912	676	568	582
20	568	798	892	958	822	1,020	1,060	1,100	852	634	564	610
21	652	722	1,030	872	788	958	1,100	1,070	862	636	566	646
22	570	726	1,140	842	752	972	936	946	840	626	524	748
23	552	658	1,180	826	732	930	932	1,130	768	626	546	820
24	548	702	1,540	744	818	938	924	888	742	620	538	878
25	562	630	1,070	1,230	808	998	970	942	736	608	516	824
26	568	634	1,320	3,240	826	948	992	852	720	606	520	790
27	516	548	1,410	2,780	822	934	1,090	920	706	568	500	808
28	566	618	1,240	2,180	806	846	1,120	884	710	534	572	808
29	560	664	1,090	1,770	738	910	1,140	918	684	604	570	668
30	558	714	1,070	1,560	.....	876	1,100	846	684	578	720	650
31	575	.....	1,080	1,460	.....	830	.....	920	.....	612	644	.....

NOTE.—Discharge has been corrected for effect of storage at power plant. Discharge for following periods determined from electrical output of power plant and by adding the flow over the dam when such overflow occurred: Nov. 2, 3, 14-24, 1918; Jan. 11, 12, July 30, 31, Aug. 1, 2, 15, 16, 20-23, 29, 30, Sept. 6-13, 16-18, 21, 24-27, Oct. 1, 4, 16-18, 25-27, Nov. 1, 7-9, 22-24, 29, 30, Dec. 6, 12-31, 1919; Jan. 16, 17, Feb. 3-8, 11, 12, 24-29, Mar. 4, 5, 12, 13, 19, 20, 25-29, Apr. 10, 11, 22-24, May 6-24, 26-29, June 3-30, July 1-3, 17, 23, 24, Aug. 7-21, 28-31, Sept. 1-4, 11, and 18-28, 1920.

Monthly discharge of White Salmon River near Underwood, Wash., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	928	561	633	38,900
November	1,270	573	706	42,000
December	1,540	589	865	53,200
January	5,010	600	1,510	92,800
February	1,490	1,220	1,330	73,900
March	2,040	1,350	1,570	96,500
April	1,980	1,340	1,660	98,800
May	1,820	1,340	1,530	94,100
June	1,370	950	1,140	67,800
July	1,060	840	933	57,400
August	826	718	774	47,600
September	808	613	700	41,700
The year	5,010	561	1,110	805,000
1919–20.				
October	672	516	582	35,800
November	856	490	680	40,500
December	1,540	460	816	50,200
January	3,240	662	1,120	68,900
February	1,330	732	946	54,400
March	1,570	722	942	57,900
April	1,150	872	1,040	61,900
May	1,380	918	1,090	67,000
June	1,110	684	860	51,200
July	744	534	634	39,000
August	720	500	573	35,200
September	1,000	542	683	40,600
The year	3,240	460	830	603,000

NOTE.—See footnote to daily-discharge table.

GORTON CREEK BASIN.

GORTON CREEK NEAR WYETH, OREG.

LOCATION.—In SW. ¼, sec. 1, T. 3 N., R. 8 E., between Upper and Lower Falls, 1 mile from Wyeth station, Hood River County. Prior to December 2, 1917, station was below Lower Falls, three-fourths mile above Wyeth station.

DRAINAGE AREA.—2.4 square miles (measured on topographic map).

RECORDS AVAILABLE.—July 14 to December 1, 1917 (gage heights only), and December 2, 1917, to March 15, 1920, when station was discontinued.

GAGE.—Stevens 8-day recorder with outside gage, used after December 2, 1917. Vertical staff at site below Lower Falls used July 14 to December 1, 1917.

CHANNEL AND CONTROL.—Bed at original site consists of large boulders; channel wide and shallow. Bed at present site consists of solid rock and boulders; permanent. Velocity very high. Four-foot rectangular weir installed September 10, 1918.

EXTREMES OF DISCHARGE.—1918–1920: Maximum stage, from water-stage recorder 4.28 feet at 11 a. m. January 17, 1919 (discharge, 120 second-feet); minimum stage, from water-stage recorder, 0.23 foot at 2 a. m. October 22, 1920 (discharge, 1.5 second-feet).

ICE.—Stage-discharge relation not affected by ice owing to high velocity.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. No rating developed for station maintained prior to December 2, 1917. Rating curve used December 2, 1917, to September 9, 1918, poorly defined, owing to high velocity of approach. Cippoletti weir table used for rectangular weir. Daily discharge ascertained December 2, 1917, to September 9, 1918, by applying mean daily gage height to rating table; September 10, 1918, to March 15, 1920, by applying mean daily gage height to Cippoletti weir tables. Records prior to installation of weir, poor; thereafter, fair.

Discharge measurements of Gorton Creek near Wyeth, Oreg., during the period July 14, 1917, to Mar. 15, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1917.		*Feet.*	*Sec.-ft.*	1918.		*Feet.*	*Sec.-ft.*
Aug. 25	C. L. Batchelder	[a] 0.95	2.6	Nov. 25	Jerome Blaisdell [b]	[d] 0.59	5.0
Dec. 9	Jerome Blaisdell [b]	[c] 1.18	10.6	1919.			
1918.				July 23	R. C. Briggs	.55	3.4
Sept. 10	do	.09	1.6	Oct. 22	J. J. Dirzulaitis	.27	1.8

[a] Station below Lower Falls.
[b] Engineer for Oregon-Washington Railroad & Navigation Co.
[c] Station between Upper and Lower Falls, natural control.
[d] Above 4-foot rectangular weir.

Daily gage height, in feet, of Gorton Creek near Wyeth, Oreg., for the period July 14 to December 1, 1917.

Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.02	0.94	0.94	0.91	1.12	16	1.16	0.98	0.94	0.92	0.93	.....
2	.....	1.02	.94	.94	.91	.....	17	.....	.98	.94	.92	.92	.....
3	.....	1.01	.94	.93	.91	.....	18	1.14	.97	.93	.92	.92	.....
4	.....	1.00	.94	.93	.95	.....	19	1.12	.97	.93	.92	.91	.....
5	.....	1.00	.94	.93	.95	.....	20	1.10	.96	.94	.92	.91	.....
6	.....	1.01	.94	.93	.94	.....	21	1.10	.96	.94	.92	.91	.....
7	.....	1.01	.94	.93	.94	.....	22	1.10	.96	.94	.91	.91	.....
8	.....	1.01	.96	.93	.92	.....	23	1.08	.96	.94	.91	.90	.....
9	.....	1.00	.95	.93	.92	.....	24	1.08	.95	.94	.91	.90	.....
10	.....	1.00	.94	.93	.92	.....	25	1.06	.95	.94	.91	.90	.....
11	.....	1.00	.96	.92	.92	.....	26	1.06	.95	.97	.91	.90	.....
12	.....	1.00	.94	.92	.93	.....	27	1.06	.94	.94	.91	.90	.....
13	.....	.99	.94	.92	.95	.....	28	1.08	.94	.94	.91	1.18	.....
14	1.16	.98	.94	.92	.95	.....	29	1.06	.94	.94	.91	1.02	.....
15	1.16	.98	.94	.92	.93	.....	30	1.04	.94	.94	.91	1.44	.....
							31	1.03	.94	.....	.91	.....	.....

Daily discharge, in second-feet, of Gorton Creek near Wyeth, Oreg., for the period Dec. 2, 1917, to Mar. 15, 1920.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1917–18.										
1	.....	30	8.6	5.0	10	7.7	4.8	3.1	2.2	1.6
2	11	22	8.4	5.3	8.2	8.2	4.7	3.0	2.0	1.6
3	12	23	6.4	5.5	7.1	8.9	4.6	2.9	2.0	1.5
4	14	23	13	5.2	6.6	8.9	4.6	2.8	2.0	1.6
5	12	19	22	5.0	6.3	7.9	4.6	2.8	1.9	1.5
6	12	18	32	4.7	5.9	7.2	4.6	2.8	1.9	1.5
7	9.5	17	24	4.6	6.1	6.9	4.6	2.7	1.9	1.6
8	9.6	16	14	4.7	7.0	6.9	4.7	2.6	1.9	1.6
9	9.9	16	11	4.6	10	7.0	4.7	2.6	2.0	1.6
10	9.4	13	12	4.5	9.7	6.3	5.0	2.6	2.0	1.7
11	11	14	11	4.7	8.9	6.0	4.9	2.5	2.0	1.7
12	18	18	12	4.8	8.3	5.9	5.0	2.4	1.9	1.7
13	.....	17	11	4.6	7.4	5.9	5.0	2.4	1.8	2.0
14	.....	16	9.0	4.6	7.1	8.3	4.9	2.4	1.8	3.3
15	.....	16	7.8	5.3	6.6	7.4	4.7	2.4	1.8	1.9
16	.....	19	7.3	7.1	8.4	7.4	4.6	2.4	1.8	1.8
17	.....	25	6.8	10	8.2	7.1	4.4	2.4	1.8	1.8
18	.....	24	6.3	12	7.3	7.3	4.3	2.4	1.8	1.8
19	.....	17	6.1	8.3	7.6	8.6	4.2	2.2	1.7	1.8
20	.....	13	6.1	7.1	9.0	10	4.2	2.2	1.7	1.8
21	.....	12	5.9	7.8	11	9.1	4.0	2.2	1.7	1.8
22	.....	11	5.7	16	11	7.7	3.9	2.4	1.7	1.8
23	.....	10	5.6	13	10	7.1	3.8	2.6	1.7	1.8
24	.....	12	5.5	14	9.5	6.6	3.7	2.2	1.7	1.8
25	.....	15	5.4	15	8.6	6.2	3.6	2.2	1.6	1.6
26	.....	13	5.2	13	7.9	5.8	3.5	2.7	1.6	1.6
27	.....	12	5.1	11	7.3	5.5	3.4	2.2	1.6	1.6
28	.....	12	5.0	11	7.3	5.3	3.4	2.0	1.6	1.6
29	.....	12	.....	12	7.4	5.2	3.3	2.0	1.6	1.6
30	.....	10	.....	14	7.7	5.2	3.1	2.0	1.6	1.7
31	.....	8.6	.....	12	.....	5.0	.....	2.0	1.6	.....

Daily discharge, in second-feet, of Gorton Creek near Wyeth, Oreg., for the period Dec. 2, 1917, to Mar. 15, 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1.8	3.9	6.4	6.0	15	22	8.4	24	15	8.1	4.6	2.3
2	1.8	4.2	7.9	6.1	14	44	15	21	14	7.9	4.6	2.2
3	2.0	5.3	12	6.1	13	24	33	19	13	7.9	4.6	2.2
4	2.0	6.3	13	6.3	12	18	47	17	13	7.7	4.6	2.3
5	3.3	5.2	15	6.3	12	16	32	16	13	7.9	4.5	3.9
6	2.4	4.3	14	6.3	12	18	23	16	12	7.6	4.5	5.5
7	2.2	3.9	12	6.3	11	16	19	19	12	7.4	4.3	2.9
8	2.0	3.8	11	6.3	11	14	17	17	11	7.2	4.2	2.9
9	1.9	6.6	9.6	6.3	20	12		18	12	7.1	4.2	2.7
10	2.8	20	8.6	6.3	20	11		17	13	6.9	4.2	2.4
11	2.1	14	8.2	6.3	18	11		16	13	6.7	4.1	2.5
12	2.3	9.6	14	6.0	15	11	22	16	12	6.6	4.1	2.6
13	2.1	7.9	41	4.9	13	11		14	12	6.4	4.1	2.7
14	1.9	20	44	4.6	13	10		15	11	6.3	4.1	2.2
15	2.1	31	34	4.9	12	10		16	11	6.1	3.9	2.1
16	8.2	24	23	16	13	10		17	11	6.0	3.8	2.0
17	3.5	16	17	100	17	16	26	16	10	5.8	3.8	2.0
18	2.6	12	16	67	14	32	32	16	9.8	5.8	3.7	2.0
19	2.3	9.8	16	60	12	29	29	16	9.8	5.6	3.7	1.9
20	2.1	7.6	13	38	11	6.0	25	16	9.8	5.6	3.5	1.9
21	2.1	7.6	11	38	11	3.9	22	17	9.8	5.5	3.5	1.9
22	2.1	7.1	10	92	10	3.9	20	17	9.6	5.3	3.5	1.9
23	2.3	6.7	9.1	77	9.8	3.9	22	16	9.5	5.3	3.4	1.8
24	3.0	6.7	8.2	47	9.1	3.2	25	15	9.3	5.2	3.4	1.8
25	2.9	6.3	7.9	35	11	2.2	23	17	9.1	5.2	3.4	1.8
26	2.4	5.8	7.9	33	14	2.0	21	22	9.1	5.0	3.4	1.8
27	9.5	5.6	7.9	26	12	2.6	24	22	9.1	4.9	3.4	1.8
28	25	5.6	7.7	23	13	3.9	26	22	8.8	4.9	2.8	1.8
29	21	5.5	7.1	20	.....	8.6	25	20	8.6	4.8	2.2	1.7
30	18	6.9	6.4	18	.....	14	22	18	8.4	4.8	2.2	1.9
31	4.3	.....	6.0	16	.....	11	.....	16	.....	4.8	2.3	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
1919–20.							1919–20.						
1	3.5	27	12	14	19	5.5	16	1.8	12	.....	15	7.4	.....
2	2.6	34	.....	12	17	5.6	17	1.8	11	.....	16	7.2	.....
3	2.2	47	.....	12	16	5.6	18	1.8	13	.....	13	7.2	.....
4	2.0	53	.....	11	14	6.4	19	1.7	14	.....	14	6.9	.....
5	2.0	33	.....	9.7	12	8.1	20	1.6	12	.....	12	6.7	.....
6	2.0	27	.....	8.4	12	6.6	21	1.5	11	.....	11	6.4	.....
7	1.9	22	.....	7.6	11	6.1	22	2.1	9.3	.....	10	6.1	.....
8	1.9	17	.....	7.4	10	7.9	23	2.2	8.8	.....	8.8	6.0	.....
9	1.9	12	.....	7.4	9.6	12	24	1.8	7.9	.....	8.6	6.0	.....
10	1.9	8.0	.....	7.4	9.1	11	25	1.6	7.2	.....	20	6.0	.....
11	1.9	7.1	.....	7.4	9.1	10	26	1.6	6.3	.....	36	6.0	.....
12	1.9	6.4	.....	7.4	8.8	26	27	1.6	6.4	.....	36	5.8	.....
13	1.9	6.3	.....	7.4	8.4	66	28	2.2	7.6	.....	35	5.5	.....
14	1.9	7.2	.....	7.4	8.1	36	29	2.8	25	18	30	5.5	.....
15	1.8	15	.....	7.7	7.7	20	30	2.2	20	17	25	.....	.....
							31	3.7	.....	15	22	.....	.....

NOTE.—Discharge for December, 1919, estimated as 12 second-feet, 1.15 per cent of discharge of Bull Run River.

Monthly discharge of Gorton Creek near Wyeth, Oreg., for the period Jan. 1, 1918, to Mar. 15, 1920.

[Drainage area, 2.4 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918.						
January	30	8.6	16.2	6.75	7.78	996
February	32	5.0	9.94	4.14	4.31	552
March	16	4.5	8.27	3.45	3.98	508
April	11	5.9	8.11	3.38	3.77	482
May	10	5.0	7.05	2.94	3.39	433
June	5.0	3.1	4.29	1.79	2.00	255
July	3.1	2.0	2.45	1.02	1.18	151
August	2.2	1.6	1.80	.75	.86	111
September	3.3	1.5	1.74	.72	.80	104
The period						3,590
1918–19.						
October	25	1.8	4.65	1.94	2.24	286
November	31	3.8	9.31	3.88	4.33	554
December	44	6.0	13.7	5.71	6.58	842
January	100	4.6	25.6	10.7	12.34	1,570
February	20	9.1	13.2	5.50	5.73	733
March	44	2.0	12.9	5.37	6.19	793
April	47	8.4	23.7	9.87	11.01	1,410
May	24	14	17.6	7.33	8.45	1,080
June	15	8.4	11.0	4.58	5.11	654
July	8.1	4.8	6.20	2.58	2.97	381
August	4.6	2.2	3.76	1.57	1.81	231
September	5.5	1.7	2.31	.96	1.07	137
The year	100	1.7	12.0	5.00	67.83	8,671
1919–20.						
October	3.7	1.5	2.04	.85	.98	125
November	53	6.3	16.4	6.83	7.62	976
December			[a] 12.0	5.00	5.76	738
January	36	7.4	14.4	6.00	6.92	885
February	19	5.5	8.98	3.74	4.03	516
March 1–15	66	5.5	15.5	6.46	3.60	461
The period						3,700

[a] Estimated from records of discharge of Bull Run River.

SANDY RIVER BASIN.

SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In SE. ¼ sec. 24, T. 2 S., R. 5 E., 2 miles by river above Sandy River dam of Portland Railway, Light & Power Co., 5 miles below mouth of Salmon River, and 1½ miles above Marmot post office, Clackamas County.

DRAINAGE AREA.—267 square miles.

RECORDS AVAILABLE.—August 15, 1911, to December 21, 1915, and July 1, 1919, to September 30, 1920. Combined discharge for station on Sandy River below dam and station on Sandy River canal give same results for period December 22, 1915, to September 30, 1919.

GAGE.—Stevens 8-day water-stage recorder on right bank; inspected by employees of Portland Railway, Light & Power Co. Gage used 1911 to 1915 referred to different datum.

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

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; may shift slightly.

EXTREMES OF DISCHARGE.—Minimum stage from water-stage recorder during period July 1 to September 30, 1919, 3.07 feet at 4 p. m. September 29 (discharge, 274 second-feet).

Maximum stage during year ending September 30, 1920, occurred November 4 when water-stage recorder was not operating (discharge, 12,500 second-feet, ascertained by adding flow of canal to flow of Sandy River below dam); minimum stage from water-stage recorder, 3.14 feet at 2 p. m. October 15 (discharge, 299 second-feet).

1911–1920: For maximum stages see Sandy River below dam (p. 114); minimum discharge recorded, that of September 29, 1919.

ICE.—Stage-discharge relation affected by ice December 11–17, 1919.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days. Records excellent.

Discharge measurements of Sandy River near Marmot, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
May 9	Henshaw and Carroll [a].	[b] 5.00	1,960	Sept. 21	R. C. Briggs	3.20	330
14	....do	[b] 5.05	1,720	Dec. 3	Briggs and Dirzulaitis	5.45	1,760
June 18	Carroll and Drill	4.43	891				
July 2	R. S. Carroll	4.00	662	1920.			
28	....do	3.54	455	Jan. 27	R. C. Briggs	8.25	5,240
Aug. 27	Carroll and Drill	3.30	355	Mar. 29	Apperson [a] and Henshaw	4.68	1,110
Sept. 3	....do	3.25	320				
3	....do	3.25	318	Aug. 11	Apperson and Robley	3.41	420

[a] Engineer for Portland Railway, Light & Power Co.
[b] Uncertain.

Daily discharge, in second-feet, of Sandy River near Marmot, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1919.				1919.				1919.			
1	651	464	400	11	685	428	452	21	566	404	328
2	651	440	352	12	610	428	584	22	556	404	328
3	651	460	348	13	592	408	420	23	584	388	324
4	651	444	336	14	602	420	396	24	602	400	328
5	670	440	400	15	642	420	380	25	543	408	320
6	638	460	660	16	656	428	376	26	489	404	313
7	615	464	472	17	620	428	376	27	468	376	302
8	610	448	388	18	556	408	372	28	468	360	292
9	685	428	384	19	556	408	376	29	489	408	285
10	765	424	360	20	561	408	356	30	472	464	302
								31	452	460	.....

Daily discharge, in second-feet, of Sandy River near Marmot, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	543	5,200	3,060	1,330	1,540	512	1,140	1,870	960	646	440	356
2	925	6,170	2,220	1,210	1,370	530	1,460	1,640	960	642	440	360
3	472	10,400	1,770	1,100	1,250	520	1,250	1,590	995	628	440	360
4	420	12,500	1,500	1,030	1,140	574	2,650	1,640	1,030	592	440	344
5	420	5,750	1,290	995	1,060	633	5,070	1,770	995	570	464	340
6	412	3,430	1,140	890	1,060	602	3,300	2,070	995	556	460	332
7	420	2,540	1,140	820	1,140	570	2,820	2,710	1,290	561	448	328
8	428	2,020	995	790	995	597	2,600	3,180	1,170	579	456	332
9	376	1,640	925	760	925	675	2,320	2,940	995	574	444	400
10	344	1,460	890	750	890	685	2,120	2,380	925	548	448	592
11	332	1,680	860	720	855	685	1,970	2,020	995	530	432	588
12	320	1,460	840	690	820	1,210	2,220	1,870	925	642	408	1,750
13	316	1,290	820	660	784	3,480	3,180	1,820	890	755	412	1,640
14	313	1,210	800	646	740	2,810	2,490	1,720	1,100	646	404	1,640
15	302	1,370	800	600	720	1,870	2,220	1,680	1,250	670	388	1,030
16	306	1,540	850	1,530	695	1,410	2,020	1,720	1,060	660	384	778
17	352	1,370	1,000	1,720	685	1,170	1,720	2,440	1,060	624	384	670
18	344	1,250	2,380	1,290	660	1,060	1,500	2,170	995	584	360	615
19	324	2,080	2,490	1,250	646	995	1,770	1,870	890	548	380	548
20	310	1,870	3,970	1,100	624	960	1,770	1,770	855	525	452	538
21	388	1,500	4,400	960	602	995	1,590	1,770	820	507	502	670
22	660	1,330	3,430	925	588	960	1,460	1,500	802	498	440	1,250
23	808	1,170	2,940	820	579	925	1,410	1,460	735	494	444	1,770
24	628	1,140	4,480	890	570	925	1,500	1,290	695	498	448	2,320
25	534	1,060	4,120	5,610	561	995	1,680	1,210	700	468	372	2,820
26	512	960	2,940	10,100	556	925	2,070	1,170	670	460	313	2,380
27	460	855	2,320	5,220	556	890	2,440	1,250	646	468	364	1,770
28	602	978	1,920	3,180	530	925	2,490	1,170	646	502	444	1,370
29	890	3,980	1,680	2,490	516	1,100	2,380	1,100	651	512	670	1,140
30	750	5,450	1,640	2,120	.....	1,250	2,170	1,060	660	489	448	960
31	855	.....	1,500	1,820	.....	1,170	.....	995	.....	440	368	.....

NOTE.—Discharge, July 1, 1919, Sept. 10 and 11, 1920, estimated; Dec. 11–17, 1919, from records of flow of Clackamas River.

Monthly discharge of Sandy River near Marmot, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
July	765	452	592	36,400
August	464	360	424	26,100
September	660	285	377	22,400
The period	.....	.....	.....	84,900
1919-20.				
October	925	302	486	29,900
November	12,500	855	2,820	168,000
December	4,480	800	1,970	121,000
January	10,100	600	1,740	107,000
February	1,540	516	816	46,900
March	3,480	512	1,050	64,600
April	5,070	1,140	2,160	129,000
May	3,180	995	1,770	109,000
June	1,290	646	912	54,300
July	755	440	562	34,600
August	670	313	429	26,400
September	2,820	328	1,000	59,500
The year	12,500	302	1,310	950,200

SANDY RIVER BELOW DAM, NEAR MARMOT, OREG.

LOCATION.—In NE. ¼ sec. 13, T. 2 S., R. 5 E., one-fourth mile below diversion dam for Bull Run plant of Portland Railway, Light & Power Co., 1 mile southwest of Marmot, Clackamas County, and 9 miles east of Bull Run.

DRAINAGE AREA.—267 square miles at cable (measured on Mount Hood topographic map of United States Geological Survey and on map of Oregon National Forest).

RECORDS AVAILABLE.—December 22, 1915, to September 30, 1919, when station was discontinued. When discharge of Sandy River canal is added results are directly comparable with those obtained at station above dam near Marmot, August 15, 1911, to December 21, 1915, and July 1 to September 30, 1919.

GAGE.—Stevens 8-day water-stage recorder on right bank. Vertical staff on right abutment of dam near head gates of canal used to September 30, 1916, and during gaps in recorder record for 1918 and 1919. Gage read by O. G. Olson and E. D. Allen.

DISCHARGE MEASUREMENTS.—Made from cable near upper end of backwater of dam (discharge of Sandy River canal deducted) or by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 9.05 feet at 7 a. m., January 22 (discharge, 10,000 second-feet; canal practically dry); minimum stage recorded, 0.3 foot August 24–28 (discharge, 5 second-feet). Minimum discharge including canal 304 second-feet September 29.

1911–1919: Maximum stage recorded, 15.3 feet at recorder and 39.0 feet at dam December 18, 1917, at 9.30 p. m. (discharge, 22,800 second-feet); minimum stage recorded, 0.27 foot September 17, 1918 (discharge, 4 second-feet). Minimum combined discharge recorded below dam, 302 second-feet November 1, 1918.

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

DIVERSIONS.—Sandy River canal of Portland Railway, Light & Power Co. takes out at dam. Its flow is included with that of river to give total run-off.

REGULATION.—The storage back of dam serves to lessen diurnal fluctuation caused by melting glaciers but has probably little effect on any daily mean.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Operation of recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to the rating table mean daily gage height obtained by inspecting recorder graph or at times of considerable fluctuation by subdividing days. Records good.

Discharge measurements of Sandy River below dam, near Marmot, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 9	Henshaw and Carroll	3.52	1,570
14	do	3.28	1,500
Sept. 21	R. C. Briggs	.40	10

Daily discharge, in second-feet, of Sandy River below dam, near Marmot, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	12	262	930	596	930	1,430	1,830	2,400	1,180	328	44	8
2	12	213	825	558	825	3,940	2,000	1,910	1,140	246	54	15
3	12	183	930	525	720	2,600	2,200	1,710	1,100	240	22	8
4	12	226	1,070	513	674	1,910	3,940	1,590	1,070	236	22	8
5	37	218	1,280	483	755	1,710	2,800	1,470	1,100	284	21	10
6	9	179	1,320	447	720	2,000	2,400	1,390	1,040	400	27	213
7	10	130	1,180	465	668	1,750	2,000	1,470	930	251	33	95
8	133	98	1,070	447	720	1,390	1,630	1,510	755	179	27	10
9	6	213	1,000	417	1,790	1,180	1,510	1,630	825	262	97	10
10	31	603	895	405	1,750	1,000	2,000	1,630	860	240	16	10
11	20	1,040	860	447	1,470	895	2,400	1,630	965	317	18	69
12	11	694	860	453	1,210	825	1,910	1,590	825	195	19	171
13	8	507	1,630	465	1,070	895	1,710	1,390	860	171	14	40
14	8	1,070	1,910	465	1,100	930	1,550	1,470	790	171	16	12
15	8	2,200	1,710	465	1,100	825	1,430	1,550	720	217	16	12
16	570	2,100	1,510	720	1,180	655	1,430	1,590	720	405	10	12
17	544	1,590	1,430	3,220	1,630	930	2,200	1,430	707	204		13
18	256	1,280	1,390	3,000	1,430	1,910	3,220	1,320	570	120	8	14
19	81	1,070	1,550	3,700	1,280	1,710	2,800	1,390	603	112		14
20	46	930	1,790	2,700	1,180	1,470	2,600	1,430	603	95		78
21	65	825	1,590	2,900	1,040	1,350	2,000	1,550	596	124	90	10
22	30	755	1,430	7,600	930	1,280	1,910	1,630	558	127	6	10
23	28	629	1,240	6,240	720	1,280	2,000	1,430	570	134	6	10
24	43	636	1,140	3,820	720	1,280	2,400	1,280	610	163	5	10
25	155	707	930	2,800	930	1,100	2,300	1,350	495	120	5	10
26	70	668	860	2,800	1,140	1,140	2,000	1,910	459	72	5	10
27	152	662	790	2,100	1,000	1,240	2,100	2,300	622	46	5	10
28	1,070	642	790	1,670	1,000	1,210	2,400	1,910	471	56	5	12
29	720	755	825	1,350	.....	1,470	2,400	1,630	290	75	6	12
30	489	790	755	1,140	.....	1,910	2,400	1,470	284	60	6	12
31	394	.....	603	1,070	.....	2,000	.....	1,280	.....	66	8	.....

NOTE.—Discharge estimated Aug. 4 and 17–23.

Monthly discharge of Sandy River below dam, near Marmot, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	1,070	6	163	10,000
November	2,200	98	729	43,400
December	1,910	603	1,160	71,300
January	7,600	405	1,740	107,000
February	1,790	668	1,060	58,900
March	3,940	655	1,460	89,800
April	3,940	1,430	2,180	130,000
May	2,400	1,280	1,590	97,800
June	1,180	284	744	44,300
July	405	46	184	11,300
August	97	5	20.5	1,260
September	213	8	30.9	1,840
The year	7,600	5	921	667,000

Combined monthly discharge of Sandy River and canal near Marmot, Oreg., for the year ending Sept. 30, 1919.

[Drainage area, 267 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	1,230	312	524	1.96	2.26	32,200
November	2,430	518	1,100	4.12	4.60	65,500
December	2,150	975	1,480	5.54	6.39	91,000
January	7,610	777	2,040	7.64	8.81	125,000
February	2,110	975	1,350	5.06	5.27	75,000
March	4,090	995	1,680	6.29	7.25	103,000
April	4,300	1,650	2,480	9.29	10.36	148,000
May	2,700	1,610	1,890	7.08	8.16	116,000
June	1,520	693	1,100	4.12	4.60	65,500
July	705	427	559	2.24	2.58	34,400
August	448	361	408	1.52	1.75	25,000
September	601	304	376	1.41	1.57	22,400
The year	7,610	304	1,250	4.69	63.60	903,000

SANDY RIVER CANAL NEAR MARMOT, OREG.

LOCATION.—In NE. ¼ sec. 13, T. 2 S., R. 5 E., 500 feet below head gate, 1 mile southwest of Marmot, and 9 miles east of Bull Run, Clackamas County.

RECORDS AVAILABLE.—December 22, 1915, to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder operated after July 1, 1919. Gurley simplex gage used July 24 to November 7, 1916.,

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

CHANNEL AND CONTROL.—Concrete-lined canal 13 feet wide on bottom, side slopes about 1 to 1. Control is at intake of first tunnel about 200 yards below gage, where there is a drop in grade.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 4.03 feet November 9 (discharge, 420 second-feet); canal practically dry at times.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 4.48 feet at noon December 20 (discharge, 472 second-feet); minimum stage from recorder, 0.24 foot recorded frequently during year (discharge, 2 second-feet).

1916–1920: Maximum discharge, 504 second-feet at 7.30 a. m. August 23, 1917.

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

ACCURACY.—Stage-discharge relation changed owing to remodeling of tunnel entrance about November 7, 1919. Rating curves fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days. Records good.

Sandy River canal diverts water from Sandy River in the NE. ¼ sec. 13, T. 2 S., R. 5 E., into a reservoir near Bull Run post office, from which it is drawn for the Bull Run hydroelectric plant of the Portland Railway, Light & Power Co. The tailrace of the power plant discharges into Bull Run River in the NE. ¼ sec. 6, T. 2 S., R. 5 E.

Discharge measurements of Sandy River canal near Marmot, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
May 14	Henshaw and Carroll[a].	2.77	218	Sept. 21	R. C. Briggs	3.40	325
19	R. S. Carroll	3.40	337	Dec. 3	Dirzulaitis and Briggs	3.30	273

[a] Engineer for Portland Railway, Light & Power Co.

Daily discharge, in second-feet, of Sandy River canal near Marmot, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	324	404	356	340	356	356	260	300	340	332	404	356
2	308	404	388	420	356	152	218	340	340	388	330	328
3	324	404	356	404	340	192	284	284	356	399	404	240
4	300	404	340	404	372	260	356	235	356	404	404	340
5	420	404	324	388	372	260	324	356	356	393	404	342
6	420	388	324	388	356	276	276	388	388	253	404	388
7	420	404	324	388	372	260	292	372	259	334	404	372
8	320	420	324	388	372	276	292	388	388	405	388	388
9	324	420	292	388	190	284	260	388	372	338	356	388
10	388	388	356	372	356	292	268	355	356	420	388	356
11	404	340	356	388	324	356	300	253	356	388	388	388
12	388	340	388	404	324	356	270	276	356	388	404	388
13	372	340	388	404	372	225	292	225	356	404	388	356
14	356	268	183	388	372	91	324	183	388	404	388	372
15	372	232	0	404	308	252	340	204	388	388	404	356
16	372	218	170	404	197	340	218	164	356	212	404	356
17	340	260	246	292	64	81	324	292	372	372	420	356
18	279	420	324	218	152	96	300	324	388	388	404	356
19	372	340	356	232	90	146	300	284	372	388	388	372
20	372	356	356	218	125	232	292	300	388	420	388	238
21	321	340	324	225	125	154	324	340	372	404	308	340
22	372	372	292	8	267	222	340	356	388	355	388	324
23	388	388	300	9	340	232	324	324	388	388	388	324
24	404	404	340	41	255	233	324	356	245	388	388	324
25	404	404	340	134	356	238	324	356	350	372	388	324
26	404	388	388	158	340	126	324	324	388	372	388	324
27	420	404	372	204	356	126	308	232	222	404	356	308
28	164	388	388	268	356	135	219	292	332	388	356	300
29	388	372	324	308	.....	95	276	276	420	356	356	292
30	372	372	292	356	.....	268	260	324	420	404	388	308
31	388	.....	372	340	.....	255	.....	356	.....	361	388	.....
1919–20.												
1	388	175	81	324	278	380	324	198	300	287	340	287
2	420	8	139	308	286	372	249	340	241	300	324	324
3	404	9	335	203	263	329	324	224	308	163	324	340
4	404	18	293	324	299	356	282	202	308	150	324	285
5	404	19	301	356	321	300	132	181	308	190	324	324
6	358	70	305	356	299	356	103	123	300	324	109	324
7	328	120	372	297	231	388	124	207	308	324	2	308
8	372	158	253	356	356	372	286	188	300	324	2	324
9	372	340	340	388	227	285	300	150	271	193	190	308
10	340	268	286	248	336	356	286	138	278	324	340	278
11	333	271	324	372	261	356	278	196	286	324	340	286
12	340	300	340	238	343	372	178	196	278	340	340	117
13	324	293	372	372	356	157	240	308	278	216	356	119
14	324	308	372	252	340	14	248	308	293	189	171	192
15	324	278	340	372	340	44	241	293	300	189	340	263
16	308	263	324	372	229	204	248	308	293	340	356	300
17	340	278	340	324	362	340	263	308	300	308	356	324
18	356	308	300	300	247	328	256	250	293	324	324	308
19	324	324	372	194	372	249	220	293	300	324	324	308
20	324	324	421	305	372	322	185	300	308	195	324	324
21	324	324	340	270	270	270	192	286	308	186	324	340
22	272	340	324	340	388	222	189	270	214	293	324	308
23	20	340	275	324	388	340	191	257	308	254	324	256
24	143	324	234	239	232	247	182	286	308	324	340	157
25	308	308	181	340	388	340	308	240	308	324	324	234
26	388	308	174	324	362	324	193	300	308	203	300	207
27	388	300	191	256	363	324	188	308	308	207	283	248
28	362	260	356	282	364	324	243	308	173	324	265	270
29	362	300	212	209	388	324	237	300	176	324	248	278
30	356	207	205	308	.....	324	232	300	308	324	324	308
31	372	.....	215	293	.....	251	.....	300	.....	324	340	.....

NOTE.—Discharge, Feb. 27, Mar. 1, Aug. 27 and 28, 1920, interpolated.

Monthly discharge of Sandy River canal near Marmot, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	420	164	361	22,200
November	420	218	366	21,800
December (30 days)	388	170	329	19,600
January	420	8	299	18,400
February	372	64	291	16,200
March	356	81	222	13,600
April	356	218	294	17,500
May	388	164	305	18,800
June	420	222	359	21,400
July	420	212	375	23,100
August	420	308	386	23,700
September	388	238	340	20,200
The year	420	8	327	236,000
1919–20.				
October	420	20	335	20,600
November	340	8	238	14,200
December	421	81	288	17,700
January	388	194	305	18,800
February	388	227	319	18,300
March	388	14	296	18,200
April	324	103	231	13,700
May	340	123	254	15,600
June	308	173	286	17,000
July	340	150	271	16,700
August	356	2	287	17,600
September	340	117	275	16,400
The year	421	2	282	205,000

ZIGZAG RIVER AT ZIGZAG, OREG.

LOCATION.—In NW. ¼ sec. 11, T. 3 S., R. 7 E., above mouth of Still Creek and half a mile from Rhododendron Inn, Zigzag, Clackamas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 11 to September 30, 1920.

GAGE.—Vertical staff with enameled face on post driven in stream bed and braced; read by C. M. McCaughlin.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Boulders and glacial sand; shifts at any stage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.53 feet May 16 (discharge, 365 second-feet); minimum stage recorded, 0.62 foot September 8 (discharge, 72 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation subject to frequent changes owing to shifting of boulders and sand. Rating curve poorly defined. Gage read to hundredths once a day except April 26 to July 15, when it was read every other day. Daily discharge ascertained by applying to rating table daily gage height, and by interpolating for days of missing gage height. Records poor.

Discharge measurements of Zigzag River at Zigzag, Oreg., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 11	F. F. Henshaw	1.18	157	June 26	Briggs and Phillips	1.11	138
Apr. 26	Briggs and Nichols	1.63	196	July 24	R. C. Briggs	.84	101

Daily discharge, in second-feet, of Zigzag River at Zigzag, Oreg., for the year ending Sept. 30, 1920.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	82	159	218	167	152	92	82
2	.....	82	258	197	175	140	98	77
3	.....	115	150	210	175	129	92	77
4	.....	115	293	224	175	129	95	77
5	.....	115	338	241	175	129	92	80
6	.....	115	249	258	167	129	95	77
7	.....	109	232	276	159	129	90	75
8	.....	111	224	293	159	130	92	72
9	.....	112	207	}	159	132	90	75
10	.....	115	199	}	167	135	90	80
11	156	115	199	290	175	138	82	90
12	152	123	215	}	168	132	85	100
13	148	224	275	}	162	126	80	110
14	145	215	215	284	159	124	82	119
15	139	175	207	324	156	123	80	122
16	136	144	183	365	153	121	82	100
17	133	122	167	324	150	118	80	98
18	133	128	167	284	147	115	82	90
19	131	122	175	266	144	115	80	87
20	125	128	170	249	144	115	82	87
21	122	136	167	228	144	118	80	95
22	}	136	157	207	144	115	80	142
23	}	128	162	203	144	104	77	196
24	}	128	172	199	141	100	80	284
25	} 102	122	189	199	138	103	77	284
26	}	122	196	199	138	98	80	232
27	}	122	222	187	132	103	87	215
28	}	125	249	175	154	95	90	167
29	82	129	244	163	175	100	114	167
30	.....	167	240	151	164	92	90	136
31	.....	159	.....	159	.....	95	80	.....

NOTE.—Discharge interpolated or estimated Feb. 12, 13, 22-28, Sept. 12, 13, and about every other day Apr. 27 to July 14.

Monthly discharge of Zigzag River at Zigzag, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 11-29	156	82	122	4,600
March	224	82	130	7,990
April	338	150	209	12,400
May	365	151	243	14,900
June	175	132	157	9,340
July	152	92	119	7,320
August	114	77	86.3	5,310
September	284	72	123	7,320
The period	.....	.....	.....	69,200

STILL CREEK AT ZIGZAG, OREG.

LOCATION.—In SW. ¼ sec. 2, T. 3 S., R. 7 E., 300 yards above mouth, 100 feet below Still Creek highway bridge on Mount Hood loop road, and half a mile west of Rhododendron Inn, Zigzag, Clackamas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 14 to September 30, 1920.

GAGE.—Vertical staff nailed to alder tree; read by C. M. McCaughlin.

DISCHARGE MEASUREMENTS.—Made by wading just above gage.

CHANNEL AND CONTROL.—Bed consists of gravel and boulders. Control wide; formed of boulders; not permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.92 feet April 5 (discharge, 354 second-feet); minimum stage recorded, 1.10 feet September 2–9 (discharge, 38 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed on September 25. Rating curves fairly well defined. Gage read to hundredths once daily except April 27 to July 15, when gage was read three or four times a week. Daily discharge determined by applying gage height to rating table. Records poor.

Discharge measurements of Still Creek at Zigzag, Oreg., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height	Discharge.
		Feet.	*Sec.-ft.*
Apr. 26	Briggs and Nichols	2.25	205
June 26	Briggs and Phillips	1.45	58
July 25	R. C. Briggs	1.23	43.1

Daily discharge, in second-feet, of Still Creek at Zigzag, Oreg., for the year ending Sept. 30, 1920.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	.....	50	131	.....	112	.....	42	40
2	.....	50	150	38	116	.....	42	38
3	.....	53	112	.....	.....	53	42	38
4	.....	53	331	150	.....	.....	42	38
5	.....	53	354	.....	114	52	41	38
6	.....	53	239	216	.....	.....	42	38
7	.....	53	228	.....	98	50	41	38
8	.....	53	204	262	.....	.....	41	38
9	.....	55	182	.....	98	47	41	38
10	.....	58	171	.....	.....	.....	41	40
11	.....	61	171	.....	110	50	40	46
12	.....	71	182	.....	.....	.....	40	74
13	.....	171	262	.....	99	46	40	102
14	64	182	182	182	.....	.....	41	131
15	64	150	171	.....	91	46	40	103
16	64	112	150	274	.....	46	40	71
17	58	103	131	.....	83	46	40	64
18	58	91	131	171	.....	46	41	55
19	58	81	150	.....	71	45	40	52
20	55	81	144	150	.....	45	40	52
21	53	89	139	.....	64	46	39	53
22	53	91	110	125	.....	44	39	94
23	53	86	133	.....	64	44	38	131
24	52	86	142	112	.....	44	39	204
25	52	81	171	.....	60	43	39	274
26	50	81	204	112	58	43	39	204
27	50	78	.....	.....	55	43	39	182
28	50	81	262	103	.....	42	42	131
29	50	86	.....	.....	.....	43	50	127
30	.....	131	55	98	.....	42	42	94
31	.....	122	.....	.....	.....	42	41	.....

Monthly discharge of Still Creek at Zigzag, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 14-29	64	50	55.3	1,760
March	182	50	85.4	5,240
April	354	55	179	10,700
May	.....	.....	[a] 153	9,410
June	.....	.....	[a] 86.2	5,130
July	.....	42	46.7	2,870
August	50	38	40.8	2,510
September	274	38	87.6	5,210
The year	.....	.....	.....	42,800

[a] Mean discharge determined by dividing sum of daily discharge by number of days it was determined.

BULL RUN RIVER NEAR BULL RUN, OREG.

LOCATION.—In SE. ¼ sec. 25, T. 1 S., R 5 E., 1½ miles above intake of Portland water supply pipe line and 5 miles east of Bull Run, Clackamas County.

DRAINAGE AREA.—102 square miles.

RECORDS AVAILABLE.—August 20, 1907, to September 30, 1920; also readings on a gage of city water department, January 5, 1895, to November 13, 1906.

GAGE.—Friez water-stage recorder referred to vertical staff on left bank; gage datum raised 2.0 feet July 26, 1916. Prior to July 28, 1909, and during gaps in recorder record an inclined staff at headworks 1¼ miles below present gage. Gage inspected by W. B. Wilson.

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

CHANNEL AND CONTROL.—Rocks and gravel; shifting in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 6.8 feet on January 22 (discharge, 6,400 second-feet); minimum stage from water-stage recorder, 0.35 foot October 1 (discharge, 68 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 10.72 feet at 10 p. m. January 25 (discharge, 16,000 second-feet); minimum stage recorded, 0.47 foot at 7 a. m. August 27 (discharge, 89 second-feet).

1895–1920: Maximum discharge recorded, that of January 25, 1920; minimum discharge, that of October 1, 1918.

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

DIVERSIONS.—None above station. The two water-supply pipes divert practically all the low-water flow 1½ miles below the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed September 6, 1919, and January 26, 1920. Curves well defined. Operation of recorder satisfactory except January 2 to February 16, October 1–3, December 10–24, 1919, January 28–30, March 16–18, 1920, when staff gage was read. Daily discharge determined by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation by subdividing days, or, for days when recorder did not operate, by applying daily gage reading to rating table. Records excellent for 1919; good for 1920, except for interpolated periods.

Discharge measurements of Bull Run River near Bull Run, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 8	F. F. Henshaw	1.15	292	Dec. 2	Dirzulaitis and Briggs	2.45	1,260
1919.				1920.			
July 4	do	.80	178	Jan. 26	R. C. Briggs	7.50	8,250
Aug. 11	do	.47	92	Feb. 29	F. F. Henshaw	.82	160
Sept. 20	R. C. Briggs	.61	149	June 27	Phillips and Briggs	1.09	275

Daily discharge, in second-feet, of Bull Run River near Bull Run, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	68	400	560	278	500	1,330	960	1,000	674	182	95	72
2	70	400	578	262	448	4,380	1,030	855	602	176	95	70
3	74	400	736	250	395	2,160	1,310	743	548	170	95	70
4	75	490	890	250	360	1,540	2,990	662	500	167	97	72
5	140	415	1,110	240	360	1,320	1,780	626	470	164	97	165
6	135	360	890	230	395	1,630	1,400	620	435	176	95	743
7	122	324	722	220	395	1,270	1,110	638	391	167	93	294
8	89	298	620	220	500	960	925	668	378	155	93	207
9	81	530	560	220	1,680	785	820	820	378	146	91	188
10	173	1,420	490	230	1,400	662	1,680	687	470	140	91	161
11	122	1,270	480	230	1,160	650	1,450	785	662	138	89	278
12	105	855	960	240	940	602	1,110	820	554	138	89	470
13	95	644	2,340	330	840	572	1,000	715	530	135	87	294
14	89	1,870	3,410	300	940	536	820	694	485	128	87	235
15	101	3,200	2,720	330	840	512	750	750	435	122	85	204
16	796	2,280	1,730	590	790	485	785	925	405	120	85	185
17	560	1,400	1,070	4,920	1,270	748	1,900	855	364	115	85	179
18	319	1,000	820	2,500	925	1,780	2,340	750	342	115	83	170
19	263	785	925	2,980	785	1,500	1,880	750	324	113	81	158
20	235	638	1,190	2,200	650	1,110	1,500	729	306	111	79	146
21	207	560	890	2,100	584	925	1,190	785	306	109	79	140
22	188	470	715	5,060	542	855	1,030	750	286	107	79	140
23	191	400	602	4,080	506	820	1,070	626	266	107	77	140
24	286	440	506	1,920	465	694	1,230	548	252	105	77	137
25	337	450	445	1,680	680	626	1,320	806	238	103	75	135
26	266	415	405	1,920	925	584	1,150	1,580	232	101	75	125
27	597	386	378	1,290	750	584	1,110	1,940	221	101	74	120
28	1,270	435	420	1,040	820	584	1,110	1,230	210	99	74	120
29	785	480	360	840	.....	715	1,070	960	200	95	72	115
30	560	530	332	640	.....	1,000	1,070	925	191	95	72	125
31	518	.....	294	640	.....	1,030	.....	785	.....	95	72	.....
1919–20.												
1	275	6,510	1,910	622	750	176	736	743	364	214	120	115
2	1,160	5,570	1,260	550	632	182	855	650	360	200	120	109
3	520	7,630	950	495	566	188	736	596	368	194	118	107
4	375	8,240	769	455	500	249	2,520	590	368	185	113	103
5	325	3,700	650	405	465	378	4,550	620	352	179	113	99
6	280	2,160	550	390	475	319	2,000	750	355	167	109	95
7	249	1,680	562	360	560	286	1,880	1,070	680	158	109	95
8	249	1,210	480	330	440	342	1,500	1,270	572	152	107	93
9	238	990	430	312	410	626	1,230	1,110	475	146	107	101
10	220	814	370	296	382	572	1,070	890	410	140	101	518
11	207	950	330	276	364	578	925	750	410	135	101	364
12	195	806	300	256	350	1,840	1,030	680	410	194	99	1,900
13	189	685	250	248	332	4,280	1,540	650	396	290	95	2,320
14	180	608	275	245	319	2,180	1,230	620	632	210	95	1,910
15	174	769	315	256	310	1,230	1,230	608	694	179	97	855
16	168	1,120	350	1,720	298	1,260	1,110	632	584	164	107	572
17	177	854	700	1,530	282	800	890	1,190	638	170	109	445
18	174	727	700	1,080	278	630	750	925	572	161	103	378
19	165	1,580	1,070	1,030	266	524	820	750	490	155	97	319
20	159	1,210	2,980	776	252	512	855	680	430	155	93	332
21	204	910	1,190	706	242	518	785	668	386	146	91	620
22	316	727	2,500	629	228	490	722	596	346	143	93	925
23	544	636	1,930	520	224	455	687	656	324	140	101	1,680
24	430	594	3,340	629	214	560	668	560	290	135	101	2,050
25	360	520	2,740	8,160	207	584	694	490	290	135	97	2,400
26	330	470	1,710	9,890	204	506	820	455	270	132	95	1,780
27	292	420	1,220	3,130	197	495	1,000	490	270	128	138	1,230
28	410	475	910	1,930	182	548	1,070	460	266	128	182	890
29	699	3,520	790	1,330	176	785	960	445	235	122	378	680
30	636	4,140	830	1,070	.....	890	820	415	224	120	179	578
31	887	.....	741	855	.....	736	.....	386	.....	120	130	.....

NOTE.—Discharge for following periods when water-stage recorder did not operate, determined from readings of staff gage: Jan. 2 to Feb. 16, Oct. 1–3, Dec. 10–14, 1919, Jan. 28–30 and Mar. 16–18, 1920; Sept. 21–26 and 28–30 determined by comparison with records of flow of Sandy River at Marmot.

Monthly discharge of Bull Run River near Bull Run, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1,270	68	288	2.82	3.25	17,700
November	3,200	298	785	7.70	8.59	46,700
December	3,410	294	908	8.90	10.26	55,800
January	5,060	220	1,230	12.1	13.95	75,600
February	1,680	360	744	7.29	7.59	41,300
March	4,380	485	1,060	10.4	11.99	65,200
April	2,990	750	1,300	12.7	14.17	77,400
May	1,940	548	840	8.24	9.50	51,600
June	674	191	388	3.80	4.24	23,100
July	182	95	129	1.26	1.45	7,930
August	97	72	84.5	.828	.96	5,200
September	743	70	189	1.85	2.06	11,200
The year	5,060	68	662	6.49	88.01	479,000
1919–20.						
October	1,160	159	348	3.42	3.94	21,400
November	8,240	420	2,010	19.7	22.20	120,000
December	3,340	250	1,070	10.5	12.11	65,800
January	9,890	245	1,310	12.8	14.76	80,600
February	750	176	348	3.41	3.68	20,000
March	4,280	176	765	7.50	8.65	47,000
April	4,550	668	1,190	11.7	13.05	70,800
May	1,270	386	690	6.77	7.80	42,400
June	694	224	415	4.07	4.54	24,700
July	290	120	161	1.58	1.82	9,900
August	378	91	119	1.17	1.35	7,300
September	2,400	93	789	7.75	8.65	46,900
The year	9,890	91	766	7.53	102.55	557,000

LITTLE SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In SW. ¼ sec. 6, T. 2 S., R. 6 E., at trail bridge at Little Sandy ranger station and 1½ miles north of Marmot, Clackamas County.

DRAINAGE AREA.—17.2 square miles (measured on topographic map).

RECORDS AVAILABLE.—August 14, 1913, to April 23, 1919, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder referred to outside staff gage on left bank just below bridge; inspected by Carl Aschoff.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; may shift somewhat.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1918, to April 23, 1919, from water-stage recorder, 2.63 feet at noon December 14 (discharge, 518 second-feet); minimum stage recorded, 0.23 foot at 1 a. m. October 1 (discharge, 14 second-feet).

1913–1919: Maximum stage from water-stage recorder, 4.56 feet at 9 p. m. December 18, 1917 (discharge, 1,710 second-feet); minimum stage recorded, 0.21 foot August 28, 1914 (discharge, 12 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except October 13 to November 8, when observer did not visit station. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or at times of considerable fluctuation in stage, by subdividing days. Records good except for period when gage did not operate.

55862—24—WSP 514——9

Discharge measurements of Little Sandy River near Marmot, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Nov. 9	F. F. Henshaw	1.34	115	Sept. 20	R. C. Briggs	.....	19.4

Daily discharge, in second-feet, of Little Sandy River near Marmot, Oreg., for the period Oct. 1, 1918, to Apr. 23, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	14	70	125	41	86	195	167
2	14	70	102	40	76	495	189
3	15	70	135	39	70	335	200
4	15	80	135	38	66	265	430
5	26	70	189	37	71	224	282
6	28	50	156	35	70	282	224
7	28	50	125	35	67	237	189
8	19	40	104	34	104	189	145
9	17	107	91	33	251	156	135
10	32	148	93	35	224	135	251
11	22	145	72	40	200	125	224
12	19	107	116	40	156	118	189
13	17	85	237	49	135	114	167
14	17	254	410	47	167	107	145
15	18	318	352	49	156	99	145
16	100	265	212	117	189	91	135
17	80	200	167	430	237	135	300
18	60	145	125	390	178	300	370
19	50	116	189	450	156	251	300
20	40	91	189	335	135	200	237
21	35	73	145	513	107	167	200
22	30	62	125	690	99	156	178
23	30	54	105	540	85	145	178
24	40	67	86	318	80	135	.....
25	50	71	73	265	107	118	.....
26	40	64	66	265	156	107	.....
27	90	55	61	200	135	107	.....
28	180	102	60	167	135	105	.....
29	100	111	56	135	.....	116	.....
30	80	135	48	118	.....	167	.....
31	60	.....	42	101	.....	178	.....

NOTE.—Gage did not operate Oct. 13 to Nov. 8; discharge estimated from records of flow of Bull Run River.

Monthly discharge of Little Sandy River near Marmot, Oreg., for the period Oct. 1, 1918, to Apr. 23, 1919.

[Drainage area, 17.2 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	180	14	44.1	2.56	2.95	2,710
November	318	40	109	6.34	7.07	6,490
December	410	42	135	7.85	9.05	8,300
January	690	33	181	10.5	12.11	11,100
February	251	66	132	7.67	7.99	7,330
March	495	91	176	10.2	11.76	10,800
April 1-23	430	135	217	12.6	10.78	9,890
The period	.....	.....	.....	.....	.....	56,600

LITTLE SANDY RIVER NEAR BULL RUN, OREG.

LOCATION.—In NE. ¼ sec. 10, T. 2 S., R. 5 E., three-eighths mile above Portland Railway, Light & Power Co.'s dam and tunnel from Sandy River and between 3 and 4 miles south of Bull Run station, Clackamas County.

DRAINAGE AREA.—23.0 square miles.

RECORDS AVAILABLE.—July 1, 1919, to September 30, 1920; May 21, 1911, to April 29, 1913 (fragmentary); at site three-fourths mile downstream.

GAGE.—Stevens 8-day water-stage recorder on the left bank, with inside and outside staff gages; inspected by employees of Portland Railway, Light & Power Co. Gage at site used 1911–1913, a vertical staff.

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

CHANNEL AND CONTROL.—Stream bed composed of boulders and gravel; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during period July 1, 1919, to September 30, 1920, from water-stage recorder, 7.3 feet at 6 a. m. November 4, 1919 (discharge, 2,580 second-feet); minimum stage from water-stage recorder, 1.95 feet August 30, 1919 (discharge, 13 second-feet).

ICE.—Stage-discharge relation not affectedby ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 2,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or in time of considerable fluctuation in stage by subdividing days. Records excellent.

COOPERATION. Gage-height record furnished by Portland Railway, Light & Power Co.

Discharge measurements of Little Sandy River near Bull Run, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
July 28	R. S. Carroll [a]	2.10	22.2	Jan. 26	M. S. Kelly	5.92	1,470
Aug. 20	do	1.99	14.3	26	do	5.78	1,550
Sept. 22	R. C. Briggs	2.11	19.1	Mar. 29	Apperson and Henshaw	3.34	181
				Aug. 12	Apperson and Horton	2.08	21.8

[a] Engineer for Portland Railway, Light & Power Co.

Daily discharge, in second-feet, of Little Sandy River near Bull Run, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.	Day.	July.	Aug.	Sept.
1919.				1919.				1919.			
1	33	19	16	11	26	16	62	21	21	15	22
2	32	18	14	12	26	16	84	22	21	14	20
3	31	19	14	13	26	16	43	23	22	14	20
4	30	20	15	14	25	16	33	24	21	14	19
5	31	20	34	15	24	16	30	25	20	13	18
6	32	18	98	16	24	16	27	26	20	13	18
7	30	18	40	17	23	15	28	27	20	14	18
8	29	18	28	18	23	15	27	28	20	14	18
9	27	17	24	19	22	14	24	29	20	13	18
10	27	16	21	20	22	15	23	30	20	13	19
								31	19	14	.....

Daily discharge, in second-feet, of Little Sandy River near Bull Run, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	91	996	415	145	141	36	160	173	85	38	24	23
2	248	1,090	265	123	117	40	182	148	85	37	24	21
3	84	1,700	186	108	101	41	170	148	88	35	23	20
4	57	1,840	148	91	91	46	771	165	84	33	22	19
5	44	747	123	85	81	78	1,240	173	74	33	22	19
6	38	390	102	78	90	69	640	226	72	32	22	18
7	35	272	114	69	104	58	502	300	173	30	22	18
8	38	194	88	64	81	70	419	314	123	29	22	18
9	38	153	78	61	73	117	347	282	91	27	21	20
10	32	132	78	58	68	102	311	200		27	21	94
11	29	206	91	56	64	101	272	165	84	26	20	69
12	28	148		54	60	282	300	152		52	20	114
13	26	123		50	58	690	458	194	77	82	19	366
14	26	112		50	56	484	374	200	134	52	19	239
15	24	145	223	54	56	279	351	141	148	44	19	136
16	24	160		246	54	188	307	165	115	40	18	87
17	29	121		216	52	143	242	413	119	37	17	66
18	30	104	355	141	50	117	203	265	99	36	17	56
19	26	329	436	170	49	101	226	200	85	34	16	48
20	24	200	716	117	46	96	229	179	74	33	16	49
21	45	150	665	93	44	98	197	170	67	31	16	90
22	94	119	493	78	44	94	182	136	62	30	15	219
23	125	108	480	68	43	90	176	170	59	29	15	314
24	81	112	796	94	41	93	173	134	56	28	16	458
25	60	96	616	1,260	41	99	192	121	57	27	16	524
26	57	81	403	1,560	40	88	212	115	53	27	16	399
27	47	69	290	690	40	87	232	136	49	26	25	235
28	87	99	232	394	38	96	255	117	46	26	34	148
29	136	742	206	252	37	170	232	104	44	26	74	110
30	108	716	210	210	.....	206	194	94	42	25	37	94
31	378	.....	185	176	.....	170	.....	87	.....	24	27	.....

NOTE.—No gage-height record Dec. 12–17, 1919, Apr. 25,26, and June 10–12, 1920; discharge interpolated or estimated.

Monthly discharge of Little Sandy River near Bull Run, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 23.0 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1919.						
July	33	19	24.7	1.07	1.23	1,520
August	20	13	15.8	.69	.80	972
September	98	14	29.2	1.27	1.42	1,740
The period	.....	.....	.....	.....	.....	4,230
1919-20.						
October	378	24	70.6	3.07	3.54	4,340
November	1,840	69	382	16.6	18.52	22,700
December	796	78	294	12.8	14.76	18,100
January	1,560	50	223	9.70	11.18	13,700
February	141	37	64.1	2.79	3.01	3,690
March	690	36	143	6.22	7.17	8,790
April	1,240	160	325	14.1	15.73	19,300
May	413	87	180	7.87	9.07	11,100
June	173	42	83.8	3.64	4.06	4,990
July	82	24	34.1	1.48	1.71	2,100
August	74	15	22.4	.97	1.12	1,380
September	524	18	136	5.91	6.59	8,090
The year	1,840	15	163	7.09	96.46	118,000

WILLAMETTE RIVER BASIN.

WILLAMETTE RIVER AT EUGENE, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 17 S., R. 3 W., at highway bridge at Eugene, Lane County.

DRAINAGE AREA.—2,150 square miles.

RECORDS AVAILABLE.—June 1, 1919, to September 30, 1920. Record at Springfield November 27, 1911, to September 30, 1913.

GAGE.—Vertical staff on left abutment of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Springfield, 4 miles by river upstream.

CHANNEL AND CONTROL.—Channel straight with even current. Bed composed of gravel and sand; subject to shift at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 1, 1919, to September 30, 1920, 12.0 feet December 11, 1919 (discharge, 36,500 second-feet); minimum stage recorded, 0.6 foot August 24 to September 3, September 23–28, October 22, 1919, August 18–23, 25, and September 7–9, 1920 (discharge, 693 second-feet).

ICE.—Stage-discharge not affected by ice.

DIVERSIONS.—None.

REGULATION.—None.

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

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

Discharge measurements of Willamette River at Eugene, Oreg., during the years ending Sept. 30, 1919 and 1920.

[Made by J. J. Dirzulaitis.]

Date.	Gage height.	Discharge.
1919.	*Feet.*	*Sec.-ft.*
Oct. 9	0.78	790
1920.		
Jan. 28	7.20	15,900
Feb. 5	3.30	4,240

Daily discharge, in second-feet, of Willamette River at Eugene, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	June.	July.	Aug.	Sept.	Day.	June.	July.	Aug.	Sept.
1919.					1919.				
1	4,530	2,070	970	693	16	3,450	1,270	800	800
2	3,980	1,700	880	693	17	2,200	1,170	800	800
3	3,620	1,940	880	693	18	2,960	1,170	740	800
4	3,800	1,820	880	740	19	2,800	1,170	740	800
5	3,980	1,820	800	800	20	2,800	1,170	740	800
6	3,980	1,700	800	880	21	2,890	970	740	740
7	3,980	1,700	800	1,700	22	2,890	970	740	740
8	3,620	1,700	800	1,480	23	2,800	970	740	693
9	3,450	1,590	800	1,270	24	2,800	970	693	693
10	3,280	1,590	800	970	25	2,490	970	693	693
11	3,280	1,480	800	970	26	2,490	970	693	693
12	2,960	1,480	800	1,270	27	2,640	970	693	693
13	2,960	1,370	800	1,370	28	2,490	970	693	693
14	3,620	1,370	800	1,070	29	2,490	970	693	740
15	3,980	1,270	800	880	30	2,340	970	693	740
					31		970	693	

Daily discharge, in second-feet, of Willamette River at Eugene, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	970	1,700	14,700	5,920	6,550	1,820	5,710	6,340	2,640	1,700	970	880
2	1,370	5,310	9,900	5,310	5,710	1,820	7,830	5,510	2,490	1,700	880	800
3	1,590	10,500	7,390	4,720	5,110	1,820	10,500	5,110	2,490	1,700	880	740
4	1,370	33,700	6,130	4,340	4,720	1,940	8,800	4,720	2,490	1,590	800	740
5	970	28,500	5,110	4,340	4,160	2,800	11,100	4,530	2,490	1,590	800	740
6	880	13,600	5,110	4,340	4,160	2,800	12,600	4,530	2,640	1,370	800	740
7	880	9,610	4,720	3,800	3,620	2,490	10,200	4,720	2,800	1,370	800	693
8	880	9,060	9,060	3,620	3,280	2,200	10,800	5,510	4,160	1,370	880	693
9	800	6,760	6,340	3,280	3,280	2,490	12,300	6,340	4,530	1,370	880	693
10	800	5,510	8,550	2,960	3,280	2,490	12,300	6,340	3,620	1,170	880	740
11	740	5,310	36,500	2,960	3,120	3,980	11,400	5,510	3,120	1,170	880	1,590
12	740	6,340	13,300	2,960	3,120	3,980	9,610	5,110	3,450	1,170	800	1,590
13	740	5,310	8,800	2,800	2,800	3,280	12,300	4,720	3,120	1,170	800	3,620
14	740	4,720	7,180	2,640	2,800	9,900	14,300	4,530	3,120	1,480	800	2,960
15	740	4,160	5,510	2,640	2,640	8,060	12,300	4,530	4,160	1,590	800	3,280
16	740	3,620	5,510	2,490	2,490	9,060	13,300	4,340	4,340	1,480	740	2,070
17	740	3,450	5,510	2,490	2,340	7,610	11,700	4,340	3,620	1,270	740	1,700
18	740	3,280	8,800	2,490	2,340	6,550	9,610	5,110	3,450	1,270	693	1,370
19	740	3,280	10,500	2,640	2,340	5,510	8,300	4,910	3,280	1,170	693	1,370
20	740	5,110	14,300	2,490	2,200	5,510	8,300	4,720	2,960	1,170	693	1,170
21	740	4,340	17,900	2,490	2,200	5,510	8,300	4,340	2,800	1,170	693	1,270
22	693	3,980	17,100	2,490	2,070	6,130	8,300	4,340	2,800	1,170	693	1,370
23	880	3,620	10,800	2,340	2,070	6,550	7,610	3,980	2,490	1,170	693	2,960
24	1,820	3,120	10,200	2,340	2,070	6,550	6,970	3,450	2,340	1,070	740	8,300
25	1,370	2,960	23,500	2,800	1,940	5,510	6,550	3,280	2,340	970	693	12,600
26	1,070	2,800	17,100	19,100	1,940	5,110	6,340	3,280	2,200	970	740	7,830
27	1,070	2,340	11,700	31,000	1,940	5,110	6,550	2,960	1,940	880	740	5,920
28	1,170	2,340	9,610	16,300	1,820	5,310	6,970	2,960	1,820	880	800	4,720
29	1,270	2,960	8,550	11,100	1,820	5,510	6,970	2,800	1,820	880	1,070	3,800
30	2,070	13,300	7,610	8,800	.....	5,510	6,760	2,800	1,820	880	1,170	3,120
31	1,940	.....	6,550	7,390	.....	6,130	.....	2,640	.....	880	1,070	.....

Monthly discharge of Willamette River at Eugene, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
June	4,530	2,200	3,180	189,000
July	2,070	970	1,330	81,800
August	970	693	774	47,600
September	1,700	693	886	52,700
The period	4,530	693	1,530	371,000
1919–20.				
October	2,070	693	1,030	63,300
November	33,700	1,700	7,030	418,000
December	36,500	4,720	10,800	664,000
January	31,000	2,340	5,660	348,000
February	6,550	1,820	3,030	174,000
March	9,900	1,820	4,810	296,000
April	14,300	5,710	9,490	565,000
May	6,340	2,640	4,470	275,000
June	4,530	1,820	2,910	173,000
July	1,700	880	1,250	76,900
August	1,170	693	816	50,200
September	12,600	693	2,670	159,000
The year	36,500	693	4,490	2,890,000

WILLAMETTE RIVER AT ALBANY, OREG.

LOCATION.—In SW. ¼ sec. 6, T. 11 S., R. 3 W., at end of Broadalbin Street, Albany, Linn County, half a mile above Southern Pacific Railroad bridge, just below mouth of Calapooya River, and 9 miles by river above Santiam River.

DRAINAGE AREA.—4,860 square miles.

RECORDS AVAILABLE.—November 24, 1878, to April 30, 1882; January 21, 1892, to September 30, 1920; fragmentary records, 1883–1888.

GAGE.—Vertical staff in two sections on right bank.

DISCHARGE MEASUREMENTS.—Made from Southern Pacific bridge.

CHANNEL AND CONTROL.—Bed composed of sand and fine gravel. Control practically permanent. Above gage height 17 feet some water flows through a slough several hundred feet to the left of the main channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 20 feet at 8 a. m. January 24 (discharge, 87,500 second-feet); minimum stage recorded, 0.5 foot October 1 and 2 (discharge, 2,470 second-feet).

Maximum stage recorded during year ending September 30, 1920, 17.1 feet January 28 (discharge, 69,000 second-feet); minimum stage recorded, 0.6 foot August 16–27 (discharge, 2,330 second-feet).

1878–1882 and 1892–1920: Maximum stage recorded, 32.8 feet January 14, 1881 (discharge, 245,000 second-feet); minimum stage recorded, 0.2 foot September 21–27, 1879 (discharge, 1,870 second-feet), but this is somewhat uncertain. Lowest stages recorded in recent years are 0.4 foot October 30 to November 10, 1895 (discharge, 2,220 second-feet), and 0.5 foot August 26 to September 25, 1905, and September 5–14, 1915 (discharge, 2,400 second-feet). The highest stage ever known was 36 feet December 8, 1861 (discharge estimated from extension of rating curve, 302,000 second-feet).

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

DIVERSIONS.—The Albany power canal diverted water from South Santiam River near Lebanon and discharged into Willamette River above the gage and measuring section since the early nineties. It ordinarily carries between 200 and 300 second-feet.

REGULATION.—Practically none.

ACCURACY.—Stage-discharge relation changed slightly for low and medium stages. Rating curve used for year ending September 30, 1919, fairly well defined; curve used for year ending September 30, 1920, well defined. Gage read to tenths once a day, except during high water of January 18–25, 1919, when it was read twice daily. Daily discharge ascertained by applying daily gage reading to rating table. Records good, except those for low stages during year ending September 30, 1919, which are fair.

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

Discharge measurements of Willamette River at Albany, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 5	F. F. Henshaw.....	0.70	2,580	July 30	F. F. Henshaw.....	1.10	3,490
				Oct. 8	J. J. Dirzulaitis.....	.98	3,680
1919.				1920.			
Feb. 21	R. C. Briggs.....	7.55	25,300	Feb. 6	.....do.....	4.50	12,500

Daily discharge, in second-feet, of Willamette River at Albany, Oreg., for the year ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	2,470	3,220	5,960	8,450	18,600	44,200	19,200	16,800	13,100	6,220	3,420	2,470
2	2,470	3,420	5,960	7,850	16,500	46,000	20,400	18,200	11,800	6,220	3,420	2,470
3	2,650	3,620	5,710	7,280	15,100	58,000	20,000	17,500	10,900	5,960	3,420	2,470
4	2,650	3,830	5,710	6,740	14,100	70,200	22,800	16,800	10,300	5,710	3,420	2,650
5	2,840	3,830	5,710	6,220	14,100	59,500	21,200	16,200	10,600	5,710	3,420	2,840
6	2,840	3,830	6,220	6,220	17,200	51,000	38,300	15,100	10,300	5,460	3,420	3,420
7	3,620	3,830	6,220	6,220	23,600	53,000	38,300	13,800	9,950	5,460	3,220	4,500
8	3,830	3,830	6,220	6,220	30,300	51,500	33,900	12,800	9,950	5,460	3,220	5,960
9	3,830	3,830	6,220	6,220	38,300	48,800	27,200	13,400	9,650	5,210	3,220	5,460
10	3,420	3,830	6,220	6,220	53,000	33,400	23,600	13,400	9,650	5,210	3,220	4,730
11	5,460	4,050	7,280	6,220	63,600	27,600	25,200	13,100	9,350	4,970	3,220	3,830
12	3,030	5,210	7,850	7,280	51,000	26,000	32,600	12,800	9,050	4,970	3,220	3,620
13	2,840	5,210	8,450	8,450	39,800	24,800	27,600	12,500	9,050	4,730	3,030	4,050
14	2,650	4,730	9,350	9,050	35,700	27,200	24,000	12,500	9,050	4,730	3,030	4,050
15	2,650	4,970	15,100	9,050	35,500	28,000	22,000	12,100	8,750	4,500	3,030	4,050
16	3,030	13,800	14,800	12,500	33,900	28,500	20,000	12,800	9,350	4,500	3,030	3,620
17	3,620	17,200	15,800	24,000	31,200	26,800	19,600	13,400	9,050	4,270	2,840	3,420
18	5,710	12,500	13,100	46,000	30,300	26,400	23,600	13,400	8,450	4,270	2,840	3,420
19	4,500	9,950	11,500	71,800	32,100	25,200	34,800	13,100	8,150	4,050	2,840	3,220
20	3,830	8,750	11,800	77,200	27,600	40,600	33,900	12,800	7,850	4,050	2,840	3,220
21	3,620	7,280	15,500	80,300	25,200	33,400	31,600	12,500	7,850	4,050	2,840	3,220
22	3,420	6,740	16,200	64,100	22,800	27,600	27,200	12,500	7,560	3,830	2,840	3,220
23	3,420	6,220	14,500	79,600	22,400	24,800	24,000	12,500	7,560	3,830	2,650	3,220
24	3,420	5,960	12,100	86,800	21,200	22,800	22,000	12,100	7,560	3,620	2,650	3,030
25	3,220	7,850	10,900	79,000	21,200	21,200	21,200	13,100	7,280	3,620	2,650	3,030
26	3,220	10,600	9,650	57,000	25,200	20,000	20,000	13,100	7,280	3,420	2,650	3,030
27	3,220	8,450	8,450	39,300	43,800	18,600	19,200	16,500	7,000	3,420	2,650	3,030
28	3,220	7,850	7,850	36,600	48,300	17,500	18,200	17,500	6,740	3,420	2,470	2,840
29	3,220	7,000	7,850	29,400	.....	17,500	17,500	17,900	6,740	3,420	2,470	2,840
30	3,220	6,480	9,050	24,400	.....	18,600	17,200	18,200	6,480	3,420	2,470	2,840
31	3,220	.....	9,050	21,200	.....	20,800	.....	14,800	.....	3,420	2,470	.....
1919–20.												
1	3,020	3,970	29,400	18,700	21,900	5,650	14,600	15,200	7,160	5,170	2,800	3,250
2	3,250	5,650	32,600	16,300	18,700	5,650	15,600	13,900	6,900	4,930	2,800	3,020
3	5,170	11,300	24,000	14,900	16,700	6,150	22,700	13,000	6,650	4,690	2,800	3,020
4	5,170	28,000	18,300	13,900	14,600	6,400	23,600	12,100	6,650	4,450	2,800	3,020
5	4,210	50,100	15,200	12,700	13,300	7,420	21,900	11,300	6,650	4,450	2,800	2,800
6	3,730	59,500	13,900	12,100	12,100	7,950	25,800	11,300	6,650	4,450	2,800	2,580
7	3,490	38,800	12,700	11,600	11,800	7,420	29,000	11,000	7,160	4,210	2,800	2,580
8	3,250	28,000	11,800	11,000	11,300	6,900	25,800	11,800	7,680	4,210	2,800	2,580
9	3,250	23,600	16,000	10,400	10,700	6,650	28,500	11,600	10,400	3,970	2,800	2,580
10	3,020	18,300	13,900	9,880	10,200	8,490	30,800	14,200	9,600	3,970	2,580	2,580
11	3,020	15,200	21,900	9,320	9,600	10,400	29,400	13,900	8,760	3,970	2,580	2,800
12	3,020	14,200	42,400	9,040	9,320	12,400	26,200	12,700	8,220	3,970	2,580	4,210
13	2,800	13,300	25,800	8,760	9,040	10,200	23,600	12,100	7,950	3,970	2,580	4,210
14	2,800	12,700	18,700	8,490	8,760	12,700	30,800	11,300	7,950	3,970	2,580	7,680
15	2,800	12,400	17,500	8,220	8,490	21,900	32,600	10,700	8,220	4,690	2,580	9,040
16	2,800	11,300	13,600	8,220	8,220	22,300	30,300	10,700	8,220	4,450	2,360	7,950
17	2,800	10,700	12,400	7,950	7,680	22,300	30,300	10,700	9,320	4,210	2,360	6,150
18	2,800	9,880	14,200	7,420	7,420	19,100	26,200	11,300	8,760	3,970	2,360	5,170
19	2,800	9,600	21,500	8,220	7,420	17,500	22,300	11,800	8,490	3,730	2,360	4,210
20	2,800	10,200	31,600	8,220	7,160	14,600	20,700	11,300	7,950	3,730	2,360	4,210
21	2,800	11,800	49,200	7,950	6,900	13,900	20,300	11,000	7,420	3,730	2,360	3,970
22	2,800	11,000	52,000	7,680	6,900	14,600	19,500	10,700	7,160	3,730	2,360	4,210
23	2,800	9,880	44,700	7,420	6,650	15,200	18,700	10,200	6,900	3,490	2,360	4,690
24	3,250	9,320	38,300	7,420	6,650	13,900	17,500	9,600	6,650	3,490	2,360	9,600
25	4,930	8,760	42,000	7,950	6,400	12,400	16,300	9,040	6,650	3,250	2,360	16,700
26	3,970	8,220	53,500	21,900	6,150	13,900	15,200	8,760	6,400	3,250	2,360	23,600
27	3,730	7,680	48,300	54,500	5,900	13,600	14,900	8,220	5,900	3,250	2,360	17,500
28	3,490	7,420	37,000	69,000	5,900	13,000	15,600	7,950	5,650	3,020	2,580	13,300
29	3,970	7,160	29,000	53,500	5,900	13,300	16,700	7,950	5,410	3,020	3,020	11,300
30	4,210	11,300	24,900	35,700	.....	13,600	16,000	7,680	5,170	3,020	3,490	9,600
31	5,900	.....	21,500	27,600	.....	13,900	.....	7,420	.....	2,800	3,490	.....

Monthly discharge of Willamette River at Albany, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	5,710	2,470	3,370	207,000
November	17,200	3,220	6,600	393,000
December	16,200	5,710	9,560	588,000
January	86,800	6,220	30,200	1,860,000
February	63,600	14,100	30,500	1,690,000
March	70,200	17,500	33,500	2,060,000
April	38,300	17,200	25,200	1,500,000
May	18,200	12,100	14,300	879,000
June	13,100	6,480	8,880	528,000
July	6,220	3,420	4,550	280,000
August	3,420	2,470	2,970	183,000
September	5,960	2,470	3,460	206,000
The year	86,800	2,470	14,300	10,400,000
1919–20.				
October	5,900	2,800	3,480	214,000
November	59,500	3,970	16,000	952,000
December	53,500	11,800	27,300	1,680,000
January	69,000	7,420	16,600	1,020,000
February	21,900	5,900	9,720	559,000
March	22,300	5,650	12,400	762,000
April	32,600	14,600	22,700	1,350,000
May	15,200	7,420	11,000	676,000
June	10,400	5,170	7,420	442,000
July	5,170	2,800	3,910	240,000
August	3,490	2,360	2,630	162,000
September	23,600	2,580	6,600	393,000
The year	69,000	2,360	11,600	8,450,000

SALMON CREEK NEAR OAKRIDGE, OREG.

LOCATION.—In NW. ¼ sec. 13, T. 21 S., R. 3 E., 1 mile above Flat Creek ranger station, 1⅛ miles above old inclined gage near Southern Pacific Railroad bridge, and 3 miles above Oakridge, Lane County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 6, 1913, to October 14, 1919, when station was discontinued.

GAGE.—Stevens water-stage recorder on right bank used since October 1, 1914,

DISCHARGE MEASUREMENTS.—Made by wading or from bridge 1⅛ miles below gage.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; may shift during floods.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1918, to October 14, 1919, from water-stage recorder, 2.75 feet at 9 a. m. April 4, 1919 (discharge, 2,030 second-feet); minimum stage recorded, 0.45 foot October 23, 1918 (discharge, 119 second-feet).

1913–1919: Maximum stage recorded, 4.35 feet January 12, 1918 (discharge, 6,400 second-feet); minimum stage, 0.23 foot at 8 p. m. October 30, 1915 (discharge, 98 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed owing to temporary obstruction January 23 to April 4. Rating curve used January 23 to April 4, fairly well defined; curve used for other periods, well defined. Operation of water-stage recorder satisfactory except during periods indicated in footnote to daily-discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good except for estimated periods.

Discharge measurements of Salmon Creek near Oakridge, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 20	R. C. Briggs	1.50	476
Aug. 1	F. F. Henshaw	.66	164

Daily discharge, in second-feet, of Salmon Creek near Oakridge, Oreg., for the period Oct. 1, 1918, to Oct. 14, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	.....	178	172	.....	505	780	1,040	540	301	165	137	212
2	.....	.....	175	170	.....	880	880	930	540	293	162	135	227
3	.....	.....	178	168	450	830	980	880	575	285	162	130	168
4	.....	.....	182	165	.....	690	1,840	780	575	277	162	137	146
5	.....	.....	182	162	.....	575	1,840	780	610	273	160	146	139
6	.....	.....	182	162	335	575	1,560	740	650	265	160	182	.....
7	.....	.....	180	162	440	575	1,240	740	610	251	158	170	.....
8	124	.....	178	162	440	440	1,040	740	575	248	158	158	.....
9	.....	.....	185	168	780	394	880	780	540	237	158	146	.....
10	.....	220	180	180	780	345	1,170	740	505	224	152	139	134
11	.....	.....	180	224	690	330	1,240	740	470	230	150	162	.....
12	.....	.....	182	218	575	320	1,100	740	440	221	152	175	.....
13	.....	.....	265	209	505	325	980	650	470	203	152	152	.....
14	.....	.....	305	200	505	335	880	650	540	209	155	141	128
15	.....	.....	350	248	470	330	830	830	470	206	155	139	.....
16	.....	.....	320	273	470	315	780	830	440	203	150	137	.....
17	160	.....	285	335	610	297	1,040	780	404	200	150	137	.....
18	.....	248	262	780	575	440	1,400	740	388	195	150	139	.....
19	.....	240	285	1,320	505	540	1,320	690	404	192	150	139	.....
20	.....	221	345	1,100	470	505	1,240	740	440	190	148	137	.....
21	.....	212	330	1,170	410	470	1,040	880	410	188	150	135	.....
22	.....	203	293	1,740	394	470	930	1,040	399	188	150	.....	.....
23	119	206	265	1,480	370	470	980	930	388	188	148	.....	.....
24	.....	240	244	1,100	345	470	1,040	830	377	188	150	.....	.....
25	.....	237	227	880	388	470	1,040	880	370	188	146	135	.....
26	.....	212	215	880	575	440	880	1,040	366	185	143	.....	.....
27	.....	200	206	740	470	505	830	1,100	355	188	139	.....	.....
28	.....	185	200	.....	440	505	930	1,100	345	190	137	135	.....
29	.....	180	200	600	.....	610	980	930	330	188	135	126	.....
30	.....	178	188	.....	.....	690	1,040	740	320	178	132	123	.....
31	150	.....	180	.....	.....	740	.....	610	.....	172	135	.....	.....

NOTE.—Discharge estimated for following periods when gage did not operate: Oct. 1–7, 9–16, 18–22, 24–30, Nov. 1–17, 1918; Jan. 28 to Feb. 5, and Sept. 22–27, 1919.

Monthly discharge of Salmon Creek near Oakridge, Oreg., for the period Oct. 1, 1918, to Oct. 14, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	.....	119	140	8,610
November	.....	.....	217	12,900
December	350	175	230	14,100
January	1,740	162	547	33,600
February	780	335	493	27,400
March	880	297	497	30,600
April	1,840	780	1,090	64,900
May	1,100	610	826	50,800
June	650	320	462	27,500
July	301	172	218	13,400
August	165	132	151	9,280
September	182	123	142	8,450
The year	1,840	119	416	302,000
1919.				
October 1-14	227	128	149	4,140

McKENZIE RIVER AT McKENZIE BRIDGE, OREG.

LOCATION.—In sec. 14, T. 16 S., R. 6 E., at highway bridge at McKenzie Bridge, Lane County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 8, 1910, to September 30, 1916; April 1, 1917, to September 30, 1920.

GAGE.—Vertical staff attached to right abutment of the highway bridge at McKenzie Bridge, installed March 12, 1918, at datum different from that of previous gage which washed out; read by S. L. Taylor. A gage at Hayes ranch, half a mile above McKenzie Bridge, and another gage on left bank at Paradise ranger station, about 2 miles above the bridge, were formerly used.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above the ranger station.

CHANNEL AND CONTROL.—Bed rocky; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 3.3 feet January 23 (discharge, 4,400 second-feet); minimum stage recorded, 0.38 foot November 8 (discharge, 1,100 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.2 feet January 26 (discharge, 6,440 second-feet); minimum stage recorded, 0.40 foot October 20 and 22 (discharge, 1,110 second-feet).

1910-1920: Maximum stage recorded, 5.0 feet on gage at highway bridge, January 13, 1912 (discharge, 7,400 second-feet); minimum discharge recorded, 924 second-feet November 7, 1915.

ICE.—Stage-discharge relation unaffected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 3,000 second-feet, and fairly well defined above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage reading to rating table. Records good for periods when gage was read.

COOPERATION.—Gage-height records furnished by United States Forest Service, C. R. Seitz, supervisor.

The following discharge measurement made by J. J. Dirzulaitis:

October 10, 1919: Gage height, 0.47 foot; discharge, 1,160 second-feet.

Daily discharge, in second-feet, of McKenzie River at McKenzie Bridge, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	1,110	1,110	1,180	1,250	1,900	1,630	1,900		2,210	1,630		1,250
2	1,110	1,110	1,180	1,250	1,810	2,000	1,900	2,400	2,320	1,630	1,400	1,250
3	1,140	1,110	1,180	1,250	1,810	2,000	2,480		2,320	1,630		1,250
4	1,140	1,110	1,180	1,180	1,810	1,900	3,060		2,320	1,630	1,460	1,250
5	1,180	1,110	1,140	1,180	1,720	1,810	2,670	2,320	2,320	1,630		1,250
6		1,110	1,180	1,180	1,720	1,810	2,430	2,210	2,260	1,540	1,390	1,250
7		1,110	1,250	1,180	1,810	1,810	2,430	2,210	2,210	1,540		1,250
8		1,110		1,180	1,810	1,720	2,210	2,210	2,100	1,540		1,250
9		1,110		1,180	2,430	1,630	2,000	2,320	2,100	1,540	1,320	1,250
10	1,140	1,110	1,200	1,180	2,210	1,630	2,670	2,210	2,100	1,540	1,320	1,250
11		1,250		1,180	2,100	1,540	2,670	2,210	2,000	1,540	1,320	1,250
12		1,300	1,180	1,180	2,000	1,540	2,430	2,320	2,000	1,540	1,320	1,250
13		1,360	1,260	1,180	1,900	1,540	2,320	2,210	2,000	1,540	1,320	[illegible]
14		1,410	2,100	1,180	1,810	1,540	2,210	2,210	2,000	1,460	1,320	[illegible]
15	1,140	1,460	1,720	1,250	1,810	1,500	2,100	2,320	2,000	1,460	1,320	1,200
16	1,250	1,410	1,540		1,810	1,460	2,100	2,430	1,900	1,460	1,320	[illegible]
17	1,250	1,370	1,460	2,000	1,900	1,460	2,320	2,430	1,900	1,460	1,320	1,180
18	1,180	1,320	1,390		1,900	1,630	2,560	2,320	1,900	1,460	1,320	1,180
19	1,110	1,250	1,420		1,810	1,630	2,800	2,320	1,900	1,460	1,320	1,180
20	1,110	1,250	1,460	2,430	1,720	1,630	2,670	2,320	1,900	1,460	1,320	1,180
21	1,110	1,250	1,460	2,210	1,720	1,630	2,550	2,430	1,900	1,460	1,320	1,180
22	1,180	1,250	1,420	4,080	1,720	1,630	2,430	2,670	1,900	1,460	1,280	1,180
23	1,110	1,250	1,390	4,200	1,780	1,630	2,550	2,550		1,460	1,250	
24	1,110	1,250	1,390	3,200	1,630	1,630	2,670	2,430		1,460		
25	1,110	1,250	1,360	2,800	1,630	1,630	2,550	2,670		1,460		1,180
26	1,140	1,250	1,320	2,670	1,630	1,630	2,430	2,930	1,800	1,460		
27	1,110	1,180	1,320	2,430	1,630	1,630	2,320	3,060		1,390	1,250	
28	1,180	1,180	1,320	2,320	1,630	1,630	2,320	2,930				1,180
29	1,110	1,180	1,320	2,210	.....	1,720	2,440	2,680	1,720	1,400		1,180
30	1,140	1,180	1,250	2,110	.....	1,810	2,550	2,430	1,680			1,180
31	1,110	.....	1,250	2,000	.....	1,900	.....	2,320	.....			.....
1919-20.												
1	1,250		2,100	1,900	2,210	1,320	1,460	1,720	1,540	1,390	1,250	1,180
2	1,320		1,900	1,810	2,210	1,320	1,540	1,720	1,460	1,390	1,250	1,140
3	1,280		1,810	1,810	2,000	1,320	1,460	1,720	1,460	1,390	1,250	1,110
4	1,250	1,700	1,720	1,720	2,000	1,320	1,460	1,630	1,460	1,390	1,250	1,110
5	1,220			1,720	1,900	1,320		1,630	1,460	1,390	1,250	1,110
6	1,220			1,720	1,900	1,320		1,720	1,460	1,360	1,250	
7	1,180	2,100		1,630	1,900	1,320		1,810	1,540	1,320	1,250	1,140
8	1,180			1,630	1,810	1,320		2,000	1,720	1,320	1,180	
9	1,180	1,960	1,630	1,540	1,720	1,390		2,000	1,630	1,320	1,180	
10	1,180			1,540		1,320		2,000	1,540	1,340	1,180	1,180
11	1,180	1,810		1,540	1,630	1,320		1,900	1,540	1,370	1,180	1,250
12		1,810		1,460		1,320	1,590	1,900	1,540	1,390	1,180	1,250
13		1,810				1,390		1,900	1,540	1,390	1,180	1,320
14		1,720	1,540		1,540	1,630		1,900	1,540	1,390	1,180	1,390
15		1,720	1,540			1,540		1,900	1,540	1,320	1,180	1,250
16	1,140	1,720	1,460		1,500	1,460		1,900	1,540	1,320	1,180	1,250
17		1,720	1,460			1,460		1,900	1,540	1,320	1,180	
18		1,630	1,460	2,100	1,460	1,390		1,900	1,540	1,320		1,250
19		1,810	1,720			1,390		1,900	1,460	1,320		
20	1,110		2,210		1,390	1,390		1,900		1,320	1,180	1,250
21	1,110	1,720	2,320			1,460	1,720	1,860	1,420	1,320		1,180
22	1,110		2,210		1,320	1,460	1,720	1,810		1,320		
23	1,180	1,630	2,210		1,320	1,460		1,760		1,320	1,180	1,500
24	1,180	1,540	2,430		1,320	1,460		1,720				
25	1,180	1,510	2,800	2,800	1,320	1,460	1,760	1,630	1,390		1,180	1,810
26	1,140	1,460		6,440	1,320	1,460			1,390			1,720
27		1,460		3,630	1,320	1,460	1,810			1,280		1,540
28		1,460	2,350	2,800	1,320	1,460	1,810	1,580	1,390		1,180	1,540
29	1,350	1,630		2,550	1,320	1,460	1,810				1,180	1,460
30		2,550		2,430	.....	1,460	1,810		1,390		1,250	1,390
31		.....		2,320	.....	1,460	.....		.....		1,250	.....

NOTE—Braced figures show mean discharge estimated for periods when gage was not read. Discharge, also estimated or interpolated for periods when gage was not read: Oct. 20, 21, 23, 26, 27, 29, 30, Nov. 3, 4, 12-14, 16, 17, Dec. 3, 19, 22, 26, 28, 1918; Jan. 6, 29, 30, Feb. 23, Mar. 2, 15, 23-25, 27, Apr. 3, 18, 23, 29, May 15, 29, June 4, 10, 11, 30, July 9, 10, 12, 19, 22, Aug. 11, 13-15, 18-20, 22, Sept. 1, 2, 6, 7, 11, 18, 19, 21, Oct. 3, 5, 6, 21, 1919; Feb. 23, 24, 26, 27, Mar. 24, May 9, 14, 15, 21, 23, June 13, July 6, 10, 11, 13, 21, Aug. 1, 12, 14, 16, and Sept. 13, 1920.

Monthly discharge of McKenzie River at McKenzie Bridge, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	1,250	1,110	1,150	70,700
November	1,460	1,110	1,220	72,600
December	2,100	1,140	1,340	82,400
January	4,400	1,180	1,900	117,000
February	2,430	1,630	1,830	102,000
March	2,000	1,460	1,670	103,000
April	3,060	1,900	2,420	144,000
May	3,060	2,210	2,430	149,000
June	2,320	1,680	1,990	118,000
July	1,630	1,390	1,500	92,200
August	1,460	1,250	1,320	81,200
September	1,250	1,180	1,210	72,000
The year	4,400	1,110	1,660	1,200,000
1919-20.				
October	.....	1,110	1,200	73,800
November	2,550	1,460	1,750	104,000
December	2,800	1,460	1,920	118,000
January	6,440	.....	2,200	135,000
February	2,210	1,320	1,600	92,000
March	1,630	1,320	1,410	86,700
April	1,810	1,460	1,640	97,600
May	2,000	.....	1,780	109,000
June	1,720	1,390	1,480	88,100
July	1,390	.....	1,330	81,800
August	1,250	1,180	1,200	73,800
September	1,810	1,110	1,310	78,000
The year	6,440	1,110	1,570	1,140,000

NORTH SANTIAM RIVER AT NIAGARA, OREG.

LOCATION.—In SE. ¼ sec. 29, T. 9 S., R. 4 E., 200 feet below Badbanks Creek, half a mile below Niagara, Marion County, and 15 miles below Breitenbush Creek.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 21, 1908, to November 17, 1910; June 7, 1911, to December 31, 1919, when station was suspended.

GAGE.—Vertical staff in two sections on right bank; read by H. D. Bondy.

DISCHARGE MEASUREMENTS.—Made from cable 75 feet above gage. Prior to 1913 made from a boat.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Control of huge boulders 50 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1918, to December 31, 1919, 12.0 feet November 4, 1919 (discharge, 33,000 second-feet); river may have reached higher stage during night; minimum stage recorded, 1.4 feet several days in October, 1918 (discharge, 520 second-feet).

1908-1919: Maximum stage (determined from high-water mark), 16.4 feet about 1 p. m. November 22, 1909 (discharge, 63,200 second-feet); minimum stage, 1.25 feet September 23-25, 1915 (discharge, 430 second-feet).

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

DIVERSIONS.—None above station. The Salem power canal diverts water near Stayton.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined for previous years. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

No discharge measurements made during years ending September 30, 1919 and 1920.

Daily discharge, in second-feet, of North Santiam River at Niagara, Oreg., for the period Oct. 1, 1918, to Dec. 31, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr	May.	June.	July.	Aug.	Sept.
1918–19.												
1	520	580	1,250	1,150	2,460	2,600	4,600	4,420	2,740	1,450	800	650
2	520	650	1,350	1,150	2,180	5,800	4,240	4,060	2,600	1,450	800	650
3	520	650	1,800	1,060	2,040	3,880	5,600	3,700	2,600	1,350	800	720
4	580	720	1,450	1,060	1,920	3,520	9,500		2,740	1,350	800	800
5	880	720	1,560	970	1,920	2,180	7,580		2,740	1,350	800	880
6	720	650	1,680	970	1,920	2,320	6,020		2,740	1,250	720	970
7	720	650	1,450	970	2,060	2,600	4,600	3,400	2,600	1,250	720	1,060
8	650	720	1,450	970	2,320	2,320	4,240		2,460	1,250	720	1,250
9	650	1,060	1,450	970	5,800	2,180	3,360		2,320	1,350	720	1,250
10	650	1,560	1,350	970	4,600	2,180	4,420		2,600	1,350	720	1,350
11	580	1,800	1,450	1,060	3,360	1,920	5,400	3,040	2,460	1,350	720	1,560
12	580	1,920	1,560	1,150	3,360	1,920	4,420	3,200	2,600	1,350	720	1,150
13	520	2,040	3,360	1,150	3,040	1,800	5,000	3,040	2,460	1,250	720	1,150
14	580	2,320	5,000	1,250	2,880	1,680	4,800	3,360	2,320	1,150	720	800
15	800	5,000	5,800	1,680	3,040	1,680	2,320	3,520	2,180	1,150	720	720
16	1,350	3,200	3,700	3,200	3,040	1,680	3,040	3,700	2,040	1,060	720	650
17	1,150	3,360	3,200	15,000	2,880	1,680	5,400	3,520	2,180	1,060	720	650
18	970	3,520	2,740	10,000	2,600	2,040	8,060	3,360	2,320	970	720	650
19	520	2,880	2,320	10,600	2,460	3,040	7,340	3,360	2,320	970	720	580
20	520	2,320	2,460	7,820	2,180	1,680	6,460	3,880	2,180	970	650	580
21	520	2,040	2,320	14,600	2,040	1,250	6,240	4,600	2,180	1,060	650	580
22	580	1,800	2,040	19,000	2,040	2,460	5,600	4,800	2,040	970	650	580
23	520	1,680	1,920	8,540	1,920	2,600	4,420	4,420	1,920	970	650	580
24	580	1,450	1,680	9,500	1,920	2,460	6,020	4,060	1,800	970	650	580
25	580	1,350	1,560	6,020	1,800	2,320	4,800	3,700	1,800	970	650	580
26	580	1,350	1,560	6,020	1,800	2,460	4,600	5,600	1,680	970	650	580
27	650	1,250	1,450	4,800	1,560	2,600	4,240	6,460	1,560	800	650	580
28	1,560	1,250	1,450	3,520	2,180	2,880	5,000	5,600	1,560	800	650	580
29	1,350	1,250	1,350	3,360	.....	3,200	5,600	4,600	1,560	800	650	580
30	520	1,150	1,250	2,880	.....	3,800	4,800	3,700	1,560	800	650	580
31	580	.....	1,150	3,040	.....	4,500	.....	2,880	.....	800	650	.....

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1919.				1919.				1919.			
1	580	4,420	7,580	11	650	2,600	1,450	21	800	2,180	7,580
2	650	7,340	6,240	12	650	2,460	1,350	22	1,060	2,040	7,340
3	650	16,600	5,600	13	580	2,460	970	23	1,250	2,040	8,060
4	650	33,000	5,000	14	580	2,460	1,350	24	1,060	2,600	10,900
5	720	26,400	3,880	15	580	2,320	1,560	25	800	3,700	8,780
6	720	7,340	3,700	16	580	2,320	1,560	26	800	5,600	7,820
7	650	3,700	2,040	17	580	2,320	2,320	27	880	5,600	6,460
8	650	3,200	1,920	18	580	2,320	3,200	28	1,060	7,580	3,880
9	650	2,880	1,800	19	580	2,180	4,600	29	1,250	8,300	3,700
10	650	2,740	1,560	20	650	2,180	6,900	30	1,250	8,540	3,200
								31	3,200	.....	2,880

NOTE.—Discharge estimated Mar. 30, 31, and May 4-10, 1919; gage not read.

Monthly discharge of North Santiam River at Niagara, Oreg., for the period Oct. 1, 1918, to Dec. 31, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,560	520	710	43,700
November	5,000	580	1,700	101,000
December	5,800	1,450	2,070	127,000
January	19,000	970	4,660	287,000
February	5,800	1,560	2,550	142,000
March	5,800	1,250	2,560	157,000
April	9,500	2,320	5,260	313,000
May	6,460	2,880	3,880	239,000
June	2,740	1,560	2,230	133,000
July	1,450	800	1,120	68,900
August	800	650	706	43,400
September	1,560	580	796	47,400
The year	19,000	520	2,350	1,700,000
1919.				
October	3,200	580	838	51,500
November	33,000	2,040	5,980	356,000
December	10,900	970	4,360	268,000
The period				676,000

ALBANY POWER CANAL AT ALBANY, OREG.

LOCATION.—In sec. 18, R. 3 W., T. 11 S., 600 feet beyond the end of South Ferry Street, Albany, Linn County.

RECORDS AVAILABLE.—February 22 to December 31, 1919.

GAGE.—Vertical staff on left bank; read by H. A. Stearns.

DISCHARGE MEASUREMENTS.—Made from footbridge half a mile below.

CHANNEL AND CONTROL.—Excavated channel. Control is drop over hardpan; subject to slight shift.

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

DIVERSIONS.—Above all diversions from canal.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation changed during period. Two fairly well defined rating curves used. Gage read to hundredths once daily. Daily discharge determined by applying daily gage height to rating table. Records good.

Canal diverts water from the South Fork of Santiam River at Lebanon, in the NE. ¼ sec. 11, T. 12 S., R. 2 W., for power and domestic use at Albany.

Discharge measurements of Albany power canal at Albany, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 22	R. C. Briggs	2.14	245	Feb. 5	J. J. Dirzulaitis	2.07	243
July 30	F. F. Henshaw	2.00	200				
Oct. 9	J. J. Dirzulaitis	1.98	213				

Daily discharge, in second-feet, of Albany power canal at Albany, Oreg., for the period Feb. 22 to Dec. 31, 1919.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	276	257	276	257	215	184	150	222	250	250
2	.....	295	257	276	242	204	194	164	250	250	250
3	.....	257	276	276	257	215	204	164	250	250	250
4	.....	276	227	276	242	204	204	150	250	222	250
5	.....	276	257	257	227	215	204	200	222	250	250
6	.....	257	257	242	227	215	204	250	222	222	250
7	.....	257	257	276	227	184	204	222	222	222	105
8	.....	257	257	257	242	204	204	222	222	200	105
9	.....	242	257	276	242	204	204	222	222	222	115
10	.....	242	276	257	257	204	200	250	222	222	138
11	.....	276	257	276	257	204	200	222	222	222	138
12	.....	276	257	242	242	204	200	222	222	250	115
13	.....	257	257	242	257	227	200	236	222	250	105
14	.....	257	257	242	257	204	200	211	222	284	105
15	.....	257	257	276	227	204	190	222	222	250	134
16	.....	257	242	276	227	204	190	222	222	138	163
17	.....	227	276	257	227	204	200	222	222	250	192
18	.....	242	257	257	215	227	164	250	222	250	221
19	.....	257	276	257	227	227	180	250	222	250	250
20	.....	242	242	257	227	242	172	211	222	284	250
21	.....	242	257	276	227	227	172	115	211	284	250
22	242	242	257	276	215	215	172	180	200	284	250
23	227	242	257	257	215	204	172	200	250	250	250
24	242	242	276	257	215	215	180	200	222	250	284
25	257	276	276	257	215	215	144	180	211	250	236
26	276	257	276	257	215	184	164	180	73	250	236
27	257	227	276	257	215	204	144	180	250	200	250
28	276	242	257	257	215	184	164	190	222	250	236
29	.....	257	257	295	215	174	150	191	250	284	236
30	.....	257	257	295	215	204	150	202	250	284	250
31	.....	257	.....	295	.....	194	150	.....	222	.....	236

NOTE.—Discharge interpolated or estimated Sept. 28–30, Oct. 12, 21, and Dec. 15–18; gage not read.

Monthly discharge of Albany power canal at Albany, Oreg., for the period Feb. 22 to Dec. 31, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
February 22–28	276	227	254	3,530
March	295	227	256	15,700
April	276	227	260	15,500
May	295	242	265	16,300
June	257	215	231	13,700
July	242	174	207	12,700
August	204	144	183	11,300
September	250	115	203	12,100
October	250	73	222	13,600
November	284	138	244	14,500
December	284	105	205	12,600
The period	.....	.....	.....	142,000

CLACKAMAS RIVER NEAR CAZADERO, OREG.

LOCATION.—In NE. ¼ sec. 11, T. 4 S., R. 4 E., a short distance above backwater from Cazadero dam of Portland Railway, Light & Power Co. and 3 miles southeast of Cazadero, Clackamas County.

DRAINAGE AREA.—685 square miles.

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1920.

GAGE.—Friez water-stage recorder referred to a vertical staff gage on right bank; inspected by employee of Portland Railway, Light & Power Co.

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

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; control subject to shift.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 36.55 feet at 1.30 p. m. January 17 (discharge, 22,400 second-feet); minimum stage recorded, 25.06 feet at 2 p. m. October 1 (discharge, 752 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 40.50 feet at 9 a. m. November 4 (discharge, 35,800 second-feet); minimum stage recorded, 25.57 feet from noon to 4 p. m. September 9 (discharge, 787 second-feet).

1909–1920: Maximum stage recorded, 43.7 feet at 1 p. m. November 22, 1909 (discharge, 46,800 second-feet); minimum discharge recorded, 705 second-feet September 21–23 and October 8–10, 1915, at stage of 25.7 feet.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water November 4, 1919. Rating curves used before and after the change well defined. Operation of water-stage recorder satisfactory except November 29 to December 26, 1919, when staff gage 5 miles above was read once daily. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or in time of considerable fluctuation by subdividing days. Records excellent, except those for period November 29 to December 26, 1919, which are fair.

COOPERATION.—Field data furnished by the Portland Railway, Light & Power Co.

Discharge measurements of Clackamas River near Cazadero, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Apr. 19	F. G. Robley	30.70	7,460	Aug. 25	R. S. Carroll	25.25	856
29	Carroll and Robley	29.25	5,110	Sept. 12	do	25.25	853
May 5	R. S. Carroll	28.08	3,840				
6	do	28.00	3,710	1920.			
16	do	28.67	4,520	Feb. 27	Briggs and Carroll	26.25	1,400
June 9	do	27.05	2,630	Mar. 17	Briggs and Apperson	27.18	2,350
19	do	26.75	2,270	June 30	Apperson and Carroll	26.15	1,400
July 3	do	26.00	1,480	Aug. 5	Apperson and Dick	25.71	888
24	do	25.50	1,070				

NOTE.—Measurements made by employees of Portland Railway, Light & Power Co.

55862—24—WSP 514——10

Daily discharge, in second-feet, of Clackamas River near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.
1918–19.												
1	759	1,200	1,700	1,350	2,980	3,460	3,940	5,180	3,220	1,550	1,010	834
2	766	1,110	1,600	1,300	2,860	7,350	4,180	4,900	3,100	1,500	1,010	842
3	788	1,110	1,650	1,260	2,620	7,050	4,540	4,420	3,100	1,500	1,090	850
4	788	1,200	1,850	1,260	2,500	6,300	7,800	4,060	3,100	1,450	1,090	850
5	908	1,200	2,150	1,210	2,500	4,660	7,200	3,820	3,100	1,450	1,030	1,010
6	1,020	1,160	2,300	1,210	2,620	4,540	6,020	3,700	3,100	1,450	1,000	1,400
7	980	1,110	2,150	1,210	2,740	4,300	5,320	3,700	2,860	1,400	978	1,130
8	916	1,110	2,000	1,170	2,860	3,460	4,540	3,820	2,740	1,350	954	938
9	860	1,340	1,900	1,170	6,020	2,980	3,940	4,060	2,620	1,350	930	946
10	868	2,160	1,750	1,170	6,450	2,620	4,900	4,180	2,620	1,300	930	890
11	876	3,180	1,650	1,210	5,180	2,500	5,460	4,060	2,500	1,260	922	1,130
12	836	2,140	1,650	1,210	4,180	2,400	4,660	4,060	2,500	1,260	914	1,260
13	796	1,750	2,980	1,210	3,700	2,300	4,420	3,700	2,500	1,260	914	1,090
14	780	3,230	5,180	1,210	3,820	2,250	3,940	3,700	2,620	1,210	906	986
15	772	7,200	6,300	1,550	3,700	2,200	3,700	3,940	2,500	1,170	898	930
16	1,720	5,180	4,660	2,400	3,580	2,150	3,460	4,540	2,400	1,170	890	906
17	1,520	3,460	3,580	15,500	4,420	2,150	4,420	4,420	2,300	1,130	882	890
18	1,110	2,740	2,980	13,600	4,060	3,340	7,650	4,060	2,200	1,090	882	874
19	980	2,400	3,220	7,350	3,580	3,460	7,350	3,940	2,250	1,050	874	866
20	940	2,200	3,820	6,750	3,220	3,100	7,050	4,060	2,300	1,050	866	850
21	924	2,050	3,100	8,200	2,860	2,860	5,460	4,540	2,200	1,050	866	842
22	916	1,850	2,740	18,300	2,740	2,740	4,900	5,040	2,100	1,050	858	834
23	892	1,800	2,300	18,900	2,500	2,740	4,660	4,900	2,000	1,050	850	818
24	908	1,800	2,050	10,700	2,400	2,740	5,040	4,180	1,950	1,050	850	794
25	1,020	1,800	1,900	7,500	2,620	2,500	5,180	4,180	1,900	1,050	850	786
26	964	1,700	1,800	7,200	3,220	2,500	4,780	5,600	1,850	1,050	842	802
27	1,020	1,600	1,700	6,020	2,980	2,500	4,660	6,020	1,850	1,030	834	810
28	2,940	1,600	1,750	4,900	2,860	2,500	5,040	5,460	1,750	1,030	826	810
29	1,850	1,650	1,750	4,180	.....	2,980	5,180	4,660	1,650	1,020	818	802
30	1,470	1,650	1,600	3,700	.....	3,580	5,180	4,180	1,600	1,010	810	794
31	1,290	.....	1,450	3,340	.....	3,940	.....	3,580	.....	1,010	826	.....
1919–20.												
1	1,000	4,760	8,800	3,030	3,580	1,340	2,040	3,210	1,830	1,250	962	877
2	1,800	8,400	5,500	2,790	3,210	1,340	2,430	2,910	1,780	1,250	954	836
3	1,250	14,600	4,800	2,610	2,910	1,340	2,260	2,730	1,780	1,200	946	819
4	1,080	26,500	2,920	2,430	2,730	1,430	3,450	2,610	1,880	1,200	937	811
5	1,000	8,950	2,560	2,260	2,550	1,530	5,300	2,610	1,880	1,160	920	811
6	968	6,060	2,440	2,150	2,430	1,430	4,880	2,850	1,880	1,150	937	803
7	920	4,490	2,440	2,040	2,490	1,380	4,230	3,450	2,260	1,140	937	795
8	920	3,450	2,320	1,930	2,320	1,380	4,230	4,360	2,610	1,110	920	795
9	912	2,910	1,800	1,830	2,220	1,580	4,100	4,490	2,320	1,090	886	795
10	912	2,490	1,620	1,780	2,100	1,580	3,970	3,970	2,040	1,070	894	980
11	888	2,610	1,620	1,680	1,980	1,580	3,580	3,450	1,980	1,070	886	1,110
12	880	2,490	1,540	1,580	1,930	1,730	3,330	3,150	1,930	1,200	877	2,430
13	864	2,260	1,470	1,530	1,880	3,970	5,020	3,030	1,830	1,480	861	2,910
14	848	2,100	1,470	1,480	1,830	5,020	4,490	2,910	2,100	1,380	854	3,840
15	832	2,100	1,400	1,430	1,780	3,330	4,100	2,850	2,430	1,200	854	2,260
16	832	2,260	1,470	1,580	1,730	2,790	3,710	2,850	2,150	1,140	844	1,730
17	832	2,260	1,540	2,150	1,680	2,430	3,330	3,710	2,040	1,120	836	1,480
18	840	2,150	2,100	2,260	1,630	2,200	2,910	3,710	1,930	1,110	836	1,380
19	840	3,030	2,560	2,100	1,580	2,040	2,850	3,330	1,830	1,090	836	1,250
20	840	3,210	7,600	1,980	1,580	1,980	2,910	3,090	1,680	1,070	819	1,200
21	840	2,670	8,350	1,830	1,530	1,930	2,790	2,970	1,580	1,070	811	1,250
22	1,000	2,730	8,050	1,730	1,480	1,980	2,730	2,730	1,480	1,040	803	1,880
23	1,380	2,100	7,750	1,680	1,480	1,930	2,670	2,610	1,430	1,040	795	3,840
24	1,160	1,980	8,200	1,580	1,480	1,930	2,610	2,370	1,380	1,020	795	5,020
25	940	1,830	8,500	5,900	1,380	2,100	2,610	2,320	1,380	1,010	795	5,900
26	920	1,680	7,300	22,800	1,380	1,980	2,850	2,150	1,380	998	795	4,360
27	856	1,530	5,300	10,900	1,380	1,930	3,330	2,150	1,380	980	836	3,150
28	1,120	1,830	4,360	7,410	1,340	1,930	3,710	2,100	1,340	980	980	2,490
29	1,560	5,080	3,840	5,750	1,340	1,980	3,710	2,040	1,340	962	1,200	2,100
30	1,380	10,200	3,580	4,420	.....	2,100	3,450	1,980	1,300	954	1,100	1,880
31	1,300	.....	3,330	4,100	.....	2,100	.....	1,880	.....	971	946	.....

NOTE.—Discharge, Nov. 29 to Dec. 26, 1919, determined by use of readings from U. S. Weather Bureau gage 5 miles upstream.

Monthly discharge of Clackamas River near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 685 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	2,940	759	1,070	1.71	1.97	65,800
November	7,200	1,110	2,120	3.09	3.45	126,000
December	6,300	1,450	2,490	3.63	4.18	153,000
January	18,900	1,170	5,070	7.40	8.53	312,000
February	6,450	2,400	3,420	5.00	5.21	190,000
March	7,350	2,150	3,360	4.91	5.66	207,000
April	7,800	3,460	5,150	7.52	8.39	306,000
May	6,020	3,580	4,340	6.34	7.31	267,000
June	3,220	1,600	2,420	3.53	3.94	144,000
July	1,550	1,010	1,200	1.75	2.02	73,800
August	1,090	810	910	1.33	1.53	56,000
September	1,400	786	919	1.34	1.50	54,700
The year	18,900	759	2,700	3.94	53.69	1,960,000
1919–20.						
October	1,560	832	1,020	1.49	1.72	62,700
November	26,500	1,530	4,620	6.74	7.52	275,000
December	8,800	1,400	4,080	5.95	6 86	251,000
January	22,800	1,430	3,510	5.12	5.90	216,000
February	3,580	1,340	1,960	2 86	3 08	113,000
March	5,020	1,340	2,040	2.98	3 43	125,000
April	5,300	2,040	3,450	5.03	5 61	205,000
May	4,490	1,880	2,920	4.26	4 91	180,000
June	2,610	1,300	1,800	2.63	2 93	107,000
July	1,480	954	1,110	1.62	1 87	68,200
August	1,200	795	892	1.30	1.50	54,800
September	5,900	795	1,990	2.90	3.24	118,000
The year	26,500	795	2,450	3.57	48.55	1,780,000

OAK GROVE FORK OF CLACKAMAS RIVER AT TIMOTHY MEADOWS, NEAR CAZADERO, OREG.

LOCATION.—In T. 5 S., R. 8 E., about sec. 26 (unsurveyed) at Timothy Meadows, 11¼ miles above station at intake, 17 miles above mouth of Oak Grove Fork, and 43 miles above Cazadero, Clackamas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—February 25, 1913, to November 26, 1916; July 14, 1918, to September 30, 1920 (fragmentary).

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by employees of Portland Railway, Light & Power Co. Intake to gage lowered September 21, 1920, and gage reset at independent datum.

DISCHARGE MEASUREMENTS.—Made from footbridge 20 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 1.99 feet at 4 p. m. January 23 (discharge, 540 second-feet); minimum stage recorded, 0.61 foot at noon October 24 (discharge, 144 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.13 feet at midnight April 20 (discharge, 282 second-feet); minimum stage recorded, 0.61 foot at noon September 21 (discharge, 124 second-feet).

1913–1916 and 1918–1920: Maximum stage recorded, 2.37 feet at 5 p. m. June 17, 1916 (discharge, 584 second-feet); minimum stage recorded, 0.43 foot at 6 p. m. November 11, 1915 (discharge, 100 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory though record is fragmentary. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good for periods when gage was in operation.

COOPERATION.—Field data furnished by the Portland Railway, Light & Power Co.

Discharge measurements of Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 3	F. G. Robley	0.62	139	May 27	Apperson and Douglas	0.98	235
				Sept. 21	A. L. Apperson	.61	123
1919.				22	do	.64	135
May 25	Carroll and Rands	1.40	353	26	do	.65	133

NOTE.—Gage reset at independent datum on September 21, 1920.

Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at Timothy Meadows near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	152	150	155	152	226			339	310			
2	150	150	155	150	212			339	296			
3	150	150	155	150	212			339	296			
4	152	150	155	150	212			339	296			
5	152	147	168	147	199		254	339	282			
6	150	147	165	150	199		240	339	282			
7	150	150	165	155	199		240	339	268			
8	150	147	160	157	186		240	339	268			
9	147	147	157	165	212		254	339	268			
10	150	160	157	170	226		268	354	268			
11	150	155	157	168	212		254	354	254			
12	147	150	155	168	199		254	354	254			
13	147	152	165	165	199		240	339	254			
14	152	178	186	168	199		240	339	254			
15	165	199	199	165	199		240	339				
16	170	175	186	157	199		254	354				
17	155	186	178	199	199		296	339				
18	152	168	168	240	199		296	339				
19	150	163	165	296	199		296	339				
20	150	155	175	282	199		296	339				
21	150	155	168	226	186		296	339				
22	150	152	165	310	186		310	339				
23	147	155	165	476	186		310	339				
24	147	155	165	384	186		310	324				
25	147	155	165	339			310	339				
26	147	152	165	310			310	354				
27	165	155	165	282			324	354				
28	163	152	170	268			339	339				
29	157	152	160	254			339	339				
30	150	152	157	240			339	339				
31	150		152	226				324				

Daily discharge, in second-feet, of Oak Grove Fork of Clackamas River at Timothy Meadows near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1							173		212	155		163
2							173		199	155		163
3							160		199	152		165
4							168		199	152		165
5							199		199	152	147	
6						160	212	240	199	152		
7						160	226		212	152		
8							226		212	152		
9							240		199	152		
10							240		199	152	147	
11							254		186	152	147	150
12							254		186	157	147	
13							268		186	165	147	
14							268		199	160	150	
15		160					268		186	152	150	
16				240			268		186	152	150	
17				240			268		186	150	150	
18				226			268		178	150	152	
19						212	268		178	152	152	
20						212	282		173	152	150	134
21						212			173	150	150	124
22						212			168	150	152	132
23						199			165	150	152	138
24						199			163	147	152	140
25						199			163		152	140
26						186			160		152	134
27						183		226	160	147	152	130
28						178		226	160		160	127
29						178		226	157		160	127
30						183		212	157		160	124
31						178		212			160	

NOTE.—Discharge, July 25 to Aug. 9 and Sept. 5–19, 1920, estimated.

Monthly discharge of Oak Grove Fork of Clackamas River at Timothy Meadows, near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	170	147	152	9,350
November	199	147	157	9,340
December	199	152	165	10,100
January	476	147	222	13,600
February 1–24	226	186	201	9,570
April 5–30	339	240	283	14,600
May	354	324	341	21,000
June 1–14	310	254	275	7,640
1920.				
April 1–20	282	160	234	9,280
June	212	157	183	10,900
July	165	147	151	9,280
August	160	147	150	9,220
September	163	124	145	8,630

OAK GROVE FORK OF CLACKAMAS RIVER AT INTAKE, NEAR CAZADERO, OREG.

LOCATION.—In SW. ¼ sec. 4, T. 6 S., R. 7 E., 2,000 feet above proposed intake of Oak Grove power development of Portland Railway, Light & Power Co. and 35 miles above Cazadero, Clackamas County.

DRAINAGE AREA.—131 square miles (measured by Portland Railway, Light & Power Co.).

RECORDS AVAILABLE.—May 21, 1909, to September 30, 1920 (fragmentary).

GAGE.—Stevens water-stage recorder on right bank, used since December, 1916; Watson recording gage on left bank used March, 1912, to September, 1913; Friez water-stage recorder October, 1913, to October, 1916. Datum of gage changed September 20, 1920.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed composed of boulders; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 2.72 feet at 2 a. m. January 17 (discharge, 1,800 second-feet); minimum stage recorded, 0.77 foot August 24–29 (discharge, 384 second-feet).

Maximum stage recorded during year ending September 30, 1920, from water-stage recorder, 1.69 feet at 10 a. m. May 10 (discharge, 900 second-feet); minimum stage recorded, 0.90 foot at noon September 30 (discharge, 348 second-feet).

1909–1920: Maximum stage recorded, 3.40 feet November 24, 1909 (discharge, 2,670 second-feet); minimum discharge recorded, 320 second-feet (gage height, 0.60 foot) October 17 to November 3, 1911.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder unsatisfactory owing to clock stopping. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent, except for estimated periods.

COOPERATION.—Field data furnished by Portland Railway, Light & Power Co.

Discharge measurements of Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 3	Robley and Possom....	0.85	402	May 27	Reineking and Apperson.....	1.35	698
1919.				28	.....do.....	1.30	680
May 26	Carroll and Rands.....	1.90	819	Sept. 20	A. L. Apperson.....	.85	331
				28	.....do.....	.97	388

NOTE.—Datum of gage changed on Sept. 20, 1920. Measurements made by employees of Portland Railway, Light & Power Co.

Daily discharge in second-feet, of Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., for the year ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919.											
1	395	431	471	466	.....	670	.....	900	535	480	399
2	395	427	466	480	.....	694	.....	865	525	480	403
3	395	423	458	480	.....	742	.....	865	520	480	407
4	395	415	458	490	.....	940	.....	865	515	480	415
5	423	407	495	505	.....	900	.....	865	505	480	423
6	415	403	515	480	.....	865	.....	830	500	480	431
7	411	399	520	448	545	830	.....	830	495	480	440
8	395	388	505	462	540	795	.....	795	490	476	448
9	395	384	500	480	540	760	.....	760	485	476	471
10	399	458	490	462	535	.....	.....	754	476	471	515
11	395	480	485	471	535	.....	.....	742	466	466	490
12	392	448	485	466	530	.....	.....	712	458	462	485
13	395	453	555	431	530	.....	.....	658	458	458	485
14	399	505	760	427	520	.....	.....	652	453	448	490
15	403	795	760	440	525	.....	.....	640	448	435	495
16	580	640	652	940	520	.....	.....	628	444	431	510
17	462	555	560	.....	530	.....	.....	616	444	423	515
18	419	510	565	.....	550	.....	.....	598	444	415	515
19	411	490	586	.....	545	.....	.....	598	440	407	.....
20	415	471	515	.....	540	.....	.....	592	440	399	.....
21	403	471	490	.....	540	.....	.....	586	444	392	.....
22	407	476	458	.....	540	.....	.....	575	448	388	
23	419	476	419	.....	540	.....	.....	570	448	388	.....
24	431	476	440	.....	545	.....	.....	570	453	384	.....
25	427	476	462	.....	540	.....	.....	570	453	384	.....
26	419	480	471	.....	545	.....	1,060	560	458	384	.....
27	458	490	466	.....	550	.....	1,060	560	462	384	.....
28	616	490	480	.....	560	.....	1,020	550	466	384	.....
29	485	480	471	.....	586	.....	865	550	471	384	.....
30	458	471	466	.....	622	.....	900	540	476	388	.....
31	435	.....	458	.....	658	.....	940	.....	476	392	.....

Day.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1920.							
1	.....	.....	.....	610	480		
2	.....	.....	.....	598	480		
3	.....	.....	.....	586	480	435	
4	.....	.....	.....	580	480		
5	505	.....	.....	580			
6	.....	.....	730	580		427	450
7	.....	.....	760				
8	.....	.....	830		480	421	
9	.....	700	865				
10	.....	.....	865			415	
11	.....	.....	865				
12	640	.....	830	560	480		480
13	634	.....	830		480		530
14	624	.....	830		480		480
15	616	.....	795		480		435
16	604	.....			480		
17	598	.....			480	446	
18	592	.....	750	530	480		425
19	598	.....			458		
20	598	700			458		415
21	580	.....		505	458		
22	550	.....			458		
23	525	.....	710	480	458		398
24	525	.....				378	
25	530	.....					
26	540	.....		480			
27	550	.....	670		450	446	390
28	580	.....	646	480			382
29	580	.....	640				365
30	575	.....	634	480		415	348
31	555	.....	628	.....		420	.....

NOTE.—Braced figures show mean discharge estimated for periods when gage did not operate.

Monthly discharge of Oak Grove Fork of Clackamas River at intake, near Cazadero, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	616	392	427	26,300
November	795	384	476	28,300
December	760	419	512	31,500
January 1–16	940	427	496	15,700
March 7–31	658	520	548	27,200
April 1–9	940	670	800	14,300
May 26–31	1,060	865	974	11,600
June	900	540	680	40,500
July	535	440	471	29,000
August	480	384	432	26,600
September 1–18	515	399	463	16,500
1920.				
May 6–31	865	628	748	38,600
June	610	480	536	31,900
July	480	.....	469	28,800
August	.....	378	436	26,800
September	530	348	429	25,500

LEWIS RIVER BASIN.

LEWIS RIVER NEAR AMBOY, WASH.

LOCATION.—In sec. 36, T. 6 N., R. 3 E., at Cresap's ferry crossing, on county road from Amboy to Cougar, 1½ miles below Canyon Creek, 2 miles above Speilei Creek, and 5 miles northwest of Amboy, Clarke County.

DRAINAGE AREA.—665 square miles (measured on map in Water-Supply Paper 253, page 74, and checked on Forest Service map).

RECORDS AVAILABLE.—January 20, 1911, to September 30, 1920.

GAGE.—Inclined and vertical staffs on left bank; read by James Hanley.

DISCHARGE MEASUREMENTS.—Made from cable 30 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; shifts during extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 12.0 feet at 8 a. m. January 23 (discharge, 39,000 second-feet); minimum stage recorded, 0.10 foot October 9 (discharge, 800 second-feet).

Maximum stage recorded during year ending September 30, 1920, 8.0 feet at 4 p. m. December 24, 1919, and at 8 a. m. January 26, 1920 (discharge, 21,900 second-feet); minimum stage recorded, 0.25 foot at 4. p m. September 8 (discharge, 920 second-feet).

1911–1920: Maximum stage determined by leveling to high-water marks, 16.4 feet December 18, 1917 (discharge estimated from extension of rating curve, 60,000 second-feet); minimum discharge recorded, 686 second-feet September 30, 1915 (gage height, 0.08 foot).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during floods of January 23 and December 24, 1919. Three well-defined rating curves used. Gage read to tenths twice daily at high stages, to half-tenths at medium and low stages. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Lewis River near Amboy, Wash., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 14	V. H. Reineking	2.89	5,280	Jan. 17	R. J. Shepard[a]	3.61	6,880
July 30	J. J. Dirzulaitis	.81	1,450	27	....do	6.20	14,900
Sept. 25	....do	.31	1,050	Sept. 16	F. F. Henshaw	.30	954

[a] Engineer for Northwestern Electric Co.

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	800	2,220	2,360	2,220	5,220	4,780	2,920	7,160	5,000	2,920	1,490	1,100
2	800	2,220	3,020	2,220	4,780	10,500	2,920	6,890	4,780	2,920	1,490	1,100
3	960	2,520	8,300	2,080	4,130	7,710	8,000	6,130	5,000	2,920	1,490	1,060
4	1,430	2,520	7,430	2,080	3,920	6,630	11,400	5,440	5,220	2,920	1,380	1,060
5	1,230	2,520	7,430	1,940	3,710	6,130	11,100	5,440	5,000	2,920	1,380	1,490
6	1,000	2,220	7,160	1,940	3,710	5,440	7,430	5,220	5,000	2,760	1,380	1,860
7	920	2,080	6,360	1,660	3,500	5,440	6,890	5,000	4,780	2,600	1,380	1,380
8	880	1,940	5,600	1,660	3,300	5,220	6,380	5,220	4,560	2,600	1,380	1,180
9	800	2,520	5,360	1,660	8,000	4,340	5,660	5,440	4,340	2,600	1,380	1,180
10	960	4,880	4,880	1,660	7,430	4,130	7,710	5,220	4,560	2,600	1,280	1,140
11	920	6,890	4,650	1,800	6,630	4,560	6,380	5,220	4,780	2,600	1,280	1,380
12	880	5,120	4,880	1,800	5,890	4,340	6,130	5,440	4,780	2,450	1,280	1,490
13	880	4,420	13,400	1,940	5,440	4,130	5,890	5,000	4,560	2,450	1,230	1,280
14	840	6,360	24,700	1,660	5,220	3,710	5,440	5,000	4,780	2,300	1,230	1,180
15	840	10,800	16,200	2,360	5,000	3,500	5,000	5,660	4,340	2,300	1,230	1,140
16	1,430	9,530	11,800	2,680	5,220	3,500	4,560	7,160	4,340	2,150	1,230	1,100
17	1,540	7,710	9,530	19,200	5,440	3,920	6,380	6,890	4,130	2,150	1,230	1,100
18	1,180	5,850	7,160	22,300	4,780	9,840	9,840	6,380	4,130	2,000	1,180	1,100
19	1,140	5,360	6,620	19,900	4,560	8,000	11,100	5,890	4,130	1,860	1,180	1,060
20	1,050	4,650	6,890	14,400	4,560	6,380	10,800	6,380	3,920	1,860	1,180	1,060
21	960	4,000	6,360	15,500	4,130	5,890	9,220	6,380	3,710	1,860	1,180	1,060
22	880	3,800	5,360	29,200	3,710	5,440	8,300	7,430	3,710	1,860	1,140	1,060
23	920	3,400	4,650	34,600	3,710	5,440	8,000	6,890	3,710	1,720	1,140	1,020
24	960	3,200	4,000	18,800	3,710	5,000	8,000	6,380	3,710	1,600	1,140	1,020
25	1,050	2,840	3,600	12,700	3,920	4,560	7,430	6,380	3,500	1,600	1,140	1,020
26	1,100	2,680	3,400	11,400	3,710	4,340	6,890	8,300	3,710	1,600	1,140	1,020
27	1,540	2,520	3,200	9,840	3,710	4,130	6,890	10,200	3,500	1,600	1,100	1,020
28	6,620	2,520	2,840	8,300	3,920	3,920	6,890	8,910	3,300	1,600	1,100	1,020
29	3,800	2,680	2,840	6,890	.....	3,710	6,890	7,430	3,100	1,490	1,100	1,020
30	3,200	2,520	2,520	6,130	.....	3,300	6,890	6,380	2,920	1,490	1,100	1,020
31	2,520	.....	2,360	5,440	.....	3,300	.....	5,660	.....	1,490	1,100	.....
1919–20.												
1	2,600	5,890	5,220	4,650	6,360	1,940	3,600	3,600	4,000	3,200	1,140	1,180
2	2,150	6,890	3,710	4,420	5,850	1,940	3,600	3,400	3,800	3,020	1,140	1,140
3	2,150	6,890	3,300	4,420	5,360	1,940	3,600	3,600	3,600	3,020	1,140	1,050
4	2,000	9,220	3,300	4,000	4,880	1,940	4,880	4,000	3,400	2,840	1,140	1,000
5	1,600	8,910	2,920	3,600	4,420	1,940	5,360	4,200	3,200	2,680	1,140	1,000
6	1,490	8,000	2,760	3,200	4,200	1,940	6,360	4,420	4,420	2,520	1,140	960
7	1,490	6,890	2,760	3,200	4,200	1,800	7,160	4,880	4,650	2,360	1,100	960
8	1,230	5,000	2,600	3,020	4,000	1,800	6,620	6,100	4,880	1,940	1,100	920
9	1,180	3,710	2,600	3,020	3,600	2,520	5,850	5,850	4,880	1,800	1,100	960
10	1,180	3,100	2,450	2,840	3,400	2,360	5,360	4,650	4,420	1,660	1,100	1,100
11	1,140	2,920	2,300	2,680	3,200	2,360	5,120	4,200	4,000	1,540	1,100	1,940
12	1,100	2,760	2,000	2,520	3,020	4,000	5,120	4,000	3,800	1,940	1,100	4,000
13	1,100	2,600	2,000	2,520	2,840	14,400	6,890	3,800		2,220	1,100	6,620
14	1,060	2,600	1,860	2,360	2,840	10,500	6,360	3,800		1,940	1,100	7,710
15	1,060	6,630	1,720	2,360	2,680	6,620	6,100	3,600		1,660	1,050	6,360
16	1,060	8,600	1,720	3,020	2,520	6,360	5,850	3,600	4,700	1,540	1,050	4,880
17	1,020	6,890	2,000	6,890	2,520	5,120	5,360	5,850		1,430	1,050	3,600
18	1,020	4,130	2,000	5,850	2,520	4,880	4,880	5,120		1,430	1,050	2,840
19	1,020	7,710	2,000	5,360	2,360	4,420	4,650	4,420		1,330	1,050	2,520
20	1,020	6,890	11,800	4,420	2,220	4,200	4,650	4,200		1,330	1,050	2,680
21	1,060	5,440	12,700	4,420	2,220	4,200	4,420	4,000	3,400	1,230	1,050	3,600
22	1,100	5,000	10,500	4,000	2,220	4,000	4,200	3,600		1,230	1,050	6,620
23	1,280	4,130	11,800	3,600	2,080	4,000	4,000	3,400		1,230	1,050	8,000
24	1,100	4,130	19,900	3,600	2,080	3,800	4,000	3,200		1,230	1,050	9,220
25	1,100	3,710	14,100	8,910	2,080	3,600	4,000	3,020		1,230	1,050	8,910
26	1,100	3,300	9,840	19,900	2,080	3,600	4,200	3,200		1,180	1,000	8,300
27	1,140	2,920	6,890	14,400	1,940	3,600	4,200	3,200	3,200	1,180	1,050	8,000
28	1,180	2,920	5,850	12,400	1,940	3,600	4,200	3,600		1,180	1,230	6,890
29	1,280	3,300	4,880	10,200	1,940	3,600	4,000	4,200		1,180	1,230	5,850
30	1,280	6,130	4,880	9,220	.....	3,600	3,800	3,600		1,140	1,230	4,880
31	1,230	.....	4,650	7,710	.....	3,600	.....	3,800	.....	1,140	1,180	.....

NOTE.—Discharge, Oct. 30, 1919, interpolated; June 13–30, 1920, estimated by comparison with records of flow of Toutle River near Silver Lake, Wash.

Monthly discharge of Lewis River near Amboy, Wash., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 665 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	6,620	800	1,420	2.14	2.47	87,300
November	10,800	1,940	4,080	6.14	6.85	243,000
December	24,700	2,360	6,610	9.94	11.46	406,000
January	34,600	1,660	8,580	12.90	14.87	528,000
February	8,000	3,300	4,680	7.04	7.33	260,000
March	10,500	3,300	5,200	7.82	9.02	320,000
April	11,400	2,920	7,240	10.89	12.15	431,000
May	10,200	5,000	6,340	9.53	10.99	390,000
June	5,220	2,920	4,230	6.36	7.10	252,000
July	2,920	1,490	2,190	3.29	3.79	135,000
August	1,490	1,100	1,250	1.88	2.17	76,900
September	1,860	1,020	1,160	1.74	1.94	69,000
The year	34,600	800	4,420	6 65	90.14	3,200,000
1919–20.						
October	2,600	1,020	1,310	1.97	2.27	80,600
November	9,220	2,600	5,240	7.88	8.79	312,000
December	19,900	1,720	5,390	8.11	9.35	331,000
January	19,900	2,360	5,570	8.38	9.66	342,000
February	6,360	1,940	3,160	4.75	5.12	182,000
March	14,400	1,800	4,010	6.03	6.95	247,000
April	7,160	3,600	4,950	7.44	8.30	295,000
May	6,100	3,020	4,070	6.12	7.06	250,000
June			3,690	5.55	6.19	220,000
July	3,200	1,140	1,760	2.65	3.06	108,000
August	1,230	1,000	1,100	1.65	1.90	67,600
September	9,220	920	4,120	6.20	6.92	245,000
The year	19,900	920	3,690	5.55	75.57	2,680,000

KALAMA RIVER BASIN.

KALAMA RIVER NEAR KALAMA, WASH.

LOCATION.—In sec. 7, T. 6 N., R. 1 E., 150 feet below power house of North Coast Power Co., and 9 miles by road east of Kalama, Cowlitz County.

DRAINAGE AREA. Not measured.

RECORDS AVAILABLE.—July 6, 1911, to January 11, 1912; December 1, 1912, to September 30, 1913; August 19, 1916, to September 30, 1920.

GAGE.—Vertical staff bolted to rock ledge; lower section up to 8 feet on left bank; upper section, 8 to 12 feet, in a cove on right bank opposite lower section; read by L. A. Van Fleet. Gage at same location, but with datum 2.0 feet lower, used 1911 to January, 1912, and one with datum 3.0 feet lower used December, 1912, to September, 1913.

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

CHANNEL AND CONTROL.—Control is rock reef and bar of coarse gravel about 100 feet below gage; gravel may shift in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.8 feet at 5 a. m. January 23 (discharge, 10,700 second-feet); minimum stage recorded, 0.69 foot October 1–3 (discharge, 178 second-feet).

Maximum stage recorded during year, 7.0 feet at 4 p. m. December 25 (discharge, 5,770 second-feet); minimum stage recorded, 0.60 foot September 3 and 4 (discharge, 166 second-feet).

1911–1913 and 1916–1920: Maximum stage recorded, 10.3 feet December 18, 1917 (discharge, 11,700 second-feet); minimum stage recorded, that of September 3 and 4, 1920.

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

DIVERSIONS.—None.

REGULATION.—Operation of power plant causes some fluctuation, but gage is read only at times when load is steady.

ACCURACY. Stage-discharge relation changed for low stages during high water in January, 1919, and April, 1920. Three well-defined rating curves used, identical above a stage of 2.4 feet Gage read to hundredths once a day at low stages; to half-tenths at medium and high stages. Daily discharge ascertained by applying daily gage reading to rating table. Records good except those for low stages, which are fair.

Discharge measurements of Kalama River near Kalama, Wash., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
July 31	J. J. Dirzulaitis	1.05	334	Sept. 5	F. F. Henshaw	0.84	225
Sept. 26	do	.80	227				

Daily discharge, in second-feet, of Kalama River near Kalama, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	178	580	630	705	1,390	2,610	1,320	1,180	930	485	340	295
2	178	532	1,620	680	1,320	3,150	1,540	1,180	815	465	340	310
3	178	1,050	2,130	655	1,250	2,510	1,460	1,180	765	465	340	295
4	180	1,050	1,950	630	1,250	2,410	2,930	1,110	715	445	340	310
5	400	990	1,780	630	1,250	2,220	2,710	1,050	715	445	325	370
6	240	755	1,780	605	1,180	2,220	2,040	930	665	465	325	388
7	222	655	1,620	605	1,110	2,130	1,620	815	665	445	325	340
8	198	680	1,620	605	1,250	2,040	1,390	765	665	445	325	325
9	180	810	1,620	580	4,140	1,950	1,320	715	715	445	310	325
10	310	3,630	1,620	580	3,390	1,700	1,780	715	765	405	310	310
11	234	2,220	1,620	605	2,820	1,700	1,620	930	815	405	310	370
12	237	1,390	1,320	655	2,310	1,540	1,320	870	815	405	310	340
13	213	1,460	4,270	680	2,220	1,460	1,320	815	815	405	310	310
14	207	2,130	9,100	680	2,130	1,320	1,250	815	870	388	310	310
15	210	4,660	4,010	930	1,860	1,250	1,180	990	815	388	310	295
16	930	3,040	2,710	2,510	2,130	1,110	1,050	1,540	715	370	310	265
17	488	2,130	2,040	7,830	2,130	1,620	2,130	1,320	715	370	310	250
18	400	1,620	1,700	7,830	1,860	3,390	2,820	1,250	715	370	310	245
19	328	1,320	1,620	5,770	1,700	2,930	2,610	1,110	665	370	295	240
20	292	1,180	1,780	4,010	1,540	2,310	2,410	1,050	620	370	295	232
21	275	1,050	1,700	3,390	1,320	1,950	1,950	1,050	620	355	295	232
22	275	810	1,460	7,470	1,320	1,780	1,700	1,050	620	355	295	232
23	275	990	1,250	9,100	1,320	1,700	1,620	990	620	340	295	232
24	345	930	1,180	4,790	1,320	1,620	1,460	930	620	340	295	332
25	310	655	1,050	3,390	2,040	1,620	1,460	1,180	575	340	295	228
26	292	655	990	3,630	1,950	1,620	1,460	1,180	575	340	295	228
27	810	655	930	3,270	2,130	1,460	1,460	1,620	552	340	295	240
28	1,460	655	1,050	2,610	2,220	1,320	1,320	1,320	530	340	295	240
29	1,180	630	930	2,040	.....	1,320	1,250	1,180	530	340	295	232
30	870	630	810	1,620	.....	1,460	1,180	1,180	508	340	295	370
31	630	.....	705	1,540	.....	1,460	.....	990	.....	340	310	.....

Daily discharge, in second-feet, of Kalama River near Kalama, Wash., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	715	1,540	1,320	870	1,700	445	990	1,110	600	326	234	188
2	620	1,540	1,050	765	1,620	445	1,050	930	600	326	225	188
3	388	1,620	930	715	1,620	445	1,050	930	600	326	219	166
4	370	2,410	930	715	1,620	620	2,610	930	600	600	210	166
5	325	2,130	765	815	1,620	620	3,750	930	575	575	205	228
6	310	1,950	715	765	1,540	575	2,610	812	600	528	200	213
7	310	2,310	665	715	1,390	552	2,510	870	930	460	193	208
8	310	1,110	620	715	1,250	620	2,220	930	990	439	193	208
9	295	930	620	665	1,110	620	1,860	1,050	930	418	193	213
10	280	815	620	665	990	620	1,700	1,050	812	380	193	460
11	280	715	552	665	870	665	1,540	930	700	309	193	326
12	280	715	530	620	765	1,390	1,620	756	700	309	188	1,460
13	265	715	500	575	715	4,660	1,950	700	700	344	188	2,510
14	265	665	480	575	665	3,270	1,950	700	1,110	309	188	2,820
15	265	2,220	460	552	665	2,410	1,860	600	990	309	188	1,950
16	265	1,860	440	1,390	665	1,780	1,700	600	930	292	186	1,620
17	265	715	800	1,320	620	1,390	1,620	1,050	700	292	186	1,320
18	250	1,110	1,460	1,320	620	1,180	1,460	870	700	292	186	930
19	250	1,780	1,460	1,250	620	1,050	1,460	756	700	275	181	812
20	250	1,320	3,150	1,180	620	930	1,320	756	600	275	181	756
21	280	1,110	2,930	1,050	620	815	1,320	700	575	259	181	812
22	355	930	2,410	930	620	815	1,250	700	550	259	181	1,320
23	325	930	2,610	930	620	815	1,250	700	528	259	179	2,930
24	325	870	5,770	930	552	815	1,180	650	482	259	179	2,310
25	310	815	3,150	2,310	552	815	1,110	600	460	259	179	2,410
26	310	815	2,510	3,880	485	815	1,110	600	439	259	179	2,310
27	310	815	2,130	2,930	485	815	1,110	600	418	259	186	2,220
28	765	815	1,780	2,220	485	930	1,110	600	399	259	237	2,040
29	620	1,050	1,390	1,950	465	870	1,110	700	344	259	309	1,780
30	340	1,250	1,390	1,950	.....	930	1,110	700	326	259	275	1,460
31	388	.....	1,320	1,700	.....	930	.....	650	.....	259	243	.....

NOTE.—Discharge estimated Dec. 13–17, 1919.

Monthly discharge of Kalama River near Kalama, Wash., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918-19.				
October	1,460	178	404	24,800
November	4,660	532	1,320	78,600
December	9,100	630	1,890	116,000
January	9,100	580	2,600	160,000
February	4,140	1,110	1,850	103,000
March	3,390	1,110	1,900	117,000
April	2,930	1,050	1,690	101,000
May	1,620	715	1,060	65,200
June	930	508	691	41,100
July	485	340	391	24,000
August	340	295	310	19,100
September	388	228	286	17,000
The year	9,100	178	1,200	867,000
1919-20.				
October	765	250	351	21,600
November	2,410	665	1,250	74,400
December	5,770	.....	1,470	90,400
January	3,880	552	1,210	74,400
February	1,700	465	902	51,900
March	4,660	445	1,090	67,000
April	3,750	990	1,620	96,400
May	1,110	600	789	48,500
June	1,110	326	653	38,900
July	600	259	330	20,300
August	309	179	202	12,400
September	2,930	166	1,210	72,000
The year	5,770	166	920	668,000

COWLITZ RIVER BASIN.

COWLITZ RIVER AT LEWIS, WASH.

LOCATION.—In sec. 15, T. 13 N., R. 9 E., at suspension bridge 1 mile northeast of Lewis and 1½ miles below Lake Creek, Lewis County.

DRAINAGE AREA.—275 square miles (measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—July 1, 1911, to December 31, 1919, when station was discontinued.

GAGE.—Vertical and inclined staff on left bank 100 feet below suspension bridge; installed January 26, 1918; read by William Sethe and J. A. Combs. For description of previous gages see Water-Supply Paper 484.

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

CHANNEL AND CONTROL.—Bed of stream composed of gravel and sand; shifts at high water. Right bank subject to overflow at extremely high stages. Control is gravel and boulder riffle 150 feet below gage. Stage of zero flow, according to measurements made September 17, 1918, gage height −0.3 foot±0.1 foot, and March 14, 1919, gage height −0.7 foot.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1, 1918, to December 31, 1919, occurred January 23, gage height not determined (discharge, estimated at 16,000 second-feet); minimum stage recorded, 0.62 foot October 27, 1919 (discharge, 184 second-feet).

1911–1919: Maximum stage recorded, 10.1 feet at 8 a. m. December 29, 1917, estimated by J. A. Combs (discharge, 22,700 second-feet); minimum stage recorded on October 27, 1919.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water on December 14 and gradually from June 20 to August 31. Rating curve used October 1 to December 13 well defined; curve used December 14 to June 19 fairly well defined below 7,000 second-feet and poorly defined above; curve used September 1 to December 31, 1919, fairly well defined below 800 second-feet. Shifting-control method used June 20 to August 31. Gage read to hundredths once daily. Daily discharge ascertained by applying gage height to rating table except as noted in footnote to table of daily discharge. Records good October 1 to December 13, 1918; fair December 14 to June 30; poor thereafter.

COOPERATION.—Gage-height record furnished by United States Forest Service and Portland Railway, Light & Power Co. Two discharge measurements furnished by J. A. Combs.

Discharge measurements of Cowlitz River at Lewis, Wash., during the period Oct. 1, 1918, to Dec. 31, 1919.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Dec. 28	R. B. Kilgore	1.41	791	June 3	McCombs and Lee	3.24	2,980
30	do	1.24	640	5	John McCombs	3.56	3,760
Mar. 12	do	1.08	562	Sept. 13	J. A. Combs	1.25	553
14	do	1.05	547	Oct. 24	do	.80	275

Daily discharge, in second-feet, of Cowlitz River at Lewis, Wash., for the period Oct. 1, 1918, to Dec. 31, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	545	1,200	620	603	1,070	634	1,220	2,830	2,890			690
2	408	980	1,530	572	980	772	1,380	2,360	2,940		1,100	620
3	360	880	6,400	572	935	700	1,550	1,800	3,000			587
4	320	785	4,140	572	850	700	2,360	1,550	3,380		1,020	554
5	785	730	2,950	572	850	700	1,670	1,430	3,750		1,100	520
6	596	675	2,390	543	772	667	1,490	1,550	3,750		1,170	487
7	408	620	2,010	533	720	634	1,320	1,670	3,360		1,270	487
8	320	582	1,530	524	850	603	1,170	1,800	3,180		1,070	552
9	295	545	1,530	514	1,020	603	1,120	1,930	3,000		1,120	487
10	580	550	1,310	507	935	593	1,490	1,800	2,510		1,020	455
11	1,360	1,090	1,250	500	850	582	1,380	1,680	2,510		1,120	803
12	880	930	1,150	494	850	572	1,320	1,550	2,510		935	654
13	678	1,150	3,260	487	811	543	1,220	1,430	2,510		892	552
14	475	1,650	7,460	487	772	543	1,120	1,430	2,590		850	586
15	448	2,010	3,750	577	736	543	1,020	1,670	2,670		1,020	620
16	620	1,770	2,670	667	811	514	980	1,800	2,510	2,200	980	588
17	545	1,420	1,930	8,300	811	634	1,550	1,550	2,510		980	555
18	462	1,200	1,670	8,880	772	736	1,930	1,610	2,830		1,120	523
19	448	1,090	1,430	5,610	736	772	1,930	1,670	3,400		892	490
20	435	980	1,320	3,360	700	772	1,930	2,360	3,960		1,120	458
21	435	930	1,170	2,510	700	772	1,670	3,000	3,750		1,020	425
22	363	858	1,020	14,600	678	772	1,550	4,400	3,550		980	393
23	395	785	935	16,000	656	772	1,550	3,360	3,360		980	487
24	545	722	892	5,110	634	772	1,680	3,560	3,550		980	487
25	480	660	865	3,000	634	736	1,800	3,750	3,360		980	487
26	415	660	838	2,360	618	700	2,000	5,740	3,550		935	455
27	2,660	620	811	1,930	603	736	2,210	7,740	3,000		700	393
28	2,950	620	772	1,670	572	772	2,360	6,070	2,670		603	334
29	2,390	580	700	1,470	.....	850	2,360	4,400	2,210		736	275
30	1,530	620	667	1,270	.....	1,070	2,670	3,360	2,210		800	298
31	1,360	.....	603	1,120	.....	1,270	.....	2,830	.....		900	.....

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1919.				1919.				1919.			
1	333	883	1,010	11	252	487	585	21	264	1,930	3,360
2	333	883	883	12	267	455	520	22	345	1,930	3,180
3	287	883	843	13	283	424	455	23	321	1,930	3,750
4	264	1,550	843	14	298	764	585	24	287	1,800	8,380
5	283	1,100	803	15	298	2,070	585	25	253	1,520	5,690
6	302	843	765	16	287	3,020	1,140	26	198	1,240	3,000
7	321	732	728	17	264	3,960	4,870	27	184	1,140	2,360
8	271	620	690	18	232	2,670	2,670	28	212	1,100	2,080
9	221	570	620	19	218	2,420	2,360	29	264	1,070	1,800
10	236	519	585	20	203	2,180	3,550	30	221	1,040	1,800
								31	203	.....	1,550

NOTE.—Gage-height book for July lost by observer. Gage not read on an average of 6 days a month, including Jan. 23, the day of maximum discharge for the year; discharge interpolated except for Oct. 3, 4, and Nov. 10, 1918; Jan. 23, Feb. 7–8, July 1–31, and Aug. 1–3, 29, 30, 1919, for which days discharge was estimated by comparison with flow of near-by streams. Braced figures show mean discharge for periods included.

Monthly discharge of Cowlitz River at Lewis, Wash., for the period Oct. 1, 1918, to Dec. 31, 1919.

[Drainage area, 275 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	2,950	295	790	2.87	3.31	48,600
November	2,010	545	930	3.38	3.77	55,300
December	7,460	603	1,920	6.98	8.05	118,000
January	16,000	487	2,770	10.1	11.64	170,000
February	1,070	572	783	2.85	2.97	43,500
March	1,270	514	711	2.59	2.99	43,700
April	2,670	980	1,630	5.93	6.62	97,000
May	7,740	1,430	2,700	9.82	11.32	166,000
June	3,960	2,210	3,030	11.0	12.27	180,000
July	.....	.....	2,200	8.00	9.22	135,000
August	1,270	603	987	3.59	4.14	60,700
September	803	275	510	1.85	2.06	30,300
The year	16,000	275	1,590	5.78	78.36	1,150,000
1919.						
October	345	184	265	.964	1.11	16,300
November	3,960	424	1,390	5.05	5.63	82,700
December	8,380	455	2,000	7.27	8.38	123,000
The period	.....	.....	.....	.....	.....	222,000

LAKE CREEK AT OUTLET OF PACKWOOD LAKE, NEAR LEWIS, WASH.

LOCATION.—In sec. 21, T. 13 N., R. 10 E., 400 feet below outlet of Packwood Lake and 5 miles east of Lewis, Lewis County.

DRAINAGE AREA.—About 18 square miles (measured on Plate I, Water-Supply Paper 313).

RECORDS AVAILABLE.—September 2, 1911, to September 30, 1920.

GAGE.—Friez water-stage recorder on left bank, installed August 3, 1918; inspected by J. A. Combs. For description of gages used prior to August 3, 1918, see Water-Supply Paper 484.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from footbridge 200 feet upstream.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders. Partial control about 20 feet downstream from gage formed by several trees felled across the stream from both banks. Trees partly broken and wedged against a large, boulder in midstream.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.2 feet at 6 p. m. January 23 (discharge, 419 second-feet); minimum stage from recorder, 1.20 feet at 6 p. m. September 30 (discharge, 32 second-feet).

Maximum stage during year ending September 30, 1920, from recorder, 2.5 feet at 10 a. m. July 5 (discharge, 272 second-feet); minimum stage from recorder, 1.16 feet October 28–31 (discharge, 30 second-feet).

1911–1920: Maximum stage estimated 6.0 feet December 18, 1917 (discharge not determined); minimum stage recorded October 28–31, 1919.

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

DIVERSIONS.—None.

REGULATION.—Flow regulated by natural storage in the lake.

ACCURACY.—Stage-discharge relation changed at midnight January 22, 1919, when logs at control were washed away. Rating curve used prior to the change well defined below 150 second-feet; rating curve used thereafter well defined below 250 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder charts by inspection, or during periods when water-stage recorder was not operating, as indicated in footnote to daily-discharge table. Records excellent, except for extremely high water and for periods when recorder was not operating, for which they are good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Portland Railway, Light & Power Co.

Discharge measurements of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Dec. 29	R. B. Kilgore	1.52	63.4	Oct. 10	J. A. Combs	1.18	31.3
1919.				Nov. 23	do	1.59	98.5
Mar. 16	do	1.33	41.9	1920.			
17	do	1.33	42.6	Apr. 11	do	1.36	45.2
June 2	J. A. Combs	1.94	165	June 8	do	2.01	178
4	McCombs and Lee	1.94	166	Sept. 19	Newton and Combs	1.54	81.7
July 27	J. A. Combs	1.66	110				

Daily discharge, in second-feet, of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	47	92	60	57	101	50	44	168	184	145	94	49
2	47	82	80	55	91	53	45	154	172	139	86	47
3	48	80	113	54	84	51	49	139	164	143	78	47
4	48	77	110	52	74	51	63	133	165	152	78	49
5	55	74	106	51	71	51	69	127	177	163	76	49
6	67	72	102	50	67	50	71	118	181	166	76	63
7	67	72	96	49	63	50	69	116	181	161	76	78
8	62	72	90	47	61	50	67	114	177	157	78	78
9	58	70	84	47	65	50	63	118	175	163	78	74
10	58	67	78	45	67	49	69	121	170	177	78	67
11	62	67	72	45	65	47	74	121	159	181	74	63
12	82	64	70	46	61	46	71	121	146	186	74	61
13	72	62	190	46	61	46	71	118	141	177	74	57
14	67	72	300	45	60	45	71	114	139	175	78	57
15	62	87	176	47	58	44	71	114	137	182	78	55
16	61	84	163	49	57	43	67	116	135	195	78	53
17	62	80	150	80	57	44	67	116	135	191	78	50
18	58	77	131	148	57	44	71	114	135	173	76	47
19	56	73	119	194	53	43	81	116	137	154	74	44
20	55	70	113	183	53	42	86	123	152	146	71	41
21	54	66	102	170	51	41	96	141	181	150	69	40
22	51	62	97	215	50	40	98	173	195	148	67	39
23	51	62	87	389	50	39	101	190	175	145	63	39
24	49	61	82	376	50	39	106	186	205	143	59	38
25	47	60	77	292	51	38	111	186	220	137	55	37
26	45	59	72	232	51	38	114	224	212	123	53	36
27	91	58	67	190	50	39	121	292	204	111	53	35
28	137	58	67	159	49	39	127	322	188	106	51	34
29	122	58	62	141	.....	40	131	302	170	106	51	34
30	108	57	61	125	.....	40	148	262	157	104	49	33
31	102	.....	58	114	.....	41	.....	220	.....	98	49	.....

Daily discharge, in second-feet, of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	33	37	61	81	148	39	41	47	91	220	94	81
2	35	53	59	76	139	39	40	47	105	231	91	69
3	35	63	57	69	125	39	40	46	118	231	88	69
4	34	65	53	63	111	38	43	46	132	220	91	63
5	33	61	51	59	98	38	51	46	146	244	94	57
6	33	55	49	53	91	38	53	47	159	231	94	50
7	33	51	47	51	91	38	51	47	173	214	94	45
8	34	47	46	50	86	38	50	51	179	206	94	43
9	33	44	45	49	81	46	50	67	179	204	96	40
10	33	44	44	47	78	57	47	84	179	203	96	45
11	33	39	43	46	74	55	46	94	181	195	98	57
12	33	37	41	45	71	51	45	127	177	184	96	86
13	32	35	40	44	65	51	45	135	173	168	96	111
14	32	36	39	44	61	51	45	114	203	152	94	146
15	32	46	38	44	59	51	45	104	248	146	94	141
16	31	78	38	61	55	50	44	111	244	157	94	121
17	31	96	38	121	51	50	44	148	237	163	91	101
18	31	96	39	145	51	49	44	170	233	164	91	81
19	31	104	44	191	50	47	44	168	220	157	86	74
20	31	98	51	190	49	46	44	163	212	148	81	84
21	31	94	69	166	47	46	44	161	216	139	76	104
22	31	94	78	145	46	45	45	152	239	129	74	108
23	31	94	91	123	45	45	45	141	224	121	71	114
24	31	94	135	118	44	44	45	133	195	118	67	116
25	31	88	164	133	43	45	45	121	172	111	61	118
26	31	78	154	163	41	44	45	111	154	106	59	114
27	30	69	137	193	40	44	45	106	145	104	51	96
28	30	67	125	212	40	43	46	101	159	108	59	78
29	30	65	114	195	40	43	46	101	172	111	91	65
30	30	65	104	181	.....	41	47	101	195	108	106	65
31	30	.....	91	164	.....	43	.....	96	.....	101	91	.....

NOTE.—Water-stage recorder not operating Oct. 19 to Dec. 15, 1918; Jan. 3–5, Feb. 14, 16, Mar. 4–9, 14–16, 19–23, 26–30, and Sept. 24 and 25, 1919; and June 2–6, 1920. Daily discharge ascertained from readings on staff gage Oct. 21–23, 26, 28, 30, 31, Nov. 1, 2, 4, 6, 8, 10, 11, 13–15, 18, 22, 28, 30, Dec. 3, 6, 11, 13, 15, 1918; Feb. 16, Mar. 9, 16, 23, and 30, 1919; by interpolation Oct. 19, 20, 24–25, 27, 29, Nov. 3, 5, 7, 9, 12, 16–17, 19–21, 23–27, 29, Dec. 4–5, 7–10, 1918, Jan. 3–4, Feb. 14–15, Mar. 4–8, 14–15, 20–22, 26–29, and Sept. 24–25, 1919, and June 2–6, 1920; by hydrographic comparison with flow of near-by streams Dec. 1, 2, 12, and 14, 1918.

Monthly discharge of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	137	45	66.2	4,070
November	92	57	69.8	4,150
December	300	58	104	6,400
January	389	45	122	7,500
February	101	49	61.7	3,430
March	53	38	44.6	2,740
April	148	44	83.1	4,940
May	322	114	161	9,900
June	220	135	169	10,100
July	195	98	152	9,350
August	94	49	70.1	4,310
September	78	33	49.8	2,960
The year	389	33	96.4	69,800
1919–20.				
October	35	30	31.9	1,960
November	104	35	66.4	3,950
December	164	38	70.5	4,330
January	212	44	107	6,580
February	148	40	69.7	4,010
March	57	38	45.0	2,770
April	53	40	45.5	2,710
May	170	46	103	6,330
June	248	91	182	10,800
July	244	101	164	10,100
August	106	51	85.8	5,280
September	146	40	84.7	5,040
The year	248	30	88.0	63,900

JOHNSON CREEK AT MOUTH, NEAR LEWIS, WASH.

LOCATION.—In sec. 33, T. 13 N., R. 9 E., 1 mile above mouth and 3 miles southwest of Lewis, in Lewis County.

DRAINAGE AREA.—About 30 square miles (measured on Plate I Water-Supply Paper 313).

RECORDS AVAILABLE.—August 14, 1907, to September 23, 1914, and October 1, 1918, to September 30, 1920.

GAGE.—Friez water-stage recorder on left bank, installed October 1, 1918; inspected by J. A. Combs. A vertical staff gage 80 feet below present site was used prior to September 23, 1914.

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

CHANNEL AND CONTROL.—Channel composed of small boulders. Low-water control is riffle about 40 feet below gage; at high stages a considerable length of channel forms control. Banks steep, not subject to overflow. Channel fairly straight for 300 feet below gage. Stage of zero flow, as determined March 15, 1919, gage height —0.35 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.75 feet at 4 a. m. January 23 (discharge, 2,500 second-feet); minimum stage from recorder, 0.49 foot from 2 to 5 p. m. October 2 (discharge, 31 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder 2.22 feet at 2 p. m. December 24 (discharge, 760 second-feet); stage may have been higher in January; minimum stage, from recorder, 0.47 foot at 8 p. m. October 27 (discharge, 29 second-feet).

1907–1914 and 1918–1920: Maximum stage recorded, that of January 23, 1919; minimum stage recorded, 0.40 foot September 1 and 7, 1914 (discharge, 28 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed December 24, 1919. Rating curves well defined. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection, except as indicated in footnote to daily-discharge table. Records excellent except those for extremely high water and for periods when recorder did not operate, which are fair January 21 to February 26, 1920, and otherwise good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Portland Railway, Light & Power Co.

Discharge measurements of Johnson Creek at mouth, near Lewis, Wash., during the period July 29, 1918, to Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
1918.				1919.			
July 29	Lee and Combs	0.83	83.2	June 5	Combs and Lee	1.72	408
Sept. 19	Bedford and Combs	.53	34.3	July 15	J. A. Combs	1.21	167
Dec. 31	R. B. Kilgore	.90	95.7				
				1920.			
1919.				Jan. 28	do	2.10	560
Mar. 13	Combs and Kilgore	.86	93.3	Apr. 6	do	1.10	149
15	R. B. Kilgore	.85	89.6	June 5	do	1.64	310
June 5	Lee and McCombs	1.72	413	Sept. 18	H. W. Newton	.90	91.5

Daily discharge, in second-feet, of Johnson Creek at mouth, near Lewis, Wash., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	32	106	79	93	147	52	197	430	301	220	92	47
2	32	95	212	92	134	180	220	380	301	216	86	47
3	33	90	344	90	121	140	257	322	356	216	84	47
4	32	83	368	88	106	106	356	280	392	208	81	47
5	40	79		84	92	104	312	248	418	216	72	47
6	43	77		83	83	102	253	244	404	212	72	46
7	42	74	180	81	84	100	216	253	350	208	70	47
8	39	74		79		98	190	285	327	204	70	47
9	37	74		77	200	96	180	306	306	212	72	47
10	40	84	121	76		94	223	285	280	223	70	59
11	39	88	121	74	167	92	220	271	262	212	70	83
12	44	86	118	72	164	90	208	244	244	184	68	86
13	40	86		70	147	90	190	220	253	174	66	83
14	37	147		68	137	90	174	227	262	180	65	79
15	37	208	450	72	130	88	164	253	257	177	64	70
16	42	182		110	130	88	161	253	257	174	62	61
17	46	157	276	550	130	96	235	235	257	159	61	59
18	46	132	231	1,180	128	106	322	235	269	142	60	58
19	47	106	208	871	128	108	350	276	356	137	59	56
20	46	103	190	634	123	106	333	327	374	132	59	54
21	47	97	176	398	106	108	322	424	362	123	59	54
22	46	93	161	1,400	90	112	267	605	333	114	59	54
23	44	88	146	1,980	74	114	276	498	312	112	58	54
24	52	84	132	966	66	114	317	411	301	108	58	52
25	56	79	128	605	68	110	312	418	333	106	56	51
26	54	74	123	437	54	108	317	532	350	105	51	47
27	130	74	116	338	47	110	368	720	312	105	51	46
28	193	74	111	239	46	121	404	680	276	99	49	44
29	181	74	106	220	.....		411	532	231	97	47	44
30	145	77	102	184	.....	180	424	418	223	95	46	44
31	123	.....	97	164	.....		.....	344	.....	93	47	.....
1919-20.												
1	49	51	97	152		83	88	177	185	287	73	66
2	56	84	88	141		79	86	162	200	268	72	56
3	51	128	86	133		75	81	154	247	257	70	46
4	47	145	84	126		72	83	157	302	240	68	46
5	44	125	79	122	200	72	126	171	314	218	66	44
6	43	93	74	113		66	154	215	298	209	68	48
7	42	72	73	111		66	131	279	323	206	65	49
8	36	63	71	109		68	124	327	323	200	63	48
9	32	59	70	104		70	120	366	294	191	60	48
10	32	56	68	100		178	115	331	276	185	58	56
11	32	54	66	94		177	113	287	276	168	55	56
12	33	58	65	83		138	122	268	268	157	53	
13	32	74	65	73		131	138	268	276	141	50	
14	33	88	65	70	150	124	136	272	376	133	52	
15	33	106	65	68		117	129	268	385	136	52	170
16	33	142	65	124		113	117	283	331	136	50	
17	33	167	83	180		109	111	428	327	141	50	
18	33	147	220	237		109	104	390	310	133	52	94
19	34	147	184	293		107	107	327	294	124	52	83
20	38	150	212	349		107	111	306	302	117	52	81
21	39	142	312			111	107	272	331	111	50	109
22	39	134	356		100	111	104	247	340	109	49	129
23	39	130	374			107	100	231	268	98	49	138
24	37	123	597			109	117	212	234	92	48	152
25	36	116	414			102	134	200	209	90	48	231
26	34	105	310	300		98	152	191	194	90	48	306
27	32	97	250		96	96	169	197	203	86	46	327
28	37	97	215		92	94	186	194	231	84	46	327
29	37	105	191		88	92	203	188	264	79	72	335
30	36	110	182		.....	92	194	185	283	79	88	340
31	34	.....	162		.....	84	.....	180	.....	75	77	.....

NOTE.—Water-stage recorder not operating properly Nov. 14–19, 25, 26, Dec. 2, 5–10, 13–17, 21–24, 27–31, 1918, Jan. 6–14, 20, 21, 27, 28, Feb. 3, 4, 8–11, Mar. 2–11, Mar. 29 to Apr. 1, Aug. 13–19 and Dec. 7–9, 1919; Jan. 16–20, Apr. 24–28, Aug. 7–13 and Sept. 12–17, 1920. Record Jan. 21 to Feb. 27, 1920, lost. Daily discharge ascertained from readings on staff gage Nov. 15, 19, 26 and Dec. 10, 17, 24, 31, 1918; Jan. 7, 14, 21, 28, Feb. 4, 11, Mar. 4, 11, Apr. 1, Aug. 19, and Dec. 9, 1919; Jan. 20, Feb. 27, and Aug. 13, 1920; by interpolation Nov. 14, 16–18, 25 and Dec. 21–23, 28–30, 1918; Jan. 7–13, 20, 27, Mar. 5–10, Aug. 14–18, and Dec. 7–8, 1919; Jan. 16–19, Apr. 24–28, and Aug. 7–12, 1920. Flat estimates of discharge ascertained by comparison with records of neighboring streams. Braced figures show mean discharge for periods included.

Monthly discharge of Johnson Creek at mouth, near Lewis, Wash., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	193	32	60.2	3,700
November	208	74	98.2	5,840
December	.....	79	205	12,600
January	1,980	68	370	22,800
February	.....	46	118	6,550
March	.....	52	112	6,890
April	424	161	273	16,200
May	720	220	360	22,100
June	418	223	309	18,400
July	223	93	160	9,840
August	92	46	64.0	3,940
September	86	44	55.3	3,290
The year	1,980	32	183	132,000
1919–20.				
October	56	32	37.6	2,310
November	167	51	106	6,310
December	597	65	169	10,400
January	.....	68	196	12,100
February	.....	88	144	8,280
March	178	66	102	6,270
April	203	81	125	7,440
May	428	154	249	15,300
June	385	185	282	16,800
July	287	75	150	9,220
August	88	46	58.1	3,570
September	.....	44	141	8,390
The year	597	32	147	106,000

TOUTLE RIVER NEAR SILVER LAKE, WASH.

LOCATION.—In sec. 19, T. 10 N., R. 1 E., 300 feet below highway bridge just below outlet of Silver Lake on Coalbank road, half a mile below junction of North and South forks, 5 miles northeast of Silver Lake, and 9 miles northeast of Castle Rock, in Cowlitz County.

DRAINAGE AREA.—472 square miles (measured on Plate XV, Water-Supply Paper 253).

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1920; September 4, 1909, to August 3, 1912, at a station 2 miles below described as "near Castle Rock."

GAGE.—Stevens continuous water-stage recorder on right bank; installed October 9, 1919; inspected by George Halleck. Earlier records obtained from vertical staff on left bank about 2 miles below.

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

CHANNEL AND CONTROL.—Channel is in rocky canyon with steep sides. Control composed of large boulders just below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1920, from water-stage recorder, 13.0 feet at 6 a. m. January 26 (discharge, 9,700 second-feet); stage may have been as high or higher on December 24 when recorder was not operating. Minimum stage from recorder, 0.46 foot from 5 to 6 p. m. August 26 (discharge, 293 second-feet).

1910–1912 and 1920: Maximum stage recorded, 11.0 feet on March 2, 1910, at gage near Castle Rock (discharge, 35,600 second-feet); minimum stage recorded that of August 26, 1920.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 6,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage-height determined from recorder graph by inspection or, for days when there was considerable variation in stage, by averaging discharge for shorter periods. Records excellent for periods when water-stage recorder was operating; for remainder of year, fair.

COOPERATION.—Station established and gage-height record furnished by J. C. Stevens, consulting engineer.

Discharge measurements of Toutle River near Silver Lake, Wash., during the period Aug. 29, 1919, to Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Aug. 29	Lee and Stevens	0.72	378	Apr. 14	R. B. Kilgore	5.51	3,180
Nov. 11	L. D. Carson	2.95	1,400	15	do	5.18	2,900
11	do	2.95	1,430	Aug. 12	H. W. Newton	.88	442
				Sept. 10	do	1.05	507

Daily discharge, in second-feet, of Toutle River near Silver Lake, Wash., for the year ending Sept. 30, 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		1,490	2,590	1,960	3,220	996	2,240	2,310	1,590	1,320	446	431
2		2,590	2,100	1,820	2,800	996	2,170	2,100	1,560	1,300	446	410
3		2,280	1,820	1,720	2,520	996	2,310	1,960	1,620	1,300	438	392
4		3,740	1,680	1,620	2,310	1,050	2,100	1,820	1,820	1,240	438	371
5	800	3,180	1,590	1,560	2,100	1,100	3,520	1,720	1,890	1,200	431	368
6		2,380	1,500	1,470	2,030	1,070	6,830	1,750	1,820	1,120	424	361
7		2,170	1,440	1,410	2,170	1,020		2,030	2,030	1,020	417	347
8		1,820	1,380	1,350	1,960			2,660	2,590	972	410	347
9	406	1,560	1,270	1,270	1,820		3,500	2,730	2,380	948	403	364
10	399	1,410	1,220	1,220	1,680	2,400		2,450	2,100	923	396	494
11	420	1,380	1,220	1,220	1,560			2,170	1,960	923	389	539
12	450	1,300		1,170	1,500			1,960	1,890	923	382	1,280
13	435	1,240		1,120	1,440		3,360	1,820	1,750	923	375	1,910
14	431	1,220		1,100	1,350	5,310	3,150	1,720	2,340	1,150	368	3,080
15	431	2,140	950	1,140	1,300	4,390	2,940	1,680	2,800	996	361	1,880
16	424	2,520		1,630	1,270	3,290	2,730	1,680	2,380	923	354	1,320
17	428	2,240		2,380	1,220	2,660	2,450	2,380	2,100	898	347	1,070
18	442	2,030		2,170	1,170	2,310	2,240	2,450	1,960	874	340	996
19	431	2,900		2,100	1,140	2,030	2,450	2,170	1,750	826	333	898
20	424	2,520		1,890	1,120	1,890	2,730	1,960	1,650	802	326	898
21	442	2,100		1,720	1,100	1,820	2,800	1,960	1,590	733	319	1,080
22	511	1,820	5,800	1,620	1,070	1,890	2,800	1,820	1,590	710	312	1,620
23	644	1,650		1,500	1,050	1,820	2,730	1,820	1,530	710	305	3,270
24	559	1,620		1,740	1,020	1,720	2,450	1,750	1,500	644	305	4,190
25	559	1,500	5,750	4,310	1,020	1,720	2,310	1,720	1,470	590	302	3,870
26	539	1,410	3,540	8,810	996	1,820	2,240	1,620	1,470	519	299	3,500
27	539	1,300	3,220	6,560	996	1,720	2,450	1,590	1,650	515	362	3,220
28	559	1,300		5,450	996	1,720	2,520	1,530	1,560	519	666	2,940
29	666	1,750	2,100	4,390	996	1,750	2,520	1,560	1,440	496	829	2,380
30	666	3,180		4,190	.....	2,100	2,380	1,650	1,320	480	678	2,030
31	601	.....		3,710	.....	2,240	.....	1,680	.....	457	496	.....

NOTE.—Discharge for following periods when water-stage recorder did not operate determined as indicated: Dec. 25, Jan. 1, and Apr. 14–15 from readings of staff gage; Aug. 5–22 by interpolation; Oct. 1–8, Dec. 12–24, 23–31, Mar. 8–13, and Apr. 7–12, from comparison with records of North Fork of Lewis River near Amboy, Wash. Braced figures show mean discharge for periods included.

Monthly discharge of Toutle River near Silver Lake, Wash., for the year ending Sept. 30, 1920.

[Drainage area, 472 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
October	.....	399	574	1.22	1.41	35,300
November	3,740	1,220	1,990	4.22	4.71	118,000
December	.....	.....	2,430	5.15	5.94	149,000
January	8,810	1,100	2,430	5.15	5.94	149,000
February	3,220	996	1,550	3.28	3.54	89,200
March	.....	996	2,060	4.36	5.03	127,000
April	.....	2,100	2,910	6.17	6.88	173,000
May	2,730	1,530	1,940	4.11	4.74	119,000
June	2,800	1,320	1,840	3.90	4.35	109,000
July	1,320	457	869	1.84	2.12	53,400
August	829	299	410	.869	1.00	25,200
September	4,190	347	1,530	3.24	3.62	91,000
The year	.....	299	1,710	3.62	49.28	1,240,000

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER.

ROGUE RIVER BASIN.

ROGUE RIVER BELOW PROSPECT, OREG.

LOCATION.—In center of W. ½ sec. 6, T. 33 S., R. 3 E., at Prospect power plant of California-Oregon Power Co., 1 mile below mouth of Mill Creek, 2 miles above Middle Fork, and 2 miles below Prospect, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 3, 1913, to September 30, 1920.

GAGE.—Vertical staff on right bank 100 feet above power house; read by E. B. Price.

DISCHARGE MEASUREMENTS.—Made from cable 500 feet above gage.

CHANNEL AND CONTROL.—Control composed of large boulders; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 5.5 feet 4 p. m. April 4 (discharge, 2,850 second-feet); minimum stage recorded, 2.3 feet January 1 (discharge, 330 second-feet).

Maximum stage recorded during year ending September 30, 1920, 4.65 feet at 4 p. m. January 26 (discharge, 1,990 second-feet); minimum stage recorded, 2.40 feet August 26 and September 3–9 (discharge, 370 second-feet).

1913–1920: Maximum stage recorded that of 1919; minimum stage recorded that of 1920.

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

DIVERSIONS.—The California-Oregon Power Co.'s flume diverts around this station; see page 166 for record of this diversion.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve well defined below 1,000 second-feet and fairly well defined below 2,500 second-feet. Staff gage read to quarter tenths twice daily. Daily discharge obtained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Rogue River below Prospect, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Sept. 26	Henshaw and Piatt	2.55	430	Sept. 28	F. F. Henshaw	2.80	549

Daily discharge, in second-feet, of Rogue River below Prospect, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	410	410	550	330	600	600	1,390	2,100	1,390	720	500	455
2	410	410	550	410	600	720	1,630	2,100	1,390	720	500	455
3	410	455	550	432	600	690	1,710	1,900	1,470	720	500	455
4	432	500	525	455	600	660	2,740	1,800	1,470	720	500	478
5	455	432	525	455	600	660	2,100	1,710	1,470	660	500	500
6	478	410	550	455	600	660	1,710	1,710	1,470	660	500	550
7	455	432	550	455	660	630	1,550	1,710	1,390	630	478	550
8	432	432	550	455	660	600	1,390	1,710	1,390	600	478	500
9	410	410	575	455	1,710	600	1,310	1,710	1,230	600	478	478
10	410	455	550	478	1,390	600	1,550	1,710	1,230	600	500	478
11	410	432	550	500	1,230	600	1,710	1,630	1,150	600	500	500
12	410	410	550	455	1,070	575	1,550	1,550	1,150	600	500	550
13	410	410	630	455	920	600	1,470	1,470	1,150	600	500	478
14	410	410	690	455	850	600	1,390	1,550	1,150	550	500	455
15	410	815	720	455	815	600	1,310	1,710	1,070	550	500	455
16	525	525	660	455	780	600	1,390	1,550	990	575	500	455
17	478	500	575	1,150	920	575	1,550	1,470	990	550	500	455
18	455	478	600	1,150	780	660	2,100	1,470	990	550	478	455
19	432	478	630	1,550	720	660	2,000	1,470	990	550	478	455
20	432	575	630	1,310	720	660	1,800	1,710	1,070	550	478	455
21	410	600	600	1,150	660	660	1,710	1,900	990	550	455	432
22	410	500	550	1,310	720	720	1,710	2,100	920	550	455	432
23	432	550	550	1,630	660	780	1,800	1,900	920	525	455	432
24	432	600	550	1,310	630	780	2,000	1,800	920	550	455	432
25	410	550	525	1,070	600	920	2,000	1,900	850	525	455	432
26	410	525	550	990	660	920	1,800	2,100	850	525	455	432
27	455	500	550	850	600	1,070	1,710	2,100	850	500	455	432
28	575	478	525	780	600	1,150	1,900	2,100	850	500	455	432
29	455	478	500	720	.....	1,310	2,100	1,900	780	500	455	432
30	410	575	410	690	.....	1,390	2,200	1,710	750	500	455	432
31	410	.....	370	660	.....	1,390	.....	1,550	.....	500	455	.....
1919–20.												
1	575	525	660	850	990	575	660	1,310	920	630	432	390
2	600	815	600	815	1,070	550	660	1,230	920	630	410	390
3	500	1,470	575	750	920	550	660	1,230	920	660	410	370
4	455	1,900	550	720	850	550	630	1,230	920	600	410	370
5	455	1,230	550	720	850	550	720	1,230	920	600	410	370
6	455	850	550	660	780	550	780	1,230	920	550	410	370
7	432	750	550	600	780	525	850	1,390	920	550	410	370
8	432	600	525	575	720	525	920	1,550	1,230	550	390	370
9	432	630	478	550	690	600	1,230	1,710	1,070	500	410	370
10	432	575	455	600	660	575	1,230	1,630	990	500	410	410
11	432	600	432	575	660	550	1,070	1,390	920	525	410	432
12	432	630	500	575	660	575	1,070	1,390	920	525	410	432
13	432	600	432	575	600	600	1,390	1,390	850	550	410	525
14	432	575	478	550	600	920	1,230	1,390	990	575	410	550
15	410	575	500	575	600	720	1,230	1,390	1,070	550	390	410
16	410	575	500	575	600	690	1,150	1,390	920	525	390	410
17	410	575	500	600	600	660	1,070	1,470	920	525	390	410
18	410	630	550	600	600	630	920	1,550	850	525	390	410
19	410	850	690	600	600	600	990	1,470	850	500	390	390
20	410	750	990	600	600	660	990	1,470	780	500	390	390
21	410	660	1,070	600	575	690	920	1,470	780	500	390	390
22	410	630	990	600	575	720	920	1,390	750	500	390	432
23	478	690	1,070	600	575	750	920	1,310	720	500	390	410
24	455	575	1,230	600	550	720	850	1,230	720	478	390	630
25	432	575	1,550	720	550	720	920	1,070	720	478	390	600
26	432	550	1,390	1,630	550	690	1,070	1,070	660	455	370	550
27	432	500	1,150	1,710	550	660	1,310	1,070	660	455	390	550
28	432	550	1,070	1,470	550	660	1,390	1,070	630	455	478	550
29	500	600	1,070	1,310	575	600	1,470	1,070	660	432	410	500
30	455	750	990	1,150	.....	660	1,390	990	660	432	410	455
31	455	.....	920	1,150	.....	660	.....	920	.....	432	390	.....

Monthly discharge of Rogue River below Prospect, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	575	410	435	26,700
November	815	410	491	29,200
December	720	370	561	34,500
January	1,630	330	757	46,500
February	1,710	600	784	43,500
March	1,390	575	763	46,900
April	2,740	1,310	1,740	104,000
May	2,100	1,470	1,770	109,000
June	1,470	750	1,110	66,000
July	720	500	582	35,800
August	500	455	480	29,500
September	550	432	464	27,600
The year	2,740	330	827	599,000
1919–20.				
October	600	410	447	27,500
November	1,900	500	726	43,200
December	1,550	432	760	46,700
January	1,710	550	781	48,000
February	1,070	550	672	38,700
March	920	525	635	39,000
April	1,470	630	1,020	60,700
May	1,710	920	1,310	80,600
June	1,230	630	859	51,100
July	660	432	522	32,100
August	478	370	403	24,800
September	630	370	440	26,200
The year	1,900	370	715	519,000

Combined monthly discharge of Rogue River and California-Oregon Power Co.'s flume, near Prospect, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	745	567	599	36,800
November	972	478	615	36,600
December	728	514	579	35,600
January	1,800	487	902	55,500
February	1,890	757	941	52,300
March	1,550	732	921	56,600
April	2,910	1,470	1,900	113,000
May	2,270	1,640	1,940	119,000
June	1,650	914	1,280	76,200
July	890	657	746	45,900
August	657	612	637	39,200
September	714	589	622	37,000
The year	2,910	478	972	704,000
1919–20.				
October	757	554	605	37,200
November	2,080	632	893	53,100
December	1,750	530	936	57,600
January	1,880	720	956	58,800
February	1,240	720	842	48,400
March	1,120	695	806	49,600
April	1,640	800	1,190	70,800
May	1,880	1,080	1,480	91,000
June	1,400	794	1,020	60,700
July	830	596	686	42,200
August	662	534	567	34,900
September	800	534	606	36,100
The year	2,080	530	883	640,000

ROGUE RIVER NEAR TOLO, OREG.

LOCATION.—In sec. 18, T. 36 S., R. 2 W., at Raygold railroad station, just below Gold Ray dam and power house of California-Oregon Power Co., half a mile below mouth of Bear Creek, 1½ miles below Tolo, Jackson County, and 7 miles above Gold Hill.

DRAINAGE AREA.—2,020 square miles.

RECORDS AVAILABLE.—August 30, 1905, to September 30, 1920.

GAGE.—Friez water-stage recorder referred to vertical staff bolted to concrete pier of bridge near right bank. Gage inspected by James Robins.

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

CHANNEL AND CONTROL.—Rock and boulders; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 9.0 feet at 2 p. m. February 9 (discharge, 19,200 second-feet); minimum stage due to sudden decrease in power load, 0.20 foot, for a few minutes several days in August and September (discharge, 690 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 5.52 feet from 3 to 5 a. m. December 25 (discharge, 8,980 second-feet); minimum stage recorded, 0.20 foot at 3 a. m. August 25 (discharge, 700 second-feet).

1905–1920: Maximum stage recorded, 20.00 feet at 7.30 a. m. November 23, 1909 (discharge estimated by extension of rating curve as 60,000 second-feet); minimum stage inderterminate, as water went below intake pipe of well (gage height, 0.20 foot) practically every night during low water of 1918 (discharge probably 400 second-feet or less).

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

DIVERSIONS.—A large area of land is irrigated from Rogue River and its tributaries.

REGULATION.—Discharge is influenced by changes of load on power plant just above station.

ACCURACY.—Stage-discharge relation practically permanent, except during June and July, 1919, when there was probably some obstruction on control. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph except during June and July, 1919, when it was estimated. Records for year ending September 30, 1919, good except those for June and July which are poor; for year ending September 30, 1920, excellent.

Discharge measurements of Rogue River near Tolo, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Sept. 24	Henshaw and Piatt....	0.90	1,180	May 7	R. C. Briggs.....	2.66	3,300
				Aug. 6	.....do.....	.38	790
1920.							
Jan. 29	J. J. Dirzulaitis.....	2.45	3,100				

Daily discharge, in second-feet, of Rogue River near Tolo, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	1,120	1,230	1,280	948	2,020	4,700	5,580	6,180	.....		1,230	1,110
2	1,140	1,230	1,280	1,080	1,900	10,200	5,980	5,980	.....		1,230	1,120
3	1,180	1,230	1,280	1,280	1,780	7,960	6,180	5,780	.....		1,230	1,120
4	1,280	1,360	1,280	1,360	1,900	5,580	8,460	5,400	.....		1,230	1,140
5	1,230	1,500	1,280	1,360	2,270	5,040	8,980	5,220	.....		1,230	1,280
6	1,360	1,590	1,280	1,320	2,270	6,180	8,980	4,870	.....	1,650	1,230	1,230
7	1,320	1,500	1,280	1,230	4,020	5,980	7,040	4,870	.....		1,230	1,410
8	1,230	1,460	1,280	1,180	3,010	4,700	5,980	4,870	.....		1,180	1,360
9	1,180	1,410	1,360	1,280	12,700	4,190	5,220	4,700	.....		1,180	1,320
10	1,180	1,280	1,320	1,360	9,760	3,700	5,580	4,530	.....		1,180	1,180
11	1,140	1,280	1,320	1,680	7,040	3,460	7,040	4,280	.....		1,180	1,320
12	1,120	1,280	1,360	1,900	5,220	3,230	6,380	4,190	.....		1,180	1,360
13	1,070	1,230	1,460	1,780	4,360	3,160	5,780	4,020	.....		1,180	1,320
14	1,080	1,180	1,730	1,640	4,360	3,380	5,220	4,020	.....		1,180	1,280
15	1,120	1,900	1,900	2,020	3,940	3,700	4,870	4,190	.....		1,230	1,180
16	1,320	2,140	1,780	2,460	3,620	3,620	4,700	4,190	.....	1,450	1,140	1,180
17	1,410	1,680	1,680	7,100	6,380	3,230	5,780	4,190	.....		1,130	1,180
18	1,280	1,540	1,500	4,700	4,530	4,870	7,960	4,100	.....		1,120	1,140
19	1,230	1,410	1,500	6,600	3,860	5,220	7,040	4,020	.....		1,020	1,180
20	1,230	1,410	1,900	5,980	3,780	4,360	6,600	4,190	.....		1,100	1,230
21	1,180	1,360	2,020	5,980	3,380	4,190	5,980	4,870	.....		1,110	1,230
22	1,230	1,320	1,730	6,380	3,620	4,530	5,780	5,220	.....		1,120	1,180
23	1,230	1,410	1,500	5,980	3,380	4,530	5,780	5,220	.....		1,140	1,230
24	1,180	1,680	1,500	5,580	3,160	4,530	5,980	5,040	.....		1,120	1,180
25	1,140	1,590	1,460	4,100	3,460	4,530	6,180	4,870	.....		1,140	1,140
26	1,140	1,540	1,410	3,620	9,500	4,530	5,580	5,400	.....	1,330	1,120	1,090
27	1,180	1,460	1,360	3,230	5,780	4,870	5,400	5,580	.....		1,130	1,050
28	1,410	1,410	1,410	2,800	5,040	5,220	5,580	5,580	.....		1,140	1,030
29	1,360	1,320	1,360	2,460	.....	5,580	5,780	5,400	.....		1,120	1,080
30	1,280	1,320	1,360	2,340	.....	5,780	5,980	4,870	.....		1,040	1,080
31	1,230	.....	1,180	2,200	.....	5,780	.....	4,280	.....	1,230	1,140	.....
1919–20.												
1	1,170	1,600	2,910	2,450	2,520	1,410	2,450	3,710	2,380	1,460	1,050	1,000
2	1,360	1,930	2,260	2,260	2,320	1,410	3,120	3,480	2,320	1,410	972	1,000
3	1,310	2,260	1,820	2,060	2,190	1,410	3,260	3,340	2,320	1,700	1,040	979
4	1,220	3,710	1,760	1,880	2,120	1,360	2,980	3,260	2,380	1,580	1,000	1,060
5	1,220	3,710	1,700	2,000	2,060	1,360	3,120	3,190	2,380	1,460	1,030	1,000
6	1,170	2,580	1,700	1,940	1,940	1,360	3,410	3,190	2,320	1,410	1,020	1,000
7	1,120	2,260	1,700	1,820	1,940	1,310	3,340	3,340	2,320	1,410	1,030	1,010
8	1,120	1,980	1,820	1,760	1,940	1,410	3,410	3,640	2,910	1,310	1,000	1,020
9	1,120	1,700	1,640	1,700	1,880	1,360	4,680	3,860	2,910	1,310	1,040	1,010
10	1,080	1,640	1,820	1,640	1,760	1,760	4,510	4,180	2,580	1,360	1,020	1,060
11	1,170	1,640	2,640	1,700	1,820	1,640	4,180	3,780	2,450	1,260	1,020	1,260
12	1,120	1,760	2,120	1,700	1,700	1,580	3,860	3,560	2,380	1,260	1,010	1,220
13	1,070	1,700	1,760	1,640	1,760	1,460	4,340	3,560	2,320	1,310	979	1,410
14	1,060	1,640	1,410	1,640	1,700	2,840	4,680	3,480	2,380	1,460	986	1,360
15	1,030	1,580	1,580	1,580	1,640	2,980	5,390	3,410	2,780	1,460	965	1,410
16	1,040	1,520	1,820	1,640	1,520	3,120	5,970	3,340	2,580	1,310	972	1,170
17	1,020	1,580	1,760	1,640	1,580	2,910	4,850	3,410	2,320	1,260	965	1,120
18	1,050	1,520	1,940	1,700	1,520	2,580	4,020	3,560	2,320	1,260	986	1,080
19	1,040	1,640	3,340	1,760	1,520	2,580	3,860	3,480	2,120	1,220	958	1,080
20	1,030	1,940	5,570	1,700	1,460	2,520	3,860	3,410	1,940	1,220	1,000	1,050
21	1,170	1,940	5,030	1,760	1,580	2,780	3,640	3,480	1,940	1,220	951	1,020
22	1,060	1,580	4,180	1,700	1,520	3,050	3,340	3,340	1,820	1,170	937	1,020
23	1,120	1,520	3,780	1,640	1,520	3,120	3,120	3,190	1,820	1,170	944	1,220
24	1,220	1,700	4,020	1,640	1,460	2,840	2,910	2,980	1,700	1,120	944	1,880
25	1,120	1,520	7,480	1,760	1,410	2,840	2,980	2,840	1,580	1,080	958	1,880
26	1,120	1,640	5,030	2,710	1,410	2,840	3,050	2,640	1,580	1,120	986	1,760
27	1,170	1,520	3,780	4,180	1,360	2,640	3,410	2,580	1,520	1,120	951	1,460
28	1,120	1,360	3,120	3,560	1,360	2,580	3,710	2,580	1,460	1,080	1,080	1,460
29	1,220	1,580	2,910	3,120	1,410	2,580	4,020	2,580	1,460	1,120	1,120	1,410
30	1,220	3,260	2,780	2,910	.....	2,520	3,860	2,580	1,460	1,070	1,050	1,260
31	1,260	.....	2,580	2,710	.....	2,520	.....	2,450	.....	1,030	1,030	.....

NOTE.—Discharge June 1 to July 31, 1919, estimated by comparison with records for other stations in the basin. Discharge interpolated Nov. 1, 2, 8, Dec. 13, 1919, and Feb. 1, 1920.

Monthly discharge of Rogue River near Tolo, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,410	1,070	1,220	75,000
November	2,140	1,180	1,440	85,700
December	2,020	1,180	1,460	89,800
January	7,100	948	3,000	184,000
February	12,700	1,780	4,500	250,000
March	10,200	3,160	4,860	299,000
April	8,980	4,700	6,250	372,000
May	6,180	4,020	4,840	298,000
June	.....	.....	[a]2,600	155,000
July	.....	1,230	[a]1,470	90,400
August	1,230	1,020	1,160	71,300
September	1,410	1,030	1,200	71,400
The year	12,700	948	2,820	2,040,000
1919–20.				
October	1,360	1,020	1,140	70,100
November	3,710	1,360	1,920	114,000
December	7,480	1,410	2,830	174,000
January	4,180	1,580	2,060	127,000
February	2,520	1,360	1,720	98,900
March	3,120	1,310	2,220	136,000
April	5,970	2,450	3,780	225,000
May	4,180	2,450	3,270	201,000
June	2,910	1,460	2,160	129,000
July	1,700	1,030	1,280	78,700
August	1,120	937	1,000	61,500
September	1,880	979	1,220	72,600
The year	7,480	937	2,050	1,490,000

[a] Estimated.

CALIFORNIA-OREGON POWER CO.'S FLUME NEAR PROSPECT, OREG.

LOCATION.—In sec. 6, T. 33 S., R. 3 E., at lower end of power flume just above forebay, 2 miles below Prospect, Jackson County.

RECORDS AVAILABLE.—August 1, 1913, to September 30, 1920.

GAGE.—Vertical staff in stilling box on right side of flume, 500 feet above forebay, used after August 17, 1915. Gage 1 mile above forebay used August 1, 1913, to August 16, 1915.

DISCHARGE MEASUREMENTS.—Made from collar of flume.

CHANNEL AND CONTROL.—Wooden flume at the end of which there is a free fall into the forebay.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.5 feet February 9, May 15 and 19–21 (discharge, 184 second-feet); flume dry several days in November and December.

Maximum stage recorded during year ending September 30, 1920, 2.7 feet December 12 (discharge, 212 second-feet); minimum stage recorded, 1.8 feet December 13 (discharge, 98 second-feet).

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

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

The California-Oregon Power Co.'s flume diverts water from Rogue River in the SE. ¼ sec. 30, T. 32 S., R. 3 E., and delivers it to the power plant in the NW. ¼ sec.6, T. 33 S., R. 3 E., where a head of about 500 feet is obtained.

Discharge measurements of California-Oregon Power Co's flume near Prospect, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919. Sept. 26	Henshaw and Piatt	*Feet.* 2.28	*Sec.-ft.* 171	1920. Sept. 28	F. F. Henshaw	*Feet.* 2.40	*Sec.-ft.* 188

Daily discharge, in second-feet, of California-Oregon Co.'s flume near Prospect, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	157	164	.....	157	157	157	157	164	170	170	157	157
2	164	170	.....	120	157	157	157	164	177	170	157	157
3	164	164	.....	93	157	157	157	164	177	170	157	157
4	164	164	.....	126	157	157	170	164	177	170	157	157
5	164	164	.....	98	157	157	157	177	177	170	157	164
6	164	164	.....	98	157	157	150	177	177	170	157	164
7	164	164	.....	88	157	157	144	177	177	164	157	164
8	164	164	.....	88	157	157	157	177	164	164	157	157
9	164	164	.....	108	184	157	157	177	170	164	157	157
10	164	170	.....	120	170	157	164	177	177	164	157	157
11	164	164	.....	177	157	157	164	177	177	164	157	157
12	164	164	.....	170	132	157	164	170	177	164	157	157
13	164	164	.....	170	144	157	157	177	170	164	157	157
14	164	164	.....	157	157	157	150	177	170	164	157	157
15	164	157	.....	157	157	157	157	184	170	164	157	157
16	170	164	.....	132	157	157	157	170	177	157	157	157
17	164	170	.....	177	157	157	157	170	170	164	157	157
18	164	164	.....	144	157	157	157	177	170	164	157	157
19	164	170	.....	177	157	157	157	184	170	164	157	157
20	164	.....	98	164	157	157	157	184	177	164	157	157
21	164	98	.....	157	157	157	157	184	170	164	157	157
22	164	98	.....	170	150	157	157	170	157	164	157	157
23	164	71	.....	170	150	157	164	170	157	164	157	157
24	164	63	.....	170	157	164	164	170	164	164	157	157
25	164	63	.....	157	157	157	157	170	170	164	157	157
26	164	63	.....	150	157	164	157	170	170	164	157	157
27	164	63	.....	157	157	164	164	170	170	157	157	157
28	170	63	71	157	157	157	164	170	170	164	157	157
29	164	.....	132	157	.....	157	157	177	164	157	157	157
30	164	.....	108	157	.....	164	157	170	164	164	157	157
31	164	.....	144	157	.....	157	.....	170	.....	157	157	.....
1919-20.												
1	157	170	150	184	170	170	170	170	170	164	164	164
2	157	170	177	184	170	170	170	170	170	164	164	164
3	150	170	170	184	170	170	170	170	170	170	157	164
4	157	177	170	177	170	170	170	170	164	164	164	164
5	157	170	170	184	164	170	170	177	170	164	164	164
6	157	170	170	177	170	170	170	170	164	164	157	164
7	157	170	170	170	170	170	170	170	164	164	157	164
8	157	170	170	157	170	177	177	170	170	164	157	164
9	157	170	170	170	170	170	170	170	164	164	164	164
10	157	170	170	157	170	170	170	170	157	164	170	164
11	157	170	191	191	170	170	170	170	164	164	170	170
12	157	164	212	184	170	170	170	170	164	164	170	170
13	157	164	98	184	170	170	184	170	164	164	164	157
14	157	164	170	184	170	198	164	170	170	164	164	184
15	157	164	170	184	170	177	170	170	170	164	164	157
16	157	164	198	184	170	177	170	170	170	164	164	164
17	157	164	184	184	170	170	164	170	164	164	164	157
18	157	164	184	170	170	170	170	170	164	164	164	164
19	144	164	198	170	170	170	170	170	164	164	164	170
20	157	164	184	170	170	170	170	170	164	164	164	170
21	157	164	177	170	170	170	170	170	164	164	164	170
22	164	170	170	170	170	170	170	170	170	164	164	170
23	164	170	177	170	170	170	164	170	164	164	164	170
24	157	170	198	170	170	170	170	126	164	164	164	170
25	164	164	198	184	170	170	170	170	164	164	157	170
26	164	164	184	177	170	170	177	170	164	164	164	164
27	164	132	177	170	170	170	184	170	164	164	164	170
28	164	144	170	170	170	170	177	170	164	157	184	170
29	164	184	184	170	170	164	170	170	164	164	170	164
30	164	184	177	170	.....	170	170	170	164	164	164	164
31	164	.....	170	170	.....	170	.....	164	.....	164	164	.....

NOTE.—No flows on days for which discharge is not given.

Monthly discharge of California-Oregon Power Co.'s flume near Prospect, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
October	170	157	164	10,100
November (27 days)	170	63	138	7,380
December (5 days)	144	71	111	1,130
January	177	88	145	8,920
February	184	132	157	8,720
March	164	157	158	9,720
April	170	144	158	9,400
May	184	164	174	10,700
June	177	157	171	10,200
July	170	157	164	10,100
August	157	157	157	9,650
September	164	157	158	9,400
The year				105,000
October	164	144	158	9,720
November	184	132	167	9,940
December	212	98	176	10,800
January	191	157	175	10,800
February	170	164	170	9,780
March	198	164	171	10,500
April	184	164	171	10,200
May	177	126	169	10,400
June	170	157	166	9,880
July	170	157	164	10,100
August	184	157	164	10,100
September	184	157	166	9,880
The year				122,000

SOUTH FORK OF BIG BUTTE CREEK NEAR BUTTE FALLS, OREG.

LOCATION.—In SE. ¼ sec. 11, T. 35 S., R. 2 E., at covered highway bridge 1 mile above Butte Falls, Jackson County, and 2 miles above junction of North and South forks.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 20, 1910, to October 5, 1911; August 5 to October 10, 1915; October 31, 1917, to September 30, 1920.

GAGE.—Vertical staff on pier near left bank; read by C. W. H. Heideman, H. J. Berrian, and Frank Nitkey.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; may shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 2.8 feet April 4 and 5 (discharge from extension of rating curve, 900 second-feet); minimum stage recorded, 1.3 feet on various days during October November, July, and August (discharge, 92 second-feet).

Maximum stage recorded during year ending September 30, 1920, 2.25 feet April 15 (discharge, 465 second-feet); minimum stage recorded, 1.2 feet August 29 (discharge, 83 second-feet).

1910–11, 1915, and 1918–1920: Maximum stage recorded, 3.2 feet January 13, 1918 (discharge from extension of rating curve, 1,280 second-feet); minimum discharge recorded, that of August 29, 1920.

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

DIVERSIONS.—A canal diverts water above the station for use in the State fish hatchery. Its discharge, 4.0 second-feet, measured on September 25, 1919, remains practically steady. A small amount of land is irrigated above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for low stages changed slightly. Rating curve used October 1, 1918, to September 30, 1919, and curve used October 1, 1919, to September 30, 1920, well defined below 300 second-feet; extended above that point. Gage read to hundredths about once a week during October and November, 1918, and daily after February 20, 1919. Daily discharge ascertained by applying daily gage height to rating table and estimating for periods of missing gage height. Records for stages below 300 second-feet good for periods when gage was read.

Discharge measurements of South Fork of Big Butte Creek near Butte Falls, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 14	J. B. Piatt [a]	1.29	93	Sept. 25	Henshaw and Piatt	1.29	91
1919.				1920.			
Feb. 11	Briggs and Piatt	1.80	232	May 10	Briggs and Berrian	1.90	262
May 23	Henshaw and Piatt	1.65	172	Sept. 27	F. F. Henshaw	1.32	98

[a] Engineer, Medford Irrigation District.

Daily discharge, in second-feet, of South Fork of Big Butte Creek near Butte Falls, Oreg. for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.
1918-19.									
1	92			430	570	370	120	97	92
2	92			570	570	370	120	97	92
3		92		500	570	320	120	97	92
4				320	900	320	120	97	92
5		92	150	320	900	320	120	97	92
6				270	810	270	111	97	92
7				270	570	270	111	97	92
8	92	92		270	320	270	111	97	92
9			240	270	430	270	111	97	92
10				230	570	270	102	97	92
11		92	230	230	570	230	102	97	92
12	92	92	190	230	570	230	102	97	92
13		97		230	650	210	102	97	92
14		102		230	610	210	102	97	92
15	95	120		230	500	190	102	97	92
16		114	210	230	430	190	102	97	92
17		108		230	500	190	102	97	92
18	92	102		320	570	190	102	92	92
19		100		320	570	170	102	92	92
20		97		320	570	170	97	92	92
21	92	95	190	320	500	170	97	92	92
22		92	190	320	500	150	97	92	92
23	92		190	320	430	170	97	92	92
24			170	320	430	150	97	92	92
25		92	230	320	430	150	97	92	92
26	92		270	320	430	150	97	92	92
27			270	370	370	150	97	92	92
28		92	270	430	370	150	97	92	92
29		92	.....	500	370	150	97	92	92
30	92	92	.....	500	370	135	97	92	92
31	92	.....	.....	500	.....	126	.....	92	92

Daily discharge, in second-feet, of South Fork of Big Butte Creek near Butte Falls, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919–20.												
1	95	105	173	138	126	108	189	208	130	108	95	89
2	101	106	130	130	126	108	279	208	130	109	95	89
3	101	106	122	130	124	108	269	208	111	111	95	89
4	95	108	111	126	120	108	227	189	130	103	95	89
5	95	115	108	126	120	108	227	189	130	103	95	89
6	95	115	105	120	117	108	269	189	130	95	95	89
7	95	111	111	120	111	108	269	197	130	95	95	89
8	95	108	111	111	108	109	317	197	138	95	89	89
9	95	126	108	103	108	124	370	269	130	95	89	89
10	95	126	108	103	108	111	370	269	120	95	89	89
11	95	128	105	103	108	111	344	248	111	95	89	95
12	95	126	108	103	108	111	370	227	113	95	89	95
13	95	124	108	103	108	189	430	227	126	95	89	103
14	95	124	108	98	108	163	430	227	126	103	89	103
15	95	122	108	95	108	157	465	227	130	103	89	103
16	95	122	108	95	108	149	430	208	130	95	89	95
17	95	122	108	95	106	146	400	208	120	95	89	95
18	95	124	109	111	106	149	317	189	111	95	89	95
19	95	128	111	111	105	149	269	189	111	95	89	103
20	95	124	208	111	105	149	269	189	111	95	89	103
21	95	122	216	111	105	157	269	170	111	95	89	103
22	95	122	227	115	105	208	248	157	109	95	89	111
23	95	124	227	115	105	189	227	152	109	95	89	111
24	95	124	227	115	105	189	227	146	109	95	89	111
25	95	124	317	117	105	189	227	146	108	103	89	111
26	98	124	370	117	105	189	227	138	108	103	89	111
27	98	122	317	130	103	189	227	130	108	103	95	98
28	103	122	227	135	103	189	227	130	108	103	95	95
29	106	128	189	130	105	183	212	130	108	103	83	95
30	103	130	167	126	.....	179	208	130	108	103	89	95
31	103	.....	157	126	.....	179	.....	130	.....	103	89	.....

NOTE.—The above table does not include water diverted in fish hatchery flume, amounting to about 4 second-feet. Discharge interpolated Oct. 1, 31, Nov. 12, 13, 16, 17, 19–21, 30 and 31, 1918. Braced figures show mean discharge estimated for periods when gage was not read.

Monthly discharge of South Fork of Big Butte Creek near Butte Falls, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	.....	.....	92.5	5,690
November	120	.....	95.6	5,690
December	.....	.....	[a]95.0	5,840
January	.....	.....	[a]140	8,610
February	.....	.....	202	11,200
March	570	230	330	20,300
April	900	320	532	31,700
May	370	126	216	13,300
June	120	97	104	6,190
July	97	92	94.7	5,820
August	92	92	92.0	5,660
September	.....	.....	[a]90.0	5,360
The year	900	.....	173	125,000
1919–20.				
October	106	95	96.7	5,940
November	130	105	120	7,140
December	370	105	162	9,960
January	138	95	115	7,070
February	126	103	110	6,330
March	208	108	149	9,160
April	465	189	294	17,500
May	269	130	188	11,600
June	138	108	118	7,020
July	111	95	99.2	6,110
August	95	83	90.5	5,560
September	111	89	97.4	5,800
The year	465	83	137	99,200

[a] Estimated.

BIG BUTTE CREEK BELOW BUTTE FALLS, OREG.

LOCATION.—In sec. 4, T. 35 S., R. 2 E., just below junction of North and South forks and 1 mile below town of Butte Falls, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 9, 1918, to September 30, 1920, when station was discontinued.

GAGE.—Lietz 8-day water-stage recorder on left bank referenced to an outside staff gage.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

CHANNEL AND CONTROL.—Rocks and small boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 3.20 feet at 6 p. m. April 5 (discharge, 1,060 second-feet); minimum stage recorded, 1.40 feet, January 5 (discharge, 125 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.88 feet at 7 p. m. April 15 (discharge, 820 second-feet); minimum stage recorded, 1.38 feet at noon August 25 (discharge, 122 second-feet).

1918–1920: Maximum stage recorded that of April 5, 1919; minimum stage recorded, 1.20 feet reached momentarily on several days in August and September, 1918, due to operation of mill just above (discharge not computed); minimum discharge recorded, due to natural cause, that of August 25, 1920.

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

DIVERSIONS.—A few small tracts irrigated above station.

REGULATION.—Mill dam at Butte Falls affected flow by ponding water for short periods in 1918.

ACCURACY.—Stage-discharge relation appears to have changed slightly about April 6, 1919, and May 28, 1920. Three well-defined rating curves used, identical above 335 second-feet. Operation of water-stage recorder satisfactory except during portions of October, November, and December, 1918, when it was not inspected regularly. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good.

COOPERATION.—Gage-height record furnished by Medford Irrigation District.

Discharge measurements of Big Butte Creek below Butte Falls, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 14	J. B. Piatt [a]	1.47	138	Sept. 25	F. F. Henshaw	1.47	134
1919.				25	do	1.47	128
Feb. 12	Briggs and Piatt	2.05	312	1920.			
Apr. 22	J. B. Piatt	2.53	581	May 10	R. C. Briggs	2.07	326
May 23	Henshaw and Piatt	1.84	225	Sept. 27	F. F. Henshaw	1.48	141
June 5	J. B. Piatt	1.67	191				

[a] Engineer, Medford Irrigation District

Daily discharge, in second-feet, of Big Butte Creek below Butte Falls, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	145			140	248	610	715	460	190	150	162	132
2	145			138	227	680	785	430	190	148	162	134
3	145		150	133	211	610	860	410	185	148	160	130
4				128	211	550	1,060	380	182	148	160	134
5		145		125	214	520	1,060	366	180	145	158	136
6			150	130	214	490	980	353	178	145	160	138
7			148	135	230	430	785	348	178	148	160	140
8			150	133	297	385	715	344	178	150	160	142
9	145		153	140	385	380	610	335	175	152	158	142
10			150	145	371	362	750	304	175	148	155	134
11		148	148	145	353	344	820	252	172	148	148	138
12		158	148	150	318	335	715	244	172	148	145	140
13		155	160	158	293	339	680	238	175	148	145	136
14	143	175	158	200	297	353	610	234	175	150	142	136
15	153	208	150	286	293	353	580	241	172	152	142	134
16	168	190	153	400	301	331	550	234	168	155	140	134
17	153	173	158	395	385	322	645	244	168	155	140	132
18	148	170	155	353	353	430	680	248	168	160	140	132
19	145	165	150	314	329	490	610	244	162	162	138	132
20	145		150	358	318	460	610	241	162	165	138	132
21	145		150	430	297	460	550	238	160	165	138	132
22			150	460	286	490	550	234	158	165	134	134
23			153	460	257	550	550	230	155	165	130	136
24			155	490	279	550	520	227	158	165	126	134
25		154	155	335	327	550	490	224	155	165	126	134
26	145		158	289	390	550	490	224	152	165	128	130
27			150	268	520	580	490	214	150	165	128	132
28			150	264	580	610	460	208	150	165	130	134
29			150	261	.....	645	460	205	150	165	130	136
30			145	257	.....	680	460	202	150	165	130	134
31		.....	143	254	.....	715	.....	193	.....	162	130	.....
1919-20.												
1	140	145	230	266	220	172	366	312	168	146	126	126
2	145	158	190	244	211	175	460	290	163	146	128	126
3	138	160	172	230	205	172	490	276	161	153	128	126
4	136	172	165	234	202	172	460	269	161	150	126	126
5	136	180	160	241	196	172	520	258	159	144	126	124
6	136	155	160	234	193	172	550	248	161	140	126	126
7	138	162	158	227	185	170	580	244	172	138	126	126
8	136	168	160	211	188	170	580	248	196	136	126	126
9	134	158	150	208	185	190	715	299	175	134	126	126
10	134	160	148	205	182	208	750	322	168	138	126	128
11	134	162	170	196	182	199	715	280	163	138	124	134
12	134	168	175	190	182	193	680	269	163	138	124	136
13	136	165	178	188	182	238	750	266	163	142	124	136
14	138	158	182	185	180	322	785	252	172	150	124	142
15	134	155	182	182	180	299	715	241	175	148	124	140
16	134	152	178	180	180	286	550	230	163	146	124	138
17	134	152	178	180	178	283	490	230	161	146	124	134
18	132	155	185	172	180	280	460	234	159	144	124	134
19	136	168	202	172	180	280	430	230	157	142	124	134
20	136	178	283	172	180	290	430	227	155	142	124	132
21	138	162	395	172	172	317	405	224	153	140	128	132
22	138	158	415	172	172	380	376	220	150	138	126	136
23	142	152	420	172	168	366	344	211	148	136	126	148
24	142	152	420	178	168	366	335	208	146	136	126	163
25	142	150	460	185	165	390	312	202	148	136	124	157
26	145	152	490	227	165	390	312	205	146	136	126	150
27	145	145	415	248	160	358	322	199	146	134	126	144
28	148	145	353	238	165	376	326	183	146	132	134	
29	152	155	322	230	172	340	330	179	146	130	132	136
30	152	241	314	224	.....	344	326	177	148	128	130	
31	148	.....	286	224	.....	348	.....	170	.....	128	128	.....

NOTE.—Discharge estimated for following periods when gage did not operate: Oct. 1, 2, 4–13, 22–31, Nov. 1–11, 20–30, Dec. 1–5, 1918; Mar. 10, 1919; June 22, 23, and Sept. 28–30, 1920.

Monthly discharge of Big Butte Creek below Butte Falls, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	168	.....	146	8,980
November	208	.....	156	9,280
December	160	143	151	9,280
January	490	125	254	15,600
February	580	211	314	17,400
March	715	322	489	30,100
April	1,060	460	661	39,300
May	460	193	276	17,000
June	190	150	168	10,000
July	165	145	156	9,590
August	162	126	143	8,790
September	142	130	135	8,030
The year	1,060	125	253	183,000
1919–20.				
October	152	132	139	8,550
November	241	145	161	9,580
December	490	148	255	15,700
January	266	172	206	12,700
February	220	160	182	10,500
March	390	170	272	16,700
April	785	312	495	29,500
May	322	170	239	14,700
June	196	146	160	9,520
July	153	128	140	8,610
August	134	124	126	7,750
September	163	124	135	8,030
The year	785	124	209	152,000

LITTLE BUTTE CREEK ABOVE EAGLE POINT, OREG.

LOCATION.—In sec. 31, T. 35 S., R. 1 E., at Bieberstedt's ranch, one-fourth mile above intake of Eagle Point ditch and 3 miles east of Eagle Point, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 24, 1916, to September 30, 1920. Station at Tronson ranch, below intake of Eagle Point ditch, was maintained July 13, 1907, to April 30, 1916.

GAGE.—Vertical staff; low-water section nailed to stump on right bank; high-water section on left bank directly opposite; read by Carl Bieberstedt and Mrs. W. E. Butler.

CHANNEL AND CONTROL.—Bed composed of smooth gravel. Control is diversion dam of Eagle Point ditch, which may be changed occasionally.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 7.1 feet at 8 a. m. February 9 (discharge, 2,740 second-feet); minimum stage recorded, 1.72 feet July 22 (discharge, 17 second-feet).

Maximum stage recorded during year ending September 30, 1920, 5.3 feet, occurred some time between 5 p. m. December 19 and 8 a. m. December 20 (discharge, 1,480 second-feet); minimum stage recorded, 0.36 foot at 7.30 p. m. August 5 and at 7.30 a. m. August 6 (discharge, 14 second-feet).

1916–1920: Maximum stage recorded, 11.3 feet at 8 a. m. January 12, 1918 (discharge, 6,200 second-feet); minimum stage recorded, 1.50 feet July 28 and August 1 and 21, 1918 (discharge, 10 second-feet). The flood of 1884 is said to have reached a stage of about 15 feet.

ICE.—Stage-discharge relation affected by ice December 12–23, 1919.

DIVERSIONS.—The Rogue River Valley canal diverts water above the station, the record at Bradshaw drop showing about the quantity carried past the gage; also, the municipal water-supply (about 7.5 second-feet) for Medford is taken out above. Several hundred acres are irrigated along the creek above the station. The Eagle Point ditch diverts just below this station, but above the old station at Tronson's ranch.

REGULATION.—Water was being stored in Fish Lake reservoir during May and released during July, August, and September; see record of stage of reservoir, page 177.

ACCURACY.—Stage-discharge relation changed, February 9 and December 12-23, 1919, by the washing away of the temporary portion of dam at control; and between July 3 and 13, 1919, when dam was repaired. Control permanent at site used after February 4, 1920. Rating curve used October 1, 1918, to February 8, 1919, well defined below 60 second-feet; curve used February 9 to July 2, 1919, well defined between 80 and 700 second-feet; curve used July 14 to December 19, 1919, well defined; December 20, 1919, to February 4, 1920, fairly well defined; February 5 to September 30, 1920, well defined below 500 second-feet. Gage read to hundredths or half-tenths twice a day; some readings prior to July 14 are questionable; thereafter they are reliable. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair October to July, 1919; good, August, 1919, to January, 1920; excellent, February to September, 1920.

Discharge measurements of Little Butte Creek above Eagle Point, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 10	R. C. Briggs	3.85	585	Jan. 29	J. J. Dirzulaitis	2.67	129
May. 18	R. P. Cowgill [a]	3.18	248	Feb. 4	do	[d] 1.02	91
25	Henshaw and Cowgill	3.30	265	May. 9	R. C. Briggs	2.32	440
June 8	R. P. Cowgill	2.50	87	11	do	2.18	[e] 401
July 17	Carl Bieberstedt	1.86	[b] 21.0	Aug. 7	Briggs and Powell	.43	17.5
Aug. 10	J. B. Piatt [c]	1.90	22.8	10	Chadwick and Piatt	.49	22.1
Sept. 27	Henshaw and Piatt	2.38	47.8	Sept. 30	Henshaw and Powell	.77	44.7
				30	do	.77	46.7

[a] Engineer, Rogue River Valley Canal Co.
[b] Measured by floats.
[c] Engineer, Medford Irrigation District.
[d] New gage, about one-fourth mile above former gage; old gage read 2.46 feet.
[e] Discharge obtained by measuring South Fork of Little Butte Creek near Lake Creek (discharge, 396 second-feet) and estimating other inflows (total, 5 second-feet).

Daily discharge, in second-feet, of Little Butte Creek above Eagle Point, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	58	60	83		60	670	610	490	195	30	25	23
2	58	60	83	40	60	2,390	640	460	168	30	23	23
3	67	71	83		56	730	670	430	155		24	24
4	64	71	83		96	610	910	430	135		24	27
5	60	71	83	48	111	550	1,090	330	126		19	30
6	60	69	83	48	178	1,830	730	305	118		18	34
7	50	68	83	48	145	550	640	305	102		19	40
8	49	68	83	48	111	580	520	280	87	28	19	41
9	48	71	77	51	1,830	610	550	280	80		21	38
10	49	77	77	52	670	550	910	280	79		23	35
11	46	83	77	127	580	280	670	280	79		23	41
12	46	77	83	111	550	240	640	280	72		23	42
13	46	77	83	90	500	280	580	360	70		20	41
14	60	71	83	90	500	380	430	240	65	27	18	38
15	68	190	145	300	550	550	430	260	63	27	19	37
16	71	136	111	500	730	280	430	260	60	20	21	40
17	68	335	90	720	850	610	1,030	240	55	20	23	41
18	67	190	90	600	550	790	790	240	49	21	22	46
19	63	90	90	530	500	610	730	240	46	22	21	47
20	60	90	190	370	500	550	670	240	39	23	21	46
21	64	83	136	300	550	330	610	240	39	20	21	48
22	69	83	96	300	550	280	610	280	37	17	22	46
23	69	165	90	285	550	330	610	280	39	21	23	46
24	64	165	83	240	610	330	610	280	39	22	25	47
25	60	111	77	190	910	380	550	280	37	23	25	46
26	60	96	77	165	970	380	550	260	37	23	24	46
27	64	96	69	136	1,090	430	490	280	37	23	26	47
28	71	90	69	104	970	520	520	280	30	24	24	48
29	71	83	46	96	.....	580	550	240	34	21	23	50
30	58	83	46	90	.....	640	490	225	30	23	21	52
31	63	.....	40	71	.....	610	.....	210	.....	24	22	.....
1919–20.												
1	65	85	103	131	98	52	269	295	137	28	20	26
2	72	92	80	131	95	50	440	283	133	28	19	26
3	64	92	70	121	90	50	301	269	128	49	17	25
4	72	101	66	117	87	52	264	261	124	43	15	25
5	66	104	65	129	85	52	286	261	124	35	15	23
6	65	97	61	125	83	57	289	255	120	33	14	26
7	62	116	68	106	81	54	280	261	144	30	16	25
8	62	92	82	95	74	52	292	289	192	28	17	25
9	68	90	62	98	70	58	425	477	130	27	26	27
10	68	91	68	92	70	105	379	440	118	25	22	35
11	65	94	160	92	66	81	349	391	109	22	21	42
12	65	98		88	66	76	325	373	101	21	20	34
13	65	94		88	66	255	494	361	120	24	20	44
14	64	91		82	66	301	462	349	144	36	20	54
15	64	87		82	65	280	603	340	140	34	20	43
16	65	87	130	84	65	325	590	331	103	31	20	31
17	65	85		90	63	235	468	340	83	32	18	28
18	66	88		86	63	206	385	343	79	34	18	28
19	70	100		82	62	179	385	340	70	32	18	28
20	70	111		81	58	179	382	394	63	28	17	28
21	70	95		78	60	216	337	361	54	28	17	26
22	70	90	250	81	55	264	298	325	43	27	17	28
23	76	87		78	55	255	277	292	35	26	17	37
24	78	87	1,340	80	54	211	263	269	34	26	17	85
25	77	85	790	92	54	275	258	247	34	25	17	95
26	78	93	350	153	52	230	236	219	33	25	17	72
27	80	77	252	142	52	236	275	203	32	24	20	62
28	82	84	220	131	50	227	304	190	31	23	26	55
29	91	98	191	115	52	218	319	181	30	23	28	52
30	91	122	177	106	.....	209	313	164	29	21	27	46
31	84	.....	153	102	.....	200	.....	154	.....	21	28	.....

NOTE.—Discharge estimated or interpolated Jan. 16, 18, Feb. 13, 14, 20, July 3–13, Nov. 28, Dec. 12–23, 1919, and June 27–30, 1920.

Monthly discharge of Little Butte Creek above Eagle Point, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	71	46	60.7	3,730
November	335	60	103	6,130
December	145	40	86.7	5,330
January	720	40	189	11,600
February	1,830	56	549	30,500
March	2,390	240	595	36,600
April	1,090	430	642	38,200
May	490	210	290	17,800
June	195	30	73.4	4,370
July		17	24.8	1,520
August	26	18	22.0	1,350
September	52	23	40.3	2,400
The year	2,390	17	220	160,000
1919–20.				
October	91	62	71.0	4,370
November	122	77	93.8	5,580
December	1,340	62	203	12,500
January	153	78	102	6,270
February	98	50	67.5	3,880
March	325	50	169	10,400
April	603	236	352	20,900
May	477	154	299	18,400
June	192	29	90.6	5,390
July	49	21	28.7	1,760
August	28	14	19.5	1,200
September	95	23	39.4	2,340
The year	1,340	14	128	93,000

DEAD INDIAN CREEK NEAR LILYGLEN, OREG.

LOCATION.—In NW. ¼ sec. 22, T. 38 S., R. 3 E., at Neill's ranch, 1 mile west of Lilyglen, a former post office, and 17 miles east of Ashland, Jackson County.

DRAINAGE AREA.—Not measured; no adequate maps available.

RECORDS AVAILABLE.—February 16, 1916, to June 30, 1917; March 1, 1918, to June 30, 1919, when station was discontinued. Records fragmentary.

GAGE.—Lietz 8-day water-stage recorder; Stevens recorder used 1916 and 1917 in same location. Vertical staff on left bank, one-eighth mile upstream used until May, 1916. Gage read by C. H. Blake.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Closely packed clay and "chalk rock;" practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period December 1, 1918, to June 30, 1919, from water-stage recorder, 1.38 feet at 1 p. m. April 17 (discharge, 88 second-feet); minimum stage recorded 0.22 foot, March 14 (discharge, 0.6 second-foot).

1916–1919: Maximum stage recorded, 3.12 feet March 29, 1917 (discharge, uncertain).

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

DIVERSIONS.—None at present. Water can be diverted from a point about 1,500 feet above the gage into the proposed Beaver Creek reservoir.

REGULATION.—None.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve fairly well defined between 5 and 25 second-feet. Operation of water-stage recorder satisfactory except for a few short periods. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good except for stages below 5 and above 25 second-feet, which are fair, and for January and February, when they may be somewhat too large, on account of ice obstruction.

Discharge measurements of Dead Indian Creek near Lilyglen, Oreg., during the period Dec. 1, 1918, to June 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 10	R. P. Cowgill[a]	0.75	19.8
24	Henshaw and Cowgill	.50	8.0

[a] Engineer, Talent Irrigation District.

Daily discharge, in second-feet, of Dead Indian Creek near Lilyglen, Oreg., for the period Dec. 1, 1918, to June 30, 1919.

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	7.6	2.5	10	7.2	22	60	3.5
2	6.8	2.2		8.4	26	55	3.5
3	7.2	2.0		10	32	51	3.2
4	6.8	1.8	7.0	8.0	62	47	2.8
5	6.0	1.5		6.8	51		3.0
6	5.6	1.5		6.0	43	34	3.0
7	5.6	1.4	4.0	5.0	36		2.8
8	4.0	1.3	4.8	4.0	32		
9	4.0	1.2	16	14	32		
10	4.4	1.2	9.2	21	56	20	
11	4.0	1.1	7.2	11	50	21	2.5
12	4.4	1.0	7.6	8.0	44	18	
13	4.4	1.0	7.2	2.5	38	15	
14	4.4	1.0	6.0	1.4	34	16	2.2
15	6.4	1.0	4.8	1.0	38	16	
16	4.4	1.5	5.2		45	14	
17	4.4	39	4.8		74	12	1.6
18	4.0	54	5.2		68	11	
19	4.8	70	4.8	3.0	66	11	
20	4.8	61	4.4		59	11	
21	4.2	46	4.8		56	10	1.0
22	4.0	40	7.6	6.0	55	10	
23	4.4	42	9.2	7.2	56	8.8	
24	4.0	26	8.4	8.4	60	8.0	
25	3.8	23	8.4	8.8	55	8.4	.8
26	3.5	14	22	9.6	50	7.2	
27	3.2		27	12	50	6.4	
28	3.0		14	14	51	5.6	.7
29	2.8	12	.....	17	55	5.2	.7
30	2.8		.....	19	60	4.8	.7
31	2.8		.....	20	.....	4.4	.....

NOTE.—Discharge estimated or interpolated for following periods: Jan. 27–31, Feb. 2–6, Mar. 6, 7, 16–22, May 5–9, June 8–13, 15–20, 22–27, 29, and 30.

Monthly discharge of Dead Indian Creek near Lilyglen, Oreg., for the period Dec. 1, 1918, to June 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
December	7.6	2.8	4.60	283
January	70	1.0	16.1	990
February	27	4.0	8.49	472
March	21	1.0	8.20	504
April	74	22	48.5	2,890
May	60	4.4	20.2	1,240
June	3.5	.7	1.88	112
The period	.....	.....	.....	6,490

FISH LAKE RESERVOIR NEAR LAKE CREEK, OREG.

LOCATION.—At dam of Fish Lake reservoir, in SW. ¼ sec. 3, T. 37 S., R. 4 E., 18 miles east of Lake Creek post office, Jackson County.

RECORDS AVAILABLE.—December 8, 1915, to September 30, 1920.

GAGE.—Vertical staff fixed to gage tower, graduated in feet and inches; read by R. B. Taffer. Zero of gage 4,799 feet above mean sea level and about 2 feet below normal level of Fish Lake.

EXTREMES OF STAGE.—Maximum stage recorded during year ending September 30, 1919, 9.0 feet June 14–21 (contents, 1,450 acre-feet). Water drawn down practically to normal lake level October 7, 1918; gates closed at 12.30 p. m. April 30, 1919.

Maximum stage recorded during year ending September 30, 1920, 13.7 feet May 17 and 18 (contents, 2,790 acre-feet). Water drawn down practically to normal lake level October 13, 1919; gates closed January 29, 1920.

COOPERATION.—Gage readings and storage table furnished by Rogue River Valley Canal Co.

Gage height and contents of Fish Lake reservoir near Lake Creek, Oreg., at the end of each month for the years ending Sept. 30, 1919 and 1920.

Date.	Gage height.	Contents.	Loss or gain.	Date.	Gage height.	Contents.	Loss or gain.
1918–19.	*Feet.*	*Acre-feet.*	*Acre-feet.*	1919–20.	*Feet.*	*Acre-feet.*	*Acre-feet.*
Oct. 19	1.77	0	−418	Oct. 18	1.70	0	−65
Nov. 30	.....	0	0	Nov. 30	.....	0	0
Dec. 31	.....	0	0	Dec. 31	.....	0	0
Jan. 31	.....	0	0	Jan. 31	3.74	265	+265
Feb. 28	.....	0	0	Feb. 29	6.54	845	+580
Mar. 31	.....	0	0	Mar. 31	8.96	1,442	+597
Apr. 30	3.22	170	+170	Apr. 30	11.48	2,131	+689
May 31	8.33	1,280	+1,110	May 31	13.00	2,579	+448
June 30	8.83	1,410	+130	June 30	12.90	2,548	−31
July 31	6.96	942	−468	July 31	9.83	1,674	−874
Aug. 31	4.92	495	−447	Aug. 31	5.60	637	−1,037
Sept. 30	2.58	65	−440	Sept. 30	1.74	0	−637

NORTH FORK OF LITTLE BUTTE CREEK AT FISH LAKE, NEAR LAKE CREEK, OREG.

LOCATION.—In SW. ¼ sec. 3, T. 37 S., R. 4 E., at outlet of Fish Lake, 18 miles east of Lake Creek post office, Jackson County.

DRAINAGE AREA.—15 square miles.

RECORDS AVAILABLE.—October 21, 1914, to July 20, 1915; June 11 to November 5, 1916; and May 26, 1917, to September 30, 1920.

GAGE.—Lietz water-stage recorder was installed July 10, 1918, used until 1920, when it was replaced by a Friez recorder. Vertical staff just above wasteway in temporary dam used 1914–15; vertical staff below permanent dam used June, 1916, to July 10, 1918. Gage readers, E. W. Frey and R. B. Taffer.

DISCHARGE MEASUREMENTS.—Made by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, from water-stage recorder, 1.54 feet October 1 (discharge, 76 second-feet); minimum stage, 0.54 foot May 2 (discharge, 16 second-feet).

Maximum stage during year ending September 30, 1920, from water-stage recorder, 1.88 feet May 20 (discharge, 68 second-feet); minimum stage recorded, 0.4 foot at 9 a. m., April 17 (discharge, 3 second-feet).

1914–1920: Maximum stage recorded, that of October 1, 1918; minimum stage, that of April 17, 1920.

ICE.—Stage-discharge relation affected by ice during extreme cold weather.

DIVERSIONS.—None.

REGULATION.—Permanent dam at Fish Lake was completed in fall of 1915, thereafter a record has been kept most of the time of height of water in reservoir. (See p. 177.)

ACCURACY.—Stage-discharge relation changed slightly during spring of 1919; and large progressive changes during summer of 1920. Rating curve used October 1, 1918, to April 29, 1919, and curve used April 30, 1919, to May 16, 1920, well defined. Operation of recorder fairly satisfactory; staff gage read once or twice practically every day. Daily discharge ascertained by applying to rating table the daily gage height obtained by inspecting the recorder graph, or the daily gage reading; shifting-control method used May 17 to September 30, 1920. Records, October, 1918, to April, 1920, good; May to September, 1920, poor.

COOPERATION.—Gage-height record and some of discharge measurements furnished by Rogue River Valley Canal Co.

Discharge measurements of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 1	R. P. Cowgill [a]	1.47	68	June 24	J. B. Piatt [b]	1.06	20.8
1919.				Sept. 9	Piatt and Powell	1.63	34.1
July 9	do	1.02	38.0				
Oct. 10	J. B. Piatt [b]	.92	32.0				

[a] Engineer, Rogue River Valley Canal Co. [b] Chief engineer, Medford Irrigation District.

Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake near Lake Creek, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	68	26	26		23		29	18	37	41	41	38
2	58	26	26	24	23		29	16	36	41	40	37
3	42	28	26		23		30	17	34	40	40	36
4	34	28	26	24	24		36	17	34	40	40	37
5	32	28	26	24	23		35	17	33	41	40	37
6	30	28	26	23	23		36	18	32	41	40	37
7	29	26	26	24	23		32	18	32	40	39	37
8	27	26	26	24	23	25	30	18	32	39	39	36
9	27	26	26	23	25		30	18	32	38	41	36
10	27	27	26	23	24		34	19	32	38	41	38
11	26	28	26	24	24		34	19	32	38	40	38
12	26	26	26	23	23		33	20	32	41	39	36
13	26	26	26	24	23		34	23	32	42	38	36
14	27	28	25	24	24		34	25	32	41	38	36
15	28	31	26	24	24		32	26	33	41	37	36
16	30	30		24	24	27	32	27	34	41	37	36
17	28	29	26	24	24	27	36	28	36	41	37	36
18	28	28		24	24	28	36	28	38	41	36	37
19	28	28	26	24	23	28	36	28	37	41	36	36
20	26	29	26	23	24	29	39	30	37	40	37	36
21	26	28	26	24		27	36	34	37	39	38	38
22	26	28	26	24		28	39	42	36	41	37	37
23	27	28	26	24			42	52	34	41	37	36
24	26	28	25	24			42	52	32	41	37	36
25	27	28	25	24	23		45	55	31	41	36	35
						28						
26	26	27	24	24			48	55	34	41	36	35
27	27	28	24	23			48	52	38	41	36	36
28	28	27	24	24			51	48	41	41	37	36
29	26	27	25	23	.....	28	58	40	41	40	37	35
30	26	26	24	23	.....	28	39	37	41	39	36	36
31	26	.....	24	23	.....	29	.....	37	.....	41	34	.....

Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake near Lake Creek, Oreg., for the years ending Sept. 30, 1919 and 1920—Continued.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1919-20.												
1	36	44	33	28	10	8	5	5	22	22	34	39
2	39	44	33	28	10	7	5	6	22	25	34	36
3	38	42	34	27	10	7	5	6	22	26	35	34
4	36	42	35	26	10	8	5	7	22	28	35	31
5	35	42	33	28	10	6	5	8	19	26	36	27
6	34	36		29	11	6	5	11	20	26	33	24
7	35	36		30	10	5	5	11	18	27	35	21
8	35	36		30	10	5	4	10	17	26	36	26
9	34	37		30	10	5	3	14	17	25	33	33
10	34	37		28	10	4	3	15	19	28	37	31
11	34	37		28	10	4	3	14	30	30	38	30
12	34	38		27	10	5	3	16	27	33	36	28
13	34	36	32	28	10	5	3	18	26	36	39	28
14	36	36		26	14	5	4	17	26	36	38	28
15	33	36		26	10	5	4	18	25	41	39	30
16	33	35		27	10	4	3	33	23	42	39	23
17	33	34		26	10	4	3	38	22	39	40	20
18	34	34		26	10	4	3	32	21	39	41	20
19	36	37		26	10	4	4	43	22	38	38	19
20	33	41	34	26	10	4	4	68	21	40	39	18
21	34	36	32	26	10	4	4	52	20	38	44	19
22	35	34	32	25	10	5	4	37	20	38	44	18
23	39	33	32	26	10	5	4	30	20	37	42	24
24	37	32	31	26	10	5	4	26	20	38	42	24
25	34	36	33	26	10	5	4	24	20	39	38	22
26	40	28	33	27	10	5	5	25	22	38	42	20
27	40		32	27	10	5	5	25	21	36	41	17
28	39	30	32	27	9	5	5	24	21	36	41	18
29	43		30	27	8	5	6	24	21	36	41	16
30	42	35	30	11	.....	5	6	23	20	36	42	14
31	36	.....	29	10	.....	5	.....	22	.....	35	42	.....

NOTE.—Stage-discharge relation affected by ice and discharge estimated Nov. 24, Dec. 10-11, 16-18, 22-27, 1918, Jan. 1-3, Feb. 1, 11, 13, 18, Feb. 21 to Mar. 15, Dec. 6-19, 1919, Jan. 7, and 8, 1920.

Monthly discharge of North Fork of Little Butte Creek at Fish Lake near Lake Creek, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Measured.	Storage.	Corrected for storage.
1918-19.						
October	68	26	30.3	1,860	−418	1,440
November	31	26	27.6	1,640	0	1,640
December	26	24	25.5	1,570	0	1,570
January	24	23	23.7	1,460	0	1,460
February	25	.....	23.4	1,300	0	1,300
March	29	.....	26.5	1,630	0	1,630
April	58	29	37.2	2,210	+170	2,380
May	55	16	30.1	1,850	+1,110	2,960
June	41	32	34.7	2,060	+130	2,190
July	42	38	40.4	2,480	−468	2,010
August	41	34	38.0	2,340	−447	1,890
September	38	35	36.4	2,170	−440	1,730
The year	68	16	31.2	22,600	−363	22,200
1919-20.						
October	43	33	36.0	2,210	−65	2,140
November	44	28	36.1	2,150	0	2,150
December	35	29	32.1	1,970	0	1,970
January	30	10	26.1	1,600	+265	1,860
February	14	8	10.1	581	+580	1,160
March	8	4	5.13	315	+597	912
April	6	3	4.20	250	+689	939
May	68	5	22.6	1,390	+448	1,840
June	30	17	21.5	1,280	−31	1,250
July	42	22	33.5	2,060	−874	1,190
August	44	33	38.5	2,370	−1,037	1,330
September	39	14	24.6	1,460	−637	823
The year	68	3	24.3	17,600	−65	17,600

NOTE.—Figures showing "run-off corrected for storage" obtained by combining the measured run-off with the gain or loss in storage in Fish Lake reservoir. (See p. 177).

NORTH FORK OF LITTLE BUTTE CREEK NEAR LAKE CREEK, OREG.

LOCATION—In sec. 21, T. 36 S., R. 2 E., one-eighth mile above intake of Rogue River Valley canal and 1 mile above Lake Creek post office, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 20 to October 13, 1916; May 7, 1917, to September 30, 1919, when record was suspended Station above city intake, about 3 miles above, September 10, 1911, to March 31, 1913 (gives results slightly greater than present station).

GAGE.—Vertical staff on right bank; datum raised 1 foot October 1, 1918; read by I. C. Daly and H. H. Baker. A Stevens continuous water-stage recorder was also used June 17, 1918, to March 25, 1919.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; fairly permanent except in extreme floods.

EXTREMES OF DISCHARGE.—Maximum discharge during year ending September 30, 1919, from water-stage recorder, 2.98 feet at 9 a. m. March 2 (discharge estimated from extension of rating curve, 650 second-feet); minimum stage from recorder, 0.80 foot at 10 a. m. December 17 (discharge, 16 second-feet).

1916–1919: Maximum stage from high-water marks, 6.02 feet January 12, 1918 (discharge not computed); minimum stage, that of 1919.

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

DIVERSIONS.—Pipe line for water supply of city of Medford, capacity about 7.5 second-feet, carries water past the gage. Several hundred acres irrigated above the station.

REGULATION.—Water was stored in Fish Lake reservoir, 15 miles above the station. (See p. 177 for record of storage.)

ACCURACY.—Stage-discharge relation fairly permanent during year. Rating curve well defined between 40 and 100 second-feet. Operation of water-stage recorder fairly satisfactory to March 25; staff gage read once daily or about three times a week thereafter. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or daily gage reading. Records good.

Discharge measurements of North Fork of Little Butte Creek near Lake Creek, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1919.		*Feet.*	*Sec.-ft.*
Oct. 13	R. P. Cowgill[a]	1.26	72	Sept. 27	Henshaw and Piatt	1.08	47.3
1919.				1920.			
Feb. 15	R. C. Briggs	1.18	58	May 11	R. C. Briggs	1.14	54
May 25	Henshaw and Cowgill	1.36	92	Aug. 7	do	1.15	53
June 8	R. P. Cowgill	1.10	54	Sept. 30	Henshaw and Powell	1.04	45.1

[a] Engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of North Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending Sept. 30, 1919.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1	82	43	43		33	112	140	77	.....	52	55	47
2	73	43	38		38	288	150	63	60	55	.....	.....
3	68	45	44		40	142	156	63	.....	.....	.....	42
4	53	44	39		42	120	288	63	55	49	55	.....
5	56		37	36	43	115	210	63	.....	.....	.....	47
6	50		36		49	225	195	60	55	.....	.....	.....
7	47		38		47	122	168	60	.....	47	.....	.....
8	45		37		43	102	146	60	49	.....	55	47
9	44	44	38	35	96	82	125	63	55	55	.....	.....
10	43		39	47	77	72	210	63	.....	.....	.....	49
11	42		39	57	77	70	174	62	55	52	52	.....
12	42		39	50	80	68	150	60	49	.....	.....	49
13	42		41	43	68	70	140	57	.....	.....	52	.....
14	42		44	39	66	105		63	.....	55	.....	.....
15	55	70	55	52	63	135	132	70	.....	.....	47	47
16	49	45	43	45	92	82		73	55	49	.....	.....
17	43	43	37	56	177	77	125	70	.....	.....	.....	49
18		42	43	47	136	165	150	70	55	57	47	.....
19		42	60	75	96	115	148	70	.....	.....	.....	47
20		41	53	70	70	92	145	70	55	.....	47	.....
21		43	42	72	77	94		70	.....	57	.....	.....
22		66	41	56	68	96		80	.....	.....	44	.....
23		53	38	80	80	102		84	55	57	.....	.....
24		48	37	73	73	108	135	88	.....	.....	.....	.....
25	43	39	37	57	105	105		92	49	57	44	.....
26			36	60	118			88	.....	.....	.....	.....
27			36	52	84	130	125	84	52	.....	47	47
28		40	36	45	100		125	80	.....	55	.....	.....
29			37	43	.....		125	76	.....	.....	44	.....
30			38	39	.....	150	130	72	57	55	.....	.....
31		.....	37	38	.....	150	.....	68	.....	.....	.....	.....

NOTE.—Discharge estimated or interpolated for following periods: Oct. 18–31, Nov. 1, 2, 5–14, 26–30, Dec. 9, 31, Jan. 1–8, Feb. 3, 4, 14, 18, Mar. 26–29, Apr. 8, 14–16, 19, 21–26, May 11, 26, 27, 29–31. From June 1 to Sept. 30 gage was read only on days for which discharge is given.

Monthly discharge of North Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.		
	Maximum.	Minimum.	Mean.	Measured.	Storage.	Corrected for storage.
October	82	42	47.7	2,930	−418	2,510
November	70	.....	44.9	2,670	0	2,670
December	60	36	40.6	2,500	0	2,500
January	75	35	49.0	3,010	0	3,010
February	177	33	76.4	4,240	0	4,240
March	288	68	119	7,320	0	7,320
April	288	125	151	8,980	+170	9,150
May	92	57	70.4	4,330	+1,110	5,440
June	60	49	54.0	3,210	+130	3,340
July	57	47	53.7	3,300	−468	2,830
August	55	44	49.1	3,020	−447	2,570
September	49	42	47.1	2,800	−440	2,360
The year	288	33	66.7	48,300	−363	47,900

NOTE.—Figures showing "run-off corrected for storage" obtained by combining measured run-off with the gain or loss in storage in Fish Lake reservoir. (See p. 177.)

ROGUE RIVER VALLEY CANAL NEAR BROWNSBORO, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 36 S., R. 1 E., at head of Bradshaw drop, 2 miles southwest of Brownsboro, 8 miles below intake, and 16 miles from Medford, Jackson County.

RECORDS AVAILABLE.—Irrigation season of 1913 and 1915 to 1919. Station discontinued.

GAGE.—Stevens 8-day water-stage recorder installed April 24, 1918, and referred to old vertical staff at head of drop, installed June 5, 1916. Former gages were a few feet upstream.

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

CHANNEL AND CONTROL.—Bed composed of solid rock at head of drop; practically permanent.

EXTREMES OF DISCHARGE.—1913; 1915–1919: Maximum stage recorded, 2.23 feet 6 p. m. May 15, 1919 (discharge, 46 second-feet); canal dry at times.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder fairly satisfactory except during September. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph, or readings of staff gage about three times a week. Records good.

The Rogue River Valley canal diverts water from North Fork of Little Butte Creek in the SE. ¼ sec. 22, T. 36 S., R. 2 E., to irrigate land lying in the basin of Bear Creek. Any seepage or return water from irrigation of about 300 acres above this point reaches Little Butte Creek above the station above Eagle Point.

Discharge measurements of Rogue River Valley canal near Brownsboro, Oreg., during the years, ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1918.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Oct. 4	R. P. Cowgill [a]	1.37	10.7	May 11	R. C. Briggs	1.97	31.2
1919.				Aug. 7	do	2.11	38.9
May 25	Henshaw and Cowgill	2.04	36.4	Sept. 30	Henshaw and Powell	1.52	15.3
July 7	R. P. Cowgill	2.18	39.6	30	do	1.52	14.8
Sept. 27	Henshaw and Piatt	1.35	9.4				

[a] Engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Rogue River Valley canal near Brownsboro, Oreg., for the year ending Sept. 30, 1919.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	34	39	38	32	16	43	36	37	36	25
2	.....	33	38	40	31	17	38	38	36	36	18
3	.....	34	38	40	31	18	36	38	37	36	14
4	.....	34	38	40	31	19	36	38	38	34	11
5	.....	36	40	40	30	20	36	38	38	34	13
6	.....	36	40	40	29	21	34	36	38	36	
7	.....	38	40	40	29	22	36	36	38	34	
8	36	36	38	40	28	23	36	36	38	33	
9	36	36	38	40	28	24	36	36	38	33	11
10	38	34	38	39	28	25	36	36	39	33	
11	25	34	38	39	29	26	38	36	40	33	
12	30	35	38	38	29	27	34	36	39	32	10
13	34	36	36	39	29	28	27	40	37	33	
14	38	36	36	40	28	29	29	40	36	34	10
15	43	34	38	38	26	30	30	40	36	32	
						31	36	.....	38	32	.....

NOTE.—Discharge estimated or interpolated for following periods: May 12–14, June 11–13, 23, 25, 30, July 1, 2, 6, 16, 18, 25, 27, 28, Aug. 3, 4, 10, 11, 13, 22, Sept. 1, 3, 5, 7, 8, 10, 12, 14, 15, 21–26, and 28–30; no gage-height record.

Monthly discharge of Rogue River Valley canal near Brownsboro, Oreg., for the year ending Sept. 30, 1919.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October (16 days)	32	9	12.7	403
May 8–31	43	25	35.0	1,670
June	40	33	36.2	2,150
July	40	36	37.9	2,330
August	40	32	36.5	2,240
September	32	10	20.8	1,240

EAGLE POINT CANAL NEAR EAGLE POINT, OREG.

LOCATION.—In SE. ¼ sec. 1, T. 36 S., R. 1 W., halfway between point of diversion and point where canal crosses Eagle Point-Brownsboro road; 100 feet above intake of Pelouze lateral, one-fourth mile below Bieberstedt's house, and 2½ miles east of Eagle Point, Jackson County.

RECORDS AVAILABLE.—May 9 to September 30, 1920.

GAGE.—Vertical staff fastened to an alder tree on left bank; read by Carl Bieberstedt.

CHANNEL AND CONTROL.—Artificial earth channel; banks high and uniform; no definite control.

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

DIVERSIONS.—None.

REGULATION.—Flow in canal regulated by head gates.

ACCURACY.—Stage-discharge relation changed several times during period owing to regulation of Pelouze lateral head gates. Gage read to hundredths three times a week. Daily discharge ascertained by applying to rating table, either directly or indirectly, the daily gage height and interpolating for days when gage was not read. Records fair.

Canal diverts water from Little Butte Creek, in sec. 1, T. 36 S., R. 1 E.; water is used for irrigating in vicinity of Eagle Point.

Discharge measurements of Eagle Point canal near Eagle Point, Oreg., during the period Sept. 27, 1919, to Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Sept. 27	Henshaw and Piatt [a]	.....	11.8	Aug. 7	R. C. Briggs	1.40	16.5
1920.				10	Chadwick and Piatt	1.49	18.9
May 11	R. C. Briggs	1.80	13.5	Sept. 30	Henshaw and Powell	1.25	11.9

[a] Engineer, Medford Irrigation District.

Daily discharge, in second-feet, of Eagle Point canal near Eagle Point, Oreg., for the year ending Sept. 30, 1920.

Day.	May.	June.	July.	Aug.	Sept.	Day.	May.	June.	July.	Aug.	Sept.
1	.....	9.8	18	15	13	16	13	8.8	14	16	12
2	.....	9.6	19	14	12	17	13	8.2	14	16	12
3	.....	9.6	16	13	12	18	12	7.5	15	16	11
4	.....	9.6	14	13	11	19	11	7.2	15	16	11
5	.....	9.6	14	13	11	20	11	6.4	15	16	11
6	.....	9.6	15	14	11	21	11	6.1	15	16	12
7	.....	9.8	14	16	11	22	11	5.8	15	16	12
8	.....	9.8	14	18	11	23	11	5.6	15	15	12
9	13	10	14	20	12	24	11	5.4	15	15	12
10	13	9.8	14	19	12	25	10	5.2	14	15	12
11	13	9.8	14	17	12	26	10	5.0	14	15	12
12	13	9.6	13	17	12	27	10	5.0	14	15	12
13	13	9.2	13	17	12	28	10	5.0	14	17	12
14	13	8.8	14	17	13	29	10	16	14	15	12
15	13	8.8	14	17	12	30	10	16	13	14	12
						31	10	.....	14	14	.....

Monthly discharge of Eagle Point canal near Eagle Point, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
May 9–31	13	10	11.5	524
June	16	5.0	8.55	509
July	19	13	14.5	892
August	20	13	15.7	965
September	13	11	11.8	702
The period	.....	.....	.....	3,592

EMIGRANT CREEK NEAR ASHLAND, OREG.

LOCATION.—In SE. ¼ sec. 20, T. 39 S., R. 2 E., 200 feet above bridge on Ashland-Johnson Prairie road, 300 feet below Emigrant Gap reservoir site, and 11 miles by road above Ashland, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 27 to September 30, 1920.

GAGE.—Stevens 8-day water-stage recorder on left bank, with inside and outside staff gages.

DISCHARGE MEASUREMENTS.—Made by wading or from downstream side of highway bridge.

CHANNEL AND CONTROL.—Bed composed of gravel; channel fairly straight. Control is gravel bar 25 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period, from water-stage recorder, 5.25 feet at 8.30 a. m. April 9 (discharge, 143 second-feet); stream dry July 1 to September 30.

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

DIVERSIONS.—Station is above practically all diversions in Rogue River valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined below 300 second-feet. Operation of water-stage recorder satisfactory except for two-day period in February. Discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records excellent.

Discharge measurements of Emigrant Creek near Ashland, Oreg., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*			*Feet.*	*Sec.-ft.*
Feb. 26	Boyden and Seaman [a]	3.60	2.0	May 6	Boyden and Seaman	4.32	25.0
Apr. 16	do	4.88	82	8	Briggs and Dillard [a]	4.28	23.2

[a] Engineers, Talent Irrigation District.

Daily discharge, in second-feet, of Emigrant Creek near Ashland, Oreg., for the year ending Sept. 30. 1920.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	.....	7.8	3.0	20	36	3.4	16	.....	2.7	15	95	20	
2	.....	6.8	3.1	29	34	3.0	17	.....	2.8	16	74	18	
3	.....	6.3	2.7	30	31	2.7	18	.....	3.0	21	68	16	
4	.....	5.8	2.5	29	28	2.2	19	.....	3.1	30	71	14	
5	.....	5.3	2.6	34	26	2.0	20	.....	2.8	31	70	12	
6	.....	4.9	2.6	34	25	2.4	21	.....	3.0	43	59	12	
7	.....	4.7	2.6	31	25	4.5	22	.....	2.5	38	50	10	
8	.....	4.2	2.7	35	24	2.6	23	.....	2.5	32	45	9.6	2.0
9	.....	4.0	3.2	117	61	2.2	24	.....	2.2	25	40	9.6	
10	.....	4.2	4.0	78	41	2.2	25	.....	2.5	24	40	9.0	
11	.....	3.6	3.8	52	33	2.4	26	.....	2.6	22	41	8.7	
12	.....	3.3	4.0	43	30	2.8	27	13	3.0	21	44	7.5	
13	.....	3.0	5.9	50	30	3.5	28	12	3.1	22	47	6.3	
14	.....	2.8	16	52	27	4.2	29	11	3.1	25	42	4.9	
15	.....	2.7	13	94	23	2.0	30	9.9	.....	23	38	4.7	
							31	8.7	.....	22	.....	4.3	.....

NOTE.—Discharge, Feb. 12, 13, June 13, and 15–30, estimated; no gage-height record. Stream dry July 1 to Sept. 30.

Monthly discharge of Emigrant Creek near Ashland, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
January 27–31	13	8.7	10.9	108
February	7.8	2.2	3.87	215
March	43	2.5	15.5	953
April	117	20	51.7	3,080
May	61	4.3	20.7	1,270
June	4.5	.....	2.40	143
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The period	.....	.....	.....	5,770

BEAR CREEK AT MEDFORD, OREG.

LOCATION.—In NW. ¼ sec. 30, T. 37 S., R. 1 W., just above Main Street Bridge in Medford, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 13, 1915, to September 30, 1920; with some breaks during low-water periods.

GAGE.—Leitz water-stage recorder installed September 20, 1918, at southeast corner of Page Theater Building, on left bank. Vertical staff prior to that date, with datum 1 foot lower. Gage inspected by R. P. Cowgill and J. B. Piatt.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of loose gravel. A concrete sewer passing under stream forms a partial control.

EXTREMES OF DISCHARGE.—Maximum stage during year ending September 30, 1919, determined from high-water mark, 6.8 feet in forenoon of February 9 (discharge estimated from extension of rating curve, 2,400 second-feet); stream practically dry in latter part of summer owing to diversions above.

Maximum stage during year ending September 30, 1920, from water-stage recorder, 2.0 feet at 6 p. m. April 19 (discharge, 196 second-feet); stream dry in August.

1915–1920: Maximum stage recorded, that of February 9, 1919; creek dry at times.

ICE.—No record during winter.

DIVERSIONS.—A large area is irrigated above the station. In addition to diversions by Phoenix ditch and Talent lateral, there are a number of unmeasured diversions above station. Return waters from some of the irrigated areas reach the creek above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter of 1919, and again during winter of 1920. Three fairly well defined rating curves used. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

Discharge measurements of Bear Creek at Medford, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
Feb. 11	Briggs and Piatt [a]	3.18	565	Jan. 29	J. J. Dirzulaitis	1.18	50
May 15	R. P. Cowgill [b]	1.66	105	Feb. 4	do	1.07	32.5
25	Henshaw and Cowgill	1.63	93	May 8	R. C. Briggs	1.14	38.3
June 7	R. P. Cowgill	1.26	49.2	Aug. 6	do		0
July 16	J. B. Piatt	.50	1.0				

[a] Engineer, Medford Irrigation District. [b] Engineer, Rogue River Valley Canal Co.

NOTE.—Point of zero flow determined as 0.37 foot by R. C. Briggs, Aug. 6.

Daily discharge, in second-feet, of Bear Creek at Medford, Oreg., for the period Sept. 20, 1918, to Sept. 30, 1920.

Day.	Sept.	Oct.	Feb.	Mar.	Apr.	May.	June.	July.
1918–19.								
1		5		270	412	225	80	6.8
2		5		535	412	210	77	6.8
3		7		448	412	185	70	5.1
4		7		345	500	185	64	5.4
5		9		345	465	175	58	5.7
6		12		500	395	160	53	5.0
7		11		430	345	152	41	5.0
8		10	500	360	285	142	40	3.6
9		9	1,360	330	255	138	39	3.3
10		7	650	300	300	132	38	2.8
11		7	535	300	315	130	38	2.6
12		5	430	285	285	128	35	2.6
13		4	345	285	270	118	36	2.4
14		4	330	240	240	108	37	2.2
15		5	315	270	225	112	34	1.0
16		27	315	240	210	108	31	2.6
17		18	448	225	285	105	28	2.0
18		16	350	345	345	102	23	.8
19		14	255	378	315	95	19	.7
20	5	12	255	330	285	96	18	.7
21	5	12	240	345	270	97	16	.7
22	6	10	240	395	255	99	18	.6
23	8	10	225	412	255	100	16	.5
24	9	10	210	412	255	99	14	.4
25	8	10	210	378	255	98	14	.....
26	8	10	420	378	240	98	13	.....
27	7	10	330	412	225	92	10	.....
28	7	12	285	448	225	92	6.8	.....
29	6	12	.....	436	225	87	7.6	.....
30	5	10	.....	424	225	75	9.2	.....
31	.....	.....	.....	412	.....	82	.....	.....

Day.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.
1919–20.							
1	.....	19	36	22	71	92	10
2	.....	21	35	21	78	88	9.0
3	.....	22	34	19	103	82	7.7
4	.....	22	33	17	105	66	
5	.....	21	33	18	107	53	
6	.....	24	33	18	109	50	12
7	.....	34	35	21	100	44	
8	.....	33	34	21	96	38	
9	.....	31	33	21	170	86	16
10	.....	29	33		186	94	16
11	.....	29	34	35	139	80	16
12	.....	29			124	74	19
13	.....	27			128	66	24
14	21	26	29	46	146	58	24
15	72	28		43		48	22
					180		
16	78	29		46		45	22
17	107	32	24	46	170	40	
18	110	31	24	50	168	35	
19	110	31	24	77	175	30	
20	122	31	24	93	168	25	
21	125	30	23	116	156	24	
22	125		25	103	135	21	
23	118	35	24	96	118	23	10
24	107		24	78	101	21	
25	130		23	71	96	18	
26	130	47	24	68	98	14	
27	81	50	22	63	111	12	
28		47	24	70	120	9	
29		43	25	83	116	8.5	
30	50	35	.....	82	107	12	
31		32	.....	74	.....	10	.....

NOTE.—Discharge estimated or interpolated for following periods for which no gage-height records were available: Sept. 22, 23, and 25, 1918; Feb. 18, Mar. 29, 30, Apr. 23, 24, May 11, 20–22, 24, June 9, 13, 15, July 6, 7, 17, and Dec. 28–31, 1919; Jan. 9, 22–25, Feb. 3, 12–16, Mar. 10–13, Apr. 4, 5, 15, 16, May 17–19, 27, June 4–8, and 17–30, 1920.

Monthly discharge of Bear Creek at Medford, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	27	5	10.0	595
February 8–28	1,360	210	393	16,400
March	535	225	362	22,300
April	500	210	300	17,900
May	225	75	123	7,560
June	80	6.8	32.8	1,950
July 1–24	6.8	0.4	2.89	138
1919–20.				
December 14–31	130	21	90.9	3,250
January	50	19	31.4	1,930
February	36	22	28.6	1,650
March	116	17	52.4	3,220
April	186	71	129	7,680
May	94	8.5	44.1	2,710
June	24	.....	12.9	768
The period	186	.....	.....	21,200

TALENT LATERAL NEAR ASHLAND, OREG.

LOCATION.—In SW. ¼ sec. 33, T. 38 S., R. 1 E., at intake one-fourth mile above mouth of Ashland Creek and half a mile east of Ashland, Jackson County.

RECORDS AVAILABLE.—May 1 to June 23, 1920.

GAGE.—Vertical staff read by employee of Talent Irrigation District.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel excavated in earth and gravel; fairly permanent for each season.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Gage read to half-tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Canal diverts water from the east bank of Bear Creek, in the SW. ¼ sec. 33, T. 38 S., R. 1 E. Water is carried across Ashland Creek in a flume and used to irrigate land on the west side of creek near Talent and Phoenix. Water is diverted only during periods of considerable run-off. Return water finds its way back to Bear Creek or into the Phoenix ditch.

Discharge measurements of Talent lateral near Ashland, Oreg., during the year ending Sept. 30, 1920.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
May 3	C. Z. Boyden [a]	1.05	7.4
26	F. C. Dillard [a]	1.45	14.1
June 2	....do	.80	4.9

[a] Engineer Talent Irrigation District.

Daily discharge, in second-feet, of Talent lateral near Ashland, Oreg., for the year ending Sept. 30, 1920.

Day.	May.	June.	Day.	May.	June.	Day.	May.	June.
1	7.0	8.6	11	17	6.3	21	16	2.8
2	8.3	4.8	12	16	6.3	22	17	2.2
3	7.6	3.6	13	15	6.3	23	16	1.6
4	18	3.2	14	14	9.0	24	15	.....
5	20	3.2	15	14	8.3	25	14	.....
6	18	3.2	16	13	7.6	26	13	.....
7	16	4.8	17	14	6.9	27	12	.....
8	16	5	18	15	5.7	28	12	.....
9	17	8.3	19	16	5.7	29	11	.....
10	17	6.9	20	17	4.6	30	9.8	.....
						31	8.6	.....

NOTE.—Discharge, May 1 and June 22, estimated; gage not read.

Monthly discharge of Talent lateral near Ashland, Oreg., for the year ending Sept. 30, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
April 21–30	.....	.....	a7.0	139
May	20	7.0	14.2	873
June 1–23	15	1.6	5.87	268
The period	.....	.....	.....	1,280

a Estimated.

NOTE.—Water turned into canal on Apr. 21. No water diverted by this canal during 1919.

PHOENIX DITCH AT TALENT, OREG.

LOCATION.—In NW. ¼ sec. 23, T. 38 S., R. 1 W., 80 feet below intake, one-fourth mile below an old bridge across Bear Creek, and half a mile north of Talent, Jackson County.

RECORDS AVAILABLE.—April 19, 1916, to September 30, 1920.

GAGE.—Barrett and Lawrence water-stage recorder on right bank referred to vertical staff on left of flume. Gage inspected by W. D. Brophy.

DISCHARGE MEASUREMENTS.—Made from collar of flume.

CHANNEL AND CONTROL.—Flume extends only a few feet below gage; no well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during 1919 from water-stage recorder, 2.53 feet at midnight June 10 (discharge, 24 second-feet); canal dry in winter.

Maximum stage during 1920, from water-stage recorder, 2.20 feet at noon June 8 (discharge, 26 second-feet); canal dry in winter.

1916–1920: Maximum discharge recorded, 28 second-feet June 22, 23, and 25, 1917.

ACCURACY.—Stage-discharge relation not permanent. Rating curve used May 1 to June 9, 1919, fairly well defined; for remainder of record poorly defined curves applicable for short periods, or shifting-control method used. Operation of water-stage recorder satisfactory except during July, 1919, when a few staff gage readings have been used, and for several short periods in 1920. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good for 1919; fair for 1920, except during estimated periods.

The Phoenix ditch diverts water from Bear Creek in the NW. ¼ sec. 23, T. 38 S., R. 1 W., for irrigating about 1,000 acres of land between Medford and Talent.

Discharge measurements of Phoenix ditch at Talent, Oreg., during the years ending Sept. 30, 1919 and 1920.

Date.	Made by—	Gage height.	Discharge.	Date.	Made by—	Gage height.	Discharge.
1919.		*Feet.*	*Sec.-ft.*	1920.		*Feet.*	*Sec.-ft.*
May 14	R. P. Cowgill [a]	1.74	12.6	May 7	R. C. Briggs	1.48	16.9
22	Henshaw and Cowgill	1.98	15.0	June 2	J. B. Platt	1.19	8.9
June 7	R. P. Cowgill	2.38	21.4	Aug. 6	R. C. Briggs	.90	.4
22	do	2.44	18.5				
July 1	do	2.67	19.6				

[a] Engineer, Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Phoenix ditch at Talent, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	1919			1920				
	May.	June.	July.	Mar.	Apr.	May.	June.	July.
1	10	18	19		16	14	10	2.8
2	10	17	18	13	18	14	9	2.6
3	10	16	15		18	15		3.6
4	11	16	10	13	14	16		3.6
5	11	18	8.2	13	17	18	12	.....
6	11	21		13	17	18		
7	11	21		11	16	17		
8	11	21	8.0	12	16	17	21	.....
9	11	23		13	18		13	.....
10	12	22	8.0	13	14		12	.....
11	12	22	8.1	13	10		11	.....
12	12	21	8.3	13	9.5	16	9.5	.....
13	13	21	8.5	13	8.0		11	.....
14	13	15	8.6	16	3.8		11	.....
15	12	14		17	3.6		9.6	.....
16	12	14		14	3.0		9.8	.....
17	12	14		12	2.8	15	10	.....
18	12	15	4.5	11		20	9.0	.....
19	12	17		12	9.0	17	7.2	.....
20	13	17		18		18	6.7	.....
21	15	18		14	15	16	6.1	.....
22	15	18	.5	14	20	15	5.5	.....
23	15	18	.6	14	20	14	4.9	.....
24	14	17	.7	12	19	15	4.1	.....
25	15	17	.9	13	19	15	4.0	.....
26	15	18		13	19	14	3.9	.....
27	15	19		13	20	13	3.8	.....
28	15	18		14	20	13	3.2	.....
29	15	18	.8	18	17	12	3.2	.....
30	19	19		18	14	12	3.0	.....
31	18	.....		17	.....	11	.....	.....

NOTE.—Discharge estimated or interpolated for following periods for which no gage-height records were available: May 3, 4, 6, 8–13, June 29, July 3, 4, 6–9, 11–13, 15–21, 23, 24, 26–31, 1919, Mar. 1–3, Apr. 18–20, 29, May 9–16, June 1, 3–7, 16, 25, and 26, 1920.

Monthly discharge of Phoenix ditch at Talent, Oreg., for the years ending Sept. 30, 1919 and 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1919.				
May	19	10	13.0	799
June	23	14	18.1	1,080
July	19	.5	5.9	363
The period				2,240
1920.				
March	18	11	13.7	842
April	20	2.8	13.8	821
May	20	11	15.4	947
June	21	3.0	8.72	519
The period				3,130

COQUILLE RIVER BASIN.

SOUTH FORK OF COQUILLE RIVER AT POWERS, OREG.

LOCATION.—In SW. ¼ sec. 13, T. 31 S., R. 12 W., 200 feet above Bingham Creek, 1,000 feet below Salmon Creek, and one-fourth mile due west of Powers post office, Coos County, the present terminus of Marshfield branch of Southern Pacific Railroad.

DRAINAGE AREA.—168 square miles (measured on topographic map and on Douglas County Abstract Co.'s map).

RECORDS AVAILABLE.—September 4, 1916, to September 30, 1920.

GAGE.—Inclined staff in three sections on left bank under footbridge. Gage read by Ray Brown.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Gravel and solid rock; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 13.0 feet at 3 p. m. January 17 (discharge, 12,000 second-feet); minimum stage recorded, 2.40 feet October 1–4 and 24–26 (discharge, 18 second-feet).

Maximum stage recorded during year ending September 30, 1920, 10.35 feet December 10 (discharge, 8,050 second-feet); minimum discharge, 23 second-feet, October 18 and 20.

1916–1920: Maximum stage, that of January 17, 1919; minimum stage recorded, 2.38 feet September 26 and 28, 1918 (discharge, 18 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of January, 1919, and December, 1919. Rating curve used October 1, 1918, to January 16, 1919, and curve used January 17 to December 10, 1919, fairly well defined; curve used December 11, 1919, to September 30, 1920, well defined. Gage read once a day to tenths during high water and three times a week to hundredths during low water. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of South Fork of Coquille River at Powers, Oreg., during the year ending Sept. 30, 1919.

Date.	Made by—	Gage height.	Discharge.
		Feet.	*Sec.-ft.*
Feb. 17	R. C. Briggs	6.60	2,570
Aug. 19	LaRue and Holbrook	2.65	26.7
Sept. 3	.....do	2.62	21.7

NOTE.—No discharge measurements were made at this station during year ending Sept. 30, 1920.

Daily discharge, in second-feet, of South Fork of Coquille River at Powers, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918–19.												
1	18	20	225	335	600	2,790	1,360	500	150	55	29	.....
2	18	20	195	298	500	5,650	1,360	455	135	54	.....	22
3	18	140	165	260	890	4,450	1,360	375	135	52	28	.....
4	18	260	165	260	1,280	3,030	2,670	355	120	50	.....	62
5	75	140	260	260	1,660	2,430	3,540	335	120	49	28	.....
6	46	93	600	260	3,030	2,790	2,980	295	105	48	.....	141
7	36	59	415	260	3,030	2,430	2,430	295	105	46	29	.....
8	32	46	508	225	5,240	2,200	1,660	295	94	43	.....	81
9	26	165	600	225	7,450	1,870	1,260	278	105	42	29	.....
10	20	165	660	335	5,250	1,620	2,310	260	105	42	.....	72
11	20	165	730	455	3,280	1,360	1,560	260	105	40	28	.....
12	20	165	940	698	2,850	1,870	1,090	251	94	38	.....	74
13	20	115	1,870	940	2,430	1,760	1,260	242	94	38	26	.....
14	19	115	2,090	940	2,670	1,560	1,170	233	94	38	.....	40
15	19	3,030	1,680	3,800	2,910	1,560	1,010	225	94	37	25	.....
16	20	1,460	1,260	5,950	2,200	1,260	1,090	260	83	36	.....	.....
17	20	730	800	12,000	2,550	1,170	3,540	260	83	35	24	33
18	20	552	600	8,200	1,980	5,350	3,670	278	83	34	.....	29
19	19	375	550	6,720	1,660	2,910	3,410	295	74	33	24	.....
20	19	260	710	5,250	1,560	2,200	2,670	295	72	33	.....	28
21	19	225	870	4,850	1,460	1,560	1,870	260	70	32	23	.....
22	19	412	660	4,450	1,360	1,460	1,560	225	69	31	.....	26
23	18	600	550	5,350	1,260	1,360	1,170	195	67	30	23	.....
24	18	1,360	500	3,800	1,260	1,260	1,090	195	65	30	.....	24
25	18	600	438	2,670	3,410	1,170	940	210	64	30	23	.....
26	18	500	375	2,090	5,950	1,170	730	210	62	30	.....	23
27	30	455	295	1,560	3,280	1,260	660	210	59	30	22	.....
28	41	375	335	1,260	3,030	1,260	600	210	56	30	.....	32
29	27	295	355	940	.....	1,260	600	180	58	30	22	.....
30	20	260	375	800	.....	1,760	550	180	56	30	.....	27
31	20	.....	375	660	.....	1,560	.....	165	.....	30	22	.....
1919–20.												
1	.....	135	1,660	530	530	113	890	405	89	85	43	.....
2	129	.....	1,010	480	480	110	2,310	380	82	.....	.....	29
3	.....	455	660	430	405	113	2,070	356	82	82	40	.....
4	52	.....	478	405	380	242	1,740	332	82	.....	.....	27
5	.....	1,460	395	430	356	224	1,300	286	82	78	37	.....
6	34	.....	315	800	332	176	1,300	264	82	.....	.....	27
7	.....	1,870	65	580	286	153	1,100	242	286	75	.....	.....
8	31	.....	695	480	264	142	3,540	242	800	.....	.....	27
9	.....	525	455	405	242	1,460	3,100	224	.....	72	38	.....
10	29	.....	8,050	380	224	1,040	1,950	205	224	.....	.....	49
11	.....	395	5,750	380	205	740	1,380	190	.....	.....	36	.....
12	28	355	2,310	380	190	630	1,100	176	176	.....	.....	153
13	.....	315	1,300	356	176	1,300	1,160	164	176	.....	33	.....
14	26	278	1,050	332	190	2,190	1,160	153	.....	70	.....	555
15	.....	260	800	309	164	1,550	1,460	153	309	.....	32	.....
16	24	210	710	309	153	1,640	1,840	153	.....	58	.....	113
17	.....	195	740	298	153	1,160	1,640	153	224	.....	30	.....
18	23	165	770	286	142	980	1,230	142	.....	58	.....	80
19	.....	195	1,840	264	142	800	1,040	132	153	.....	.....	.....
20	23	242	7,640	242	142	770	920	122	.....	57	.....	76
21	.....	242	2,820	242	142	1,300	890	122	136	.....	27	.....
22	24	195	1,840	205	132	1,230	830	113	.....	54	.....	82
23	.....	172	1,380	205	132	1,040	740	113	113	.....	27	.....
24	33	150	3,100	190	122	920	630	113	.....	51	.....	1,300
25	.....	135	3,540	685	122	1,160	1,160	104	110	.....	27	.....
26	40	135	2,820	4,850	113	1,100	920	104	.....	49	.....	580
27	.....	120	1,460	2,310	113	1,040	685	96	.....	.....	27	.....
28	39	105	1,160	1,300	113	1,160	580	96	.....	47	.....	309
29	.....	105	920	920	113	920	530	96	88	.....	42	.....
30	141	2,090	800	740	.....	920	480	89	.....	45	.....	153
31	.....	.....	630	630	.....	920	.....	89	.....	.....	36	.....

Monthly discharge of South Fork of Coquille River at Powers, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 168 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	75	18	24.2	0.144	0.17	1,490
November	3,030	20	439	2.61	2.91	26,100
December	2,090	165	650	3.87	4.46	40,000
January	12,000	225	2,460	14.6	16.83	151,000
February	7,450	500	2,640	15.7	16.35	147,000
March	5,650	1,170	2,110	12.6	14.53	130,000
April	3,670	550	1,710	10.2	11.38	102,000
May	500	165	267	1.59	1.83	16,400
June	150	56	89.2	.531	.59	5,310
July	55	30	37.9	.226	.26	2,330
August	29	22	25.3	.151	.17	1,560
September	.....	22	47.6	.283	.32	2,830
The year	12,000	18	863	5.14	69.80	626,000
1919–20.						
October	.....	.....	45.1	.27	.31	2,770
November	2,090	105	504	3.00	3.35	30,000
December	8,050	65	1,840	11.00	12.68	113,000
January	4,850	190	657	3.91	4.51	40,400
February	530	113	216	1.29	1.39	12,400
March	2,190	110	879	5.23	6.03	54,000
April	3,540	480	1,320	7.86	8.77	78,600
May	405	89	181	1.08	1.24	11,100
June	800	.....	183	1.09	1.22	10,900
July	.....	.....	62.9	.37	.43	3,870
August	.....	.....	33.9	.20	.23	2,080
September	.....	.....	237	1.41	1.57	14,100
The year	8,050	.....	515	3.07	41.73	373,000

UMPQUA RIVER BASIN.

UMPQUA RIVER NEAR ELKTON, OREG.

LOCATION.—In sec. 8, T. 23 S., R. 7 W., at ferry crossing 4 miles south (by road) from Elkton, Douglas County, and 8 miles by river above Elk Creek.

DRAINAGE AREA.—3,680 square miles.

RECORDS AVAILABLE.—October 18, 1905, to December 31, 1906; May 12, 1907, to September 30, 1920.

GAGE.—Staff in five sections; low-water section inclined, the others vertical: read by D. C. Higginbotham. Datum lowered 0.52 foot September 2, 1910.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; somewhat shifting. Control of rock; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 25.0 feet at 5 p. m., January 19, and 7 a. m. February 10 (discharge, 91,000 second-feet); minimum stage recorded, 0.20 foot October 1–5 (discharge, 960 second-feet).

Maximum stage recorded during year ending September 30, 1920, 17.0 feet at 7 a. m. December 9 (discharge, 53,500 second-feet); minimum stage recorded, 0.20 foot from August 26 to September 11 (discharge, 1,160 second-feet).

1905–1920: Maximum stage recorded, 38.5 feet (present datum) at 7 a. m. November 23, 1909 (discharge estimated from extension of rating curve, 163,000 second-feet); minimum stage recorded, 0.17 foot in August and September, 1918 (discharge, 930 second-feet).

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

DIVERSIONS.—Practically none.

REGULATION.—Practically none.

ACCURACY.—Stage-discharge relation changed February 11, 1919; permanent during 1920. Two well-defined rating curves used, identical above 2,800 second-feet. Gage read twice a day to tenths. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except during August and September, when there may have been moss effect for which no allowance has been made.

The following discharge measurement made by J. J. Dirzulaitis:
October 12, 1919: Gage height, 0.31 foot; discharge, 1,260 second-feet.

Daily discharge, in second-feet, of Umpqua River near Elkton, Oreg., for the years ending Sept. 30, 1919 and 1920.

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1918-19.												
1	960	1,300	3,290	4,230	12,300	31,100	15,000	13,500	6,010	1,570	1,250	1,340
2	960	1,300	3,440	3,910	13,200	49,100	15,700	13,200	5,630	1,680	1,200	1,570
3	960	1,360	3,910	3,910	11,700	49,100	18,500	12,300	4,900	1,900	1,300	1,840
4	960	1,780	4,230	3,750	9,600	31,100	19,900	11,400	4,900	1,730	1,300	1,620
5	960	2,020	3,910	3,590	10,200	28,000	28,000	11,100	4,390	1,620	1,300	1,340
6	1,180	1,720	3,910	3,590	14,100	35,100	24,800	11,400	3,910	1,520	1,300	1,300
7	1,360	1,420	4,560	3,910	19,200	31,100	21,300	11,400	3,910	1,480	1,300	1,340
8	1,180	1,300	5,630	4,070	23,800	24,800	17,800	10,800	3,590	1,430	1,300	1,520
9	1,120	1,360	5,630	3,910	39,100	20,200	13,800	9,600	3,290	1,380	1,300	1,620
10	1,070	1,600	5,260	3,910	73,800	18,500	12,600	8,850	3,290	1,520	1,300	1,430
11	1,070	2,150	6,010	4,230	41,100	17,800	21,300	8,120	3,590	1,480	1,300	1,430
12	1,070	4,560	6,800	4,730	29,100	18,500	19,600	7,890	3,290	1,480	1,200	1,520
13	1,070	10,200	9,100	6,010	22,700	19,600	17,100	8,120	2,990	1,380	1,200	1,620
14	1,070	6,800	10,200	7,660	17,800	19,200	15,000	7,660	2,990	1,250	1,200	1,520
15	1,120	6,010	9,900	10,200	15,000	18,500	12,600	7,220	2,690	1,200	1,200	1,340
16	1,540	5,260	9,100	17,400	13,800	17,100	11,400	6,800	2,410	1,250	1,200	1,300
17	1,660	4,560	8,600	27,200	15,700	15,400	11,700	6,800	2,690	1,380	1,200	1,300
18	1,300	3,750	8,120	60,200	21,000	17,460	22,700	7,010	2,990	1,250	1,200	1,300
19	1,240	3,290	6,800	76,000	19,200	32,700	18,800	8,120	2,990	1,200	1,200	1,300
20	1,180	3,440	6,400	64,800	18,200	27,200	17,400	8,600	2,690	1,250	1,200	1,300
21	1,180	3,290	6,010	43,100	16,000	22,700	16,400	8,120	2,690	1,340	1,200	1,300
22	1,360	3,290	5,630	33,100	15,000	20,600	13,800	8,120	2,690	1,340	1,200	1,300
23	1,360	3,590	4,900	55,800	12,900	19,200	12,600	7,440	2,420	1,200	1,200	1,300
24	1,240	3,910	4,560	35,100	15,000	17,400	9,100	7,010	2,300	1,200	1,200	1,300
25	1,180	4,900	4,230	23,800	25,500	15,000	8,600	6,800	2,180	1,200	1,200	1,300
26	1,180	5,630	3,910	19,900	49,100	14,700	9,100	6,400	1,950	1,200	1,200	1,300
27	1,240	4,900	3,910	17,800	43,100	15,000	10,800	7,440	1,840	1,200	1,200	1,300
28	1,240	4,560	4,390	16,400	25,500	14,400	12,600	8,600	1,780	1,200	1,200	1,300
29	1,180	4,070	4,900	15,000	.....	14,400	12,900	8,600	1,780	1,200	1,200	1,300
30	1,300	3,590	4,730	13,800	.....	15,000	12,900	7,440	1,620	1,200	1,200	1,300
31	1,420	.....	4,230	13,200	.....	16,400	.....	6,600	.....	1,250	1,200	.....
1919-20.												
1	1,300	2,990	6,400	12,300	12,000	2,990	15,700	8,850	3,290	2,550	1,340	1,160
2	1,300	3,590	13,500	11,400	11,400	3,290	18,500	8,120	3,290	1,950	1,340	1,160
3	1,430	10,200	21,800	10,800	10,200	3,290	19,200	7,660	2,990	1,950	1,340	1,160
4	2,420	33,100	17,400	9,900	8,850	2,990	17,800	8,120	2,840	1,900	1,340	1,160
5	1,380	29,100	13,500	9,100	7,220	2,990	17,800	9,100	2,690	1,780	1,340	1,160
6	1,300	18,500	8,120	8,600	6,010	2,990	18,500	10,200	2,690	1,620	1,340	1,160
7	1,300	11,700	8,600	7,440	5,260	2,990	19,200	10,800	2,990	1,480	1,340	1,160
8	1,300	9,600	27,200	6,010	4,900	3,440	20,600	10,200	3,140	1,480	1,340	1,160
9	1,300	9,350	45,100	5,260	4,560	4,390	19,900	11,400	2,990	1,480	1,340	1,160
10	1,300	12,600	22,000	4,560	4,560	5,260	19,200	10,800	2,690	1,430	1,340	1,160
11	1,300	11,400	15,700	4,230	4,560	6,200	18,500	10,800	2,420	1,380	1,300	1,160
12	1,300	9,350	14,400	3,910	4,390	5,260	18,200	9,900	2,300	1,340	1,250	1,200
13	1,250	8,600	12,600	3,590	4,230	4,560	18,800	8,600	2,420	1,480	1,250	1,620
14	1,250	7,660	12,000	3,590	3,910	4,730	20,600	7,890	2,690	1,520	1,250	2,990
15	1,250	6,010	11,400	4,230	3,590	6,400	21,300	7,220	2,990	1,430	1,250	3,290
16	1,250	5,630	10,500	3,910	3,290	8,360	22,400	7,220	2,990	1,380	1,250	2,990
17	1,250	6,800	10,200	3,590	2,990	10,500	21,300	6,400	2,690	1,340	1,250	2,180
18	1,300	8,600	14,400	3,290	2,990	15,700	20,200	6,010	2,690	1,380	1,250	1,780
19	1,340	9,100	25,500	3,290	2,990	17,400	19,200	5,630	2,420	1,340	1,250	1,730
20	1,250	7,660	37,100	2,990	2,990	13,800	17,400	5,260	2,420	1,430	1,250	2,690
21	1,250	6,800	33,100	2,990	2,840	11,400	15,700	4,900	2,690	1,340	1,250	4,230
22	1,380	6,200	23,400	3,290	2,550	10,800	14,100	4,560	2,690	1,340	1,250	8,120
23	1,680	5,630	21,300	3,290	2,410	10,200	12,300	4,230	2,420	1,340	1,250	12,300
24	1,680	5,260	19,600	2,990	2,150	9,100	11,400	4,230	2,300	1,340	1,250	8,120
25	1,520	4,900	18,500	4,070	2,150	8,600	10,800	3,910	2,420	1,340	1,250	6,010
26	1,430	4,560	17,800	15,000	2,150	9,600	8,600	3,590	2,420	1,340	1,160	5,260
27	1,430	4,070	16,400	35,100	2,150	11,400	9,100	3,290	2,180	1,340	1,160	4,900
28	1,620	4,230	15,700	23,800	2,410	10,200	8,360	3,290	2,180	1,340	1,160	6,010
29	1,950	4,230	14,400	18,500	2,550	10,200	9,100	3,140	1,950	1,340	1,160	7,220
30	2,690	4,230	13,200	15,000	.....	11,700	9,600	2,990	2,180	1,340	1,160	8,850
31	2,990	.....	12,900	13,200	.....	13,200	.....	2,840	.....	1,340	1,160	.....

Monthly discharge of Umpqua River near Elkton, Oreg., for the years ending Sept. 30, 1919 and 1920.

[Drainage area, 3,680 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Inches.	Acre-feet.
1918–19.						
October	1,660	960	1,190	0.323	0.37	73,200
November	10,200	1,300	3,560	.967	1.08	212,000
December	10,200	3,290	5,680	1.54	1.78	349,000
January	76,000	3,590	19,500	5.30	6.11	1,200,000
February	73,800	9,600	23,000	6.25	6.51	1,280,000
March	49,100	14,400	22,800	6.20	7.15	1,400,000
April	28,000	8,600	15,800	4.29	4.79	940,000
May	13,500	6,400	8,790	2.39	2.76	540,000
June	6,010	1,620	3,150	.856	.96	187,000
July	1,900	1,200	1,370	.372	.43	84,200
August	1,300	1,200	1,230	.334	.39	75,600
September	1,840	1,300	1,400	.380	.42	83,300
The year	76,000	960	8,870	2.41	32.75	6,420,000
1919–20.						
October	2,990	1,250	1,510	.410	.47	92,800
November	33,100	2,990	9,060	2.46	2.74	539,000
December	45,100	6,400	17,800	4.84	5.58	1,090,000
January	35,100	2,990	8,360	2.27	2.62	514,000
February	12,000	2,150	4,560	1.24	1.34	262,000
March	17,400	2,990	7,870	2.14	2.47	484,000
April	22,400	8,360	16,400	4.45	4.96	976,000
May	11,400	2,840	6,810	1.85	2.13	419,000
June	3,290	1,950	2,640	.717	.80	157,000
July	2,550	1,340	1,500	.408	.47	92,200
August	1,340	1,160	1,260	.342	.39	77,500
September	12,300	1,160	3,480	.946	1.06	207,000
The year	45,100	1,160	6,780	1.84	25.03	4,910,000

NORTH UMPQUA RIVER NEAR GLIDE, OREG.

LOCATION.—In SW. ¼ sec. 13, T. 26 S., R. 4 W., at Hughes ferry, 2 miles below Glide, just off main road to Roseburg, Douglas County.

DRAINAGE AREA.—1,210 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—September 1, 1915, to May 1, 1920, when station was discontinued (fragmentary during 1919).

GAGE.—Vertical staff on left bank just below ferry landing. Gage read by Merle H. Hayes and Charles Clark.

DISCHARGE MEASUREMENTS.—Can be made from ferry up to a stage of about 6 feet; excellent section. Flood measurements have been made from the bridge at Winchester, about 20 miles downstream, and the inflow, estimated from measurements of Oak Creek, deducted.

CHANNEL AND CONTROL.—Practically permanent; control is of solid rock.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1919, 9.4 feet at 3 p. m. January 17 (discharge, 26,100 second-feet); minimum stage recorded, 0.2 foot October 1–3, 12–15, September 1–3 and 24–30 (discharge, 850 second-feet).

Maximum stage recorded during period October 1, 1919, to May 1, 1920, 10.8 feet at 5 p. m. November 3 (discharge, 32,400 second-feet); minimum stage recorded, 0.2 foot October 15–22 (discharge, 850 second-feet).

1915–1920: Maximum stage recorded, 12.9 feet, January 12, 1918 (discharge, 42,500 second-feet); minimum stage recorded, 0.05 foot October 1, 2, 7–13, and 18–22, 1915 (discharge, 750 second-feet).

Maximum stage in many years occurred during night of November 22, 1909; gage height 22 feet, as determined by leveling to well-defined high-water marks on September 1, 1917 (discharge, estimated from extension of rating curve, 90,000 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 10,000 second-feet. Gage read to quarter or half tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

No discharge measurements made at this station during years ending September 30, 1919 and 1920.

Daily discharge, in second-feet, of North Umpqua River near Glide, Oreg., for the period Oct. 1, 1918, to May 1, 1920.

Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Sept.	Day.	Oct.	Nov.	Jan.	Feb.	Mar.	Sept.
1918–19.							1918–19.						
1	850	930	1,330	2,940	7,100	850	16	1,390	.....	4,320	5,700	4,700	930
2	850	930	1,650	2,620	18,800	850	17	1,280	.....	18,100	8,350	4,320	930
3	850	.....	1,390	2,620	12,200	850	18	1,020	.....	10,600	7,100	10,000	930
4	890	.....	1,330	2,940	9,400	930	19	930	.....	21,900	5,500	9,700	930
5	980	.....	1,330	3,610	7,850	1,220	20	930	.....	12,500	4,900	6,850	890
6	1,020	.....	1,450	5,300	10,600	1,450	21	930	.....	12,200	4,320	6,350	880
7	980	.....	1,450	9,100	8,350	1,280	22	930	.....	14,600	4,320	6,600	890
8	930	.....	1,450	7,100	6,350	1,170	23	890	.....	12,500	4,140	6,350	890
9	930	.....	1,450	19,500	5,100	1,070	24	890	.....	9,400	3,960	6,350	850
10	930	.....	1,580	12,500	4,320	980	25	890	.....	6,850	4,900	5,900	850
11	890	.....	2,940	9,400	4,140	1,020	26	930	.....	7,350	9,400	5,900	850
12	850	.....	2,780	6,850	4,320	1,450	27	1,020	.....	6,100	6,850	7,350	850
13	850	.....	2,620	5,900	4,320	1,120	28	1,330	.....	5,700	6,350	6,850	850
14	850	.....	2,620	6,350	4,700	1,020	29	1,070	.....	3,960	.....	8,350	850
15	850	.....	3,960	6,350	5,100	980	30	980	.....	3,440	.....	8,850	850
							31	930	.....	3,100	.....	8,350	.....

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
1919–20.								
1	980	4,320	10,600	3,610	3,270	1,330	5,100	2,780
2	850	4,320	5,500	2,940	2,940	1,330	8,350	.....
3	1,220	23,500	3,960	2,620	2,780	1,280	5,900	.....
4	1,020	17,400	4,800	3,960	2,620	1,720	5,700	.....
5	980	16,000	4,700	4,510	2,460	2,220	7,850	.....
6	930	11,800	4,700	4,320	2,300	1,650	8,100	.....
7	930	10,000	5,700	4,140	2,150	1,450	6,600	.....
8	930	4,700	4,700	4,140	2,000	1,860	5,900	.....
9	930	3,270	4,700	4,140	1,860	2,940	9,400	.....
10	930	3,270	13,900	3,960	1,860	3,270	7,600	.....
11	930	4,320	13,200	3,960	1,860	2,620	6,350	.....
12	930	3,960	5,300	2,220	1,720	2,940	7,350	.....
13	930	3,440	4,510	1,860	1,720	3,610	9,400	.....
14	930	3,270	4,140	1,860	1,650	7,600	9,400	.....
15	850	2,620	2,780	1,720	1,580	4,900	8,850	.....
16	850	2,300	2,780	1,720	1,580	4,320	7,850	.....
17	850	2,620	3,780	1,860	1,520	3,780	6,350	.....
18	850	2,380	5,300	1,860	1,520	3,610	5,500	.....
19	850	2,620	9,400	1,790	1,520	3,610	5,300	.....
20	850	3,270	15,300	1,720	1,450	4,320	5,100	.....
21	850	2,780	11,800	1,650	1,450	6,850	4,700	.....
22	850	2,460	8,600	1,580	1,450	5,700	4,320	.....
23	1,120	2,300	7,600	1,580	1,450	6,100	3,960	.....
24	1,170	2,000	6,600	1,580	1,450	5,300	3,780	.....
25	1,120	1,790	13,200	5,100	1,390	4,320	3,610	.....
26	1,020	1,720	8,850	17,800	1,330	3,610	3,270	.....
27	1,020	1,580	5,900	11,800	1,330	3,610	3,270	.....
28	1,020	1,790	5,100	7,100	1,330	3,610	3,270	.....
29	930	3,440	4,510	5,500	1,390	3,610	2,940	.....
30	1,450	11,800	3,960	4,510	.....	3,610	2,940	.....
31	1,650	.....	3,960	3,960	.....	3,960	.....	.....

Monthly discharge of North Umpqua River near Glide, Oreg., for the period Oct. 1, 1918, to May 1, 1920.

Month.	Discharge in second-feet.			Run-off in acre-feet.
	Maximum.	Minimum.	Mean.	
1918–19.				
October	1,390	850	963	59,200
January	21,900	1,330	5,870	361,000
February	19,560	2,620	6,390	355,000
March	18,900	4,140	7,279	447,000
September	1,450	850	982	58,400
1919–20.				
October	1,650	850	991	60,900
November	23,500	1,580	5,370	320,000
December	15,300	2,780	6,770	416,000
January	17,800	1,580	3,910	240,000
February	3,270	1,330	1,820	105,000
March	6,850	1,280	3,570	220,000
April	9,400	2,940	5,930	353,000
May 1	.....	.....	2,780	5,560
The period	.....	.....	.....	1,720,000

MISCELLANEOUS DISCHARGE MEASUREMENTS.

Records of measurements of the flow of streams at points other than those at which gaging stations were maintained are presented in the following tables:

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the years ending Sept. 30, 1919 and 1920.

Walla Walla River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1920.				*Feet.*	*Sec.-ft.*
Aug. 11	Touchet River	Walla Walla River	Bolles, Wash.	.....	29.5
Sept. 7	.....do.....	.....do.....	.....do.....	.....	41.7

Deschutes River basin.

1920.					
Aug. 26	Spring River	Deschutes River	Mouth, near Harper, Oreg.	.....	149
Sept. 10	Springs	.....do.....	Left bank of river between Spring River and Benham Falls, Oreg.	.....	37
11	Lost Creek	Diverts from Deschutes River.	½ mile above Lava Island Falls, Oreg.	.....	[a] 55
Aug. 24	Tumalo Creek	Deschutes River	Discontinued gaging station near Tumalo, Oreg., above Columbia southern intake.	1.10	65
1919.					
Oct. 29	Crooked River	.....do.....	Highway bridge at trail crossing near Terrebonne, Oreg.	.....	61
29	.....do.....	.....do.....	Gates ranch, 6 miles below Terrebonne, Oreg.	.....	301
1920.					
July 27	Shitike Creek	.....do.....	Warmspring, Oreg	.....	58
28	Warm Springs River	.....do.....	Discontinued gaging station near Warmspring, Oreg.	.....	247
30	White River	.....do.....	Above Tygh Creek near Tygh Valley, Oreg.	.....	139
1919.					
Aug. 15	Clear Creek	White River	Oak Grove road crossing near Wapinitia, Oreg.	.....	18.9
June 28	Wapinitia Irrigation Co.'s canal.	Diverts from Clear Creek.	.....do.....	.....	14.1
1920.					
July 30	Tygh Creek	White River	Near Tygh Valley, Oreg.	.....	12

[a] Estimated.

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the years ending Sept. 30, 1919 and 1920—Continued.

Hood River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919. July 25	Dead Point Creek	West Fork of Hood River.	Intake of low-line ditch		8.3

White Salmon River basin.

1919. Sept. 16	White Salmon River	Columbia River	Below Trout Creek near Guler, Wash.		152
19	do	do	Below Big Springs, in sec. 25, T. 5 N., R. 10 E., near Husum, Wash.		354

Sandy River basin.

1919. Sept. 18	Zigzag River	Sandy River	Above Little Zigzag River, near Zigzag, Oreg.		25.1
1920. July 25	do	do	Below mouth of Lady Creek		60
1919. Sept. 18	do	do	Zigzag (Rhododendron Inn), Oreg.		71
18	Little Zigzag River	Zigzag River	Bridge, near mouth		24.2
18	Lady Creek	do	Mouth		5.2
1920. July 25	do	do	do		8.6
1919. Sept. 18	Devil Canyon Creek	do	do		a 5.0
18	Camp Creek	do	Below Yocum Falls, elevation about 3,400 feet.		9.1
1920. July 25	do	do	do		12.9
1919. Sept. 18	do	do	Mouth		18.8
1920. July 25	Still Creek	do	Near Government camp, elevation about 4,000 feet.		10.6
1919. Sept. 17	do	do	Near Summit House at former gaging station near Rowe, Oreg.		11.8
1920. July 25	do	do	do		14.4
Sept. 18	do	do	Mouth		31.7
1919. Sept. 17	Salmon River	Sandy River	Below road crossing, near Government camp.		8.4
19	do	do	Below South Fork, 4 miles above Welches, Oreg.		88
1920. July 27	do	do	do		136
1919. Sept. 17	East Fork of Salmon River.	Salmon River	Below road crossing, near Government camp, Oreg.		1.0
17	West Fork of Salmon River.	do	do		6.1
1920. July 27	Sheeny Creek	do	Mouth near Welches, Oreg.		4.7
1919. Oct. 22	Bull Run River	Sandy River	Mann Falls, 5 miles below Bull Run Lake.		32.0

a Estimated.

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the years ending Sept. 30, 1919 and 1920—Continued.

Willamette River basin.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
1919.					
Aug. 26	Clackamas River	Willamette River	Immediately below Cazadero dam.		22.4
26	do	do	1 mile below Cazadero dam, above power plant.		45.6
1920.					
Sept. 29	Collowash River	Clackamas River	Near mouth		606
1919.					
July 24	Cazadero flume	Diverts from Clackamas River.	Half a mile below dam		1,050
Aug. 25	do	do	do		872
1920.					
Feb. 27	do	do	do		1,410
Aug. 5	do	do	do		903

Lewis River basin.

1920.					
June 11	Swampy Creek	Lewis River	Elevation 3,500 feet		9.0
13	Allen Creek	do	do		7.9
13	Noname Creek	do	do		13.1
1919.					
Sept. 24	East Fork	do	Near Heison, Wash		111

Rogue River basin.

1920.					
May 11	South Fork of Little Butte Creek.	Little Butte Creek	Above canal company's intake, near Lake Creek, Oreg.	2.40	396
Aug. 7	do	do	do	1.13	17.1
Sept. 30	do	do	do	1.19	17.3
1919.					
May 25	Rogue River Valley canal.	Diverts from North Fork of Little Butte Creek.	Intake, near Lake Creek, Oreg.	2.32	44.0
Sept. 27	do	do	do	1.91	19.5
1920.					
May 11	do	do	do	2.00	49.3
Aug. 7	do	do	do	2.21	49.3
May 7	Bear Creek	Rogue River	Talent, Oreg	.92	47.5
1919.					
Feb. 14	Evans Creek	do	Miller's ford, sec. 26, T. 34 S., R. 3 W., near Wimer, Oreg.	1.90	444
14	Pleasant Creek	Evans Creek	Above intake of Wakeman ditch, sec. 28, T. 34 S., R. 4 W., near Wimer, Oreg.	.71	68
Apr. 15	East Fork of Illinois River.	Illinois River	Above intake of Deep Gravel Mining Co.'s ditch near Takilma, Oreg.		221
16	do	do	600 feet above Logan or Scotch Gulch diverting dam near Takilma, Oreg.		246
17	do	do	Takilma, Oreg		1,750
16	West Fork of East Fork of Illinois River.	East Fork of Illinois River.	Half a mile below Osgood ditch intake, near Takilma, Oreg.		112
16	West Fork of East Fork of East Fork of Illinois River.	East Fork of East Fork of Illinois River.	100 feet above mouth, near Takilma, Oreg.		82
16	East Fork of East Fork of East Fork of Illinois River.	do	do		31
16	Queen and Brown ditch.	East Fork of Illinois River.	Takilma, Oreg		[a] 3
15	Logan or Scotch Gulch ditch.	do	do	.65	26.4
16	McBriety ditch	do	do		[a] 10

[a] Ditches dry and capacity estimated.

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the years ending Sept. 30, 1919 and 1920—Continued.

Rogue River Basin—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
1919.				*Feet.*	*Sec.-ft.*
Apr. 16	G. G. Shadinger ditch.	East Fork of Illinois River.	Takilma, Oreg.		1.3
15	Deep Gravel Mining Co's. ditch.	do.	do.		52
15	Wilson ditch.	do.	do.		[a] 1
15	Washington ditch.	do.	1 mile below Takilma, Oreg.		[a] 200
16	Osgood ditch.	West Fork of East Fork of Illinois River.	Near Takilma, Oreg.		[a] 14
16	Logan or Waldo ditch.	do.	do.		17.3
16	Beers ditch.	East Fork of East Fork of Illinois River.	do.		[a] 2

Coquille River basin.

1919.					
Aug. 22	South Fork of Coquille River.	Coquille River.	Below Billings Creek in NE. ¼ sec. 33, T. 32 S., R. 11 W.		2.6
18	Middle Fork of Coquille River.	South Fork of Coquille River.	Above Myrtle Creek, in sec. 34, T. 29 S., R. 11 W.		9.2
18	Myrtle Creek.	Middle Fork of Coquille River.	Above Rock Creek in NE. ¼ sec. 16, T. 30 S., R. 11 W.		1.0
18	Rock Creek.	Myrtle Creek.	⅛ mile above mouth in NE. ¼ sec. 16, T. 30 S., R. 11 W.		3.2

Coos River basin.

1919.					
Aug. 8	East Fork of Millicoma River.	Millicoma River.	¼ mile above Matson Creek, in NE. ¼ sec. 6, T. 25 S., R. 10 W.		4.3
8	Matson Creek.	East Fork of Millicoma River.	Half a mile above mouth, in sec. 6, T. 25 S., R. 10 W.		7.4

[a] Ditches dry and capacity estimated.

INDEX.