DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

WATER-SUPPLY PAPER 554

SURFACE WATER SUPPLY OF THE UNITED STATES

1922

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

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SURFACE WATER SUPPLY OF LOWER COLUMBIA RIVER AND PACIFIC SLOPE DRAINAGE BASINS IN OREGON, 1922

AUTHORIZATION AND SCOPE OF WORK

This volume is one of a series of 14 reports presenting results of measurements of flow made on streams in the United States during the year ending September 30, 1922.

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 appropriation bills passed by Congress have carried the following items:

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, 1895–1923

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
1922	180,000.00
1923	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 5,480 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1922, 1,540 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.

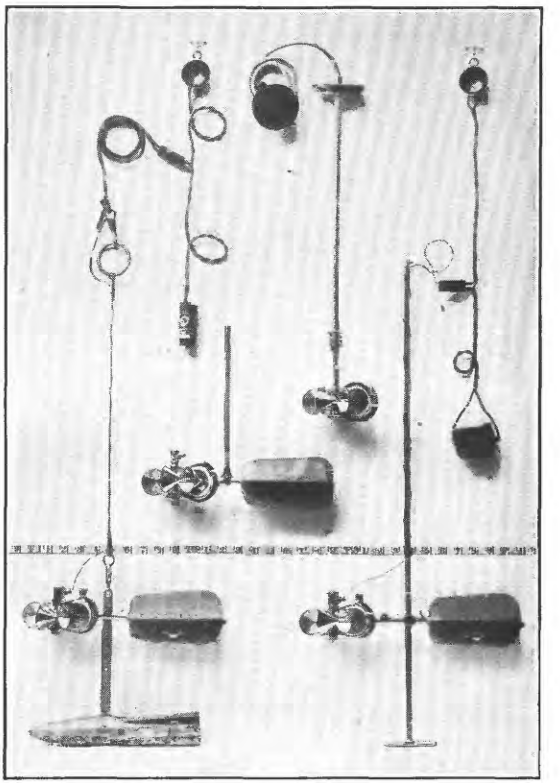
"Run-off in inches" is the depth to which an area would be covered if all the water flowing from it in a given period were uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

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.

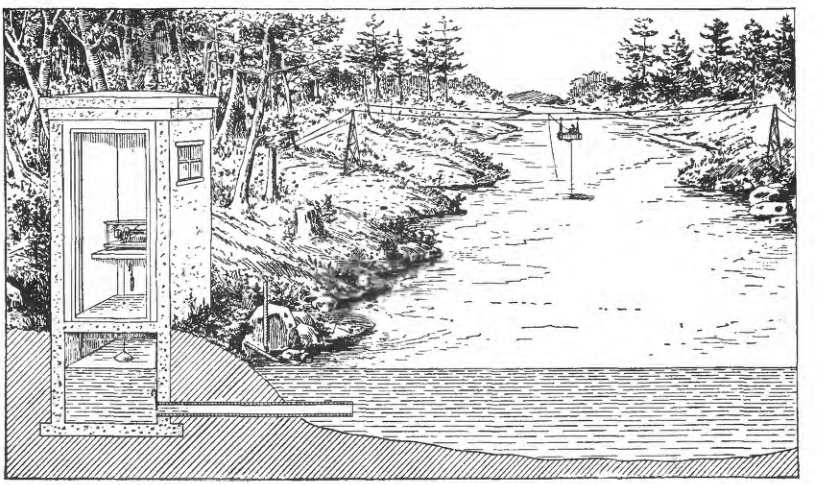
The following terms not in common use are here defined.

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

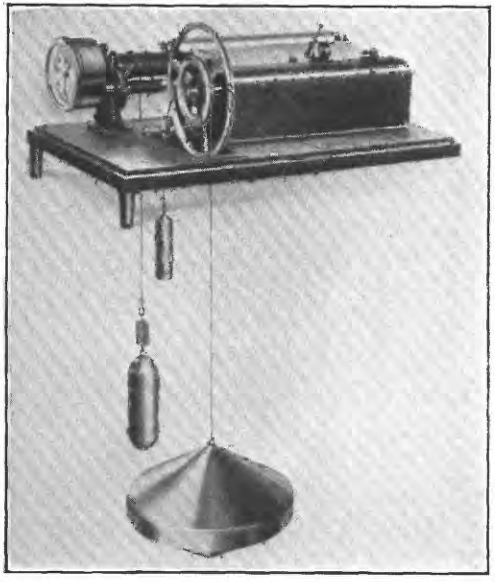
"Control," a term used to designate the section or sections of the stream below the gage which determines the stage-discharge relation at the gage. It should be noted that the control may not be the same section or sections at all stages.



A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION



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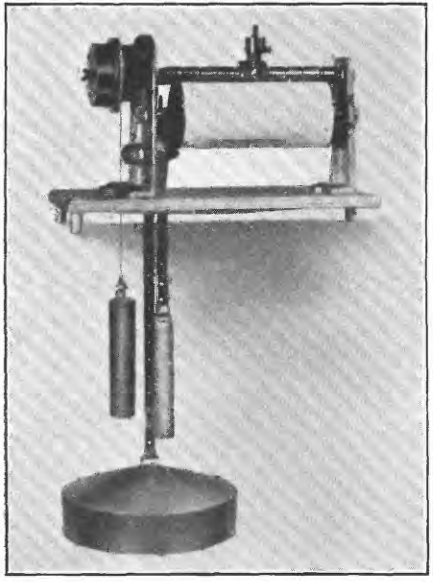

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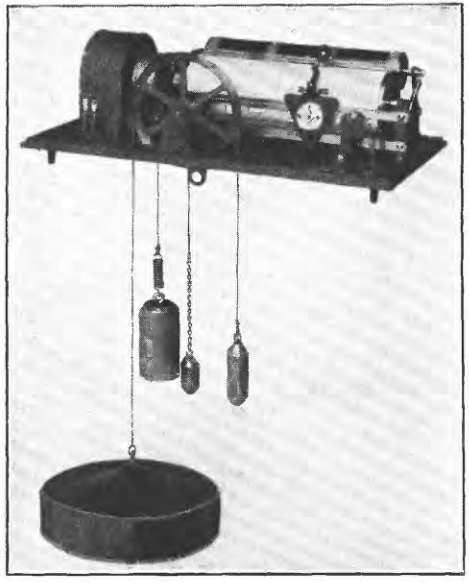

C

WATER-STAGE RECORDERS

A, Au; *B*, Gurley; *C*, Stevens

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.

EXPLANATION OF DATA

The data presented in this report cover the year beginning October 1, 1921, and ending September 30, 1922. 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

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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

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

above the station. "Second-feet per square mile" and "Run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining areas in which the annual rainfall is less than 20 inches. All figures representing "second-feet per square mile" and "run-off in inches" 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 subjects as irrigation, water storage, water powers, underground waters, and quality of waters. Most of the results of these investigations have been published in the series of water-supply papers, but some have appeared in the bulletins, 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 slope basins (St. John River to York River).
II. South Atlantic slope and eastern Gulf of Mexico basins (James River to the Mississippi).
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.

Part IX. Colorado River Basin.
X. Great Basin.
XI. Pacific slope basins in California.
XII. North Pacific slope basins, in three parts:
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 purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will furnish lists giving prices.

2. Sets of the reports may be consulted in the libraries of the principal cities in the United States.

3. 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.
Charlottesville, Va., University of Virginia.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Engineering Experimental Station, Ohio State University.
Chicago, Ill., 950 Transportation 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., 45–46 Federal Building.
Denver, Colo., 403 Post Office Building.
Salt Lake City, Utah, 313 Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Boise, Idaho, Federal Building.
Tacoma, Wash., 404 Federal Building
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 303 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Tucson, Ariz., Room 106, College of Law, 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 5,480 points in the United States, and the data obtained have been published in the reports tabulated on pages 7 and 8.

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	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive, information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W11	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	Descriptions, measurements, gage heights, and ratings	1900.
22d A, pt. 4	Monthly discharge	1900.
W 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W 75	Monthly discharge	1901.
W 82 to 85	Complete data	1902.
W 97 to 100	do	1903.
W 124 to 135	do	1904.
W 165 to 178	do	1905.
W 201 to 214	do	1906.
W 241 to 252	do	1907-8.
W 261 to 272	do	1909.
W 281 to 292	do	1910.
W 301 to 312	do	1911.
W 321 to 332	do	1912.
W 351 to 362	do	1913.
W 381 to 394	do	1914.
W 401 to 414	do	1015.
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.
W 521 to 523	do	1921.
W 541 to 554	do	1922.

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 1922. 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 1921, are published in Water-Supply Papers 97, 124, 165, 201, 241, 261, 281, 301, 321, 351, 381, 401, 431, 451, 471, 501, and 521, which contains records for the New England streams from 1903 to 1921. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1922

[For basins included see p. 5]

Year	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
												A	B	C
1899 [a]	35	[b] 35, 36	36	36	36	[c] 36, 37	37	37	[d] 37, 38	38, [e] 39	38, [f] 39	38	38	38
1900 [g]	47, [h] 48	48	48, [i] 49	49	49	49, [j] 50	50	50	50	51	51	51	51	51
1901	65, 75	65, 75	65, 75	65, 75	[k] 65, 66, 75	66, 75	[k] 65, 66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75	66, 75
1902	82	[b] 82, 83	83	[l] 82, 83	[k] 83, 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] 179, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [b] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332–A	332–B	332–C
1913	351	352	353	354	355	356	357	358	359	360	361	362–A	362–B	362–C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
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
1921	521	522	523	524	525	526	527	528	529	530	531	532	533	534
1922	541	542	543	544	545	546	547	548	549	550	551	552	553	554

[a] Rating tables and index to Water-supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kerns rivers and south Pacific slope basins.
[g] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52. Tables of monthly discharge for 1900 in Twenty-second Annual Report, Part IV.
[h] Wissahickon and Schuylkill rivers to James River.
[i] Scioto River.
[j] Loup and Platte rivers near Columbus, Nebr., and all tributaries below junction with Platte.
[k] Tributaries of Mississippi from east.
[l] Lake Ontario and tributaries to St. Lawrence River proper.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson River Basins.
[s] Below junction with Gila.
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 money.

Work in Washington was carried on in cooperation with the Department of Conservation and Development, Dan A. Scott, director. Cooperative relations were administered by Marvin Chase, supervisor of hydraulics.

Acknowledgment is also due to Percy A. Cupper, State engineer of Oregon, for the efficient manner in which he represented his State in the cooperative investigations.

Acknowledgments are also due to the United States Bureau of Reclamation and the United States Office of Indian Affairs, for assistance, suggestions, and the 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 city of Portland; Tumalo project of the State of Oregon; John Day Irrigation District; Teel Irrigation District; Central Oregon Irrigation District; East Fork Irrigation District; Talent Irrigation District; Medford Irrigation District; Horse Heaven Irrigation District; North Canal Co.; Pacific Power & Light Co.; Arnold Irrigation Co.; Northwestern Electric Co.; Portland Electric Power Co.; North Coast Power Co.; California-Oregon Power Co.; and Rogue River Valley Canal Co.

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 G. H. Canfield, J. W. Bones, K. N. Phillips, 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 D. J. Calkins, R. B. Kilgore, John McCombs, C. C. Osborne, and J. M. Rogers.

GAGING-STATION RECORDS

COLUMBIA RIVER AT THE DALLES, OREG.

LOCATION.—In NW. ¼ sec. 3, T. 1 N., R. 13 E., at foot of Court Street at The Dalles, Wasco County, 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, 1922. Maximum stages 1858 to 1877.

GAGE.—Vertical staff in several sections, belonging to United States Weather Bureau, attached to row of dolphins, with upper section on a warehouse. Gage of United States Engineer Corps at Cascade Locks, 40 miles below The Dalles attached to side of wooden fender of upper locks chamber between upper guard and lock gates. Elevation of datum of The Dalles gage, 46.36 feet (adjustment of primary level net, 1912).

DISCHARGE MEASUREMENTS.—In 1903, made by United States Engineer Corps with rod floats and meter from a steamer; in 1907, 1923, and 1924, by United States Geological Survey engineers with meter from a launch; in 1908, flood measurements by United States Geological Survey engineers 2,000 feet below gage at The Dalles; in 1910 and 1913, measurements 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 both gages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 38.2 feet June 9 (discharge 677,000 second-feet); minimum stage recorded, −0.6 foot March 2 (discharge, 64,400 second-feet).

1857–1922: Maximum stage recorded, 59.6 feet at 2 p. m. June 6, 1894 (discharge, 1,170,000 second-feet); minimum stage recorded, −4.0 feet on gage at Cascade Locks December 17, 1919 (discharge, 47,000 second-feet).

ICE.—Stage-discharge relation at The Dalles affected by ice during severe winters; gage-height record at Cascade Locks used.

DIVERSIONS.—Quantity of water diverted for irrigation is large 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. Rating curve well defined. Gage read to tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

The rating curve for low stages used since October 1, 1920, is based on current-meter measurements made in 1923 and 1924, and differs from the curve used before that date. Low-water records from 1878 to 1910 published in Water- Supply Paper 370 and from 1911 to 1920 published in the papers for those years, and the records published in Water-Supply Paper 492 are too small by the percentages shown in the following table:

Gage height (feet)	Discharge in sec.-ft.		Difference (per cent)
	Former rating	Revised rating	
4.3	100,000	100,000	0
3.0	87,400	89,000	+1.8
1.0	70,600	74,000	+4.8
−1.0	56,800	62,000	+9.1
−2.0	51,000	56,200	+10.2

COOPERATION.—Gage-height record furnished by United States Weather Bureau. No discharge measurements were made at this station during the year.

Daily discharge, in second-feet, of Columbia River at The Dalles, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	89,500	89,500	138,000	91,300	68,600	68,000	124,000	209,000	463,000	430,000	187,000	136,000
2	88,600	93,100	144,000	89,500	68,000	64,400	129,000	209,000	483,000	414,000	181,000	136,000
3	89,500	94,000	150,000	88,600	70,400	66,200	143,000	216,000	511,000	407,000	178,000	135,000
4	90,400	95,000	153,000	87,700	71,600	68,000	151,000	223,000	543,000	394,000	176,000	135,000
5	89,500	96,000	143,000	85,900	72,200	68,000	163,000	230,000	574,000	381,000	174,000	135,000
6	89,500	96,000	131,000	87,700	72,800	68,600	173,000	237,000	607,000	367,000	173,000	133,000
7	88,600	97,000	120,000	88,600	74,700	69,200	170,000	255,000	635,000	359,000	172,000	133,000
8	88,600	95,000	113,000	88,600	78,900	71,600	173,000	263,000	666,000	349,000	170,000	135,000
9	87,700	97,000	111,000	85,000	81,000	71,000	181,000	263,000	677,000	344,000	170,000	132,000
10	86,800	99,000	109,000	87,700	82,600	71,600	190,000	266,000	673,000	339,000	170,000	131,000
11	85,900	103,000	107,000	85,900	80,300	71,600	184,000	261,000	668,000	330,000	170,000	130,000
12	85,900	102,000	114,000	82,600	78,200	71,600	173,000	257,000	653,000	325,000	167,000	130,000
13	85,000	101,000	123,000	78,900	76,100	71,600	165,000	240,000	635,000	320,000	167,000	130,000
14	83,400	99,000	135,000	78,200	74,000	71,600	159,000	248,000	624,000	307,000	165,000	125,000
15	82,600	99,000	150,000	78,200	72,800	71,000	153,000	251,000	622,000	295,000	164,000	122,000
16	81,800	98,000	168,000	77,500	74,000	74,000	148,000	261,000	618,000	283,000	163,000	117,000
17	81,000	97,000	169,000	74,000	75,400	72,800	143,000	286,000	618,000	273,000	163,000	114,000
18	81,000	99,000	156,000	72,400	82,600	75,400	137,000	313,000	624,000	266,000	160,000	111,000
19	81,000	95,000	142,000	70,800	80,300	78,200	133,000	350,000	622,000	260,000	158,000	109,000
20	83,400	97,000	126,000	69,200	76,800	81,800	131,000	401,000	611,000	252,000	156,000	109,000
21	85,000	96,000	120,000	67,600	74,700	90,400	130,000	433,000	598,000	242,000	155,000	107,000
22	83,400	102,000	111,000	65,300	72,800	98,000	138,000	439,000	587,000	234,000	153,000	106,000
23	84,200	103,000	107,000	69,200	71,600	103,000	147,000	447,000	574,000	227,000	150,000	106,000
24	85,000	103,000	107,000	70,800	70,400	110,000	172,000	441,000	555,000	222,000	148,000	105,000
25	86,800	102,000	105,000	71,600	69,200	121,000	185,000	435,000	536,000	215,000	145,000	105,000
26	87,700	110,000	103,000	74,000	69,200	132,000	199,000	435,000	518,000	211,000	143,000	104,000
27	88,600	111,000	102,000	75,400	71,000	135,000	206,000	459,000	495,000	208,000	147,000	103,000
28	89,500	107,000	100,000	76,800	69,800	130,000	209,000	479,000	481,000	205,000	145,000	102,000
29	89,500	104,000	99,000	75,400	-------	121,000	212,000	475,000	465,000	201,000	143,000	102,000
30	88,600	111,000	98,000	74,000	-------	118,000	211,000	465,000	447,000	195,000	142,000	100,000
31	87,700	-------	94,000	68,000	-------	118,000	-------	455,000	-------	191,000	137,000	-------

NOTE.—Stage-discharge relation affected by ice Jan. 18–25; discharge determined from gage-height record at Cascade Locks.

Monthly discharge of Columbia River at The Dalles, Oreg., for the year ending September 30, 1922

[Drainage area, 237,000 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	90,400	81,000	86,300	0.364	0.42	5,310,000
November	111,000	89,500	99,700	.421	.47	5,930,000
December	169,000	94,000	124,000	.523	.60	7,620,000
January	91,300	65,300	78,600	.332	.38	4,830,000
February	82,600	68,000	74,300	.313	.33	4,130,000
March	135,000	64,400	87,200	.368	.42	5,360,000
April	212,000	124,000	164,000	.692	.77	9,760,000
May	479,000	209,000	329,000	1.39	1.60	20,200,000
June	677,000	447,000	579,000	2.44	2.72	34,500,000
July	430,000	191,000	292,000	1.23	1.42	18,000,000
August	187,000	137,000	161,000	.679	.78	9,900,000
September	136,000	100,000	119,000	.502	.56	7,080,000
The year	677,000	64,400	183,000	.772	10.47	133,000,000

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 December 31, 1908; March 17, 1918, to September 30, 1919; March 19, 1920, to September 30, 1921; and April 25 to September 30, 1922.

GAGE.—Friez water-stage recorder referred to vertical staff.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Channel straight at cable; curved 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 period April 25 to September 30, 1922, from water-stage recorder, 2.38 feet at 8 p. m. May 17 (discharge, 1,140 second-feet); minimum stage recorded, 0.53 foot September 17 (discharge, 121 second-feet).

1903–1906; 1918–1922: Highest flood ever known occurred May 30, 1906, discharge, 8,130 second-feet, estimated from observation of cross sections and slope, after flood had subsided; minimum discharge recorded, 95 second-feet July 18, 1918.

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

DIVERSIONS.—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.—Pacific Power & Light Co.'s power plant 5 miles above this station affects flow somewhat, especially at low water. Some water is ponded in fore bay.

ACCURACY.—Stage-discharge relation apparently permanent during period of record. Rating curve 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. 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
June 12	Perry[a] and Hesse	1.48	449
July 25	Hesse[b] and Goodwin	.60	135

[a] Water master for Umatilla County.
[b] Deputy water master for Umatilla County.

Daily discharge, in second-feet, of Walla Walla River near Milton, Oreg., for the year ending September 30, 1922

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	------	482	625	170	131	129	16	------	880	342	140	140	125
2	------	566	660	168	129	129	17	------	960	314	133	138	125
3	------	506	660	160	127	129	18	------	960	302	133	135	127
4	------	545	695	160	131	129	19	------	765	282	135	133	129
5	------	585	695	155	131	131	20	------	660	258	131	131	129
6	------	625	625	148	131	131	21	------	554	236	129	129	127
7	------	660	554	150	127	131	22	------	506	229	127	131	127
8	------	572	530	152	127	131	23	------	530	212	131	131	129
9	------	450	578	155	125	131	24	------	590	203	135	129	127
10	------	435	625	155	123	129	25	518	625	191	135	129	127
11	------	400	554	155	127	129	26	554	500	188	133	131	129
12	------	440	488	145	150	129	27	572	440	188	131	131	138
13	------	524	445	142	145	127	28	500	430	188	129	133	129
14	------	625	420	140	145	127	29	430	450	180	131	129	127
15	------	730	370	140	142	125	30	420	518	175	131	127	131
							31	------	572	------	129	129	------

Monthly discharge of Walla Walla River near Milton, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 25–31	572	420	499	5,940
May	960	400	583	35,800
June	695	175	400	23,800
July	170	127	142	8,730
August	150	123	132	8,120
September	138	125	129	7,680
The period				90,100

UMATILLA RIVER BASIN

UMATILLA RIVER ABOVE McKAY CREEK, NEAR PENDLETON, OREG.

LOCATION.—In NW. ¼ sec. 8, T. 2 N., R. 32 E., near track of main line of Oregon-Washington Railroad & Navigation Co., one-fourth mile above mouth of McKay Creek, and 2 miles west of Pendleton, Umatilla County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1, 1921, to September 30, 1922. Records at Pendleton, February, 1891, to July, 1892, and May 22, 1903, to March 21, 1906, are directly comparable with those at this station.

GAGE.—Stevens continuous water-stage recorder on left bank installed October 13, 1921. Vertical staff at same location used prior to that date. Gage read and recorder inspected by Fred Price and A. E. Perry.

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

CHANNEL AND CONTROL.—Channel straight 100 yards above and below gage. Banks high and will not be overflowed. Control is a gravel riffle opposite gage, where at low stages the stream is confined to narrow channel along left bank.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 6.6 feet about noon April 22 (discharge, 5,400 second-feet); minimum stage recorded, 0.10 foot October 7 (discharge, 17 second-feet).

1921–1922: Maximum stage recorded, that of April 22, 1922; minimum discharge, 16 second-feet August 13, 1921.

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

DIVERSIONS.—Water diverted for power at Pendleton is returned to river above this station. Some small diversions are made for irrigation above station.

REGULATIONS.—At low stages there is considerable diurnal fluctuation due to impounding and releasing of water in the power canals of the two flour mills at Pendleton.

ACCURACY.—Stage-discharge relation changed probably January 9–20. Both rating curves fairly well defined. Staff gage read to hundredths once a day October 1–12 and November 6–8. Water-stage recorder operated satisfactorily except October 24 to November 8, January 9–14, May 30 to June 8, June 30 to August 2, and August 7 to September 30. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph; mean discharge for periods of no gage-height record, estimated by comparison with records of flow at other stations. Records good except for estimated periods, for which they are fair.

Discharge measurements of Umatilla River above McKay Creek, near Pendleton, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 9	A. E. Perry[a]	3.00	679	June 14	A. E. Perry	2.30	466
17	do	2.96	597	21	do	1.52	192
Mar. 21	do	3.92	1,280	29	G. H. Canfield	1.03	107
31	do	4.83	2,320	Aug. 3	A. E. Perry	.57	34.4

[a] Watermaster for Umatilla County.

Daily discharge, in second-feet, of Umatilla River above McKay Creek, near Pendleton, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Aug.
1	58		4,250	310	131	321	2,420	2,710		-------
2	58		3,270	310	145	375	2,710	3,190		-------
3	58	85	2,180	310	149	450	3,030	2,550		34
4	56		1,610	310	157	465	4,250	2,360		34
5	55		1,160	298	163	435	3,190	3,190	770	32
6	54	100	940	305	291	435	2,290	2,870		30
7	17	97	830	298	630	465	2,030	2,550		-------
8	92	92	700	298	920	450	4,250	2,290		-------
9	58	92	630		880	450	3,190	1,790	630	-------
10	56	90	578		495	450	2,420	1,520	570	-------
11	55	83	595		345	435	1,900	1,320	525	-------
12	62	86	1,010		285	420	1,570	1,370	495	-------
13	48	80	2,050		260	420	1,370	1,680	465	-------
14	52	80	2,310		252	420	1,190	2,290	420	-------
15	62	80	1,720	220	235	495	1,060	2,710	375	-------
16	73	93	1,160		1,240	525	1,020	3,030	345	-------
17	78	100	940		840	610	950	3,030	306	-------
18	69	100	780		675	630	880	3,030	270	-------
19	66	111	780		570	675	950	2,360	248	-------
20	60	114	665		495	780	1,570	1,900	228	-------
21	66	102	542	174	465	1,280	2,870	2,030	200	-------
22	83	132	542	149	435	1,570	5,010	1,240	187	-------
23	83	272	490	131	390	1,790	4,630	750	174	-------
24		385	430	143	375	1,470	3,030	1,140	161	-------
25		612	415	151	360	1,190	2,550	810	139	-------
26		740	415	151	360	950	2,710	950	133	-------
27	85	760	385	151	345	880	2,870	780	115	-------
28		880	370	141	330	980	2,290	700	108	-------
29		830	340	141	-------	1,240	2,030	700	102	-------
30		2,480	340	147	-------	1,620	2,290	700	94	-------
31		-------	325	139	-------	2,220	-------	700	-------	-------

Monthly discharge of Umatilla River above McKay Creek, near Pendleton, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	----------	17	67.7	4,160
November	2,480	----------	301	17,900
December	4,250	325	1,060	65,200
January	310	139	216	13,300
February	1,240	131	436	24,200
March	2,220	321	803	49,400
April	5,010	880	2,420	144,000
May	3,190	----------	1,880	116,000
June	----------	94	415	24,700
The period	----------	----------	----------	459,000

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, 1922.

GAGE.—Stevens continuous water-stage recorder on right of main channel at downstream end of bridge pier; inspected by A. E. Perry, water master.

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 and brush. Control is at almost right angle turn to right, 250 feet below gage and below deep pool and is composed of gravel and free from vegetation; subject to slight shifts.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.45 feet at 11 a. m. April 22 (discharge, 7,160 second-feet); minimum discharge, 31 second-feet September 21–23.

1916–1922: Maximum stage from water-stage recorder, 9.9 feet, January 3, 1921 (discharge, 10,000 second-feet); minimum discharge, 16 second-feet August 19, 1920.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—On Umatilla River above gaging station and below mouth of McKay Creek 150 acres are irrigated, and above mouth of McKay Creek, 600 acres. On principal tributaries, 1,750 acres are irrigated on Birch Creek and 1,300 acres on McKay Creek.

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 the mills. This causes considerable fluctuation at low stages. There is practically no effect at medium and high stages. The backwater from Furnish Reservoir extends to within a few hundred yards below control.

ACCURACY—Stage-discharge relation changed probably during period February 22 to March 8. Rating curves fairly well defined. Water-stage recorder operated satisfactorily except December 28 to February 2 and February 22 to

March 8 when well was frozen and stage-discharge relation was affected by ice, and March 10–15 when there was a poor connection between river and well, for which period gage height was estimated. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. For periods when well was frozen and stage-discharge relation was affected by ice, mean discharge was estimated by comparison with records at station on Umatilla River above McKay Creek, McKay Creek, and Birch Creek. Records good except for periods when discharge was estimated, for which they are fair.

Discharge measurements of Umatilla River above Furnish Reservoir, near Yoakum, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 16	A. E. Perry [a]	0.77	68	May 8	A. E. Perry	6.00	3,070
Nov. 30	do	7.36	5,250	June 19	do	2.13	301
Dec. 13	do	5.62	2,620	23	do	1.78	200
Feb. 3	do	1.55	208	26	do	1.54	145
Mar. 22	do	5.36	2,520	29	Canfield and Perry	1.36	109
Apr. 3	do	6.66	4,020	Aug. 2	A. E. Perry	.71	38.9

[a] Water master for Umatilla County.

Daily discharge, in second-feet, of Umatilla River above Furnish Reservoir, near Yoakum, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	59	89	4,650	180		3,320	3,180	965	104	39	35
2	59	86	3,460			3,740	3,740	930	98	39	41
3	57	85	2,180	192		4,030	3,320	900	95	39	44
4	57	86	1,530	252		6,040	3,460	840	90	38	44
5	55	86	1,250	365	530	4,650	4,330	870	86	39	44
6	60	83	1,090	445		3,460	4,030	810	84	40	44
7	57	90	970	855		3,460	3,600	700	78	38	43
8	59	84	880	1,740		6,590	3,060	700	78	37	42
9	57	88	805	1,200	725	4,990	2,480	750	77	34	42
10	56	86	755	730	700	3,740	2,080	810	77	31	42
11	58	82	780	550	700	3,060	1,900	675	76	31	40
12	59	90	1,220	452	700	2,480	1,900	625	75	42	38
13	62	85	2,580	400	650	2,180	2,080	600	71	57	37
14	64	91	2,700	382	650	2,080	2,480	500	69	50	36
15	72	90	2,080	348	750	1,810	2,940	440	60	56	35
16	72	96	1,600	2,090	810	1,730	3,060	400	60	55	34
17	76	96	1,280	1,600	810	1,650	3,320	362	57	53	33
18	76	99	1,120	1,250	810	1,570	3,320	310	55	51	33
19	76	109	940	970	870	1,650	2,700	289	53	50	33
20	76	112	830	705	1,000	2,480	2,280	260	52	50	33
21	76	125	780	630	1,650	4,490	1,900	224	49	50	31
22	84	165	705		2,380	6,400	1,650	211	45	49	31
23	78	382	680		2,580	5,860	1,490	193	43	48	31
24	82	590	610		2,080	4,490	1,490	171	42	47	33
25	77	1,000	550	470	1,570	4,030	1,490	146	42	45	34
26	82	1,120	510		1,420	4,030	1,280	144	41	42	34
27	84	1,120	470		1,280	4,030	1,140	123	41	41	36
28	92	1,250			1,420	3,460	965	118	40	39	36
29	90	1,120	400	--------	1,730	2,820	900	114	39	37	38
30	90	3,140		--------	2,080	2,700	930	106	38	36	40
31	92	--------		--------	2,940	--------	965	--------	38	34	--------

Monthly discharge of Umatilla River above Furnish Reservoir, near Yoakum, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	92	55	70.8	4,350
November	3,140	82	394	23,400
December	4,650	----------	1,250	76,900
January	----------	----------	a270	16,600
February	2,090	----------	672	37,300
March	2,940	----------	1,110	68,200
April	6,590	1,570	3,570	212,000
May	4,330	900	2,370	146,000
June	965	106	476	28,300
July	104	38	63.0	3,870
August	57	31	43.1	2,650
September	44	31	37.2	2,210
The year	6,590	31	859	622,000

a 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., 1½ miles below diversion point of main canal on west division of Umatilla project, 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, 1922.

GAGE.—Inclined staff in two sections; lower section 2.0 to 3.5 feet, upper 3.5 to 10.8 feet. Read by employees of United States Bureau of Reclamation.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.2 feet April 9 (discharge, 5,370 second-feet); minimum discharge, no flow September 1–15.

1903–1922: Maximum stage recorded, 11.0 feet May 31, 1906 (discharge, 19,600 second-feet); no flow July 25 and August 1–9, 1906, and September 1–15, 1922.

ICE.—Stage-discharge relation affected by ice.

DIVERSIONS.—Large part of total flow of river diverted for irrigation above station. Umatilla project feed canal also diverts water during winter for storage in Cold Springs Reservoir. The main canal on west division of Umatilla project of the United States Bureau of Reclamation diverts just above 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 division dam of Umatilla project.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to half-tenths once daily after November 6. Daily discharge ascertained by applying daily gage height to rating table. Records good except December 26 to February 5, for which they are fair.

The following discharge measurement was made by G. H. Canfield:
June 26, 1922: Gage height, 1.99 feet; discharge, 14.2 second-feet.

Daily discharge, in second-feet, of Umatilla River near Umatilla, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		5,340	425		18	2,620	2,130	410	35	11	0
2		3,210	345		14	3,140	2,290	330	31	18	0
3	80	2,690	345	250	22	3,140	2,620	295	37	14	0
4		1,590	311		370	4,260	2,130	260	37	22	0
5		1,120	311		370	4,910	2,620	140	31	12	0
6	80	1,060	277	490	370	3,310	3,140	295	31	10	0
7	80	770	345	880	370	2,790	2,620	225	31	22	0
8	80	670	345	880	410	3,310	2,620	80	31	18	0
9	80	580	345	2,790	370	5,370	2,050	25	22	22	0
10	80	580	345	1,120	450	3,310	1,590	450	31	20	0
11	80	465	311	770	370	2,960	1,310	225	31	22	0
12	80	505	311	670	330	2,290	1,060	190	29	31	0
13	80	770	311	625	295	1,890	1,120	165	20	26	0
14	106	2,620	345	580	295	1,820	1,450	123	18	26	0
15	106	1,980	345	490	370	1,660	1,890	69	14	22	0
16	50	1,750	311	410	490	1,520	2,290	26	18	41	.4
17	50	1,110	311	2,790	490	1,380	2,290	22	33	26	22
18	50	770	245	1,970	490	1,240	2,450	43	29	31	19
19	50	750	215	1,310	490	1,180	2,450	31	26	33	24
20	50	900	215	625	490	1,450	1,970	31	22	33	24
21	50	770		580	580	2,290	1,450	14	22	37	24
22	106	770		465	1,820	3,680	1,240	18	29	33	32
23	140	670		385	2,130	5,370	995	14	26	33	29
24	345	670		385	2,290	4,050	825	26	18	33	29
25	465	670		590	1,660	3,310	880	22	14	31	29
26	580	590	200	277	1,120	2,960	938	18	26	29	29
27	670	635		190	1,120	2,960	720	26	31	22	26
28	1,120	590		26	995	2,960	490	31	22	30	26
29	1,120	545		-------	1,310	2,450	370	29	18	31	29
30	1,120	505		-------	1,380	2,130	410	24	18	31	33
31	-------	465		-------	2,050	-------	370	-------	18	1.3	-------

NOTE.—Discharge determined from gage-height record from United States Bureau of Reclamation gage at diversion dam Nov. 24, 25, Dec. 1–3, 11–19, Dec. 26 to Jan. 20, Feb. 23–26, and June 9. Discharge estimated Jan. 21 to Feb. 5 when stage-discharge relation was affected by ice at both gages. Braced figures give mean discharge for periods indicated.

Monthly discharge of Umatilla River near Umatilla, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	-------	-------	[a] 60	3,690
November	1,120	50	241	14,300
December	5,340	465	1,160	71,300
January	425	-------	275	16,900
February	2,790	26	734	40,800
March	2,050	14	753	46,300
April	5,370	1,180	2,860	170,000
May	3,140	370	1,640	101,000
June	450	14	122	7,260
July	37	14	25.8	1,590
August	41	1.3	24.9	1,530
September	33	0	12.5	744
The year	5,370	0	656	475,000

[a] Estimated.

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, 1922; also May 23, 1903, to July 6, 1904, at a station 4 miles downstream, in section 8.

GAGE.—Vertical staff in pool near ditch head gates; read by Harry Jones.

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

CHANNEL AND CONTROL.—Concrete diversion dam at dam site, fairly permanent. Changes in head gate of small canal will affect stage-discharge relation only during irrigation season.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.35 feet during night of April 7 (discharge, 2,000 second-feet). No flow at times.

1903–4; 1919–1922: Maximum discharge recorded, 3,250 second-feet February 10, 1921; no flow at times.

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below and poorly defined above 1,400 second-feet. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of McKay Creek near Pendleton, Oreg., during the year ending September 30, 1922

[Made by A. E. Perry, water master for Umatilla County]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Feb. 10	0.60	67	May 11	1.16	249
17	.70	90	19	1.15	238
Mar. 21	1.50	408	June 1	.39	34.3
30	1.66	541	21	.15	[a] 3.8
Apr. 19	1.83	592			

[a] Weir measurement.

Daily discharge, in second-feet, of McKay Creek near Pendleton, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1		370	43	19	49	750	518	43	3.0
2		345	41	19	49	950	582	39	
3		295	36	27	72	1,030	550	35	
4		246	33	36	82	1,340	550	23	
5		202	33	33	97	990	648	22	
6		156	33	39	89	830	582	25	
7	5	140	30	94	103	1,250	518	30	
8		124	33	41	94	1,840	425	35	
9		106	33	69	106	1,070	370	39	
10		94	39	59	156	750	320	53	
11		130	41	69	136	615	280	53	
12		156	44	69	134	550	275	51	
13	5.5	345	36	69	140	455	300	44	
14	6.0	270	33	57	206	398	320	36	
15	7.0	210	30	59	226	398	345	30	
16	8.0	180	27	69	194	370	345	26	
17	8.0	156	26	94	156	345	345	19	
18	8.0	130	19	140	180	320	320	15	
19	9.1	124	19	137	202	370	280	9.1	
20	8.0	109	26	124	262	518	246	7.0	
21	8.0	94	27	112	425	950	206	5.5	
22	10	89	26	109	550	1,200	173	4.5	
23	69	76	23	94	550	950	153	4.0	
24	183	69	22	89	455	715	140	4.0	
25	280	61	33	79	398	715	137	3.5	
26	270	59	39	76	320	750	118	3.5	
27	320	59	41	69	295	648	103	3.0	
28	300	55	41	57	345	518	89	3.0	
29	485	49	26		398	518	74	3.0	
30	455	49	24		518	518	57	3.0	
31		46	22		680		51		

NOTE.—Stream bed practically dry during October and July 2 to September 30. Braced figure gives estimated mean discharge for period indicated.

Monthly discharge of McKay Creek near Pendleton, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	0	0	0	0
November	455		83.3	4,960
December	370	46	148	9,100
January	44	19	31.7	1,950
February	140	19	71.7	3,980
March	688	49	247	15,200
April	1,840	320	754	44,900
May	648	51	304	18,700
June	53	3	22.4	1,330
July	3	0	.1	6
August	0	0	0	0
September	0	0	0	0
The year	1,840	0	138	100,000

McKAY CREEK AT MOUTH, NEAR PENDLETON, OREG.

LOCATION.—In NW. ¼ SE. ¼ sec. 8, T. 2 N., R. 32 E., at bridge one-fourth mile above Umatilla River, 2½ miles west of Pendleton, Umatilla County, and 4½ miles downstream from gaging station at dam site.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 19 to September 30, 1922.

GAGE.—Vertical staff gage fastened to log just above bridge; read by Fred Price.

DISCHARGE MEASUREMENTS.—Made by wading, from bridge at gage, or from another bridge 2 miles upstream, correcting for diversions.

CHANNEL AND CONTROL.—Banks are high and not subject to overflow. The section at bridge is pool at low stages but there is an eddy near left bank at high stages. Below bridge, the stream divides into two channels separated by a gravel bar; the main channel being against the right bank. Control is at a gravel riffle 50 feet below bridge and is subject to change.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 6.2 feet on April 22 (discharge, 1,170 second-feet); minimum stage, 3.18 feet at time of measurement on June 29 (discharge, 2.3 second-feet).

DIVERSIONS.—Numerous ditches above station divert practically entire summer flow, but at this point there is a constant flow of about 3 second-feet from springs or return water.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent April 19 to June 30. Rating curve fairly well defined. Gage read to hundredths once a day; gage-height record, July 1 to September 30 unreliable. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Discharge measurements of McKay Creek at mouth, near Pendleton, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 31	A. E. Perry[a]	5.34	771	June 21	A. E. Perry	[c] 3.32	13.1
Apr. 19	do	5.20	[b] 592	29	Canfield and Perry	3.18	2.3
May 11	do	4.50	243	Aug. 3	A. E. Perry		[d] 3.0
June 2	do	3.60	35.0				

[a] Water master for Umatilla County.
[b] Measurement made at bridge 2 miles upstream and corrected for diversions.
[c] Observer's reading.
[d] Estimated.

Daily discharge, in second-feet, of McKay Creek at mouth, near Pendleton, Oreg., for the year ending September 30, 1922

Day	Apr.	May	June	Day	Apr.	May	June	Day	Apr.	May	June
1		530	49	11		280	49	21	1,050	182	9.3
2		585	37	12		242	49	22	1,170	182	4.6
3		530	27	13		242	49	23	1,110	154	3.2
4		530	18	14		242	37	24	750	129	6.6
5		585	18	15		280	37	25	695	129	3.9
6		585	18	16		280	37	26	695	105	3.2
7		530	18	17		280	10	27	695	84	3.2
8		475	37	18		280	18	28	585	84	2.9
9		375	37	19	585	242	10	29	475	65	2.9
10		325	49	20	475	212	10	30	475	65	2.9
								31		65	

Monthly discharge of McKay Creek at mouth, near Pendleton, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 19-30	1,170	475	730	17,400
May	585	65	284	17,500
June	49	2.9	21.5	1,280
July	----------	----------	[a] 3.0	184
August	----------	----------	[a] 3.0	184
September	----------	----------	[a] 3.0	179
The period	----------	----------	----------	36,700

[a] Estimated.

BIRCH CREEK NEAR PILOT ROCK, OREG.

LOCATION.—In SE. ¼ sec. 15, T. 1 N., R. 32 E., at Guderian ranch, 6 miles downstream from Pilot Rock, Umatilla County, and 8 miles southwest of Pendleton.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1922.

GAGE.—Vertical staff gage installed February 13 on right bank 50 feet above bridge, 400 feet west of Guderian ranch house. Vertical staff above diversion dam in SE. ¼ sec. 22, 1 mile above Guderian ranch, used prior to that date. Gage read by Howard Guderian.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; fairly permanent. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.0 feet at 6 a.m. April 8 (discharge, 790 second-feet); no flow at times.

1920-1922: Maximum stage recorded, 3.80 feet at old gage April 13, 1920 (discharge, 1,270 second-feet); no flow at times.

ICE.—Stage-discharge relation may have been affected by ice during January; discharge estimated by study of records of flow at other stations.

DIVERSIONS.—Several small ditches divert water above station and use practically all the summer flow.

REGULATION.—None.

ACCURACY.—Stage-discharge relation for both gages permanent. Rating curve for upper gage fairly well defined and for lower gage well defined. Upper gage read to half-tenths once a day; lower gage to half-tenths twice a day. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records for upper station fair; for lower station good.

Discharge measurements of Birch Creek near Pilot Rock, Oreg., during the year ending September 30, 1922

[Made by A. E. Perry, water master for Umatilla County]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Feb. 13	0.51	27.6	Apr. 20	1.51	218
17	.70	54	May 19	1.60	263
Mar. 21	1.06	123	June 1	.53	29.8
30	1.13	123	21	.33	11.0

Daily discharge, in second-feet, of Birch Creek near Pilot Rock, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Feb.	Mar.	Apr.	May	June
1	15	194	12	28	196	285	36
2	15	226	19	34	223	425	32
3	15	133	19	38	285	338	26
4	12	80	19	38	480	408	26
5	12	80	19	54	390	500	26
6	12	52	19	38	372	425	21
7	12	52	28	51	372	408	21
8	12	52	28	51	745	320	21
9	12	52	28	46	480	238	21
10	12	45	28	70	390	183	105
11	12	45	28	54	302	170	96
12	12	70	28	54	223	135	46
13	0	80	24	54	183	170	46
14	0	133	26	78	183	285	46
15	0	104	26	91	170	338	46
16	33	80	120	91	170	355	38
17	33	80	67	84	170	355	32
18	12	60	54	78	146	355	28
19	12	45	54	87	146	269	24
20	12	39	51	87	223	196	15
21	12	23	46	124	442	170	8.1
22	12	12	38	146	700	146	4.7
23	80	9.0	38	158	620	120	1.2
24	104	6.5	38	146	500	101	-------
25	92	15	36	146	460	84	-------
26	80	19	32	124	460	78	-------
27	80	15	38	105	460	67	-------
28	70	15	28	105	372	51	-------
29	70	15	-------	109	285	38	-------
30	80	19	-------	142	253	41	-------
31	-------	23	-------	170	-------	38	-------

NOTE.—Discharge estimated Nov. 1-3. No flow Oct. 1-31 and June 24 to Sept. 30.

Monthly discharge of Birch Creek near Pilot Rock, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	0	0	0	0
November	104	0	31.2	1,860
December	226	6.5	60.4	3,710
January	-------	-------	[a] 25	1,540
February	120	12	35.4	1,970
March	170	28	86.5	5,320
April	745	146	347	20,600
May	500	38	229	14,100
June	105	0	25.5	1,520
July	0	0	0	0
August	0	0	0	0
September	0	0	0	0
The year	745	0	69.9	50,600

[a] Estimated.

BIRCH CREEK AT RIETH, OREG.

LOCATION.—In NW. ¼ sec. 13, T. 2 N., R. 31 E., one-fourth mile above Umatilla River, 1 mile south of Rieth, Umatilla County, and 8 miles below gaging station at Guderian ranch.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 1 to August 31, 1921; March 1 to July 31, 1922.

GAGE.—Vertical staff on right bank 200 feet below footbridge; read by W. H. Harrison.

CHANNEL AND CONTROL.—Bed composed of gravel; channel straight; current swift; no well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage recorded for period, March 1 to July 31, 1922, 4.35 feet April 22 (discharge, 705 second-feet); no flow July 15–31.

DIVERSIONS.—Numerous ditches above station divert practically all the summer flow.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read to hundredths once a day; gage difficult to read above low stage because of large fluctuation of water surface. Daily discharge ascertained by applying daily gage height to rating table. Records good except for days when discharge exceeded 150 second-feet, for which they are fair.

Discharge measurements of Birch Creek at Rieth, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 17	A. E. Perry [a]	[b]	61	May 11	A. E. Perry	2.67	170
Mar. 3	do	1.72	37.5	June 2	do	1.65	23.0
21	do	2.33	121	21	do	1.50	9.7
30	do	2.43	125	29	Canfield and Perry	1.20	1.0

[a] Water master for Umatilla County. [b] Gage gone.

Daily discharge, in second-feet, of Birch Creek at Rieth, Oreg., for the period March 1 to July 31, 1922

Day	Mar.	Apr.	May	June	July	Day	Mar	Apr.	May	June	July
1	30	182	305	46	1.0	16	79	156	335	38	
2	30	200	320	36	.8	17	82	156	365	33	
3	33	268	320	30	.8	18	85	138	320	26	
4		418	452	36	.7	19	90	138	230	21	
5		320	452	21	.7	20	99	220	220	15	
6		280	435	19	.7	21	126	452	210	10	
7		320	452	17	.5	22	191	705	156	7.3	
8	43	665	400	17	.5	23	191	525	134	5.5	
9		382	320	12	.5	24	182	488	111	4.4	0
10		350	191	14	.4	25	156	365	105	2.4	
11		280	156	126	.2	26	164	452	96	1.7	
12	53	220	164	105	.2	27	173	418	82	1.4	
13	59	191	191	82	.1	28	173	382	77	1.0	
14	53	182	280	56	.1	29	164	350	77	1.0	
15	77	164	320	43	0	30	134	320	72	1.0	
						31	156	-------	64	-------	

NOTE.—Braced figures give mean discharge for periods indicated.

Monthly discharge of Birch Creek at Rieth, Oreg., for the period March 1 to July 31, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
March	191		94.3	5,800
April	705	138	323	19,200
May	452	64	239	14.700
June	126	1.0	27.6	1,640
July	1.0	0	.23	14
The period				41,400

UMATILLA PROJECT FEED CANAL NEAR ECHO, OREG.

LOCATION.—In SW. ¼ sec. 22, T. 3 N., R. 29 E., one-fourth mile below head gate at United States Bureau of Reclamation diversion dam on Umatilla River and 2 miles above Echo Umatilla County.

RECORDS AVAILABLE.—October 1, 1920, to September 30, 1922.

GAGE.—Vertical staff on right bank 60 feet above concrete dam just below first waste gage in canal. Gage read by L. M. Hills, ditch rider for United States Bureau of Reclamation.

DISCHARGE MEASUREMENTS.—Made at footbridge across concrete-lined section of canal half a mile below gage.

CHANNEL AND CONTROL.—Gage is at earth section of canal just above concrete dam having five piers. At middle of dam is a gate, 2 feet wide, of removable 2-inch planks, the top of which is 0.33 foot below crest of dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.00 feet March 11 to April 11 (discharge, 315 second-feet); canal dry at times.

ACCURACY.—Stage-discharge relation changed some time prior to April 28; change probably occurred during summer when canal was dry. Rating curve well defined. Gage read to hundredths once a day and also after making changes at head gate. Daily discharge ascertained by applying daily or mean daily gage height to rating table, or for days of considerable fluctuation by averaging the discharge for intervals of a day. Records prior to March 1, good; after that date, excellent.

Umatilla project feed canal diverts from right bank of Umatilla River at diversion dam. The water is carried to Cold Springs Reservoir from which it is released during the irrigation season.

Discharge measurements of Umatilla project feed canal near Echo, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 28	C. N. Taylor[a]	1.66	232
June 26	Canfield and Crocker[a]	.47	42.3

[a] Engineer, United States Bureau of Reclamation.

Daily discharge, in second-feet, of Umatilla project feed canal near Echo, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1		224	107		292	315	261	292	44
2		252	115		292	315	272	292	44
3		266	121		297	315	283	292	13
4		277	128	47	304	315	285	292	
5		277	131	80	306	315	292	292	
6		270	136	58	306	315	292	292	
7	20	281	145		308	315	285	292	
8	20	285	148		308	315	285	292	
9	20	292	155		310	315	285	285	
10	20	292	162	40	313	315	285	255	
11	20	292	174	66	315	315	285	248	
12	20	301	168	70	315	263	274	235	
13	20	304	145	29	315	206	266	228	
14	20	304	67	70	315	74	252	228	
15	20	308	33	77	315	78	248	213	
16	20	308	24	19	315	87	248	176	
17	20	308	24	55	315	107	266	86	
18	20	308	24	177	315	115	277	38	
19	20	203		235	315	115	281	38	
20	20	56		266	315	138	285	57	
21	20	56		274	315	161	292	70	
22	20	33		285	315	166	292	76	
23	20	33	50	285	315	166	292	55	
24	20	33	70	166	315	177	292	43	
25	20	33	70	181	315	193	292	43	
26	20	33	70	272	315	205	292	43	
27	123	33	70	288	315	222	292	43	
28	107	59	70	292	315	235	292	43	
29	115	79	70		315	239	292	43	
30	157	94	70		315	248	292	43	
31		99	70		315		292		

NOTE.—Canal dry on days for which no discharge is given.

Monthly discharge of Umatilla project feed canal near Echo, Oreg., for the ye a ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
November	157	0	30.1	1,790
December	308	33	193	11,900
January	174	0	84.4	5,190
February	292	0	119	6,610
March	315	292	311	19,100
April	315	74	222	13,200
May	292	248	281	17,300
June	292	38	164	9,760
July	44	0	3.26	200
The year	315	0	118	85,000

NOTE.—Canal dry during months for which no record is given.

ECHO MILL TAILRACE AT ECHO, OREG.

LOCATION.—In NW. ¼ sec. 16, T. 3 N., R. 29 E., 100 yards west of Echo mill, and 200 yards west of head gate on Umatilla project feed canal at Echo, Umatilla County.

RECORDS AVAILABLE.—October 1, 1920, to September 30, 1922.

GAGE.—Inclined staff 150 feet below outlet of tunnel under main-line track of Oregon-Washington Railroad & Navigation Co. Prior to April 4, United States Bureau of Reclamation gage at outlet of tunnel was used. Both gages read by Levi Hills, ditch rider for United States Bureau of Reclamation.

DISCHARGE MEASUREMENTS.—Made by wading or from strut across channel 15 feet below tunnel outlet.

CHANNEL AND CONTROL.—The channel is of earth and banks are high. Some aquatic growth appears in channel during summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.44 feet at time of discharge measurement April 28 (discharge, 40.5 second-feet); channel dry at times.

1920–1922: Maximum discharge recorded, that of April 28, 1922; no flow during several periods.

ACCURACY.—Stage-discharge relation for both gages practically permanent; affected by moss July 1–3. Both rating curves fairly well defined. Gage read to hundredths once a day and time noted when water was turned in or out. Daily discharge ascertained by applying daily gage height to rating table except July 1 when gage height was applied indirectly. Records fair.

Water diverted from the Umatilla project feed canal is used for power in the Echo flour mill or wasted into tailrace or occasionally into spillway at that point and returned to Umatilla River one-fourth mile below gage. The flow at gage is not subject to diurnal fluctuation.

Discharge measurements of Echo mill tailrace at Echo, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 5	C. N. Taylor	2.00	25.7	May 17	C. N. Taylor	1.98	33.0
19	do	2.16	33.9	June 26	Canfield and Crocker	1.18	12.5
28	do	2.44	40.5	28	do	.80	5.4
May 6	do	2.22	35.0	July 1	C. N. Taylor	.93	6.0
17	do	1.98	30.0				

NOTE.—Taylor and Crocker are engineers of United States Bureau of Reclamation.

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Daily discharge, in second-feet, of Echo mill tailrace at Echo, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1		26	26		26	30	31	35	5.0
2		30	26		34	30	31	36	5.0
3		30	26		34	30	28	36	5.0
4		30	26		30	34	28	36	
5		30	26		30	34	33	36	
6		30	30		34	35	36	36	
7		30	30		34	36	33	36	
8		34	30		34	36	35	36	
9		34	26		34	30	35	36	
10		34	30		34	32	40	36	
11		34	30		34	32	40	30	
12		30	26		34	33	40	29	
13		34	26		34	33	31	29	
14		12			34	33	30	29	
15		34			34	33	30	29	
16		34			34	35	30	23	
17	20	34			34	36	30	26	
18		34		26	34	35	29	17	
19		34		26	34	32	31	21	
20		34		26	34	32	30	22	
21		34		26	34	32	29	22	
22		26		26	34	32	29	22	
23		26		26	36	32	29	16	
24		26		26	36	36	29	15	
25		26		26	36	35	28	15	
26		26		26	36	33	29	15	
27		26		26	34	36	30	15	
28	26	26		26	34	40	30	5.5	
29	26	26			34	32	30	5.5	
30	26	26			34	31	30	5.5	
31		26			30		30		

NOTE.—No flow on days for which no record is given. No gage-height record Nov. 8–27 but entire flow in Umatilla project feed canal returned to Umatilla River either through tailrace or spillway at that point, discharge from feed canal record. Discharge estimated July 2 and 3.

Monthly discharge of Echo mill tailrace at Echo, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run off in acre-feet
	Maximum	Minimum	Mean	
November	26	0	15.9	946
December	34	12	29.5	1,810
January	30	0	11.5	707
February	26	0	10.2	566
March	36	26	33.6	2,070
April	40	30	33.3	1,980
May	40	28	31.4	1,930
June	36	5.5	25.0	1,490
July	5.0	0	0.5	30
The year	40	0	15.9	11,500

NOTE.—Tailrace dry during months for which no record is given.

WESTERN LAND & IRRIGATION CO.'S CANAL AT ECHO, OREG.

LOCATION.—In SE. ¼ sec. 17, T. 3 N., R. 29 E., at rectangular timber weir, half a mile below turn out to Allen Canal, 1 mile below head gate on Umatilla River, and 1 mile southwest of Echo, Umatilla County.

RECORDS AVAILABLE.—May 10 to July 31, 1921; April 1 to June 30, 1922. A few discharge measurements in 1905 and 1906.

GAGE.—Vertical staff gage on right wing wall of weir; read by G. S. Sherman.

DISCHARGE MEASUREMENTS.—Made from footbridge half a mile upstream just below turn out to Allen Canal.

CHANNEL AND CONTROL.—Canal is in earth section. Control for gage is 16-foot rectangular weir having 2-inch crest.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 1 to June 30, 1922, 2.78 feet May 18 and 19 (discharge, 284 second-feet); no flow April 30.

1921 and 1922: Maximum stage recorded, that of May 18 and 19, 1922; no flow at times.

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

Head gate is situated in NE. ¼ sec. 21, T. 3 N., R. 29 E., on left bank of Umatilla River. A portion of flow may be turned into Allen Canal half a mile below head gate and into Pioneer & Courtney Canal one-fourth mile below gage. During the irrigation season of 1922 the amount of water turned into Allen Canal was about as follows: April 11-30, 225 acre-feet; May, 1,330 acre-feet; June, 1,840 acre-feet.

The following discharge measurement was made by Canfield and Crocker:

June 28, 1922: Gage height, 1.91 feet; discharge, 136 second-feet.

Daily discharge, in second-feet, of Western Land & Irrigation Co.'s canal at Echo, Oreg., for the period April 1 to June 30, 1922

Day	Apr.	May	June	Day	Apr.	May	June	Day	Apr.	May	June
1	71	251	243	11	50	267	150	21	131	259	71
2	71	259	227	12	57	267	211	22	150	267	88
3	65	259	227	13	57	267	160	23	150	259	83
4	43	243	227	14	78	267	167	24	150	259	100
5	54	243	259	15	101	267	160	25	196	276	87
6	74	259	259	16	98	267	143	26	219	276	89
7	74	259	219	17	93	267	141	27	219	259	143
8	47	267	243	18	131	284	141	28	219	243	120
9	50	267	219	19	131	284	146	29	219	235	13
10	50	259	203	20	131	259	153	30	0	65	14
								31		243	

Monthly discharge of Western Land & Irrigation Co.'s canal at Echo, Oreg, for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	219	0	106	6,310
May	284	65	255	15,700
June	257	13	157	9,340
The period				31,400

MAXWELL CANAL NEAR HERMISTON, OREG.

LOCATION.—In SW. ¼ sec. 20, T. 4 N., R. 28 E., 2.34 miles below head gate on Umatilla River and 3 miles southwest of Hermiston, Umatilla County.

RECORDS AVAILABLE.—March 18, 1921, to September 30, 1922.

GAGE.—Vertical staff and float gage in stilling well 200 feet below second waste way into Umatilla River. Read by W. H. Starr for United States Bureau of Reclamation.

DISCHARGE MEASUREMENTS.—Made from foot plank 100 feet below gage.

CHANNEL AND CONTROL.—The canal is concrete lined and is straight between gage and measuring section; control is permanent except when affected by aquatic growth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.22 feet June 6 and 7 (discharge, 86 second-feet); canal dry during winter.

1921–22: Maximum discharge recorded, 96 second-feet May 24 and 25, 1921; canal dry during winter.

ACCURACY.—Stage-discharge relation changed during winter. Rating curve used during October fairly well defined. Rating curve used after April 1 well defined above and extended below 20 second-feet. Gage read to hundredths once a day and also after making change at head gate. Daily discharge ascertained by applying daily mean daily gage height to rating table. Records good except for days when discharge was less than 20 second-feet for which they are fair.

Maxwell Canal diverts from right bank of Umatilla River at diversion dam in SW. ¼ sec. 28, T. 4 N., R. 28 E. The water is used for irrigation on the Umatilla project of United States Bureau of Reclamation.

Discharge measurements of Maxwell Canal near Hermiston, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 5	C. N. Taylor	1.71	15.0	May 26	C. N. Taylor	2.26	43
Apr. 20	do	1.72	22.2	June 8	do	3.06	77
25	do	2.68	61	27	Canfield and Crocker	2.92	71
May 10	do	2.86	65	July 11	C. N. Taylor	1.98	29
15	do	3.16	82				

NOTE.—Taylor and Crocker are engineers of United States Bureau of Reclamation.

Daily discharge, in second-feet, of Maxwell Canal near Hermiston, Oreg., for the year ending September 30, 1922

Day	Oct.	Apr.	May	June	July	Aug.	Day	Oct.	Apr.	May	June	July	Aug.
1	15	6.2	81	80	58	24	16	15	10	80	47	27	6.2
2	15	6.2	83	80	57	22	17	15	10	80	49	24	6.2
3	15	6.2	83	80	57	20	18	15	12	81	56	24	7.7
4	15	8.8	83	82	37	20	19	15	18	81	58	24	7.7
5	15	11	83	84	25	26	20	15	22	79	60	27	7.7
6	15	10	73	86	34	26	21	15	22	79	66	25	7.7
7	15	10	76	86	33	18	22	15	26	80	68	28	6.2
8	15	11	70	84	29	------	23	15	33	78	79	26	6.2
9	15	12	68	77	29	9.3	24	15	43	81	66	27	6.2
10	15	12	68	72	29	8.5	25	15	56	65	69	29	6.2
11	15	10	72	76	29	8.5	26	15	67	43	68	22	------
12	21	10	80	72	25	9.3	27	15	70	64	61	20	------
13	21	10	75	64	27	7.7	28	15	70	78	66	24	------
14	21	10	80	51	26	6.2	39	15	76	80	58	25	------
15	15	10	81	43	26	6.2	30	15	78	80	54	24	------
							31	15	------	80	------	24	------

NOTE.—Canal dry on days for whic h no discharge is given.

Monthly discharge of Maxwell Canal near Hermiston, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	21	15	15.6	959
April	78	6.2	25.2	1,500
May	83	43	76.3	4,690
June	86	43	68.1	4,050
July	58	20	29.7	1,830
August	26	0	9.02	555
The year				13,600

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

WEST DIVISION MAIN CANAL NEAR UMATILLA, OREG.

LOCATION.—In SW. ¼ sec. 28, T. 5 N., R. 28 E., just below head gate at United States Bureau of Reclamation diversion dam on Umatilla River, and 3 miles above Umatilla, Umatilla County.

RECORDS AVAILABLE.—March 17, 1921, to September 30, 1922.

GAGE.—Vertical staff gage in stilling well just below head gate. Read by United States Bureau of Reclamation ditch rider.

DISCHARGE MEASUREMENTS.—Made from footbridge 2 miles below intake and just below Umatilla spillway.

CHANNEL AND CONTROL.—Canal is concrete lined; stage-discharge relation seriously affected by aquatic growth during summer.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 164 second-feet June 10–14; canal dry at times.

1921–22: Maximum discharge recorded, 164 second-feet May 16–19, 1921 and June 10–14, 1922; canal dry at times.

ACCURACY.—Stage-discharge relation unstable during most of year owing to growth of aquatic plants. Fairly well defined rating curves used October 1 to December 19 and February 13 to June 12; indirect shifting-control method used thereafter. Gage read to hundredths once a day. Daily discharge ascertained by applying directly or indirectly, daily gage height to rating table. Records good.

Main Canal diverts water from left bank of Umatilla River at United States Bureau of Reclamation diversion dam for irrigation on the western division of the Umatilla project of the United States Bureau of Reclamation. Part of the area was formerly irrigated by the Oregon Land & Water Co.'s ditch which diverted water from left bank of Umatilla River 1 mile below the present United States Bureau of Reclamation diversion dam.

Discharge measurements of West Division Main Canal near Umatilla, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 5	C. N. Taylor[a]	3.10	27.1	June 27	Canfield and Taylor	4.44	131
Apr. 6	do	3.76	78	July 10	C. N. Taylor	4.87	120
21	do	3.77	79	Aug. 21	do	4.65	113
28	do	4.43	111	Sept. 1	do	5.20	146
May 10	do	4.65	125	1	do	5.20	123
17	do	4.68	124	1	do	5.20	121
23	do	4.90	133	9	do	5.10	102
23	do	4.90	134				

[a] Engineer, U. S. Bureau of Reclamation.

NOTE.—All measurements were made below Umatilla spillway except that of Oct. 5 and the first on of Sept. 1. Gage height is observer's daily reading except on June 27, when gage was read at time of measurement. Umatilla spillway open Aug. 30 to Sept. 15.

Daily discharge, in second-feet, of West Division Main Canal near Umatilla, Oreg., for the year ending September 30, 1922

Day	Oct.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	48			79	56	114	133	114	120	147
2	27			79	56	114	133	114	122	141
3	27			79	56	114	133	112	122	150
4	27			79	72	122	133	114	122	144
5	27			79	72	125	147	114	122	141
6	27			79	76	125	158	116	120	147
7	27			79	76	122	158	120	120	147
8	33			79	76	122	158	122	120	136
9	33			79	76	120	133	120	120	141
10	33			79	76	122	164	122	120	141
11	33			79	74	122	164	125	120	141
12	33	38		82	76	122	164	125	120	138
13	33	38	54	82	72	122	164	120	120	141
14	33	38	54	82	76	122	164	120	120	128
15	33	38	54	44	76	125	152	120	120	125
16	33	38	54	44	76	125	147	109	112	99
17	33	38	54	44	76	125	125	114	112	104
18	33	38	54	44	76	125	125	114	112	104
19	33	38	64	44	76	125	122	112	112	104
20	33		64		76	128	122	112	112	104
21	33		64		76	128	141	112	112	104
22	33		64	46	76	136	144	112	114	104
23	33		72	50	76	136	144	112	114	102
24	33		72	50	76	136	136	112	114	102
25	33		72	50	84	136	133	109	114	102
26	33		72	54	82	136	130	112	120	102
27	33		72	54	112	136	133	109	125	102
28	33		72	54	112	136	133	114	125	102
29	33			54	112	136	128	112	125	102
30	33			54	112	132	128	114	154	102
31	33			54		132		114	152	

NOTE.—Canal dry on days for which no discharge is given.

Monthly discharge of West Division Main Canal near Umatilla, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	48	27	32.3	1,990
December	38	0	9.8	603
February	72	0	36.1	2,000
March	82	0	59.8	3,680
April	112	56	78.8	4,690
May	136	114	126	7,750
June	164	122	142	8,450
July	125	109	115	7,070
August	154	112	121	7,440
September	150	99	122	7,260
The year	164	0	70.3	50,900

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

JOHN DAY RIVER BASIN

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, 1922.

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

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, 8.3 feet April 23 and morning of April 24 (discharge, 16,400 second-feet); minimum stage recorded, 1.2 feet September 19-30 (discharge, 117 second-feet).

1905–1922: Maximum stage recorded, 10.38 feet February 6, 1907 (discharge, 22,800 second-feet); minimum stage, 1.02 feet September 8–11, 1915 (discharge, 63 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).

ICE.—Stage-discharge relation affected by ice.

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 probably February 17. Both rating curves well defined below 10,000 second-feet. Gage read to half-tenths twice a day October 1 to January 22. Gage-height record January 23 to July 22 of doubtful accuracy. Daily discharge ascertained by applying mean daily gage height to rating table except as noted in footnote to daily-discharge table. Record good October 1 to January 22 and poor thereafter because of doubtful gage-height record.

Discharge measurements of John Day River at McDonald, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 18	K. N. Phillips	4.42	4,000
Sept. 19	G. H. Canfield	1.22	130

Daily discharge, in second-feet, of John Day River at McDonald, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Sept.
1	300	344	1,990	1,320	955		5,500	8,500	5,500	1,070	
2	300	330	8,600	1,050	910		6,960	8,840	6,060	1,070	
3	300	330	7,960	1,000	775		9,180	11,200	6,360	970	
4	300	365	2,630	910	730		15,000	10,500	6,660	920	
5	300	386	3,000	775	820		14,700	10,500	6,660	920	
6	270	400	2,460	640		1,800	13,300	10,900	6,660	870	
7	270	415	2,300	555			12,200	11,900	7,260	870	
8	270	438	2,140	598			11,200	11,200	7,860	825	
9	270	460	1,770	685			16,100	10,500	7,860	825	
10	270	475	1,500	730			16,100	6,660	8,500	780	150
11	270	438	1,380		800		15,400	8,180	9,180	735	
12	300	400	1,320			2,150	15,400	7,260	9,180	690	
13	300	515	1,440			2,000	8,500	7,260	8,180	648	
14	300	640	1,570			1,860	5,500	7,560	7,860	605	
15	300	640	3,000			1,860	5,220	9,180	7,560	525	
16	300	555	2,810	600		1,860	10,500	12,600	6,660	485	
17	330	598	1,990			1,860	8,840	13,300	4,600	445	
18	330	640	1,570		4,960	2,000	4,000	13,300	3,560	415	
19	330	730	1,440			2,000	6,060	15,400	3,360	415	117
20	330	3,200	1,320			2,630	5,500	15,800	3,160	375	117
21	344	1,920	1,320			3,160	5,500	15,000	2,980	375	117
22	365	3,640	1,210	820		3,160	4,960	14,700	2,800	375	117
23	365	5,620	1,100	820		3,560	16,400	14,400	2,460		117
24	365	5,100	955	730	1,200	4,220	15,800	14,000	2,300		117
25	400	5,100	910	730		8,180	13,300	13,300	2,150		117
26	400	4,840	865	820		5,220	13,000	12,200	1,860	300	117
27	400	3,420	820	820		4,960	11,200	11,200	1,670		117
28	438	2,300	820	820		4,220	10,500	9,520	1,490		117
29	400	2,140	865	865		5,220	9,860	7,860	1,320		117
30	400	1,920	865	910		4,000	9,520	6,360	1,170		117
31	365		775	910		4,460		5,500			

NOTE.—Stage-discharge relation affected by ice Jan. 11–21; mean discharge estimated. Mean discharge computed from average weekly stage reported by observer Feb. 6–17 and Feb. 19 to Mar. 11. Discharge taken from discharge measurement Apr. 18. Discharge interpolated June 18 because gage height appeared to be in error. No gage-height record July 23 to Sept. 18; mean discharge estimated.

Monthly discharge of John Day River at McDonald, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	438	270	328	20,200
November	5,620	330	1,610	95,800
December	8,600	775	2,020	124,000
January	1,320	555	745	45,800
February	4,960	----------	1,100	61,100
March	8,180	----------	2,850	175,000
April	16,400	4,000	10,500	625,000
May	15,800	5,500	10,800	664,000
June	9,180	1,170	5,100	304,000
July	1,070	----------	578	35,500
August	----------	----------	[a]200	12,300
September	----------	117	137	8,150
The year	16,400	117	3,000	2,170,000

[a] Discharge estimated.

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 September 30, 1922.

GAGE.—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, 4.2 feet at 7 p. m. April 21 (discharge, 1,430 second-feet); minimum stage, 1.05 feet, August 29–31 (discharge, 2.0 second-feet).

1914–1917; 1920–1922: Maximum stage recorded, 4.5 feet May 13 and 14, 1917 (discharge, 1,790 second-feet); minimum discharge, 2 second-feet in December, 1914, August and September, 1921, and August, 1922.

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

DIVERSIONS.—Practically none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of April 21. Both rating curves fairly well defined. Gage read to half-tenths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table except as explained in footnote to table of daily discharge. Open-water records good, winter records fair.

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Discharge measurements of Camas Creek above Cable Creek, near Ukiah, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 21	K. N. Phillips	3.67	951	Apr. 23	K. N. Phillips	3.63	902
22	do	3.90	1,150	June 30	G. H. Canfield	1.36	14.2

Daily discharge, in second-feet, of Camas Creek above Cable Creek, near Ukiah, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3.5	17	80				135	750	270	14	3.0	3.0
2	5.0	19	94				160	750	295	14	3.0	3.0
3	3.5	21	110				192	820	270	14	3.0	3.0
4	3.5	19	130				230	820	270	11	3.0	4.5
5	5.0	17	135	55			270	860	270	11	3.0	4.5
6	4.4	17	135				315	785	250	8.5	4.5	4.5
7	4.4	14	122				420	750	270	8.5	4.5	4.5
8	5.0	14	122			15	530	680	320	8.5	3.0	4.5
9	3.5	17	135				590	610	320	8.5	3.0	4.5
10	3.5	16	148				590	610	370	8.5	3.0	4.5
11	5.0	14	160				560	610	345	8.5	3.0	4.5
12	5.0	14	160				590	610	320	6.0	4.5	4.5
13	7.5	17	176				625	680	270	6.0	4.5	4.5
14	7.5	17	160				590	715	230	6.0	4.5	3.0
15	10	14	160	30	15		625	750	212	4.5	4.5	3.0
16	10	10	148				590	750	195	4.5	4.5	3.0
17	10	10	148				530	785	195	4.5	4.5	3.0
18	10	7.5	135			20	502	750	165	4.5	3.0	3.0
19	10	11	122				502	680	115	4.5	3.0	3.0
20	7.5	17	122				560	680	94	4.5	3.0	3.0
21	9.0	17	110				980	610	76	4.5	3.0	3.0
22	10	25	106				1,140	540	55	4.5	3.0	3.0
23	7.5	30	100				900	420	43	4.5	3.0	3.0
24	7.5	34	90			35	540	420	33	4.5	3.0	4.5
25	10	30	90				540	420	27	4.5	3.0	4.5
26	10	30	80	15			540	420	23	4.5	3.0	4.5
27	10	34	90			63	540	480	21	4.5	3.0	4.5
28	11	44	100			70	680	370	17	4.5	3.0	4.5
29	14	50	100		-------	90	540	320	14	3.0	2.0	4.5
30	14	70	90		-------	100	610	295	15	3.0	2.0	4.5
31	17	-------	80		-------	110	-------	270	-------	3.0	2.0	-------

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Feb. 26; discharge determined from gage heights corrected for effect of ice by means of observer's notes and weather records. Braced figures give mean discharge for periods indicated.

Monthly discharge of Camas Creek above Cable Creek, near Ukiah, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	17	3.5	7.86	483
November	70	7.5	22.2	1,320
December	176	80	121	7,440
January			32.7	2,010
February			15.	830
March	110		31.2	1,920
April	1,140	135	537	32,000
May	860	270	613	37,700
June	370	14	179	10,700
July	14	3.0	6.61	406
August	4.5	2.0	3.29	202
September	4.5	3.0	3.85	229
The year	1,140	2.0	131	95,200

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 1, 1919, to September 30, 1922.

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, uneven; slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.65 feet May 20 (discharge, 328 second-feet); minimum discharge, 0.5 second-foot August 28–31 and September 17–23.

1914–1917; 1920–1922: Maximum stage recorded, 2.7 feet May 15, 1917 (discharge, 590 second-feet); creek probably dry at times during winter of 1917.

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

DIVERSIONS.—Probably none.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed some time prior to measurement of April 21; date of change taken arbitrarily as April 1. Rating curve used prior to April 1 poorly defined; curve used after that date fairly well defined. Gage read to half-tenths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair prior to April 21, after which date they are good.

Discharge measurements of Cable Creek near Ukiah, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr 21	K. N. Phillips	1.08	117	Apr. 22	K. N. Phillips	1.18	157
21	do	1.47	252	June 30	G. N. Canfield	.49	7.0

Daily discharge, in second-feet, of Cable Creek near Ukiah, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.0	4.0	32				45	162	108		1.0	1.0
2	1.8	4.6	42				56	183	108	6.0	1.0	1.0
3	1.8	5.5	47				68	162	100		1.0	1.0
4	2.0	4.6	54				89	133	81	4.0	1.0	1.5
5	1.5	4.0	60	35			108	190	81	4.0	1.0	1.5
6	2.0	4.0	64				100	162	68	4.0	1.5	1.5
7	1.8	4.0	57				116	138	81	4.0	1.5	1.5
8	1.5	3.0	64			3	129	129	89	3.0	1.5	1.5
9	1.0	3.6	64				155	148	100	3.0	1.0	1.5
10	1.0	4.0	70				129	162	108	3.0	1.0	1.5
11	1.5	3.0	79				129	183	94	2.0	1.0	1.5
12	1.0	3.0	88				148	183	81	2.0	1.5	1.5
13	1.5	4.0	99				155	197	63	2.0	1.5	1.5
14	1.5	4.0	110				138	208	50	2.0	1.5	1.0
15	1.5	3.0	99	18	4		155	225	45	1.5	1.5	1.0
16	2.0	2.0	88				138	245	36	1.5	1.5	1.0
17	2.0	2.0	88				122	265	28	1.5	1.0	.5
18	2.0	1.5	79			4	100	245		1.5	1.0	.5
19	1.5	2.0	70				108	273		1.5	1.0	.5
20	2.0	3.0	70				122	314		1.5	1.0	.5
21	1.5	4.0	64				190	285		1.0	1.0	.5
22	2.0	5.5	64				190	257		1.0	1.0	.5
23	3.0	7.0	57				155	218		1.0	1.0	.5
24	3.0	11	57			15	148	218	18	1.0	1.0	1.0
25	4.0	7.0	50				148	233		1.0	1.0	1.0
26	4.0	11	50	5			162	225		1.0	1.0	1.0
27	5.5	14	57			32	155	233		1.0	1.0	1.0
28	5.5	14	57			38	183	208		1.0	.5	1.0
29	4.0	18	64		-------	44	108	183		1.0	.5	1.0
30	5.5	27	57		-------	50	148	148	8	1.0	.5	1.0
31	4.0	-------	50		-------	50	-------	122	-------	1.0	.5	-------

NOTE.—Stage-discharge relation affected by ice Dec. 31 to Mar. 26; discharge determined from gage heights corrected for effect of ice by means of observer's notes and weather records. Braced figures give mean discharge for periods indicated.

Monthly discharge of Cable Creek near Ukiah, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	5.5	1.0	2.42	149
November	27	1.5	6.24	371
December	110	32	66.2	4,070
January	----------	----------	18.9	1,160
February	----------	----------	4.0	222
March	50	----------	11.9	732
April	190	45	130	7,740
May	314	122	203	12,500
June	108	8	51.5	3,060
July	----------	1.0	2.29	141
August	1.5	.5	1.06	65
September	1.5	.5	1.05	62
The year	314	.5	41.8	30,300

DESCHUTES RIVER BASIN

DESCHUTES RIVER ABOVE SNOW CREEK, NEAR LAPINE, OREG.

LOCATION.—In NE. ¼ sec. 21, T. 20 S., R. 8 E., 1 mile above mouth of Snow Creek and backwater of proposed Crane Prairie Reservoir and 30 miles northwest of Lapine, Deschutes County.

DRAINAGE AREA.—Indeterminate, as most of water comes from springs.

RECORDS AVAILABLE.—May 25 to September 30, 1922.

GAGE.—Vertical staff on left bank; read by George Graft.

DISCHARGE MEASUREMENTS.—Made from footbridge 150 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel; somewhat shifting. Banks steep.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period, May 25 to September 30, 1922, 2.2 feet August 14–29 (discharge, 213 second-feet); minimum discharge, 111 second-feet, May 25–31.

ICE.—Ice never forms.

DIVERSIONS.—None.

REGULATION.— None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read to hundredths six times a week. Daily discharge obtained by applying daily gage height to rating table and interpolating for days of no gage-height record. Records good.

COOPERATION.—Gage-height record furnished by North Canal Co.

Discharge measurements of Deschutes River above Snow Creek, near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
May 27	1.51	111	Aug. 4	2.03	187	Sept. 11	2.10	201
June 12	1.74	140	25	2.19	207	28	1.94	171
July 17	1.73	144						

Daily discharge, in second-feet, of Deschutes River above Snow Creek, near Lapine, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1			131	178	205	16		140	139	213	187
2			132	181	205	17		140	141	213	186
3		120	134	184	205	18		138	143	213	184
4			134	186	205	19		137	144	213	183
5			134	189	205	20		137	145	213	181
6			134	190	197	21		137	147	213	180
7			134	192	197	22		137	148	213	178
8			134	197	195	23		137	151	213	176
9		140	135	199	195	24		136	154	213	
10			136	200	194	25	111	136	156	213	174
11			136	205	194	26	111	136	158	213	
12		143	136	209	193	27	111	136	163	213	172
13		143	137		192	28		136	168	213	170
14		140	137	213	191	29	111	134	169	213	169
15		140	137	213	189	30		133	172	205	166
						31			176	205	

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Deschutes River above Snow Creek, near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 25–31	----------	----------	111	1,320
June	143	----------	135	8,030
July	176	131	145	8,920
August	213	178	204	12,500
September	205	166	187	11,100
The period	----------	----------	----------	41,900

DESCHUTES RIVER AT CRANE PRAIRIE, NEAR LAPINE, OREG.

LOCATION.—In NW. ¼ sec. 16, T. 21 S., R. 8 E., 200 yards below Crane Prairie dam site and 28 miles by road west of Lapine, Deschutes County.

DRAINAGE AREA.—Indeterminate.

RECORDS AVAILABLE.—January 1, 1914, to June 30, 1917, and February 23 to September 30, 1922; fragmentary gage readings 1907 to 1913.

GAGE.—Stevens 8-day water-stage recorder on left bank, just above new Forest Service bridge installed June 9, 1922; staff gage in sec. 17, half a mile above present gage, used prior to that date.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed composed of rock and boulders; probably permanent; slight aquatic growth at times.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period February 22 to September 30, 1922, 2.22 feet at 5 p. m. June 11 (discharge, 529 second-feet); minimum stage recorded, 0.70 foot on old gage April 17 (discharge, 253 second-feet).

1907–1917; 1922: Maximum discharge recorded, 531 second-feet July 31, 1913; minimum discharge recorded, 130 second-feet March 31, 1917.

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent at both gages. Rating curve for staff gage February 23 to June 8 fairly well defined; for water-stage recorder, June 9 to September 30, well defined. Gage read weekly February 23 to May 13, almost every day May 18 to June 8; operation of recorder satisfactory June 9 to September 30. Daily discharge ascertained by applying to rating table daily gage height or mean daily gage height obtained by inspecting recorder graph. Records fair, February to May; excellent, June to September.

Discharge measurements of Deschutes River at Crane Prairie, near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height		Discharge	Date	Gage height		Discharge
	Staff gage	Water-stage recorder			Staff gage	Water-stage recorder	
	Feet	*Feet*	*Sec.-ft.*		*Feet*	*Feet*	*Sec.-ft.*
May 23	1.10	----------	361	Aug. 4	----------	1.77	349
June 9	1.45	2.18	508	25	----------	1.84	352
July 3	1.11	1.83	353	Sept. 11	----------	1.78	343
11	1.06	1.79	338	28	----------	1.72	321

Daily discharge, in second-feet, of Deschutes River at Crane Prairie, near Lapine, Oreg., for the year ending September 30, 1922

Day	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		280			380	368	340	356
2		285		320		364	340	356
3					393	364	337	352
4			270		393	356	337	352
5				325	414	356	337	348
6		280			414	352	333	352
7					458	352	337	352
8			273		482	348	340	348
9		273			511	348	344	344
10				320	511	348	344	340
11					520	344	348	340
12		270			520	340	352	340
13			260		511	344	352	340
14				325	493	340	352	340
15					475	340	356	340
16		273		320	466	337	352	337
17			253		452	337	356	337
18				311	444	337	360	333
19				325	439	333	364	333
20		270		341	434	333	356	333
21			280	350	422	333	368	333
22					413	333	364	333
23	273	263		357	405	333	364	333
24				357	401	333	360	329
25					396	333	364	325
26	280		311	360	388	333	364	318
27		270		357	384	333	360	318
28			320	357	380	333	360	318
29					376	337	356	318
30				380	372	337	352	318
31						340	356	

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Deschutes River at Crane Prairie, near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
February 23–28			279	3,320
March			273	16,800
April			278	16,500
May			336	20,700
June	520	372	434	25,800
July	368	333	343	21,100
August	368	333	352	21,600
September	356	318	337	20,100
The period				146,000

DESCHUTES RIVER AT PRINGLE FALLS, NEAR LAPINE, OREG.

LOCATION.—In NE. ¼ sec. 23, T. 21 S., R. 9 E., at head of Pringle Falls, 9 miles by road northwest of Lapine, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 26, 1915, to June 17, 1916; October 1, 1916, to June 30, 1917; June 6 to September 30, 1922.

GAGE.—Stevens 8-day water-stage recorder on left bank 250 yards above road bridge. Staff gage, almost directly opposite, used 1915 to 1917.

DISCHARGE MEASUREMENTS.—Made from cable half a mile below gage and below falls; during 1916 and 1917 made from boat near gage.

CHANNEL AND CONTROL.—Control is at head of falls; mostly rock and practically permanent. Some construction work was evidently done in river channel below gage during 1916 and 1917.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during period June 6 to September 30, 1922, 2.65 feet June 11–14 (discharge, 1,070 second-feet); minimum stage, 2.3 feet July 15–26, September 26, 29, and 30 (discharge, 890 second-feet).

1915–1917; 1922: Maximum discharge recorded, 1,170 second-feet June 21–27, 29, and 30, 1917; minimum discharge, 540 second-feet December 27, 1915.

ICE.—Stage-discharge relations affected by ice; discharge estimated.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation somewhat unstable 1915 to 1917; practically permanent during 1922. Rating curves used December 26, 1915, to June 17, 1916, and October 1, 1916, to June 30, 1917, fairly well defined; curve used during 1922 well defined. Gage read to tenths once a day December, 1915, to June, 1916; to hundredths once daily October 1, 1916, to June 30, 1917. Operation of water-stage recorder satisfactory during 1922, except for short periods. Daily discharge ascertained by applying to rating table daily gage height or mean daily gage height obtained by inspecting recorder graph. Records for 1916 and 1917, fair; for 1922, excellent.

Discharge measurements of Deschutes River at Pringle Falls, near Lapine, Oreg., during the years ending September 30, 1916, 1917, and 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1916		*Feet*	*Sec.-ft.*	1922		*Feet*	*Sec.-ft.*
Aug. 12	F. F. Henshaw	1.30	950	June 8	Wendell Dawson	2.58	1,030
Oct. 14	C. L. Batchelder	1.28	1,070	July 1	do	2.38	952
				13	do	2.33	914
1917				18	do	2.32	905
June 3	Batchelder and Briggs	1.28	1,040	Aug. 5	do	2.36	900
Aug. 20	R. C. Briggs	1.32	987	23	do	2.42	943

Daily discharge, in second-feet, of Deschutes River at Pringle Falls, near Lapine, Oreg., for the years ending September 30, 1916, 1917, and 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
1915-16									
1				580	580	620	620	755	800
2				580	580	620		800	800
3				580	580	620		800	800
4				580	580	620		800	800
5				580	620	620		800	800
6				580	620	620		800	800
7				580	620	620		800	800
8				580	665	620		800	800
9				580	665	620	640	800	800
10				580	620	620		800	800
11				580	620	620		800	800
12				580	580	580		800	800
13				580	580	580		800	800
14					580	580		800	800
15					580	580		800	800
16				580	620	580	755	800	800
17					620	620	710	800	800
18					620	620	710	800	
19					620	620	710	800	
20				755	580	620	710	800	
21				665	580	620	710	800	
22				620	580	620	710	800	
23				580	580	620	710	800	
24				620	580	620	710	800	
25				580	580	620	755	800	
26			580	580	580	620	755	800	
27			540	580	620	620	755	800	
28				580	620	620	755	800	
29			560	620	620	620	755	800	
30				580		620	755	800	
31			580	580		620		800	
1916-17									
1	1,090	1,040	960	885	885	835	810	935	1,040
2	1,090	1,040	960	885	885	835	835	960	1,050
3	1,090	1,040	960	885	885	835	835	985	1,060
4	1,090	1,040	960	885	885	835	835	985	1,060
5	1,090	1,040	960	885	885	835	835	1,000	1,060
6	1,090	1,040	960	885	885	835	835	1,010	1,060
7	1,090	1,040	935	885	885	835	835	1,010	1,060
8	1,090	1,040	935	885	885	835		1,040	1,090
9	1,090	1,040	935	885	860	835		1,040	1,090
10	1.060	1,010	935	885	860	835		1,040	1,120
11	1,060	1,010	935	885	860	835		1,040	1,120
12	1,060	1,010	910	885	860	835		1,050	1,120
13	1,060	1,010		885	860	835		1,060	1,120
14	1,060	1,010		885	860	835	835	1,060	1,120
15	1,060	1,010		885	860	835		1,060	1,120
16	1,040	985		885	860	835		1,060	1,120
17	1,040	985		872	860	835		1.060	1,120
18	1,040	985		860	860	835		1,090	1,130
19	1,040	985	900	860	860	835		1,060	1,140
20	1,040	985		860	860	835		1,060	1,140
21	1,040	985		860	860	835	810	1,060	1,170
22	1,040	985		885	860	835	835	1,060	1,170
23	1,040	985		885	860	835	860	1,060	1,170
24	1,040	985		885	835	835	885	1,060	1,170
25	1,040	985	885	885	835	835	885	1,060	1,170
26	1,040	985	885	885	835	835	885	1,060	1,170
27	1,040	985	885	885	835	835	885	1,060	1,170
28	1,040	960	885	885	885	835	910	1,060	1,140
29	1,040	960	885	885		835	910	1,040	1,170
30	1,040	960	885	885		835	910	1,040	1,170
31	1,040		885	885		835		1,040	

Daily discharge, in second-feet, of Deschutes River at Pringle Falls near Lapine, Oreg., for the year ending September 30, 1916, 1917, and 1922—Continued

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1922					1922				
1		940	915		16	1,020	890	940	940
2		940	915		17	1,020	890	940	940
3		915	915		18	1,020	890	940	940
4		915	915		19	1,020	890	940	940
5		915	915	940	20	1,020	890	940	940
6	995	915	915		21	995	890	970	940
7	995	915	915		22	970	890	970	915
8	1,020	915	915		23	970	890	970	915
9	1,040	915	915	940	24	970	890	970	915
10	1,040	915	915	940	25	970	890	940	915
11	1,070	915	915	940	26	940	890	940	890
12	1,070	915	915	940	27	940		940	915
13	1,070	915	940	940	28			940	915
14	1,070	915	940	940	29	940	900	940	890
15	1,040	890	940	940	30			940	890
					31			940	

NOTE.—Stage-discharge relation affected by ice Dec. 28-30, 1915, and Jan. 14-19, 1916; discharge estimated. Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Deschutes River at Pringle Falls, near Lapine, Oreg., for the years ending September 30, 1916, 1917, and 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1915–16				
December 26–31	580	540	563	6,700
January	755	580	592	36,400
February	665	580	602	34,600
March	620	580	614	37,800
April	755	620	685	40,800
May	800	755	799	49,100
June 1–17	800	800	800	27,000
The period				232,000
1916–17				
October	1,090	1,040	1,060	65,200
November	1,040	960	1,000	59,500
December	960	885	914	56,200
January	885	860	881	54,200
February	885	835	863	47,900
March	835	835	835	51,300
April	910	810	848	50,500
May	1,090	935	1,040	64,000
June	1,170	1,040	1,120	66,600
The period				515,000
1922				
June 6–30	1,070	940	1,000	49,600
July	940	890	905	55,600
August	970	915	934	57,400
September	940	890	930	55,300
The period				218,000

DESCHUTES RIVER NEAR LAPINE, OREG.

LOCATION.—In NW. ¼ sec. 26, T. 20 S., R. 10 E., at Big River ranger station, 7 miles by river above mouth of East Fork and 11 miles north of Lapine, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 22 to December 21, 1910; February 18 to December 31, 1912; April 7 to October 27, 1913, occasional readings; October 1, 1914, to May 14, 1917; August 26 to October 27, 1920; and July 24 to October 10, 1922, when station was discontinued.

GAGE.—Vertical staff 100 yards below bridge; read by George Broadwell.

DISCHARGE MEASUREMENTS.—Made from boat, held in place by light cable, 150 yards above gage.

CHANNEL AND CONTROL.—Bed composed of gravel and sand; no definite control. Channel crooked; gradient low.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 24 to October 10, 1922, 8.45 feet August 21 and 22 (discharge, 1,100 second-feet); minimum stage recorded, 8.2 feet July 24–28 and September 23 to October 10 (discharge, 1,050 second-feet).

DIVERSIONS.—None.

REGULATION.—None.

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

Discharge measurements of Deschutes River near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
July 24	8.22	1,070
Aug. 7	8.26	1,050
31	8.42	1,080

Daily discharge, in second-feet, of Deschutes River near Lapine, Oreg., for the period July 24 to October 10, 1922

Day	July	Aug.	Sept.	Oct.	Day	July	Aug.	Sept.	Oct.
1		1,070	1,090	1,050	16		1,080	1,070	
2		1,070	1,080	1,050	17		1,080	1,060	
3		1,070	1,080	1,050	18		1,080	1,060	
4		1,070	1,080	1,050	19		1,080	1,060	
5		1,070	1,080	1,050	20		1,090	1,060	
6		1,070	1,080	1,050	21		1,100	1,060	
7		1,060	1,080	1,050	22		1,100	1,060	
8		1,060	1,080	1,050	23		1,090	1,050	
9		1,070	1,070	1,050	24	1,050	1,090	1,050	
10		1,070	1,070	1,050	25	1,050	1,090	1,050	
11		1,070	1,070		26	1,050	1,090	1,050	
12		1,070	1,070		27	1,050	1,090	1,050	
13		1,070	1,070		28	1,050	1,090	1,050	
14		1,070	1,070		29	1,060	1,090	1,050	
15		1,080	1,070		30	1,060	1,090	1,050	
					31	1,060	1,090		

Monthly discharge of Deschutes River near Lapine, Oreg., for the period July 24 to October 10, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
July 24–31	1,060	1,050	1,050	16,700
August	1,100	1,060	1,080	66,400
September	1,090	1,050	1,070	63,700
October 1–10	1,050	1,050	1,050	20,800
The period				168,000

DESCHUTES RIVER BELOW BEND, OREG.

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

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—November 27, 1914, to September 30, 1922.

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.—Bed composed of coarse gravel and boulders. Logs, drift, and aquatic plants lodged on wide shallow control may affect stage-discharge relation at times.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.90 feet at 1 p. m. December 7 (discharge, 2,500 second-feet); minimum stage from recorder, 0.65 foot at 4. p. m. July 20 (discharge, 180 second-feet).

1915–1922: Maximum stage recorded, that of December 7, 1921; minimum stage recorded, 0.23 foot August 21, 1920 (discharge, 70 second-feet).

1905–1922: Maximum discharge of river in this vicinity, 4,820 second-feet at 7.45 a. m. November 27, 1909, for gage height of 3.45 feet at pumping plant at Bend; no diversions.

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

DIVERSIONS.—Station is below intakes of the five large canals which divert water from Deschutes River near Bend; only small diversions below station.

REGULATION.—Flow regulated by two hydroelectric plants, one at North Canal dam and one at Bend.

ACCURACY.—Logs on control affected stage-discharge relation from about October 1 to December 7, when they were probably carried out by the high water; stage-discharge relation permanent after December 7. Rating curve used October 1 to December 6 fairly well defined; curve used December 7 to September 30 well defined. 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 obtained by inspecting recorder graph. Discharge for days of no gage-height record ascertained by interpolation based on figures obtained by first including the diversions in the five canals near Bend and then subtracting from the interpolated figures the total discharge of the canals for those days. Records good.

Discharge measurements of Deschutes River below Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 8	K. N Phillips	1.81	930	June 5	K. N. Phillips	1.71	947
9	G. H. Canfield	1.80	1,000	July 8	Wendell Dawson	1.42	667
Nov. 2	K. N. Phillips	1.94	1,090	20	----do	1.31	589
Feb. 3	G. H. Canfield	2.11	1,440	Aug. 22	----do	1.14	447
Apr. 20	J. W. Bones	2.17	1,440	Sept. 8	----do	1.58	772
May 6	Wendell Dawson	2.21	1,460	21	----do	1.08	428

Daily discharge, in second-feet, of Deschutes River below Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	974	1,080	1,910	1,700	1,370	1,300	1,300	1,430		722	430	388
2	963	1,090	1,980	1,700	1,430	1,290	1,250	1,430	1,100	713	418	382
3	941	1,090	2,050	1,700	1,430	1,300	1,240	1,430		704	406	388
4	941	1,060	2,050	1,630	1,430	1,330	1,320	1,460		668	394	507
5	941	1,060	2,050	1,630	1,430	1,350	1,430		980	650	394	812
6	930	1,060	2,120	1,490	1,430	1,350	1,490	1,490	996	626	406	812
7	930	1,060	2,280	1,490	1,370	1,340	1,430	1,280	1,030	713	394	821
8	963	1,120	2,280	1,490	1,340	1,260		1,320	1,060	618	382	794
9	996	1,090	2,200	1,350	1,290	1,220		1,430	1,180	602	388	578
10	1,010	1,080	2,050	1,350	1,330	1,220		1,430	1,350	586	370	479
11	996	1,080	1,630	1,250	1,300	1,260	1,330	1,330	1,700	570	388	486
12	950	1,080	1,560	1,250	1,290	1,320			1,430	570	758	472
13	941	1,060	1,560	1,360	1,290	1,260			1,430	549	785	472
14	950	1,090	1,770	1,340	1,280	1,270		1,400	1,430	535	656	479
15	930	1,110	1,910	1,370	1,270	1,260			1,350	521	556	472
16	950	1,070	1,910	1,490	1,270	1,280	1,450		1,270	521	594	458
17	1,010	1,090	1,910	1,490	1,270	1,300			1,230	556	406	472
18	1,010	1,120	1,770	1,490	1,280	1,350			1,190	500	406	451
19	1,020		1,770	1,490	1,290	1,230	1,430		1,160	486	400	479
20	1,050	1,150	1,910		1,320	1,240	1,490		1,110	472	406	479
21	1,070	1,490		1,490	1,300	1,240	1,430		1,050	458	472	458
22	1,060	1,700	1,910	1,630	1,300	1,260	1,350		1,030	521	444	444
23	1,020	1,840		1,630	1,300	1,300	1,430	1,300	996	458	437	451
24	1,010	1,840	1,910	1,560		1,300	1,360		963	444	437	458
25	1,030	1,910	1,910	1,560	1,340	1,260	1,430		963	444	430	458
26	1,060	1,910	1,910	1,430	1,370	1,260	1,560		910	437	418	458
27	1,070	1,910	1,910	1,370	1,360	1,290	1,490		890	430	424	472
28	1,090	1,910	1,700	1,430	1,360	1,360	1,490		840	424	418	549
29	1,090	1,840	1,700	1,430	-------	1,430	1,490		812	406	406	472
30	1,110	1,840	1,700	1,430	-------	1,430	1,490	1,150	758	406	406	472
31	1,110	-------	1,630	1,430	-------	1,430	------		-------	418	400	-------

NOTE.—Water-stage recorder not operating satisfactorily Nov. 17–19, Dec. 21–23, Jan. 19, 20, Feb. 24, 25, Mar. 28, Apr. 8–18, May 4, 5, May 12 to June 4, Aug. 14, 17, and 18. Braced figures give mean discharge for periods indicated.

Monthly discharge of Deschutes River below Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,110	930	1,000	61,500
November	1,910	1,060	1,330	79,100
December	2,280	1,560	1,900	117,000
January	1,700	1,250	1,480	91,000
February	1,430	1,270	1,340	74,400
March	1,430	1,220	1,300	79,900
April	1,560	1,240	1,410	83,900
May	1,490	-------	1,340	82,400
June	1,700	758	1,120	66,600
July	722	406	540	33,200
August	785	370	453	27,900
September	821	382	512	30,500
The year	2,280	370	1,140	827,000

Daily discharge, in second-feet, of Deschutes River, including canals, near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,500	1,400	1,930	1,710	1,370	1,300	1,490	1,660	1,770	1,680	1,450	1,390
2	1,490	1,420	2,000	1,700	1,430	1,290	1,410	1,660	1,700	1,680	1,440	1,380
3	1,480	1,420	2,070	1,700	1,430	1,300	1,400	1,650	1,800	1,680	1,430	1,370
4	1,490	1,420	2,070	1,630	1,430	1,330	1,440	1,670	1,960	1,640	1,420	1,300
5	1,490	1,420	2,070	1,630	1,430	1,350	1,450	1,670	1,880	1,620	1,420	1,400
6	1,470	1,400	2,140	1,630	1,430	1,370	1,510	1,700	1,900	1,590	1,430	1,400
7	1,460	1,400	2,300	1,630	1,380	1,390	1,450	1,650	1,920	1,610	1,410	1,350
8	1,490	1,460	2,300	1,640	1,400	1,310	1,440	1,690	1,990	1,570	1,400	1,480
9	1,490	1,420	2,220	1,540	1,360	1,270	1,500	1,710	2,040	1,560	1,400	1,430
10	1,500	1,410	2,170	1,560	1,380	1,270	1,500	1,810	2,130	1,540	1,390	1,340
11	1,490	1,410	1,930	1,510	1,360	1,330	1,500	1,780	2,340	1,540	1,280	1,350
12	1,460	1,410	1,860	1,400	1,350	1,390	1,460	1,770	2,290	1,540	1,380	1,340
13	1,450	1,390	1,860	1,430	1,380	1,340	1,480	1,740	2,300	1,520	1,400	1,340
14	1,460	1,390	1,930	1,420	1,400	1,350	1,480	1,770	2,310	1,510	1,360	1,350
15	1,440	1,410	1,930	1,440	1,390	1,340	1,480	1,810	2,260	1,500	1,470	1,350
16	1,460	1,370	1,930	1,490	1,390	1,370	1,480	1,830	2,200	1,500	1,460	1,350
17	1,520	1,400	1,910	1,490	1,390	1,390	1,500	1,790	2,160	1,540	1,410	1,360
18	1,520	1,430	1,770	1,490	1,420	1,450	1,510	1,800	2,130	1,500	1,420	1,340
19	1,500	1,430	1,770	1,490	1,430	1,340	1,470	1,820	2,110	1,480	1,420	1,330
20	1,520	1,480	1,910	1,490	1,450	1,360	1,520	1,820	2,070	1,470	1,420	1,360
21	1,530	1,630	1,910	1,490	1,430	1,380	1,480	1,830	2,000	1,460	1,480	1,340
22	1,500	1,760	1,910	1,630	1,430	1,410	1,520	1,820	1,990	1,450	1,460	1,340
23	1,480	1,920	1,910	1,630	1,380	1,470	1,590	1,830	1,960	1,470	1,450	1,340
24	1,450	1,900	1,910	1,570	1,370	1,490	1,550	1,840	1,920	1,460	1,440	1,350
25	1,460	1,960	1,910	1,580	1,340	1,460	1,580	1,840	1,900	1,460	1,430	1,350
26	1,460	1,960	1,910	1,500	1,370	1,460	1,670	1,840	1,850	1,450	1,420	1,350
27	1,470	1,960	1,910	1,420	1,360	1,370	1,680	1,830	1,840	1,440	1,420	1,350
28	1,480	1,960	1,700	1,480	1,360	1,380	1,700	1,870	1,800	1,440	1,420	1,340
29	1,460	1,900	1,710	1,460	-------	1,450	1,700	1,870	1,780	1,420	1,410	1,350
30	1,480	1,870	1,720	1,430	-------	1,450	1,710	1,870	1,720	1,420	1,420	1,350
31	1,480	-------	1,650	1,430	-------	1,450	-------	1,900	-------	1,440	1,410	-------

Monthly discharge of Deschutes River, including canals, near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre feet
	Maximum	Minimum	Mean	
October	1,530	1,440	1,480	90,900
November	1,960	1,370	1,570	93,400
December	2,300	1,650	1,940	120,000
January	1,710	1,420	1,540	94,300
February	1,450	1,340	1,400	77,700
March	1,490	1,270	1,380	84,600
April	1,710	1,400	1,520	90,600
May	1,900	1,650	1,780	109,000
June	2,340	1,700	2,000	119,000
July	1,680	1,420	1,520	93,600
August	1,470	1,280	1,420	87,300
September	1,400	1,310	1,360	80,800
The year	2,340	1,270	1,580	1,140,000

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 Spring River.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—June 7, 1911, to September 30, 1922.

GAGE.—Vertical staff fastened to tree 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, 5.30 feet at noon December 2 (discharge, 10,600 second-feet); minimum stage recorded, 2.30 feet August 1–9, 20, September 1–4, and 20–30 (discharge, 3,760 second-feet).

1911-1922: Maximum stage recorded, 5.75 feet March 21, 1916 (discharge, 11,700 second-feet); minimum stage recorded, 1.95 feet August 27–30, 1920 (discharge, 3,170 second-feet).

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. 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 at Mecca, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 4	K. N. Phillips	2.64	4,420	July 26	Wendell Dowson	2.40	3,960
Feb. 18	G. H. Canfield	2.92	4,980	Sept. 7	do	2.50	4,080
May 6	K. N. Phillips	4.10	7,630				

Daily discharge, in second-feet, of Deschutes River at Mecca, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,330	4,730	9,820	5,570	5,150	4,730	6,210	7,570	5,570	4,330	3,760	3,760
2	4,330	4,730	10,600	5,570	5,150	4,940	6,430	7,340	5,570	4,330	3,760	3,760
3	4,330	4,730	8,520	5,570	5,150	5,150	6,880	7,340	5,990	4,330	3,760	3,760
4	4,330	4,730	7,800	5,570	5,150	5,150	7,340	7,340	5,990	4,330	3,760	3,760
5	4,330	4,730	7,340	5,570	5,150	5,150	7,800	7,340	5,990	4,330	3,760	4,330
6	4,330	4,730	6,880	5,570	5,150	4,940	7,110	7,570	5,570	4,330	3,760	4,330
7	4,330	4,730	6,880	5,150	5,150	4,940	7,340	7,340	5,990	4,330	3,760	4,140
8	4,330	4,730	6,880	5,150	5,150	4,940	7,570	7,110	5,990	4,330	3,760	4,140
9	4,330	4,730	6,650	5,150	5,150	4,940	7,340	6,880	5,990	4,330	3,760	4,040
10	4,330	4,730	6,430	5,150	5,150	4,940	7,110	6,880	5,990	4,330	3,850	3,950
11	4,330	4,730	6,430	5,150	5,150	4,940	6,880	6,430	6,430	4,330	3,850	3,850
12	4,330	4,730	6,430	5,150	5,150	5,150	6,430	6,210	5,990	4,330	3,850	3,850
13	4,330	4,730	6,210	4,940	5,150	5,150	6,210	6,430	5,780	4,140	4,040	3,850
14	4,330	4,730	5,990	4,940	5,150	5,150	5,990	6,430	5,570	4,330	4,330	3,850
15	4,330	4,730	6,210	5,150	4,940	5,150	5,990	6,880	5,570	4,140	4,330	3,850
16	4,330	4,730	6,210	5,150	4,940	5,150	5,990	6,880	5,570	4,140	3,850	3,850
17	4,530	4,730	5,990	5,360	5,150	5,150	5,990	6,880	5,570	4,140	3,850	3,850
18	4,730	4,730	5,990	4,940	4,940	5,150	5,780	6,880	5,360	4,140	3,850	3,850
19	4,730	4,730	5,780	4,330	4,940	5,150	5,780	6,880	5,360	4,140	3,850	3,760
20	4,730	5,780	5,360	4,530	4,940	5,150	5,990	6,880	5,360	4,140	3,760	3,760
21	4,530	9,820	5,360	4,730	4,940	5,150	6,880	6,650	5,360	4,040	3,850	3,760
22	4,530	9,300	5,570	5,150	4,940	5,570	7,800	6,430	5,150	3,950	3,850	3,760
23	4,530	7,340	5,570	5,150	4,940	6,430	9,040	6,210	4,940	3,950	3,850	3,760
24	4,530	7,110	5,570	5,150	5,150	6,430	9,300	5,990	4,730	3,950	3,850	3,760
25	4,530	6,880	5,570	5,150	5,150	6,650	9,040	5,990	4,730	3,950	3,850	3,760
26	4,530	6,650	5,570	5,150	4,940	6,650	9,300	5,990	4,730	3,950	3,850	3,760
27	4,730	6,650	5,780	5,150	5,150	6,430	9,040	5,780	4,730	3,950	3,850	3,760
28	4,730	6,430	5,780	5,150	4,730	6,430	8,520	5,570	4,530	3,950	3,850	3,760
29	4,730	6,650	5,780	5,150	-------	6,430	8,280	5,570	4,530	3,950	3,850	3,760
30	4,730	8,520	5,570	5,150	-------	6,430	7,800	5,570	4,530	3,950	3,850	3,760
31	4,730	-------	5,570	5,150	-------	6,210	-------	5,570	-------	3,850	3,850	-------

Monthly discharge of Deschutes River at Mecca, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	4,730	4,330	4,480	275,000
November	9,820	4,730	5,700	339,000
December	10,600	5,360	6,450	397,000
January	5,570	4,330	5,160	317,000
February	5,150	4,730	5,070	282,000
March	6,650	4,730	5,480	337,000
April	9,300	5,780	7,240	431,000
May	7,570	5,570	6,610	406,000
June	6,430	4,330	5,440	324,000
July	4,330	3,850	4,150	255,000
August	4,330	3,760	3,860	237,000
September	4,330	3,760	3,860	230,000
The year	10,600	3,760	5,290	3,830,000

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, 1922; October 19, 1897, to December 31, 1899, for 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 Dave Jones.

DISCHARGE MEASUREMENTS.—Made from a cable 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, 6.4 feet December 1 (discharge, 22,900 second-feet); minimum stage recorded, 2.2 feet August 6–8, September 5, and 18–20 (discharge, 4,200 second-feet).

1906–1922: Maximum stage recorded, 7.50 feet February 6, 1907 (discharge, 30,600 second-feet); minimum stage recorded, 1.9 feet August 23–28, 1920 (discharge, 3,510 second-feet).

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 now probably exceeds 20 per cent.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined below 12,000 second-feet. Gage read to tenths or half-tenths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Deschutes River at Moody, near Biggs, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-feet*
Apr. 18	K. N. Phillips	3.05	6,630
25	do	4.10	10,700
Sept. 21	G. H. Canfield	2.20	4,350

Daily discharge, in second-feet, of Deschutes River at Moody, near Biggs, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	5,000	5,280	22,900	6,180	5,570	5,280	9,030	9,440	7,520	5,280	4,320	4,320
2	4,860	5,280	20,200	6,180	5,570	5,280	9,030	9,440	7,170	5,280	4,320	4,320
3	4,860	5,280	14,900	6,180	5,870	5,280	9,440	9,440	7,520	5,280	4,320	4,320
4	4,860	5,280	12,300	6,180	5,870	5,570	10,300	9,440	7,880	5,280	4,320	4,320
5	4,860	5,280	10,300	6,500	5,870	5,870	9,860	10,300	7,880	5,280	4,320	4,200
6	4,860	5,280	9,440	6,500	5,870	5,870	9,860	10,300	7,520	5,000	4,200	4,450
7	4,860	5,000	9,030	6,180	5,870	5,870	9,440	10,300	7,520	5,000	4,200	4,450
8	4,860	5,000	8,630	5,870	6,500	5,870	9,440	9,440	7,170	5,000	4,200	4,580
9	4,860	5,000	8,630	5,870	6,830	6,180	9,440	8,630	7,520	4,860	4,320	4,720
10	4,860	5,000	7,880	6,180	6,500	6,180	9,440	8,630	7,880	4,860	4,320	4,580
11	4,860	5,000	8,250	6,180	6,180	5,870	9,440	8,630	7,880	4,860	4,450	4,320
12	4,860	5,000	8,630	5,870	5,870	5,870	9,030	7,880	7,880	4,860	4,450	4,320
13	4,860	5,000	9,440	5,570	5,570	6,500	9,030	7,880	7,880	4,720	4,720	4,320
14	4,860	5,000	8,630	5,570	5,570	7,170	8,630	8,630	7,170	4,720	4,720	4,320
15	4,860	5,000	8,630	5,570	5,570	7,170	8,250	8,630	7,170	4,720	4,720	4,320
16	4,860	5,000	8,250	5,570	5,870	7,520	7,520	9,440	6,830	4,720	4,580	4,320
17	5,000	5,000	7,880	5,570	7,170	7,170	7,170	10,300	6,500	4,720	4,580	4,320
18	5,000	5,000	7,880	5,570	6,830	7,170	6,830	10,300	6,500	4,580	4,450	4,200
19	5,000	5,000	7,880	5,570	6,500	7,880	6,830	10,300	6,500	4,580	4,320	4,200
20	5,000	5,000	7,520	5,280	6,180	8,630	7,880	9,440	6,500	4,580	4,450	4,200
21	5,000	6,500	7,520	5,280	6,180	9,860	7,880	9,440	6,180	4,450	4,450	4,200
22	5,000	13,800	7,520	5,570	5,870	9,860	8,630	9,030	6,180	4,450	4,320	4,200
23	5,000	11,300	7,170	5,570	5,570	10,300	9,860	8,630	5,870	4,450	4,320	4,200
24	5,000	10,300	7,170	5,570	5,570	10,300	9,860	8,250	5,870	4,450	4,320	4,200
25	5,000	8,630	6,500	5,570	5,570	9,440	11,300	7,880	5,870	4,450	4,320	4,200
26	5,280	9,860	6,500	6,180	5,570	7,880	11,300	7,880	5,870	4,450	4,320	4,200
27	5,280	10,300	6,500	6,180	5,570	7,880	11,300	7,520	5,870	4,450	4,320	4,200
28	5,280	8,630	6,500	5,870	5,280	7,520	10,800	7,520	5,570	4,450	4,320	4,200
29	5,280	8,630	6,180	5,870	-------	7,880	10,300	7,520	5,280	4,320	4,320	4,200
30	5,280	15,400	6,180	5,870	-------	9,440	10,300	7,170	5,280	4,320	4,320	4,200
31	5,280	-------	6,180	5,570	-------	8,630	-------	7,170	-------	4,320	4,320	-------

Monthly discharge of Deschutes River at Moody, near Biggs, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	5,280	4,860	4,990	307,000
November	15,400	5,000	6,830	406,000
December	22,900	6,180	9,070	558,000
January	6,500	5,280	5,850	360,000
February	7,170	5,280	5,960	331,000
March	10,300	5,280	7,330	451,000
April	11,300	6,830	9,300	553,000
May	10,300	7,170	8,860	545,000
June	7,880	5,280	6,810	405,000
July	5,280	4,320	4,730	291,000
August	4,720	4,200	4,380	269,000
September	4,720	4,200	4,300	256,000
The year	22,900	4,200	6,540	4,730,000

SNOW CREEK ABOVE CRANE PRAIRIE, NEAR LAPINE, OREG.

LOCATION.—In SE. ¼ sec. 21, T. 20 S., R. 8 E., half a mile above mouth and backwater of proposed Crane Prairie Reservoir and 30 miles northwest of Lapine, Deschutes County.

DRAINAGE AREA.—Indeterminate; stream spring fed.

RECORDS AVAILABLE.—May 25 to September 30, 1922.

GAGE.—Vertical staff; read by George Graft.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

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

EXTREMES OF DISCHARGE.—Stage ranged from 0.80 foot (discharge, 29 second-feet) to 0.78 foot (discharge, 26 second-feet) during practically every month of record.

ICE.—Ice never forms.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent. Rating curve well defined. Gage read to hundredths six times a week. Daily discharge obtained by applying daily gage height to rating table and interpolating for days of no gage-height record. Records good.

Discharge measurements of Snow Creek above Crane Prairie, near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
May 27	0.80	29.3
June 12	.80	28.8
Aug. 31	.79	27.4

Daily discharge, in second-feet, of Snow Creek above Crane Prairie, near Lapine, Oreg., for the year ending September 30, 1922

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

NOTE.—Gage not read May 30 to June 13; discharge estimated. Braced figures give mean discharge for periods indicated.

Monthly discharge of Snow Creek above Crane Prairie, near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 25–31	29	29	29.0	402
June			29.4	1,750
July	29	26	27.7	1,700
August	29	26	26.9	1,650
September	29	27	27.9	1,660
The period				7,160

CULTUS RIVER BELOW CULTUS CREEK, NEAR LAPINE, OREG.

LOCATION.—In NW. ¼ sec. 32, T. 20 S., R. 8 E., Deschutes County, just below mouth of Cultus Creek and within flow line of proposed Crane Prairie Reservoir.

DRAINAGE AREA.—Indeterminate, mostly spring fed.

RECORDS AVAILABLE.—June 13 to October 31, 1922, when station was discontinued.

GAGE.—Vertical staff nailed to tree on left bank; read by George Graft.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel, sand, and mud, with many logs and some aquatic growth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 13 to October 31, 1922, 1.70 feet June 13 (discharge, 164 second-feet); minimum stage recorded, 0.64 foot October 11–19 (discharge, 69 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—Some diurnal fluctuation may be caused by drift at outlet of Big Cultus Lake and wind on its surface.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined. Staff gage read to hundredths once a day about six days a week. Daily discharge ascertained by applying daily gage height to rating table and by interpolating for days when gage was not read. Records fair.

Discharge measurements of Cultus River below Cultus Creek, near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
June 13	1.70	164	July 17	1.06	95
July 3	1.24	117	Aug. 25	.84	84

Daily discharge, in second-feet, of Cultus River below Cultus Creek, near Lapine, Oreg., for the period June 13 to October 31, 1922

Day	June	July	Aug.	Sept.	Oct.	Day	June	July	Aug.	Sept.	Oct.
1	-------	119	90	80	72	16	153	99	85	74	69
2	-------	118	90	79	72	17	153	98	85	74	69
3	-------	117	89	78	72	18	150	98	84	74	69
4	-------	115	88	78	72	19	148	97	83	74	69
5	-------	111	87	78	70	20	142	92	82	74	70
6	-------	111	87	78	71	21	142	92	82	74	70
7	-------	110	87	77	71	22	137	92	83	74	70
8	-------	109	87	77	71	23	137	92	83	73	71
9	-------	108	87	77	71	24	134	92	82	72	71
10	-------	106	86	77	70	25	131	92	82		71
11	-------	104	85	77	69	26	128	91	82		71
12	-------	100	85	76	69	27	126	92	82	72	
13	164	102	86	75	69	28	125	91	81	72	
14	158	101	86	75	69	29	121	90	81	72	70
15	153	100	86	75	69	30	120	90	80	72	
						31	-------	91	80	-------	

Monthly discharge of Cultus River below Cultus Creek, near Lapine, Oreg., for the period June 13 to October 31, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
June 13–30	164	120	140	4,990
July	119	90	101	6,210
August	90	80	84.6	5,200
September	80	72	75.1	4,470
October	72	69	70.2	4,320
The period				25,200

BROWN CREEK NEAR LAPINE, OREG.

LOCATION.—In SE. ¼ sec. 29, T. 21 S., R. 8 E., at road crossing a quarter of a mile above mouth, 3½ miles south of Crane Prairie dam site, and 20 miles west of Lapine, Deschutes County.

DRAINAGE AREA.—Indeterminate; spring fed.

RECORDS AVAILABLE.—May 24 to September 30, 1922.

GAGE.—Vertical staff on left bank; read by George Graft.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Control is gravel bar; somewhat unstable. Aquatic plants grow along shore.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Staff gage read about three or four times a week. Daily discharge ascertained by applying to rating table mean daily gage height and by interpolating for days when gage was not read. Records good.

Discharge measurements of Brown Creek near Lapine, Oreg., during the year ending September 30, 1922

[Made by Wendell Dawson]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
May 24	0.46	39.8
July 17	.47	41.4
Aug. 24	.55	43.3

Daily discharge, in second-feet, of Brown Creek near Lapine, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1			40	42	43	16		40	41	42	43
2			40	41	43	17		40	41	42	43
3			40	42	43	18		40	41	42	43
4			40	42	43	19		40	41	42	43
5			40	42	43	20		40	41	42	43
6			40	42	43	21		40	41	42	43
7		40	40	42	43	22		40	41	43	43
8			40	42	43	23		40	41	42	43
9			40	42	43	24	40	40	41	43	43
10			40	42	43	25		40	41	43	43
11			40	42	43	26		40	41	43	43
12			40	42	43	27	40	40	41	42	43
13			40	42	43	28		40	41	43	43
14		40	40	42	43	29		40	41	42	43
15		40	41	42	43	30		40	42	43	43
						31			42	43	

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Brown Creek near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 24-31			40.0	634
June	40	40	40.0	2,380
July	42	40	40.6	2,500
August	43	41	42.2	2,590
September	43	43	43.0	2,560
The period				10,700

EAST FORK ABOVE WALKER BASIN INTAKE, NEAR LAPINE, OREG.[2]

LOCATION.—In sec. 33, T. 23 S., R. 9 E., above intake of canal of Walker Basin project and below Crescent Creek, half a mile from river road to Crescent, and 12 miles southwest of Lapine, Deschutes County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 26, 1914, to September 14, 1917, and May 7, 1919, to September 30, 1922 (summer periods). Records for 1919 and 1920 were collected below Walker Basin intake but monthly discharge was corrected for the diversion.

GAGE.—Stevens continuous water-stage recorder on right bank above intake installed May 22, 1922, replacing staff gage at same location. Recorder inspected by Fred L. Mahn.

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

CHANNEL AND CONTROL.—Bed composed of gravel and sand; may shift in floods. Banks are steep, composed of silt, and overgrown with brush.

EXTREMES OF DISCHARGE.—Maximum stage during period May 1 to September 30, 1922, from water-stage recorder, 6.40 feet, from 1 to 8 a.m. June 10 (discharge, 828 second-feet); minimum stage recorded, 2.70 feet at 9 p. m. September 25 (discharge, 57 second-feet).

1914-1917; 1919-1922: Maximum stage, 6.73 feet June 12, 1917 (discharge, 835 second-feet); minimum discharge, 40 second-feet September 3–11, 1915.

[2] Previously published as "at Morson intake."

Flood of November 24, 1909, may have reached 1,800 second-feet (estimated from records at Allen's ranch).

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

DIVERSIONS.—A few small ditches divert water above station. Water was diverted in Walker Basin Canal past the gage at bridge during a portion of 1919 and 1920.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter; apparently permanent during period of records. Rating curve well defined. Operation of recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good, except May 1–21, for which they are fair.

Discharge measurements of East Fork above Walker Basin intake, near Lapine, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 1	K. N. Phillips		99	June 4	K. N. Phillips	5.73	658
Nov. 1	do	3.28	153	July 2	Wendell Dawson	4.50	370
May 4	Wendell Dawson	4.87	454	13	do	3.92	243
8	do	5.34	579	Aug. 8	do	3.38	142
22	K. N. Phillips	6.04	718	28	do	2.85	73
28	Wendell Dawson	5.50	585				

Daily discharge, in second-feet, of East Fork above Walker Basin intake, near Lapine, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.
1		566	376	161	71
2	400	603	364	161	71
3		628	352	155	70
4	445	678	341	153	69
5		678	319	150	69
6	500	703	308	149	69
7		728	308	146	70
8	566	778	297	143	70
9		803	286	143	70
10		828	276	140	69
11		778	266	129	67
12		753	251	132	66
13		728	245	132	67
14		703	235	132	66
15	650	628	225	124	64
16		616	215	122	62
17		603	215	120	62
18		578	211	117	61
19		566	206	116	60
20		553	204	116	59
21		541	199	123	59
22	728	529	192	124	59
23	703	517	188	122	59
24	678	493	185	120	59
25	653	469	182	118	58
26	628	445	180	101	58
27	628	433	177	78	60
28	603	422	173	74	63
29	590	410	170	71	65
30	553	398	165	71	67
31	553		163	71	

NOTE.—Discharge May 1–21, estimated from discharge measurements. Braced figures give mean discharge for periods indicated.

Monthly discharge of East Fork above Walker Basin intake, near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May			596	36,600
June	828	398	605	36,000
July	376	163	241	14,800
August	161	71	123	7,560
September	71	58	64.6	3,840
The period				98,800

CRESCENT CREEK BELOW COLD CREEK, NEAR CRESCENT, OREG.

LOCATION.—In SW. ¼ sec. 7, T. 24 S., R. 7 E., 1 mile below mouth of Cold Creek, 2 miles by road below outlet of Crescent Lake, and 15 miles west of Crescent, Klamath County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 30, 1912, to December 11, 1913; June 17 to September 30, 1922.

GAGE.—Stevens continuous water-stage recorder on left bank; staff gage at road bridge, half a mile upstream read during 1912 and 1913.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; wide and flat; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during period June 17 to September 30, 1922, 1.50 feet at noon June 17 (discharge, 228 second-feet); minimum stage recorded, −0.10 foot August 27 to September 30 (discharge, 17 second-feet).

1912–13; 1922: Maximum and minimum discharges same as those for 1922.

DIVERSIONS.—None.

REGULATION.—Gates closed in Crescent Lake Reservoir dam, August 26, accumulation of storage for August 26–31 was 350 acre-feet; for September, 2,030 acre-feet.

ACCURACY.—Stage-discharge relation permanent. 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. Records good.

Discharge measurements of Crescent Creek below Cold Creek, near Crescent, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 16	K. N. Phillips	1.50	228	Aug. 9	Wendell Dawson	0.62	77
July 12	Wendell Dawson	1.07	148	28	do	−.10	17.4

Daily discharge, in second-feet, of Crescent Creek below Cold Creek, near Crescent, Oreg., for the year ending September 30, 1922

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1		184	94	17	16		136	47	17
2		182	90	17	17	224	133	45	17
3		180	88	17	18	222	131	43	17
4		176	86	17	19	222	128	39	17
5		175	83	17	20	218	125	39	17
6		173	82	17	21	216	122	40	17
7		167	78	17	22	212	117	42	17
8		164	77	17	23	208	115	44	17
9		160	77	17	24	202	112	45	17
10		157	69	17	25	202	109	46	17
11		150	64	17	26	200	106	22	17
12		148	64	17	27	198	104	17	17
13		146	61	17	28	197	101	17	17
14		141	58	17	29	193	100	17	17
15		139	51	17	30	187	98	17	17
					31		96	17	

Monthly discharge of Crescent Creek below Cold Creek, near Crescent, Oreg., for the year ending September, 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimun	Mean	
June 17-30	224	187	207	5,750
July	184	96	138	8,480
August	94	17	53.5	3,290
September	17	17	17.0	1,010
The period				18,500

WALKER BASIN CANAL NEAR LAPINE, OREG.

LOCATION.—In SE. ¼ sec. 34, T. 23 S., R. 9 E., one-fourth mile below intake, 8 miles northeast of Crescent, and 13 miles southwest of Lapine, Deschutes County.

RECORDS AVAILABLE.—May 22 to September 20, 1922.

GAGE.—Vertical staff on left side of canal head gate; read by Fred L. Mahn.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control is gravel bar just below gage; shifting. Below the bar canal is very sluggish and filled with aquatic growth.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during period, 46 second-feet June 26; canal dry at times.

ACCURACY.—Stage-discharge relation unstable during most of season. Rating curve fairly well defined; indirect shifting-control method used June 15 to August 5. Gage read to hundredths three times a week. Daily discharge ascertained by applying daily gage height to rating table. Records fair.

Walker Basin (Morson) Canal diverts water from East Fork of Deschutes River in SW. ¼ sec. 34, T. 23 S., R. 9 E., for irrigating the Carey Act tract lying just east of the river near Lapine. Little land was actually irrigated and tilled in 1922, and much of the water was returned to the stream as waste or seepage.

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Discharge measurements of Walker Basin Canal near Lapine, Oreg., during the year ending September, 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 1	K. N. Phillips	0.29	1.0	July 2	Wendell Dawson	0.56	35.9
May 22	do	.60	29.4	Aug. 8	do	.58	27.1

Daily discharge, in second-feet, of Walker Basin Canal near Lapine, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1		22		30		16					
2			36		28	17		28	37		45
3		24		30		18			37		
4			38			19		26		29	44
5		25		29	28	20			36		27
6			37		28	21		32	37	30	
7		26		27		22	29				
8			36	28	28	23		37	34	28	
9		28		28		24					
10			36		28	25		45	36	29	
11		25		27		26		46			
12			38		28	27			33	27	
13		24				28	0	44			
14			38	27	36	29			32	28	
15		28	38			30	23	37			
						31			32	28	

Monthly discharge of Walker Basin Canal near Lapine, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
June	46	22	31.1	1,850
July	38	32	35.9	2,210
August	30	27	28.3	1,740
September 1–20	45	27	32.0	1,270
The period				7,070

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, 1922; information sufficient for a rough estimate, October, 1912, to March, 1914.

GAGE.—Vertical staff on right side of flume 400 feet below a spillway, installed May 12, 1917; read by G. W. Schafer.

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 stage recorded during year, 2.38 feet August 13, 22, 23, 28, 30, September 2, 5, and 6 (discharge, 128 second-feet); canal dry at various times during year.

1914–1922: Maximum stage recorded, 2.5 feet June 1–3, 1920 (discharge, 134 second-feet); canal dry at various times each year.

ICE.—Canal dry during winter.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying to rating table daily gage height except September 21 when mean of observer's and hydrographer's gage readings was applied. Records good.

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

Discharge measurements of Arnold Canal near Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	G. H. Canfield	1.52	62	July 20	Wendell Dawson	2.31	121
June 6	K. N. Phillips	2.20	106	Sept. 1	do	2.40	122
July 6	Wendell Dawson	2.30	120	21	do	2.02	90

Daily discharge, in second-feet, of Arnold Canal near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	May	June	July	Aug.	Sept.
1			94	112	122	122
2			94	112	122	128
3			97	117	122	122
4			102	117	122	122
5	60		106	117	122	128
6			112	117	122	128
7			106	117	122	90
8			106	117	122	83
9	62		97	117	117	83
10		45	97	117	122	90
11		50	97	117	122	90
12		52	97	117	122	97
13		55	97	117	128	94
14		55	97	117	122	97
15		60	112	117	122	106
16		60	106	117	117	112
17		60	106	112	117	106
18		65	106	117	122	112
19		86	106	117	122	106
20	50	86	112	117	117	112
21		94	112	117	117	102
22		90	112	117	128	106
23		97	117	117	128	106
24		102	117	117	122	106
25		102	94	117	122	106
26		106	94	117	122	97
27		112	106	117	117	90
28		106	112	117	128	------
29		------	112	117	122	90
30		77	106	117	128	83
31		77	------	122	122	------

NOTE.—Canal dry during periods for which no discharge is given. Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Arnold Canal near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October			53.0	3,260
May	112	0	52.8	3,250
June	117	94	104	6,190
July	122	112	117	7,190
August	128	117	122	7,500
September	128	0	100	5,950
The year	128	0	46.1	33,300

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

CENTRAL OREGON CANAL NEAR BEND, OREG.

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

RECORDS AVAILABLE.—May 11, 1905, to September 30, 1922.

GAGE.—Vertical staff on left wing wall at entrance to flume section used after July 1, 1922, except August 11–16, September 4 and 8. Vertical staff, 200 yards downstream, used during remainder of year. Gage read by Frank Slattery.

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

CHANNEL AND CONTROL.—A plank flume of rectangular cross section with battened seams. Flume rather unstable but the rating appears to have changed little.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.25 feet at new gage August 3–5, 8–10, 19, and 26 (discharge, 390 second-feet); canal dry at various times during year.

1905–1922: Maximum discharge recorded, 459 second-feet at time of measurement 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 changing during October and November and permanent for remainder of year. Rating for old gage used December 10 to June 30, August 11–16, September 4 and 8, well defined and rating curve for new gage used July 1 to August 10, August 17 to September 3, and September 9–30, well defined between 320 and 390 second-feet. Gage read to half-tenths twice daily and time of turning in or out of water generally noted. Daily discharge ascertained by applying mean daily gage height to rating tables; indirect method for shifting control used October and November. Records good.

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

Central Oregon Canal diverts water from right bank of Deschutes River in NE. ¼ sec. 13, T. 18 S., R. 11 E., and irrigates land lying to the east of Bend and near Powell Buttes.

Discharge measurements of Central Oregon Canal near Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height		Discharge	Date	Made by—	Gage height		Discharge
		Old gage	New gage				Old gage	New gage	
		Feet	*Feet*	*Sec.-ft.*			*Feet*	*Feet*	*Sec.-ft.*
Oct. 8	G. H. Canfield	2.93	------	243	June 14	Phillips and Dawson	3.60	4.03	368
8	K. N. Phillips	2.92	------	243	July 20	Wendell Dawson	3.78	4.22	385
Nov. 2	do	2.55	------	207	Sept. 1	do	3.75	4.18	381
June 6	do	3.38	------	335	14	do	3.40	3.70	321

Daily discharge, in second-feet, of Central Oregon Canal near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	182	195	------	------	------	------	------	169	142	359	383	383
2	182	202	------	------	------	------	------	188	58	371	383	383
3	214	195	------	------	------	------	------	195	208	371	383	383
4	242	195	------	------	------	------	------	202	301	371	383	193
5	242	195	------	------	------	------	------	208	333	371	383	------
6	242	195	------	------	------	------	------	208	333	371	383	------
7	242	195	------	79	------	------	------	208	333	371	383	------
8	242	195	------	147	24	------	88	208	361	371	383	156
9	242	195	------	182	24	------	144	208	361	371	383	335
10	242	195	58	182	------	------	144	208	297	371	383	335
11	242	195	144	182	------	------	144	208	166	371	265	335
12	249	195	144	72	------	------	102	104	361	371	24	335
13	249	195	144	------	30	------	------	------	361	371	------	335
14	249	195	72	------	47	------	------	------	361	371	89	335
15	249	195	------	------	55	------	------	------	361	383	289	335
16	249	195	------	------	60	------	------	------	361	383	254	335
17	249	195	------	------	60	------	23	------	361	383	383	335
18	249	195	------	------	79	63	34	------	361	383	383	335
19	221	195	------	------	89	94	11	------	375	383	383	335
20	214	195	------	------	89	108	------	------	375	383	383	335
21	202	81	------	------	89	121	------	------	375	383	383	335
22	195	------	------	------	89	126	------	------	375	383	383	335
23	195	------	------	------	37	144	------	------	375	383	383	335
24	195	------	------	------	------	162	------	------	375	383	383	335
25	195	------	------	------	------	169	------	------	375	383	383	335
26	195	------	------	45	------	169	62	------	375	383	383	335
27	195	------	------	45	------	56	137	------	375	383	383	335
28	195	------	------	45	------	------	156	52	375	383	383	335
29	195	------	------	28	------	------	156	138	375	383	383	335
30	195	------	------	------	------	------	162	208	375	383	383	335
31	195	------	------	------	------	------	------	235	------	383	383	------

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

Monthly discharge of Central Oregon Canal near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	246	182	221	13,600
November	202	0	133	7,910
December	144	0	18.1	1,110
January	182	0	32.5	2,000
February	89	0	27.6	1,530
March	169	0	39.1	2,400
April	162	0	45.4	2,700
May	235	0	95.1	5,850
June	375	58	331	19,700
July	383	359	377	23,200
August	383	0	338	20,800
September	383	0	296	17,600
The year	383	0	163	118,000

PILOT BUTTE CANAL NEAR BEND, OREG.

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

RECORDS AVAILABLE.—March 6, 1905, to September 30, 1922.

GAGE.—Vertical staff on right bank; read by Frank Slattery.

DISCHARGE MEASUREMENTS.—Made by wading at gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.0 feet at 5 p. m. April 1 (discharge, 34 second-feet); canal dry at various times.

1905–1922: 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 unstable, due largely to drift lodged on control. Standard rating curve poorly defined. Gage read to half-tenths twice a day. Daily discharge ascertained by shifting-control method. Records fair.

Pilot Butte Canal diverts water from right bank of Deschutes River in NE. ¼ sec. 13, T. 18 S., R. 11 E., in a flume common to it and the Central Oregon Canal for irrigating lands most of which lie north of Bend and extend nearly to Crooked River. North Canal also diverts water into Pilot Butte Canal.

Discharge measurements of Pilot Butte Canal near Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 8	K. N. Phillips	1.40	12.7	July 20	Wendell Dawson	[b] 1.52	19.8
Nov. 1	do	1.36	8.7	Sept. 14	do	1.43	13.4
June 6	do	[a] 1.41	13.1				

[a] Gage read 1.52 feet before drift was cleaned off control.
[b] Gage read 1.54 feet before drift was cleaned off control.

Daily discharge, in second-feet, of Pilot Butte Canal near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	13	8.3					29	24		18	18	14
2	13	8.3						24	7.0	18	18	14
3	13	8.3						24	7.0	18	18	14
4	13	8.3						10	7.0	18	18	8
5	13	8.3							14	18	18	
6	13	8.3							13	18	18	
7	13	8.3		1.8					13	18	18	
8	13	8.3		6.1			2.9		16	18	18	14
9	13	8.3		8.3			4.8		16	18	18	14
10	13	8.3	2.9	8.3			4.8		11	18	18	14
11	13	8.3	7.0	8.3			4.8		6.5	18	12	14
12	13	8.3	7.0	4.5			4.8		13	18	.4	14
13	13	8.3	7.0					12	13	18		14
14	11	8.3	3.5		7.0			13	13	18	1.6	14
15	11	8.3			7.0			13	15	8	16	14
16	11	8.3			7.0			13	16		10	14
17	11	8.3			7.0			9.2	16	2	15	14
18	11	8.3			7.0				16	13	15	14
19	9.6	8.3			7.0				16	14	15	14
20	9.6	8.3			7.0				16	19	15	14
21	9.6	3.5			7.0	2.3			16	19	14	14
22	9.6				7.0	7.0			16	19	14	14
23	9.6				7.0	7.0			16	19	14	14
24	9.6					7.0			16	19	14	14
25	9.6					7.0			16	19	14	14
26	8.3					7.0	11		16	19	14	14
27	8.3					2.3	24		16	19	14	14
28	8.3						24	3.9	16	19	14	14
29	8.3						24	7.0	16	19	14	14
30	8.3						24	7.0	16	19	14	14
31	8.3							7.0		19	14	

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

Monthly discharge of Pilot Butte Canal near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	13	8.3	11.0	676
November	8.3	0	5.65	336
December	7.0	0	.88	54
January	8.3	0	1.20	74
February	7.0	0	2.50	139
March	7.0	0	1.28	79
April	29	0	5.27	314
May	24	0	5.39	331
June	16	0	13.5	803
July	19	0	16.7	1,030
August	18	0	14.0	861
September	14	0	12.4	738
The year	29	0	7.50	5,440

NORTH CANAL NEAR BEND, OREG.

LOCATION.—In NE. ¼ sec. 29, T. 17 S., R. 12 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, 1922.

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-line section extends 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, 6.5 feet July 23 to September 1 (discharge, 401 second-feet); canal dry at various times.

1913-1922: Maximum discharge recorded that of July 23 to September 1, 1922; canal dry at various times.

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

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 100 second-feet. Gage read to tenths twice daily and time of changing head gates noted. Daily discharge determined by applying to rating table mean daily gage height, or, for days of considerable fluctuation by averaging the discharge for intervals of a day. Records excellent for discharge over 100 second-feet; fair below.

North Canal diverts water from right bank of Deschutes River at a concrete dam 60 feet high, in NE. ¼ sec. 29, T. 17 S., R. 12 E., and extends eastward for about a mile, where it discharges water into Pilot Butte Canal.

Discharge measurements of North Canal near Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 10	Wendell Dawson	2.84	113	July 20	Wendell Dawson	6.40	392
June 6	K. N. Phillips	6.10	372	Sept. 1	do	6.40	386
July 8	Wendell Dawson	6.10	354				

Daily discharge, in second-feet, of North Canal near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	228	122					136		374	374	401	401
2	228	122					136		374	374	401	392
3	212	122					136		374	374	401	383
4	196	122					102		374	374	401	383
5	196	122							374	374	401	383
6	180	109		136		24			374	374	401	383
7	172	109		62		47		125	374	374	401	365
8	172	103			26	47		126	374	374	401	356
9	172	97			39	47		47	334	374	401	348
10	180	97	47	15	47	49		104	316	374	401	348
11	188	97	136	70	55	65		164	316	383	401	348
12	196	97	136	70	55	70		184	331	383	401	348
13	196	97	136	70	55	80		231	340	383	401	348
14	196	97	68	75	55	72		260	356	383	401	348
15	196	97		65	55	70		292	365	383	401	348
16	196	97			55	80		308	374	392	401	356
17	196	103			55	80		356	374	392	401	356
18	196	109			55	27		365	374	392	401	356
19	196	109			45			365	374	392	401	356
20	196	109			35			365	374	392	401	356
21	196	37			35		23	365	374	392	401	365
22	180	41			35		143	365	374	392	401	374
23	172	65			35		130	365	374	401	401	374
24	172	39			26		164	365	374	401	401	374
25	172	39					116	365	374	401	401	374
26	150	39						374	374	401	401	374
27	150	39						374	374	401	401	374
28	136	39						374	374	401	401	374
29	122	39						374	374	401	401	374
30	122	15						374	374	401	401	374
31	122							374		401	401	

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

Monthly discharge of North Canal near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	228	122	180	11,100
November	122	15	84.3	5,020
December	136	0	16.9	1,040
January	136	0	18.2	1,120
February	55	0	27.2	1,510
March	80	0	24.5	1,510
April	164	0	36.2	2,150
May	374	0	237	14,600
June	374	316	365	21,700
July	401	374	387	23,800
August	401	401	401	24,700
September	401	348	366	21,800
The year	401	0	180	130,000

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, 1922.

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, 2.30 feet July 24 and August 2–6 (discharge, 99 second-feet); canal dry at various times.

1913–1922: Maximum discharge recorded, 105 second-feet July 31 and August 3, 1919 (gage height, 2.40 feet). Canal dry at various times.

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

ACCURACY.—Stage-discharge relation changed, probably during period January 21–23. Both rating curves fairly well defined. Gage read to tenths twice a day and time of opening or closing gates noted. Daily discharge ascertained by applying mean daily gage height to rating table. Record good.

Swalley Canal diverts water from right bank of Deschutes River at North Canal dam, in 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-feet*			*Feet*	*Sec.-feet*
Oct. 9	K. N. Phillips	0.38	1.6	July 20	Wendell Dawson	2.22	93
May 9	Wendell Dawson	1.14	26.0	Sept. 1	do	2.10	81
June 6	K. N. Phillips	1.96	76	21	do	1.80	59
July 8	Wendell Dawson	2.03	81				

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Daily discharge, in second-feet, of Swalley Canal near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	42		16	11			21	33	62	91	95	83
2	42		16				21	16	62	95	99	83
3	42	7.4	16				21		69	95	99	83
4	42	32	16				21		76	95	99	83
5	42	32	16				21		76	95	99	76
6	42	32	16				21		72	80	99	76
7	42	32	16		13	2.8	21	33	69	13	91	76
8	42	32	16		7.0	2.8	21	33	69	76	95	76
9	1.6	32	16		7.0	2.8	21	26	55	76	95	76
10		32	16		7.0	2.8	21	25	55	76	95	76
11		32	16		7.0	2.8	21	25	55	76	95	76
12		32	16		7.0	2.8	23	28	55	83	76	76
13		32	16		7.0	2.8	25	39	55	83	91	76
14			16		7.0	7.0	25	46	55	83	91	76
15	3.5		16		4.2	13	25	49	58	87	83	76
16	3.5		16		1.6	13	25	52	69	87	87	76
17					1.6	13	25	66	76	91	87	76
18					1.6	13	25	69	83	95	95	38
19					1.6	13	27	69	83	91	95	41
20		16			1.6	17	29	69	80	91	95	62
21		16			1.6	21	29	69	76	95	91	62
22	6.4	16			1.6	21	29	69	80	19	87	62
23	34	16				21	29	69	83	91	83	62
24	10	16		10		21	29	69	80	99	80	62
25		16		21		23	31	69	80	95	83	66
26		16		21		25	33	69	83	95	83	69
27		16		9		25	33	40	83	95	80	69
28		16				25	33	36	83	95	80	69
29		16	6			23	33	55	87	99	87	69
30		16	16			21	33	55	91	95	91	69
31			16			21		58		95	87	

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

Monthly discharge of Swalley Canal near Bend Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	42	0	12.7	781
November	32	0	16.8	1,000
December	16	0	9.48	583
January	21	0	2.32	143
February	13	0	2.75	153
March	25	0	11.5	707
April	33	21	25.7	1,530
May	69	0	43.1	2,650
June	91	55	72.0	4,280
July	99	13	84.9	5,220
August	99	76	90.1	5,540
September	83	38	70.7	4,210
The year	99	0	37.0	26,800

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, 1922, 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, inspected by W. Andrew and F. N. Wallace. Records prior 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; fairly permanent. One channel at all stages; fairly straight above and below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 3.10 feet at 2 p. m. November 30 (discharge, 615 second-feet); minimum stage from recorder, 1.20 feet at 10 p. m. October 13 (discharge, 42 second-feet).

1906–1922: 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 October 31, 1920 (discharge, 19 second-feet).

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

DIVERSIONS.—Columbia Southern Canal diverted water above station practically continuously throughout the year. Water was diverted into head of Tumalo Creek from Crater Creek, tributary of Deschutes River. No record of this diversion in 1922.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent during year. Rating curve well defined below 200 second-feet; extended above. Operation of water-stage recorder satisfactory October 1 to December 4, February 4–27, and April 23 to September 30; clock run down during remainder of year. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Tumalo Creek near Bend, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	G. H. Canfield	1.31	54	July 25	Wendell Dawson	1.66	[a]112
Feb. 4	do	1.48	80	Aug. 22	do	1.54	[a]84
May 20	K. N. Phillips	1.86	161	Sept. 16	do	1.50	77
July 4	Wendell Dawson	1.69	[a]110				

[a] Measurement made in Tumalo feed canal 1 mile below gage in creek.

Daily discharge, in second-feet, of Tumalo Creek near Bend, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Feb.	Apr.	May	June	July	Aug.	Sept.
1	58	75	282			93	215	125	115	70
2	57	72	197			94	230	127	94	69
3	57	70	157			94	282	144	91	70
4	56	70	130	74		93	300	170	77	72
5	54	75		75		109	370	154	82	67
6	54	72		77		89	335	125	82	64
7	52	70		77		94	318	127	78	63
8	23	69		78		93	300	118	82	70
9	51	70		78		91	282	115	87	80
10	49	77		82		84	215	141	87	82
11	47	77		82		82	176	139	98	84
12	46	77		105		82	188	111	122	85
13	44	77		87		94	215	115	100	82
14	52	77		107		113	248	122	93	82
15	67	75		84		122	230	111	91	78
16	63	77		84		144	215	94	93	85
17	87	78		84		173	230	96	94	82
18	98	98		84		154	248	122	98	80
19	70	77		84		188	248	122	96	80
20	67	137		84		157	265	127	91	82
21	67	335		83		147	265	118	107	79
22	62	215		98		125	200	113	91	77
23	58	137		86		130	173	122	72	67
24	60	80		111	77	147	188	115	75	62
25	54	72		130	79	139	200	113	80	62
26	66	63		125	80	100	230	115	80	60
27	66	59		87	82	96	215	111	84	59
28	63	57			82	118	194	107	79	57
29	62	70			82	152	170	111	75	53
30	84	450			82	194	132	115	77	50
31	82				82	200		120	79	

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

Monthly discharge of Tumalo Creek near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	98	44	61.5	3,780
November	450	57	104	6,190
May	200	82	122	7,500
June	370	132	236	14,000
July	170	94	121	7,440
August	122	72	88.7	5,450
September	85	50	71.8	4,270

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 November 2, 1921.

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 30 feet wide and 4 feet deep. Control not well defined but fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during period October 1 to November 2, 1921, from water-stage recorder, 1.38 feet October 2 (discharge, 38 second-feet); minimum stage recorded, 0.72 foot October 29 and 30 (discharge, 4.5 second-feet).

1906-1914; 1916-1921: Maximum discharge recorded, 165 second-feet July 2, 1921; canal dry at times.

DIVERSIONS.—None above gage.

REGULATION.—Flow controlled by head gates.

ACCURACY.—Stage-discharge relation apparently permanent during period. 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. Records good.

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

Discharge measurements of Columbia Southern Canal near Tumalo, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
May 20	K. N. Phillips	[a] 1.53	57.1
July 4	Wendell Dawson	[b] 2.36	112
Sept. 2	do	[b] 1.05	14.4

[a] On gage at recorder.
[b] On gage at intake.

Daily discharge, in second-feet, of Columbia Southern Canal near Tumalo, Oreg., for the period October 1 to November 2, 1921

Day	Oct.	Nov.	Day	Oct.	Nov.	Day	Oct.	Nov.
1	32	7.2	11	35		21	8.6	
2	31	6.5	12	37		22	7.9	
3	37		13	14		23	7.9	
4	35		14	12		24	7.9	
5	34		15	10		25	7.9	
6	34		16	10		26	6.5	
7	34		17	10		27	5.5	
8	34		18	10		28	5.5	
9	34		19	9.3		29	4.5	
10	34		20	9.3		30	5.0	
						31	6.5	

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; October 1, 1920, to September 30, 1921; and May 19 to September 30, 1922.

GAGE.—Painted on sloping concrete lining; gage reader, W. Andrew.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.3 feet June 12–28, July 4 and 5 (discharge, 148 second-feet); canal dry at various times.

1914–1922: Maximum stage recorded, 3.80 feet May 4–6, 1916 (discharge, 219 second-feet); canal dry at various times.

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

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

Tumalo feed canal diverts water from Tumalo Creek in 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	G. H. Canfield	2.28	52	July 25	Wendell Dawson	3.00	112
May 2	Wendell Dawson	2.70	78	Aug. 22	do	2.70	84
20	K. N. Phillips	3.05	117	Sept. 16	do	2.70	81
July 4	Wendell Dawson	3.00	110				

Daily discharge, in second-feet, of Tumalo feed canal near Bend, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1	-------	116	122	96	62	16	-------	141	86	78	74
2	-------	110	110	82	62	17	-------	148	78	82	70
3	-------	122	134	78	62	18	-------	148	110	86	70
4	-------	134	148	74	66	19	122	148	110	86	70
5	-------	134	122	78	59	20	122	148	110	82	70
6	-------	134	105	78	56	21	122	148	100	96	70
7	-------	134	105	78	50	22	110	141	100	74	66
8	-------	64	91	78	62	23	110	141	105	70	56
9	-------	122	91	82	70	24	122	141	105	74	50
10	-------	134	110	82	74	25	116	148	105	74	44
11	-------	134	105	86	78	26	96	148	105	74	50
12	-------	148	91	110	74	27	96	148	100	78	47
13	-------	148	100	91	74	28	116	148	96	70	42
14	-------	148	110	82	74	29	116	134	96	70	44
15	-------	148	100	78	74	30	116	122	96	70	42
						31	110	-------	105	62	-------

Monthly discharge of Tumalo feed canal near Bend, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 19-31	122	96	113	2,910
June	148	64	136	8,090
July	148	78	105	6,460
August	110	62	80.0	4,920
September	78	42	62.1	3,700
The period				26,100

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.—Irrigation seasons, 1913 to 1921, April 23 to September 30, 1922. From July 1, 1906, to May 23, 1913, in sec. 29, at station below intake of McCallister ditch and 700 feet downstream.

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

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

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

EXTREMES OF DISCHARGE.—Maximum stage during period April 23 to September 30, 1922, from water-stage recorder, 3.28 feet at 11 p. m. June 4 (discharge, 405 second-feet); minimum stage from recorder, 2.08 feet April 23 (discharge, 52 second-feet).

1906–1922: Maximum stage recorded, 7.5 feet at old station, November 22, 1909 (discharge, estimated from extension of rating curve, 1,940 second-feet); minimum discharge recorded, 32 second-feet, March 19, 1912.

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 entire flow of this creek. Low-water flow entirely diverted below station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of recorder satisfactory except for short periods. 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 6	K. N. Phillips	2.37	87	July 9	Wendell Dawson	2.80	211
May 12	Phillips and Dawson	2.27	88	Sept. 5	do	2.24	83

Daily discharge, in second-feet, of Squaw Creek near Sisters, Oreg., for the year ending September 30, 1922

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	------	64	197	207	193	117	16	------	134	262	228	119	132
2	------	72	210	228	188	110	17	------	154	280	210	137	108
3	------	74	245	300	174	134	18	------	177	300	245	154	104
4	------	100	300	340	169	121	19	------	172	320	245	137	114
5	------	100	340	320	177	85	20	------	149	360	245	114	106
6	------	100	320	280			21	------	137	340	196	119	90
7	------	90	320	262	184	94	22	------	128	262	177	110	86
8	------	85	300	245			23	52	130	228	166	119	86
9	------	85	320	228	190	104	24		137	210	174	128	85
10	------	85	262	262	172	110	25	56	137	245	174	132	85
11	------	85	245	245	185	121	26		125	300	169	149	94
12	------	90	245	245	182	130	27	60	121	320	164	146	76
13	------	104	262	228	119	128	28	60	128	262	161	139	67
14	------	117	300	280	98	121	29	60	144	210	177	144	67
15	------	123	300	245	102	119	30	60	161	197	172	134	69
							31	------	177	------	190	121	------

NOTE.—Water-stage recorder not operating satisfactorily Apr. 24–26, Aug. 6–8, Sept. 6–8; mean discharge estimated by interpolation.

Monthly discharge of Squaw Creek near Sisters, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 23–30	60	52	57.5	912
May	177	64	119	7,320
June	360	197	275	16,400
July	340	161	226	13,900
August	193	98	149	9,160
September	134	67	102	6,070
The period				53,800

CROOKED RIVER NEAR CULVER, OREG.

LOCATION.—In SW. ¼ sec. 11, T. 12 S., R. 12 E., at Cove power plant of Deschutes Power Co. and 6 miles west of Culver, Jefferson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1922.

GAGE.—Vertical staff on right bank 100 feet below power house used since February 15, 1922. An inclined gage on left bank in NW. ¼ sec. 11, 100 feet below highway bridge and one-eighth mile downstream from present gage used prior to that date. Surge of current made reading of old gage very difficult. Both gages read by A. K. McAlpine.

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

CHANNEL AND CONTROL.—River banks, bed, and control composed of rock and heavy boulders; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.1 feet on new gage April 24 (discharge, 6,240 second-feet); minimum discharge recorded, 1,090 second-feet October 1-22, and January 1-4.

1917-1922: Maximum discharge recorded, that of April 24, 1922; minimum discharge, 970 second-feet July 12 to September 5, 1921.

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 derived from springs a few miles above.

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

ACCURACY.—Stage-discharge relation permanent for both gages. Both rating curves well defined. Old gage read to half-tenths once a day. New gage read to hundredths once daily at low stages and to half-tenths once daily at higher stages. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Crooked River near Culver, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height		Discharge	Date	Made by—	Gage height		Discharge
		Old gage	New gage				Old gage	New gage	
		Feet	*Feet*	*Sec.-ft.*			*Feet*	*Feet*	*Sec.-ft.*
Oct. 4	K. N. Phillips	1.87	------	1,110	May 16	Phillips and Dawson	3.80	2.70	2,480
Feb. 16	G. H. Canfield	1.99	0.65	1,200	July 25	Wendell Dawson	1.80	.40	1,120
May 8	K. N. Phillips	4.25	3.13	2,950	Sept. 8	do	------	.43	1,140

Daily discharge, in second-feet, of Crooked River near Culver, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jnne	July	Aug.	Sept.
1	1,090	1,120	1,250	1,090	1,190	1,180	1,900	3,020	1,260	1,120	1,110	1,120
2	1,090	1,120	2,340	1,090	1,190	1,180	2,210	3,020	1,260	1,120	1.110	1,120
3	1,090	1,120	2,090	1,090	1,190	1,180	2,290	3,400	1,220	1,120	1,110	1,140
4	1,090	1,120	1,850	1,090	1,190	1,180	2,900	3,140	1,220	1,120	1,110	1,140
5	1,090	1,120	1,430	1,140	1,190	1,180	3,140	2,900	1,220	1,120	1,110	1,140
6	1,090	1,140	1,310	1,190	1,190	1,180	2,630	3,140	1,220	1,120	1,110	1,140
7	1,090	1,140	1,250	1,190	1,250	1,180	2,130	3,140	1,220	1,120	1,110	1,140
8	1,090	1,140	1,250	1,140	1,250	1,180	2,450	2,900	1,220	1,120	1,110	1,120
9	1,090	1,140	1,190	1,140	1,250	1,200	3,720	2,630	1,220	1,120	1,110	1,120
10	1,090	1,140	1,190	1,140	1,310	1,180	2,810	2,370	1,300	1,120	1,110	1,120
11	1,090	1,140	1,250	1,140	1,250	1,180	2,540	2,130	1,400	1,120	1,110	1,120
12	1,090	1,120	1,310	1,140	1,190	1,180	2,210	2,050	1,350	1,120	1,110	1,120
13	1,090	1,120	1,250	1,140	1,190	1,200	2,050	1,970	1,350	1,110	1,110	1,120
14	1,090	1,140	1,250	1,140	1,190	1,220	1,970	2,130	1,300	1,110	1,110	1,110
15	1,090	1,140	1,250	1,140	1,190	1,220	1,690	2,290	1,260	1,120	1,110	1,110
16	1,090	1,140	1,190	1,140	1,200	1,220	1,690	2,540	1,220	1,110	1,110	1,120
17	1,090	1,140	1,190	1,140	1,200	1,260	1,570	2,540	1,200	1,110	1,110	1,120
18	1,090	1,120	1,160	1,140	1,180	1,350	1,570	2,290	1,200	1,110	1,110	1,120
19	1,090	1,120	1,140	1,120	1,220	1,320	1,570	2,210	1,180	1,110	1,110	1,120
20	1,090	1,140	1,140	1,140	1,240	1,320	1,900	2,130	1,150	1,110	1,110	1,120
21	1,090	1,140	1,140	1,140	1,220	1,400	2,630	2,050	1,150	1,110	1,110	1,120
22	1,090	1,140	1,140	1,140	1,200	1,830	4,200	2,050	1,150	1,110	1,110	1,120
23	1,120	1,560	1,140	1,140	1,200	1,970	6,040	1,830	1,150	1,110	1,110	1,120
24	1,120	1,370	1,140	1,140	1,200	2,210	6,240	1,760	1,150	1,110	1,110	1,120
25	1,120	1,310	1,140	1,160	1,200	2,630	5,440	1,570	1,150	1,110	1,110	1,120
26	1,120	1,190	1,140	1,190	1,200	2,210	5,260	1,450	1,150	1,110	1,110	1,120
27	1,120	1,190	1,140	1,190	1,200	1,900	5,260	1,400	1,150	1,110	1,110	1,120
28	1,120	1,250	1,120	1,190	1,180	1,900	4,900	1,350	1,120	1,110	1,110	1,120
29	1,120	1,250	1,120	1,190	-------	1,760	4,200	1,300	1,120	1,110	1,110	1,120
30	1,120	1,250	1,140	1,190	-------	1,970	3,560	1,300	1,120	1,110	1,120	1,120
31	1,120	------	1,140	1,190	-------	1,900	-------	1,300	-------	1,110	1,120	-------

Monthly discharge of Crooked River near Culver, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,120	1,090	1,100	67,600
November	1,250	1,120	1,180	70,200
December	2,340	1,140	1,280	78,700
January	1,190	1,090	1,150	70,700
February	1,310	1,180	1,210	67,200
March	2,630	1,180	1,480	91,000
April	6,240	1,570	3,090	184,000
May	3,420	1,300	2,240	138,000
June	1,400	1,120	1,210	72,000
July	1,120	1,110	1,110	68,200
August	1,120	1,110	1,110	68,200
September	1,140	1,120	1,120	66,600
The year	6,240	1,090	1,440	1,040,000

BEAR CREEK AT RICKMAN RANCH, NEAR ROBERTS, OREG.

LOCATION.—In NE. ¼ sec. 31, T. 18 S., R. 19 E., at Rickman ranch, 12 miles southeast of Roberts post office, and 35 miles from Princeville, Crook County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 30, 1920, to June 30, 1921, February 10 to June 25, 1922.

GAGE.—Stevens 8-day water-stage recorder on right bank 100 yards back of Rickman ranch house installed March 25, 1922; vertical staff read prior to that date; gage read and recorder inspected by J. A. Rickman.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.19 feet at 6 p. m. April 21 (discharge, 540 second-feet, computed from observations of cross-section and slope). Stream bed dry during midsummer.

1920–1922: Maximum stage recorded, that of April 21, 1922; no flow during midsummer.

ICE.—None during period of record.

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 20 second-feet and fairly well defined between 20 and 50 second-feet; extended above 50 second-feet on basis of discharge computed by Kutter's formula for the crest stage of 4.19 feet for the flood on April 21, 1922 (discharge, 540 second-feet). Gage read to hundredths three times a week February 10 to March 15; daily to March 24. Operation of water-stage recorder satisfactory March 25 to June 25. Daily discharge ascertained by applying to rating table daily gage reading, or mean gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of Bear Creek at Rickman ranch, near Roberts, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 10	G. H. Canfield	0.13	0.3	May 10	K. N. Phillips	0.64	12.8
Apr. 21		4.19	[a]540	18	do	.47	7.5

[a] Discharge computed by use of Kutter's formula.

Daily discharge, of second-feet, of Bear Creek at Rickman ranch, near Roberts, Oreg., for the period February 10 to June 25, 1922

Day	Feb.	Mar.	Apr.	May	June
1	-------	0.8	6.6	41	1.2
2	-------	.8	16	35	1.1
3	-------	.8	20	29	1.0
4	-------	.8	17	38	1.1
5	-------	.8	14	32	1.1
6	-------	.8	32	28	.9
7	-------	.8	88	22	1.2
8	-------	.8	64	19	1.9
9	-------	.8	48	16	4.1
10	0.7	.8	32	13	3.2
11	.7	.8	22	13	2.1
12	.7	1.0	17	13	1.6
13	.7	1.0	13	13	1.0
14	}	1.0	10	11	.9
15	.8	1.0	8.6	10	.9
16	}	1.3	8.6	9.5	.8
17	.8	1.6	9.2	8.6	.8
18	.8	1.9	28	7.2	.7
19	.8	1.9	76	6.3	.6
20	.8	3.4	176	8.3	.5
21	.8	4.3	264	6.6	.5
22	.8	5.8	252	6.0	.4
23	.8	5.8	138	5.0	.3
24	.8	6.3	124	4.1	.3
25	.8	5.8	110	3.9	.3
26	.8	5.8	96	3.4	-------
27	.8	5.2	68	2.8	-------
28	.8	5.2	52	2.3	-------
29	-------	5.0	41	1.9	-------
30	-------	6.9	38	1.7	-------
31	-------	7.2	-------	1.4	-------

NOTE.—Braced figure gives mean discharge for period indicated.

Monthly discharge of Bear Creek at Rickman ranch, near Roberts, Oreg., for the period February 10 to June 25, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
February 10–28	0.8	0.7	0.78	29.4
March	7.2	.8	2.78	171
April	264	6.6	63.0	3,750
May	41	1.4	13.3	818
June 1–25	4.1	.3	1.14	56.4
The period	----------	----------	----------	4,820

METOLIUS RIVER NEAR GRANDVIEW, OREG.

LOCATION.—In NE. ¼ sec. 19, T. 11 S., R. 11 E., at Montgomery ranch, 10 miles northwest of Grandview post office, Jefferson County, and 11 miles above mouth.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 1, 1921, to September 30, 1922.

GAGE.—Vertical staff on right bank; read by E. A. Montgomery.

DISCHARGE MEASUREMENTS.—Made from cable one-fourth mile above gage.

CHANNEL AND CONTROL.—Bed composed of smooth boulders. Current swift. Channel straight. River confined to its banks at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.40 feet at 7 p. m. November 30 (discharge, estimated from extension of rating curve, 4,200 second-feet); minimum stage recorded, 0.42 foot, September 28–30 (discharge, 1,400 second-feet).

ICE.—Never any ice on river.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 2,000 second-feet; extended above. Gage read to half-tenths or hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good, except for flood stages of November and December for which they are somewhat uncertain.

Discharge measurements of Metolius River near Grandview, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
May 15	Dawson and Phillips	0.67	1,690
Sept 6	Wendell Dawson	.42	1,380
7	do	.42	1,410

Daily discharge, in second-feet, of Metolius River near Grandview, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1,450	3,710	1,610	1,500	1,450	1,560	1,610	1,780	1,720	1,500	1,500
2	1,500	1,450	3,390	1,610	1,500	1,450	1,560	1,610	1,830	1,720	1,500	1,500
3		1,450	2,780	1,610	1,500	1,450	1,560	1,610	1,830	1,720	1,500	1,500
4		1,450	2,480	1,610	1,500	1,450	1,610	1,660	1,950	1,720	1,500	1,500
5	1,500	1,450	2,340	1,610	1,500	1,450	1,610	1,660	1,950	1,720	1,500	1,500
6	1,500	1,450	2,340	1,610	1,500	1,450	1,610	1,660	1,950	1,720	1,500	1,450
7	1,500	1,450	2,340	1,610	1,500	1,450	1,610	1,660	1,950	1,660	1,500	1,450
8	1,500	1,450	2,070	1,560	1,500	1,450	1,660	1,660	1,950	1,660	1,500	1,450
9	1,500	1,450	1,950	1,560	1,500	1,450	1,660	1,660	1,950	1,660	1,500	1,450
10	1,500	1,450	1,950	1,560	1,500	1,450	1,660	1,660	1,950	1,660	1,500	1,450
11	1,450	1,450	1,830	1,560	1,500	1,450	1,660	1,660	1,950	1,660	1,500	1,450
12	1,450	1,450	1,830	1,560	1,500	1,450	1,660	1,660	1,950	1,660	1,500	1,450
13	1,450	1,450	1,950	1,500	1,500	1,450	1,610	1,660	1,950	1,610	1,500	1,450
14	1,450	1,450	1,950	1,500	1,500	1,450	1,610	1,660	1,830	1,610	1,500	1,450
15	1,450	1,450	1,830	1,500	1,500	1,450	1,610	1,720	1,830	1,610	1,500	1,450
16	1,450	1,450	1,830	1,500	1,500	1,450	1,610	1,720	1,830	1,610	1,500	1,450
17	1,610	1,450	1,830	1,500	1,450	1,450	1,610	1,720	1,830	1,610		1,450
18	1,610	1,450	1,780	1,500	1,450	1,450	1,610	1,780	1,830	1,610		1,450
19	1,560	1,500	1,780	1,500	1,450	1,450	1,560	1,830	1,830	1,610		1,450
20	1,500	2,480	1,720	1,500	1,450	1,450	1,560	1,830	1,830	1,610	1,500	1,450
21	1,500	3,870	1,720	1,500	1,450	1,500	1,560	1,830	1,830	1,560		1,450
22	1,450	2,930	1,720	1,500	1,450	1,500	1,560	1,830	1,830	1,560		1,450
23	1,500	2,200	1,720	1,500	1,450	1,500	1,610	1,780	1,950	1,560		1,450
24	1,500	2,070	1,720	1,500	1,450	1,500	1,610	1,780	1,950	1,560	1,500	1,450
25	1,450	1,950	1,720	1,500	1,450	1,500	1,610	1,780	1,830	1,500	1,500	1,450
26	1,450	2,070	1,660	1,500	1,450	1,500	1,610	1,780	1,830	1,500	1,500	1,450
27	1,450	1,950	1,660	1,500	1,450	1,500	1,610	1,780	1,830	1,500	1,500	1,450
28	1,450	1,830	1,660	1,500	1,450	1,500	1,610	1,780	1,780	1,500	1,500	1,400
29	1,450	1,830	1,660	1,500	-------	1,500	1,610	1,780	1,780	1,500	1,500	1,400
30	1,450	3,710	1,660	1,500	-------	1,500	1,610	1,780	1,720	1,500	1,500	1,400
31	1,450	-------	1,610	1,500	-------	1,500	-------	1,780	-------	1,500	1,500	-------

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Metolius River near Grandview, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,610	1,450	1,490	91,600
November	3,870	1,450	1,820	108,000
December	3,710	1,610	2,010	124,000
January	1,610	1,500	1,530	94,100
February	1,500	1,450	1,480	82,200
March	1,500	1,450	1,470	90,400
April	1,660	1,560	1,610	95,800
May	1,830	1,610	1,720	106,000
June	1,950	1,720	1,870	111,000
July	1,720	1,500	1,610	99,000
August	1,500	1,500	1,500	92,200
September	1,560	1,400	1,450	86,300
The year	3,870	1,400	1,630	1,180,000

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.

DRAINAGE AREA.—20.5 square miles.

RECORDS AVAILABLE.—April 7, 1915, to September 30, 1922, with a few gaps; occasional readings, 1911 to 1913.

GAGE.—Stevens continuous water-stage recorder on left bank used since October 16, 1917, except for short period in 1919. Recorder inspected by C. N. Sorenson.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 2.37 feet from 10 p. m. December 3 to 6 a. m. December 4 (discharge, 257 second-feet); minimum discharge, 32 second-feet April 6 and 7.

1911–1913; 1915–1922: Maximum stage recorded, that of December 3 and 4, 1921; minimum stage recorded, 0.31 foot October 18, 1916 (discharge, 20 second-feet).

ICE.—Stage-discharge relation apparently unaffected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changing due to varying amounts of drift on control. Rating curve used December 2 to July 7 well defined below and extended above 100 second-feet. Operation of water-stage recorder unsatisfactory during greater part of year as explained in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good except for periods when recorder was not operating and for periods when discharge exceeded 125 second-feet, for which they are fair.

Discharge measurements of Lake Creek near Sisters, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. [a]	G. H. Canfield	0.59	36	Aug. 25	C. N. Sorenson [a]	0.68	38.7
May 13	K. N. Phillips	1.14	74	Sept. 5	Wendell Dawson	.60	33.9
July 9	Wendell Dawson	.84	46.6				

[a] Water master.

Daily discharge, in second-feet, of Lake Creek near Sisters, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		170	52	47		34	40	126	59	40	
2		209	53	47		33	40	133	59		36
3		227	53	46		33	40	140	59		
4		244	53	44		34	44	148	57		
5	35	201	53	44		33	48	155	56		34
6		177	54	44		32	50	162	55		
7		155	53	44		32	54	162	53		
8		140	51	44		36	56	162	50		
9	35	126	50	44			66	162	48		
10	35	112	50	44			69	155	48		
11	35	105	48	44			74	155			
12	35	98	48	44			74	148			
13	35	92	47	44			74	140		39	
14	36	92	45	44			74	133			
15	36		44	44	38		74	126			
16	36		44	47		36	80	118			
17	36		45	48			86	112			
18	36		44	48			92	112			36
19	43		44	48			105	105			
20	69		44	48			118	98			
		76							43		
21	86			44			126	98			
22	86			44			133	92			
23	112			42			133	92			
24	140		44			36	133	86			
25	140					37	133	86		39	
				40							
26	133					38	133	86			
27	126	59	44			36	133	86			
28	118	57	46			36	126	80		38	
29	118	55	46			39	126	74			
30	140	54	46			40	126	69	39		
31		53	46		36		126		39		

NOTE.—Water-stage recorder not operating satisfactorily Nov. 1-8, Dec. 15-26, Jan. 21-26, Feb. 24 to Mar. 30, Apr. 9-23, July 8, 11-29, Aug. 2-24, 26-31, Sept. 1-4 and 6-30; discharge estimated or interpolated. Indirect method for shifting control used Nov. 9 to Dec. 1, and July 9 to Sept. 30.

Monthly discharge of Lake Creek near Sisters, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October			[a]36	2,210
November	140		64.9	3,860
December	244	53	108	6,640
January	54		47.3	2,910
February	48		44.2	2,450
March			37.9	2,330
April	40	32	35.6	2,120
May	133	40	89.9	5,530
June	162	69	120	7,140
July	59	39	46.4	2,850
August	40		38.8	2,390
September			35.9	2,140
The year	244	32	58.8	42,600

[a] Discharge estimated.

MILL CREEK AT OUTLET OF OLALLIE LAKE, OREG.

LOCATION.—In unsurveyed sec. 12, T. 9 S., R. 8 E., just west of boundary of Warm Springs Indian Reservation and 25 miles west of Warmspring, Jefferson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—March 1, 1915, to September 30, 1916.

GAGE.—Stevens continuous water-stage recorder.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Evidently practically permanent; little information available.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder during period March 1 to September 30, 1915, 1.43 feet May 11–13 (discharge, 26 second-feet); no flow July 19 to September 30.

Maximum stage during year ending September 30, 1916, 1.83 feet indicated by recorder pencil during period June 25 to July 23, when clock stopped (discharge, 50 second-feet); no flow October 1 to November 17 and September 23–30.

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve fairly well defined below 30 second-feet. Operation of water-stage recorder satisfactory except for periods when clock was run down. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

COOPERATION.—Field data furnished by Portland Electric Power Co.

Discharge measurements of Mill Creek at outlet of Olallie Lake, Oreg., during the year ending September 30, 1915

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Apr. 15	1.15	13.8	May 13	1.43	26.2
May 11	1.43	26.6	July 15	.68	.1

NOTE.—Discharge measurements made by engineers of Portland Electric Power Co.

Daily discharge, in second-feet, of Mill Creek at outlet of Olallie Lake, Oreg., for the period March 1, 1915, to September 30, 1916

Day	Mar.	Apr.	May	June	July	Day	Mar.	Apr.	May	June	July
1915						1915					
1	5.0	13	16	18	3.5	16	7.0	14	19	8.6	0.1
2	5.3	16	15	20	2.7	17	7.6	14	18	8.0	.1
3	5.6	20	14	18	2.3	18	8.3	14	20	7.0	.1
4	5.6	20	14	18	1.4	19	8.3	15	20	7.0	------
5	6.0	16	13	16	.8	20	8.3	17	19	7.0	------
6	6.0	18	12	14	.8	21	8.3	18	18	6.5	------
7	5.6	17	12	13	1.0	22	8.3	17	18	6.2	------
8	5.3	16	13	12	.8	23	8.6	16	18	6.2	------
9	5.3	15	17	11	.8	24	9.0	17	18	5.3	------
10	5.3	14	24	10	.4	25	9.0	15	18	5.0	------
11	5.0	13	26	12	.1	26	8.6	14	18	5.3	------
12	5.0	14	26	12	.1	27	8.6	14	19	5.3	------
13	5.0	16	26	11	.1	28	9.0	14	22	4.0	------
14	5.6	15	25	11	.1	29	10	15	22	4.0	------
15	6.7	14	22	10	.1	30	11	16	19	3.5	------
						31	12	------	18	------	------

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1915–16											
1	------	15	7.3	10			13	16		12	2.0
2	------	13	7.3	7.6			13	17	40	11	2.0
3	------	12	7.0	6.7			15	18		10	3.7
4	------	11	6.5	6.7			18	22		10	3.3
5	------	18	5.6	11			22	22		10	2.7
6	------	22	5.3	19			28	22		9.5	2.7
7	------	18	5.3	26			26	22		9.0	2.5
8	------	16	6.2	24			25	24		8.6	2.5
9	------	16	6.5				24	27		9.0	3.7
10	------	14	6.5				20	27		9.0	3.7
11	------	14	6.2				17	24		8.3	3.5
12	------	12	6.2			13	14	24		8.6	3.3
13	------	11	6.2				12	24		9.0	2.3
14	------	9.0	6.2				11	26	24	9.5	1.4
15	------	7.6	6.5		14		10	28		8.6	1.0
16	------	7.6	6.2				10	32		7.0	1.0
17	------	7.6	6.2				10	37		7.3	.8
18	0.4	6.5	6.2				12	43		7.3	.6
19	4.6	6.0	6.2	15			14	45		7.3	.2
20	11	7.0	6.2				14	41		7.3	.1
21	20	15	6.2				16	32		6.5	.1
22	26	24	8.6				17	26		6.5	.1
23	38	23	12				17	24		6.0	------
24	33	18	13			10	17	22	18	5.6	------
25	35	17	13			10	16		18	4.6	------
26	30	14	12			12	16		17	4.6	------
27	28	12	10			15	17	20	16	4.3	------
28	18	12	10			16	18		15	4.0	------
29	20	10	8.3			15	18		14	3.7	------
30	18	8.6	8.0	------		14	17		12	3.3	------
31	------	7.3	8.3	------		------	16	------	12	2.7	------

NOTE.—No flow for days for which no discharge is given. Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Mill Creek at outlet of Olallie Lake, Oreg., for the period March 1, 1915, to September 30, 1916

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1915				
March	12	5.0	7.23	445
April	20	13	16.1	958
May	26	12	18.7	1,150
June	20	4.0	9.83	585
July	3.5	.0	.49	30
The period				3,170
1915–16				
November	38	0	9.40	559
December	24	6.0	13.0	799
January	13	5.3	7.59	467
February	26	6.7	14.7	846
March			14.0	861
April			13.0	774
May	28	10	16.5	1,010
June	45	16	25.5	1,520
July		12	23.3	1,430
August	12	2.7	7.42	456
September	3.7	.0	1.44	86
The year		.0	12.2	8,810

NOTE.—No flow for months for which no discharge is given.

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, 1922.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by M. F. Coberth.

DISCHARGE MEASUREMENTS.—Made from cable one-fourth mile below gage.

CHANNEL AND CONTROL.—Control of rock overlain with sand deposits; shifts occasionally.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 7.80 feet at 10 p. m. November 30 (discharge, 5,820 second-feet); minimum stage, 0.90 foot at noon October 15 (discharge, 116 second-feet).

1917–1922: Maximum stage recorded, 8.24 feet December 19, 1917 (discharge, 5,940 second-feet); minimum discharge occurred December 11–14, 1919, due to extreme cold, estimated from records at power plant as 10 second-feet.

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

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 probably May 1–5. Both rating curves well defined below 2,000 second-feet; extended above. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good, except estimates for periods of no gage-height record for which they are fair.

Discharge measurements of White River below Tygh Valley, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 14	K. N. Phillips	4.47	1,940	May 5	K. N. Phillips	3.89	1,630
16	do	3.17	966	Sept. 20	G. H. Canfield	.98	152
Apr. 17	do	2.13	466				

Daily discharge, in second-feet, of White River below Tygh Valley, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		220	4,570		225	670	960	1,630		190	155
2		202	3,720		253	645	1,110	1,630		185	153
3		185	2,230		259	770	1,140	1,630		180	151
4		185			280	900	1,380	1,630	400	180	153
5		180			295	820	1,630	1,630		169	149
6		178			295	795	1,470	1,470		171	149
7	155		1,400	350	372	870	1,470	1,320		169	
8					442	1,020	1,320	1,250	298	169	
9					480	845	1,180	1,180	274	171	
10					442	795	1,080	1,080	274	175	
11		190	1,610		390	770	1,010	1,010	268	185	
12			1,690		425	695	980	980	250	180	
13	144		1,780		540	620	1,180	980	250	165	160
14	175		1,690	256	460	580	1,390	980	250	171	
15	170	182	1,320	265	500	540	1,630	920	238	171	
16	170	180	960	262	540	500	1,970	860	238	169	
17	215	192	900	280	480	480	2,250	800	225	171	
18	190	205		355	500	460	2,450	775	230	169	
19	170	1,140		372	600	500	2,250	750	220	163	
20	170	2,330		340	670	520	1,970	700	212	163	151
21	188	1,610		325	645	580	1,710	650	208	159	149
22	178	990		340	695	745	1,630	625	205	159	
23	160	820		295	645	795	1,550		215	161	
24	162	795	500	280	540	795	1,550		208	159	
25	172	745		265	460	845	1,470		205	157	170
26	185	745		259	442	930	1,320	560	202	159	
27	205	695		247	425	930	1,250		202	155	
28	310	645		232	500	870	1,320		195	155	182
29	325	870		-------	560	845	1,390		195	157	175
30	256	3,840		-------	620	820	1,470		192	155	157
31	235	-------		-------	670	-------	1,550	-------	195	153	-------

NOTE.—Water-stage recorder not operating satisfactorily Oct. 1–12, Nov. 2, 7–14, Dec. 4–10, 15, 18–31, Feb. 1–13, June 23 to July 7, Sept. 7–19, and 22–27; discharge estimated by comparison with records of flow of Hood and White Salmon rivers.

Monthly discharge of White River below Tygh Valley, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	325	144	182	11,200
November	3,840	----------	622	37,000
December	4,570	----------	1,200	73,800
January	----------	----------	[a]350	21,500
February	----------	232	319	17,700
March	695	225	473	29,100
April	1,020	460	732	43,600
May	2,450	960	1,480	91,000
June	1,630	----------	965	57,400
July	----------	192	266	16,400
August	190	153	168	10,300
September	----------	149	161	9,580
The year	4,570	144	579	419,000

[a] Estimated.

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.—Fragmentary record May 16, 1918, to July 26, 1922, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on right bank, inspected by R. E. Ellenwood.

DISCHARGE MEASUREMENTS.—Made by wading near canal intake.

CHANNEL AND CONTROL.—Bed composed of sand, gravel, and small boulders; may shift slightly.

EXTREMES OF DISCHARGE.—Minimum stage recorded during period October 1, 1921, to July 26, 1922, from water-stage recorder, 0.46 foot November 11 (discharge, 6.0 second-feet). No record of maximum.

1918–1922: Maximum stage recorded, from water-stage recorder, 1.80 feet between January 1 and April 30, 1919, when clock was not running (discharge, not determined); minimum discharge, 5.0 second-feet several times during 1918 and 1919.

ICE.—No ice during period of record.

DIVERSIONS.—Wapinitia Irrigation Co.'s 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; extended above. Operation of water-stage recorder very unsatisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting the recorder graph. Records good below 30 second-feet; uncertain above.

The following discharge measurement was made by Wendell Dawson:

July 26, 1922: Gage height, 0.60 foot; discharge, 15.3 second-feet.

Daily discharge, in second-feet, of Clear Creek above intake, near Wapinitia, Oreg., for the period October 1, 1921, to July 26, 1922

Day	Oct.	Nov.	Dec.	May	June	July	Day	Oct.	Nov.	Dec.	May	June	July
1	12		80		118		16		8.7		101		
2	12				126		17		8.7		109		
3	11				129		18		14		113		
4	11				133		19		109		113		
5	11				131		20		124		113		
6	9.4				129		21		127		113		
7	8.7				122		22		86		109		
8	8.7				117		23		49		109		
9							24		38		108		
10							25		38		106		
11		6.0					26		38		101		15
12		6.5					27		37		98		
13		7.0					28		37		99		
14		8.7					29		62		102		
15		8.7		91			30		77		109		
							31				113		

GATE CREEK NEAR WAMIC, OREG.

LOCATION.—In sec. 35, T. 4 S., R. 11 E., 100 yards north of old Purcell ranch and 8 miles southwest of Wamic, Wasco County.

RECORDS AVAILABLE.—October 24, 1920, to July 31, 1921, and October 16, 1921, to July 31, 1922. Records at Mulvany sawmill in sec. 21, T. 4 S., R. 12 E., for October 7, 1917, to July 31, 1918, show slightly more water.

GAGE.—Vertical staff on right abutment of highway bridge; read by Miss Ora Duncan.

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

CHANNEL AND CONTROL.—Bed composed of clean gravel and small boulders; probably slightly shifting. Control section narrow at low stages. Banks are overflowed at extreme high water.

EXTREMES OF DISCHARGE.—Maximum discharge recorded during year, 78 second-feet at time of discharge measurement May 5; minimum stage recorded, 0.20 foot at time of discharge measurement September 20 (discharge, 0.6 second-foot).

ICE.—Stage-discharge relation affected by ice; discharge estimated.

DIVERSIONS.—Practically none above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed May 5 when a low footlog below gage was removed. Both rating curves well defined. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Gate Creek near Wamic, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 15	K. N. Phillips	0.82	16.5	May 5	K. N. Phillips	1.79	78
Apr. 17	do	1.35	36.9	Sept. 20	G. H. Canfield	.20	.6

Daily discharge, in second-feet, of Gate Creek near Wamic, Oreg., for the period October 16, 1921, to July 31, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1		1.3	34	6.5	3.0	3.8	42	63	34	8.0
2		1.2	32	5.9	4.0	3.5	46	71	34	11
3		1.2	32	5.9	7.4	3.0	48	71	32	11
4		1.4	11	5.0	7.7	2.5	63	75	32	8.6
5		1.3	9.8	6.2	6.5	3.0	63	75	31	7.7
6		1.2	8.9	6.2	3.2	3.0	67	69	30	7.1
7		1.2	8.0	6.5	3.2	2.8	71	69	29	6.8
8		1.2	7.4	5.6	2.5	2.8	71	60	28	5.9
9		1.2	5.6	5.0	3.8	2.5	71	60	28	5.0
10		1.3	5.6	4.8	2.5	3.5	67	55	27	4.5
11		1.3	11	4.8	2.5	3.5	59	52	25	3.8
12		1.4	13		3.5	3.8	55	48	24	3.0
13		1.3	16		3.2	4.0	52	52	23	2.8
14		1.3	19		3.2	4.8	45	55	21	2.8
15		1.2	17		3.0	5.0	45	55	19	2.5
16	1.0	1.2	12	4.0	3.2	5.6	38	60	18	2.4
17	1.4	1.3	12		2.8	6.8	39	64	17	2.3
18	1.3	1.4			2.8	6.5	41	69	16	2.2
19	1.4	1.4			3.2	7.7	52	69	15	2.1
20	1.4	1.4		11	3.2	8.6	52	64	11	1.8
21	1.5	1.6	8.0	11	2.5	12	48	55	12	1.6
22	1.6	1.8		10	2.8	18	59	52	12	1.5
23	1.5	1.8		10	3.0	23	55	48	11	1.4
24	1.3	2.1		10	3.0	23	55	46	11	1.3
25	1.3	2.5	5.0	9.8	3.2	23	63	44	11	1.2
26	1.5	23	5.9	8.6	3.2	22	63	41	10	1.2
27	1.4	25	5.9		3.5	21	63	38	10	1.2
28	1.6	32	1.8		3.5	21	63	36	9.8	1.2
29	1.5	37	1.8	5.0	------	23	59	36	9.5	1.2
30	1.4	40	2.0		------	36	63	34	9.2	1.1
31	1.3	------	2.0		------	41	------	34	------	1.1

NOTE.—Stage-discharge relation affected by ice Dec. 18–24, Jan. 12–19, 27–31, Feb. 1 and 2; discharge estimated from study of gage-height and weather records.

Monthly discharge of Gate Creek near Wamic, Oreg., for the period October 16, 1921, to July 31, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October 16–31	1.6	1.0	1.40	44
November	40	1.2	6.42	382
December	34	1.8	10.8	664
January	11	------	6.12	376
February	7.7	2.5	3.54	197
March	41	2.5	11.3	695
April	71	38	55.9	3,330
May	75	34	55.5	3,410
June	34	9.2	20.0	1,190
July	11	1.1	3.72	229
The period	------	------	------	10,500

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, 1922, with gaps in winters of 1921 and 1922. October 29, 1909, to December 15, 1910, at a point a mile above, in section 11.

GAGE.—Stevens water-stage recorder referred to vertical staff on left bank; inspected by A. G. Hanson.

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 recorded during year from water-stage recorder, 3.90 feet at 4 a. m. June 5 (discharge, 3,420 second-feet); minimum stage from water-stage recorder, 1.32 feet November 20-21 (discharge, 444 second-feet). No higher or lower stages were indicated by recorder pencil when clock was stopped.

1909-1922: Maximum discharge recorded, 6,250 second-feet November 24, 1909 (estimated by extension of rating curve); minimum discharge recorded, 285 second-feet November 13, 1915.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water the latter part of November. Rating curve used October 1 to November 21 fairly well defined; curve used December 13 to September 30 well defined. Operation of recorder unsatisfactory during a large part of the year. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

Discharge measurements of Klickitat River near Glenwood, Wash., during the year ending September 30, 1922

[Made by A. G. Hanson]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 13	3.33	2,510	July 2	2.27	1,120
Apr. 30	2.05	881	31	1.89	768
May 28	2.84	1,750			

Daily discharge, in second-feet, of Klickitat River near Glenwood, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1	547	528			1,050	2,910	1,170	738	
2	547	516			1,120	3,000	1,090	690	538
3	561	510			1,140	3,080	1,110	669	555
4	561	504			1,350	3,250	1,140	655	506
5	554	498			1,540	3,340	1,080	634	481
6	554	504			1,460	3,000	1,040	634	490
7	554	498			1,410	2,830	960	627	511
8	568	492			1,290	2,510	895	634	486
9	568	486		634	1,200	2,280	868	655	495
10	575	486		634	1,150	2,280	850	655	511
11	568	480		614	1,130	2,130	850	722	528
12	561	480		581	1,170	2,060	826	581	516
13	610	480	2,510	568	1,350	1,990	834	538	522
14	650	486	1,720	555	1,660	1,990	826	538	511
15	634	486	1,380	538	1,920	1,850	786	528	
16	582	480	1,150	528	2,280	1,720	770	538	
17	626	466	1,020	516	2,910	1,660	770	568	
18	589	480	950	522	3,080	1,600	786	581	
19	596	466		550	2,750	1,480	746	550	
20	589	444		648	2,430	1,480	730	528	
21	547	444		778	2,280	1,430		522	
22	516			931	1,990	1,360		550	500
23	498			922	1,850	1,250		562	
24	492			922	1,850	1,250		568	
25	504			950	1,850	1,250		588	
26	561			1,020	1,850		730	641	
27	522			1,020	1,850			588	
28	603			980	1,850	1,170		562	
29	626			931	2,060			544	
30	554			922	2,360			522	
31	534				2,750		730	538	

NOTE.—Water-stage recorder not operating satisfactorily June 26–30, July 1, 21–30, Sept. 1, 2, and 15–30; discharge estimated.

Monthly discharge of Klickitat River near Glenwood, Wash., for the year ending September 30, 1922

[Drainage area, 356 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	626	492	566	1.59	1.83	34,800
November 1–21	528	444	486	1.37	1.07	20,200
April 9–30	1,020	516	739	2.08	1.70	32,300
May	3,080	1,050	1,800	5.06	5.83	111,000
June	3,340		1,960	5.51	6.15	117,000
July			844	2.37	2.73	51,900
August	738	522	595	1.67	1.92	36,600
September	555		506	1.42	1.58	30,100

HOOD RIVER BASIN

HOOD RIVER AT POWERDALE, NEAR HOOD RIVER, OREG.

LOCATION.—In NE. ¼ sec. 36, T. 3 N., R. 10 E., at Powerdale, 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, 1922.

GAGE.—Gurley 8-day water-stage recorder on right bank near power plant, half a mile above railroad bridge; inspected by 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 during year from water-stage recorder, 8.35 feet at noon, November 30 (discharge, 21,300 second-feet); minimum discharge recorded, 358 second-feet at 6 p. m. September 4. 1913–1922: Maximum discharge, that of November 30, 1921; minimum stage recorded, 0.80 foot August 26, 1920 (discharge, 170 second-feet).

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. 97).

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

ACCURACY.—Stage-discharge relation changed probably April 8. Both rating curves well defined. Operation of water-stage recorder satisfactory except as 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 periods when recorder did not operate for which they are fair.

Discharge measurements of Hood River at Powerdale, near Hood River, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 30	J. W. Bones	7.8	18,500	Apr. 26	K. N. Phillips	3.08	1,420
Feb. 27	do	1.81	569	May 2	do	3.32	1,780
Apr. 14	K. N. Phillips	2.76	1,100	Sept. 14	G. H. Canfield	1.84	506
15	do	2.73	1,140				

Daily discharge, in second-feet, of Hood River at Powerdale, near Hood River, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	509	695	11,000	765	800	509	1,510	1,590	2,540		448	380
2	537	596	6,680	765	765	509	1,860	1,710	2,620		518	362
3	509	566	4,140	765	765	509	1,970	1,900	2,710		601	362
4	509	566		765	765	566	1,760	2,710	3,090		556	371
5	481	537		765	800	566	1,710	2,380	3,000		427	364
6	481	566	2,800	765	800	537	1,860	2,230	2,620			371
7	481	537		730	835	596	2,090	2,230	2,380			406
8	481	481		730	835	596	1,830	2,020	2,230			385
9	455	509		870	800	596	1,650	1,770	2,160		540	371
10	419	509		765	800	628	1,480	1,590	2,300	900		411
11	385	509	3,490	765	765	628	1,330	1,540	2,230			450
12	385	537	4,360	765	765		1,330	1,540	2,160		562	485
13	409	800	3,090	800	730		1,140	1,650	2,090		613	454
14	509	730	2,540	765	695		1,140	2,090	2,090		584	529
15	566	537	1,920	765	660	700	1,230	2,460	2,230		595	443
16	581	481	1,660	730	695		1,180	3,000	1,830		590	380
17	596	455	1,550	730	660		1,040	3,490	1,830		584	385
18	566	455	1,450	730	765	800	1,000	3,190			573	385
19	596	596	1,370	730	765	1,020	1,040	2,540		507	573	385
20	566	695	1,280	765	730	1,020	1,040			475		432
21	509	730	1,240	765	730	1,060	1,090			443		427
22	455	940	1,190	765	695	1,100	1,230			411	445	422
23	455	1,760	1,100	765	628	1,100	1,180			401		443
24	455	2,090	1,020	730	596	1,020	1,140		1,500	401		465
25	509	3,000		765	566	940	1,280	2,100		390		490
26	835	3,490		835	566	940	1,480			406	371	507
27	800	2,620	900	800	537	1,020	1,430			411	385	551
28	2,090	2,090		765	537	1,140	1,380			411	385	551
29	1,280	2,090		730	-------	1,190	1,330			411	371	507
30	905	15,600		730	-------	1,370	1,380			411	371	464
31	765	-------		765	-------	1,460	-------	2,380	-------	422	371	-------

NOTE.—Water-stage recorder not operating satisfactorily Oct. 16, Nov. 21–24, Dec. 4–10, 17, 18, 25–31, Jan. 1, Mar. 12–17, May 20–30, June 11, 12, 18–30, July 1–18, 20, 21, Aug. 6–11, and 20–25; discharge interpolated Oct. 16, July 20 and 21, estimated from gage readings at diversion dam Nov. 21–24; estimated by comparison with records of flow of White River and White Salmon River for other periods.

Monthly discharge of Hood River at Powerdale, near Hood River, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	2,090	385	615	37,800
November	15,600	455	1,530	91,000
December	11,000	-------	2,420	149,000
January	870	730	763	46,900
February	835	537	716	39,800
March	1,460	509	826	50,800
April	2,090	1,000	1,400	83,300
May	3,490	1,540	2,160	133,000
June	3,090	-------	1,990	118,000
July	-------	390	700	43,000
August	613	371	496	30,500
September	551	362	431	25,600
The year	15,600	362	1,170	849,000

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Combined monthly discharge of Hood River and Pacific Power & Light Co.'s tailrace at Powerdale, near Hood River, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	2,200	492	724	44,500
November	15,600	569	1,610	95,800
December	11,000	----------	2,460	151,000
January	977	730	835	51,300
February	942	644	812	45,100
March	1,570	616	933	57,400
April	2,200	1,100	1,490	88,700
May	3,590	1,640	2,250	138,000
June	3,190	----------	2,050	122,000
July	----------	401	781	48,000
August	613	371	496	30,500
September	551	362	431	25,600
The year	15,600	362	1,240	898,000

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 October 16, 1918, irrigation seasons 1919 to 1921, May 4 to December 2, 1922, when station was discontinued.

GAGE.—Stevens 8-day water-stage recorder on left bank; inspected by C. H. Shaw.

DISCHARGE MEASUREMENTS.—Made from cable about 200 yards below gage. near intake of East Fork Irrigation District Canal 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 May 4 to December 22, 1922, 2.94 feet at 11 p. m. June 4 (discharge, 725 second-feet); minimum stage, 1.20 feet at 2 p. m. October 30 (discharge, 115 second-feet).

1915–1922: 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.

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

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

REGULATION.—None.

ACCURACY.—Stage-discharge relation probably permanent. Rating curve well defined. Operation of water-stage recorder satisfactory except May 24–26 and August 16-19. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records excellent.

Discharge measurements of East Fork of Hood River near Mount Hood, Oreg., during the period May 4 to December 2, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft*
May 4	K. N. Phillips	2.21	401	Sept. 17	G. H. Canfield	1.36	146
June 4	F. F. Henshaw	*2.79	649	Oct. 31	Wendell Dawson	1.35	135

Daily discharge, in second-feet, of East Fork of Hood River near Mount Hood, Oreg., for the period May 4 to December 2, 1922

Day	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1		588	364	233	165	131	135	125
2		610	364	239	158	131	128	123
3		632	372	211	173	137	125	
4	400	678	388	208	170	141	128	
5	428	678	360	200	149	137	128	
6	400	632	339	200	145	128	129	
7	384	610	332	203	151	126	129	
8	346	565	308	208	139	125	131	
9	322	542	304	219	145	128	135	
10	308	520	315	211	158	129	141	
11	300	520	300	277	173	128	131	
12	325	520	290	222	173	128	128	
13	356	520	294	175	173	128	126	
14	412	520	297	165	173	129	129	
15	460	480	283	165	163	131	128	
16	542	472	274		156	131	220	
17	632	456	264	164	156	133	274	
18	655	460	257		151	129	180	
19	610	468	251		158	128	168	
20	565	476	236	163	158	123	156	
21	520	460	230	158	149	121	147	
22	500	416	227	153	145	121	143	
23	480	392	224	168	145	123	139	
24		408	227	182	145	120	137	
25	450	440	227	190	147	156	137	
26		448	214	190	151	151	135	
27	420	432	211	192	143	128	135	
28	452	408	208	188	149	131	131	
29	472	388	205	188	131	120	126	
30	500	372	208	185	135	117	126	
31	542		224	180		141		

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of East Fork of Hood River near Mount Hood, Oreg., for the period May 4 to November 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 4-31	655	300	453	25,200
June	678	372	504	30,000
July	388	224	277	17,100
August	277	153	191	11,700
September	173	131	154	9,160
October	156	117	130	7,990
November	274	126	144	8,570
The period				110,000

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, 1922, irrigation seasons only.

GAGE.—Stevens water-stage recorder on left side of canal just below road crossing; inspected by C. H. Shaw.

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

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

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.48 feet 10 p. m. July 31, and 10 p. m. August 4 (discharge, 145 second-feet); canal dry at various times.

1913–1922: Maximum discharge recorded, 153 second-feet July 9, 1919; canal dry at various times.

ICE.—No water carried in cold weather.

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory, April 30 to May 4 and June 4 to September 30. Gage read about every other day, May 9 to June 3. Daily discharge ascertained by applying to rating table daily gage height or mean daily gage height obtained by inspecting recorder graph and interpolating for days of no gage-height record. Records good.

The East Fork Irrigation District Canal diverts water in 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 lower part of Hood River.

Discharge measurements of East Fork Irrigation District Canal near Mount Hood, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
May 4	K. N. Phillips	1.82	32.1
June 4	F. F. Henshaw	3.21	121
Sept. 13	G. H. Canfield	2.28	53

Daily discharge, in second-feet, of East Fork Irrigation District Canal near Mount Hood, Oreg., for the year ending September 30, 1922

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1		31	119	140	140	132	16		37	119	136	70	67
2		31	121	140	140	127	17		44	119	136	103	67
3		31	123	140	140	123	18		55	119	136	107	67
4		31	123	140	140	111	19		56	119	136	107	67
5			119	140	140	107	20		57	119	136	103	67
6		31	119	140	136	103	21		57	119	136	119	67
7			119	140	136	103	22		57	119	136	119	64
8			119	140	136	95	23		67	119	136	123	61
9		31	119	38	44	78	24		67	119	136	127	61
10		31	119			61	25		67	119	136	127	62
11		31	115			61	26		66	123	136	127	62
12		31	115	77		52	27		65	123	136	127	61
13		31	119	127	52	52	28		74	119	136	127	62
14		31	119	132	72	59	29		84	136	136	132	61
15		31	119	136	36	67	30	31	92	140	140	132	62
							31		99		140	132	

NOTE.—After April 30, canal dry on days for which no discharge is given.

Monthly discharge of East Fork Irrigation District Canal near Mount Hood, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May	99	31	48.7	2,990
June	140	115	121	7,200
July	140	0	123	7,560
August	140	0	103	6,330
September	132	52	76.3	4,540
The period				28,600

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; July 7, 1920, to September 30, 1921, and June 1 to September 30, 1922.

GAGE.—Staff nailed to flume; read by Fred. Gilcher.

DISCHARGE MEASUREMENTS.—Made from plank at gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 1 to September 30, 1922, 1.95 feet on several occasions during June, July, and August (discharge, 59 second-feet); minimum stage recorded, 1.0 foot September 24–30 (discharge, 21 second-feet).

1917; 1920–1922: Maximum discharge recorded, 67 second-feet, on a number of days in July and August, 1920.

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

Farmers Canal diverts water from right bank of Hood River in 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.

The following discharge measurment was made by G. H. Canfield:

September 18, 1922: Gage height, 1.30 feet; discharge, 32 second-feet.

Daily discharge, in second-feet, of Farmers Canal near Oakgrove, Oreg., for the year ending September 30, 1922

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1	54	59	59	57	16	57	57	52	32
2	54	59	59	57	17	57	57	57	32
3	54	57	59	57	18	57	57	52	32
4	57	59	59	57	19	57	57	52	28
5	54	59	57	52	20	57	57	52	28
6	54	59	57	50	21	57	57	52	28
7	54	59	57	48	22	57	57	52	28
8	57	57	57	48	23	57	57	52	28
9	57	59	57	48	24	54	54	54	21
10	57	59	57	34	25	57	54	57	21
11	57	57	59	34	26	57	54	57	21
12	57	57	59	32	27	59	52	54	21
13	57	57	59	34	28	57	52	57	21
14	57	59	57	34	29	57	50	57	21
15	57	59	57	32	30	59	59	57	21
					31		59	57	

Monthly discharge of Farmers Canal near Oakgrove, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
June	59	54	56.5	3,360
July	59	50	56.9	3,500
August	59	52	56.1	3,450
September	57	21	35.2	2,090
The period				12,400

PACIFIC POWER & LIGHT CO.'S TAILRACE NEAR HOOD RIVER, OREG.

LOCATION.—In SE. ¼ sec. 36, T. 3 N., R. 10 E., opposite gage on Hood River, three-fourths mile south of Hood River, Hood River County.

RECORDS AVAILABLE.—October 1, 1913, to September 30, 1914, and January 1, 1916, to July 31, 1922, when operation of plant was discontinued.

GAGE.—Vertical staff on right bank about 150 feet below power house; read by R. E. Fewel. Vertical staff just below power house used prior to October 1, 1921.

DISCHARGE MEASUREMENTS.—Made from footbridge at gage.

CHANNEL AND CONTROL.—Canal is excavated in gravel; fairly stable.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1921, to July 31, 1922, 1.6 feet October 7, October 23 to November 18, November 23, and 24 (discharge, 114 second-feet); tailrace dry at times.

1913–14; 1916–1922: Maximum discharge recorded, 123 second-feet, in June, July, August, September, and December, 1919, and January and February, 1920.

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

ACCURACY.—Stage-discharge relation permanent during period. Rating curve well defined above 80 second-feet; extended below. Gage read to hundredths once a day October 1 to April 8. Daily discharge ascertained by applying daily gage height to rating table. Records fair prior to April 8, poor thereafter.

Discharge measurements of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 27	J. W. Bones	1.59	108	Apr. 26	K. N. Phillips	1.44	104
Apr. 15	K. N. Phillips	1.19	83	May 2	do	1.26	91

Daily discharge, in second-feet, of Pacific Power & Light Co.'s tailrace, near Hood River, Oreg., for the period October 1, 1921, to July 31, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1	107	114		107	107	107				100
2	107	114		107		107				0
3	107	114		107		107	107			100
4	107	114		107		107	107	100		0
5	107	114		107	107	107	107			
6	107	114		107	107	107	107			100
7	107	114		107	107	107	107	0		
8	107	114		107	107	107	107			
9	107	114		107	107	107			100	
10	107	114		107	107	107				0
								100		
11	107	114		107	107	107				
12	107	114		107	107	107	100			
13	107	114	34	107	107	107				100
14	107	114	34	107	107	107		0		
15	107	114	34	107	107	107				
16	107	114	34	107	107	107				0
17	107	111	34	107	107	107		100		
18	107	114	107		107	107				
19	107	69	107		107	107				
20	107		107		107	107				100
21	107		107		107	107		0		
22	107		107		107	107				
23	114	114	107		107	107	100			0
24	114	114	107		107	107				
25	114	72	107		107	107		100		
26	114	72	107		107	107				100
27	114				107	107				
28	114			107	107	107		0		
29	114			107		107			100	
30	114			107		107	0	100	100	0
31	114		107	107		107				100

NOTE.—No gage height record Apr. 9 to July 31; discharge estimated from a record of the days on which plant was operating. No flow on days for which no discharge is given.

Monthly discharge of Pacific Power & Light Co.'s tailrace near Hood River, Oreg., for the period October 1, 1921, to July 31, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	114	107	109	6,700
November	114	0	83.1	4,940
December	107	0	40.0	2,460
January	107	0	72.5	4,460
February	107	0	95.5	5,300
March	107	107	107	6,580
April	107	0	88.1	5,240
May		0	87.1	5,360
June		0	60.0	3,570
July		0	80.6	4,960
The period				49,600

WHITE SALMON RIVER BASIN

WHITE SALMON RIVER NEAR UNDERWOOD, WASH.

LOCATION.—In NW. ¼ sec. 14, T. 3 N., R. 10 E., 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 September 30, 1922. October 18, 1912, to February 26, 1913, at dam 1 mile above.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by D. J. Shore, foreman of power plant.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, from water-stage recorder, 5.67 feet at 10 p.m. December 1 (discharge, 3,930 second-feet); minimum stage, below zero on November 19 and 20; float could not operate recorder (discharge, practically zero).

1915–1922: Maximum stage from high-water marks, 9.5 feet, old gage datum, December 29, 1917 (discharge, about 9,700 second-feet); minimum stage occurs when power plant is occasionally shut down suddenly, recorder does not operate to such low stages, discharge practically zero.

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

DIVERSIONS.—About 3,500 acres irrigated above this station.

REGULATION.—At low and medium stages practically all water is used through wheels of power plant. Pond above dam covers about 80 acres; daily discharge has been corrected for storage except during continuous high water of April to June.

ACCURACY.—Stage-discharge relation changed very slightly during spring; date of change taken arbitrarily as April 26. Both rating curves well defined above 300 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge obtained by discharge integrator, except for January 19–29, August 11, 12, and September 4–22, for which it was computed from electrical output of power plant, and April 26 to June 4, for which it was ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of White Salmon River near Underwood, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 28	J. W. Bones	2.40	861	July 5	G. H. Canfield	3.42	1,520
Apr. 26	K. N. Phillips	3.39	1,440	Sept. 22	do	2.29	804
May 3	do	3.38	1,400	23	do	1.30	389

Daily discharge, in second-feet, of White Salmon River near Underwood, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	711	728	3,360	898	720	680	1,410	1,360	2,200	1,090	826	724
2	659	706	3,160	890	776	686	1,460	1,360	2,300	1,090	827	705
3	679	668	2,150	854	777	706	1,590	1,390	2,400	1,090	819	662
4	672	652	1,620	863	778	709	1,670	1,540	2,400	1,120	768	698
5	684	648	1,410	852	766	694	1,550	1,760	2,480	1,070	808	690
6	666	620	1,250	858	798	676	1,500	1,760	2,220	1,020	770	700
7	640	652	1,150	851	787	702	1,640	1,660	2,020	1,010	800	714
8	646	626	1,080	834	809	728	1,740	1,620	1,840	986	796	702
9	610	623	1,020	858	782	738	1,560	1,500	1,790	980	810	668
10	632	610	1,050	902	778	738	1,500	1,420	1,740	1,020	766	702
11	614	607	1,450	826	770	737	1,380	1,390	1,580	980	844	664
12	626	622	2,730	830	758	700	1,340	1,360	1,700	957	858	696
13	634	598	2,630	760	740	752	1,280	1,390	1,550	954	720	660
14	676	598	2,770	838	729	748	1,200	1,460	1,540	924	811	668
15	722	622	2,210	836	746	764	1,190	1,710	1,500	934	827	652
16	688	596	1,770	749	758	765	1,060	1,950	1,440	904	815	650
17	682	612	1,600	742	769	746	1,220	2,400	1,400	938	806	614
18	683	592	1,320	776	850	855	1,130	2,500	1,340	910	854	622
19	632	630	1,320	770	792	956	1,060	2,400	1,400	912	814	612
20	670	491	1,140	836	796	1,020	1,160	2,100	1,320	886	764	622
21	640	540	1,120	788	782	1,050	1,170	1,900	1,290	883	825	578
22	635	624	1,130	768	765	1,110	1,290	1,800	1,250	852	722	600
23	620	705	1,100	786	754	1,070	1,320	1,710	1,200	882	742	616
24	632	722	1,020	810	730	1,010	1,320	1,660	1,180	868	712	582
25	614	828	963	782	751	970	1,330	1,660	1,080	836	727	592
26	762	927	956	830	674	948	1,360	1,580	1,300	846	723	590
27	788	958	984	848	686	946	1,360	1,460	1,200	816	729	612
28	907	943	927	782	650	991	1,320	1,580	1,180	794	693	634
29	972	909	924	776	-------	1,110	1,320	1,800	1,170	905	711	616
30	862	2,290	890	774	-------	1,230	1,260	1,900	1,150	810	718	598
31	770	-------	875	744	-------	1,350	-------	2,100	-------	878	738	-------

NOTE.—Daily discharge corrected for storage at power plant. Water-stage recorder failed to operate satisfactorily Jan. 19–29, Aug. 11, 12, and Sept. 4–22.

Monthly discharge of White Salmon River near Underwood, Wash., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	972	610	691	42,500
November	2,290	491	732	43,600
December	3,360	875	1,520	93,500
January	902	742	816	50,200
February	850	650	760	42,200
March	1,350	676	867	53,300
April	1,740	1,060	1,360	80,900
May	2,500	1,360	1,720	106,000
June	2,480	1,080	1,610	95,800
July	1,120	794	940	57,800
August	858	693	779	47,900
September	724	578	648	38,600
The year	3,360	491	1,040	752,000

NOTE.—Discharge corrected for storage at power plant.

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SANDY RIVER BASIN

SANDY RIVER NEAR MARMOT, OREG.

LOCATION.—In SE. ¼ sec. 24, T. 2 S., R. 5 E., on Vanderhoof ranch 1½ miles above Marmot post office, Clackamas County, 2 miles by river above Sandy River Dam of Portland Electric Power Co., and 5 miles below mouth of Salmon River.

DRAINAGE AREA.—267 square miles.

RECORDS AVAILABLE.—August 15, 1911, to December 21, 1915, and July 1, 1919, to September 30, 1922. Combined discharge of Sandy River and canal give same results for the gap in record.

GAGE.—Stevens eight-day water-stage recorder on right bank; inspected by employees of Portland Electric Power Co.

DISCHARGE MEASUREMENTS.—Made from a cable 1 mile below gage.

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; may shift slightly.

EXTREMES OF DISCHARGE.—Maximum stage of year occurred on November 20 when recorder was not working properly. Maximum stage recorded on gage at Sandy River Dam, 40.0 feet, at 9 p. m. on that day (discharge, 25,600 second-feet); no water in canal. Minimum discharge, 295 second-feet at 8 p. m. September 25.

1911–1922: Maximum stage recorded, that of November 20, 1921; minimum discharge recorded, 274 second-feet September 29, 1919.

ICE.—Stage-discharge relation apparently unaffected by ice.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed November 20 and affected by ties on control July 7 to September 30. Both rating curves well defined below 4,000 second-feet. Operation of water-stage recorder satisfactory except as explained in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or, for days of considerable fluctuation, by averaging the discharge for intervals of a day. Shifting-control method used July 7 to September 30. Records good, except for periods of break in record and when stage-discharge relation was affected by ties, for which they are fair.

Discharge measurements of Sandy River near Marmot, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	Wendell Dawson	3.95	587	Apr. 4	K. N. Phillips	6.18	2,810
31	do	4.60	959	July 27	Wendell Dawson	[a]3.25	446
Mar. 4	K. N. Phillips	3.35	546	Aug. 28	F. F. Henshaw	[a]3.10	399
22	do	5.04	1,650	Sept. 25	G. H. Canfield	[a]2.97	301
23	do	4.90	1,600				

[a] Stage-discharge relation affected by ties on control.

Daily discharge, in second-feet, of Sandy River near Marmot, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	416	820	8,860	900	720	508	1,660	2,160	3,840	750	468	392
2	392	720	6,460	810	720	516	960	3,000	3,570	750	444	376
3	376	656	4,120	750	720	545	3,080		3,320	780	452	360
4	368	606	3,080	750	810	555	2,850		3,200	750	444	376
5	364	579	2,560	810	840	555	2,060	3,840	2,740	720	440	364
6	356	561	2,160	810	810	530	1,840	3,080	2,560	670	444	368
7	348	548	1,930	750	810	620	2,510	2,740	2,160	670	464	416
8	340	516	1,700	750	840	620	2,850	2,310	1,980	645	464	376
9	328	484	1,530	960	810	620	2,060	1,980	1,980	695	476	344
10	310	468	1,620	1,060	780	645	1,800	1,930	1,800	720	496	360
11	302	460	2,110	930	720	595	1,530	1,840	1,660	720	525	360
12	306	472	2,740	870	695	620	1,330	2,060	1,570	695	520	376
13	320	452	4,120	840	670	695	1,250	2,960	1,530	695	480	360
14	380	498	2,850	810	670	695	1,210	3,700	1,490	670	428	360
15	428	642	2,310	780	645	780	1,140	4,270	1,370	620	428	360
16	392	633	1,930	810	870	780	1,140	4,580	1,290	645	412	328
17	744	606	1,700	870	930	750	1,060	5,230	1,250	595	428	311
18	855	646	1,570	720	930	840	1,030	4,420	1,210	620	456	311
19	566	2,200	1,370	670	870	1,330	1,210	3,320	1,170	570	440	328
20	615	15,800	1,290	670	750	1,250	1,370	2,960	1,140	535	392	328
21	790	17,000	1,170	670	750	1,660	1,880	2,630	1,060	670	360	311
22	646	8,230	1,060	645	695	1,800	2,310	2,460	995	504	372	311
23	570	5,230	995	620	645	1,570	1,880	2,460	930	500	388	302
24	570	3,840	930	995	620	1,330	1,800	2,560	900	535	392	302
25	675	3,840	900	960	620	1,140	2,020	2,510	930	468	420	302
26	1,030	3,840	840	1,450	595	1,030	2,260	2,260	930	444	428	344
27	1,290	3,840	840	1,210	570	960	1,930	2,210	900	456	428	360
28	3,300	3,200	870	1,030	516	1,170	1,750	2,850	840	464	396	432
29	2,020	4,120	810	930	-------	1,410	1,660	3,440	810	480	396	400
30	1,290	11,600	780	840	-------	1,840	1,750	3,700	750	500	408	328
31	995	-------	750	750	-------	1,570	-------	3,840	-------	492	436	-------

NOTE.—Water-stage recorder not operating satisfactorily Nov. 20 and 21 (graph estimated) and May 2-4 (discharge interpolated). Graph lost Apr. 9-18; discharge determined from daily gage reading.

Monthly discharge of Sandy River near Marmot, Oreg., for the year ending September 30, 1922

[Drainage area, 267 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,300	302	700	2.62	3.02	43,000
November	17,000	452	3,100	11.6	12.94	184,000
December	8,860	750	2,130	7.98	9.20	131,000
January	1,450	620	852	3.19	3.68	52,400
February	930	516	736	2.76	2.87	40,800
March	1,840	508	953	3.57	4.12	58,600
April	3,080	960	1,770	6.63	7.40	105,000
May	5,230	1,840	3,010	11.3	13.03	185,000
June	3,840	750	1,660	6.22	6.94	98,800
July	780	444	614	2.30	2.65	37,800
August	525	360	436	1.63	1.88	26,800
September	432	302	352	1.32	1.47	20,900
The year	17,000	302	1,360	5.09	69.20	984,000

BULL RUN RIVER NEAR BULL RUN, OREG.

LOCATION.—In SE. ¼ sec. 25, T. 1 S., R. 5 E., 1¼ 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, 1922; 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; inspected by F. O. Radford. During gaps in recorder record a staff 1 mile below gage is used.

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

CHANNEL AND CONTROL.—Bed composed of rocks and gravel; shifting in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 13.13 feet at 11 p.m. November 20 (discharge, computed from maximum head over spillway of diversion dam, 20,300 second-feet); minimum stage from water-stage recorder, 0.23 foot August 25 (discharge, 90 second-feet).

1895–1922: Maximum discharge recorded, that of November 20, 1921; minimum discharge recorded, 68 second-feet October 1, 1918.

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

DIVERSIONS.—None above station. The two water-supply pipes divert practically all low-water flow 1½ miles below station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water on November 20. Both rating curves well defined below and fairly well defined above 6,000 second-feet. Rating curve for total flow at dam used April 6 to May 6 fairly well defined. Operation of water-stage recorder satisfactory except for short periods; April 6 to May 12 the recorder was removed for repairs and observer's readings at dam were used, except May 7–12 when none were made. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable fluctuation, by averaging discharge for intervals of a day; April 6 to May 6, by applying mean daily gage height at dam to rating table giving total flow diverted and spilling over dam. Records good.

Discharge measurements of Bull Run River near Bull Run, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	Wendell Dawson	1.04	276	Apr. 5	K. N. Phillips	2.68	1,390
Nov. 22	do	6.11	5,940	Sept. 6	do	.49	161
Mar. 3	K. N. Phillips	.79	265	26	do	.35	116
24	do	1.91	811				

Daily discharge, in second-feet, of Bull Run River near Bull Run, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	177	560	6,700	420	367	242	940	880	1,850	242	102	129
2	165	448	3,700	380	359	239	1,040	1,060	1,750	232	100	123
3	154	397	1,950	343	416	256	2,380	1,260	1,570	222	100	110
4	146	350	1,390	331	545	264	1,800	2,040	1,480	212	102	123
5	137	316	1,080	388	550	260	1,230	2,040	1,230	199	105	177
6	132	300	908	388	535	253	1,110	1,470	1,080	189	107	156
7	127	297	765	359	540	315	1,580		940	183	107	218
8	122	259	673	388	520	319	1,690		875	180	107	165
9	119	240	592	625	485	327	1,210		842	177	105	151
10	117	223	643	661	445	331	1,060	1500	778	171	107	137
11	114	219	1,230	550	411	319	880		691	168	183	120
12	114	226	2,160	495	375	327	760		655	159	154	120
13	130	213	2,220	445	347	359	720	1,350	643	151	162	118
14	184	316	1,390	411	319	367	685	1,660	608	148	126	118
15	219	502	1,010	375	331	406	685	2,000	545	142	140	115
16	199	453	778	375	685	411	650	2,490	510	142	120	110
17	631	408	679	384	745	375	650	2,550	510	142	110	107
18	554	514	598	364	752	520	615	2,050	490	140	105	105
19	369	2,670	495	343	649	1,190	650	1,480	470	134	102	102
20	350	14,500	445	311	545	975	650	1,310	440	126	102	102
21	321	13,500	425	299	480	1,190	720	1,270	416	118	100	100
22	297	6,190	380	288	420	1,230	880	1,350	398	118	97	100
23	263	3,190	359	270	367	975	800	1,230	359	115	95	102
24	359	2,270	327	520	335	790	720	1,230	343	112	93	105
25	459	2,990	307	978	323	655	840	1,270	335	110	90	102
26	1,180	3,400	295	1,080	299	570	925	1,120	327	110	93	118
27	1,480	3,060	299	842	274	510	840	1,120	307	107	95	159
28	2,990	2,270	343	661	256	679	800	1,570	288	107	95	285
29	1,480	3,470	299	535	-------	975	800	1,800	267	107	97	183
30	892	11,600	285	465	-------	1,230	1,210	1,950	253	107	118	145
31	691	-------	274	406	-------	1,010	-------	2,000	-------	105	177	-------

NOTE.—Discharge interpolated Jan. 18; estimated Dec. 1 and 2 and June 1 and 2. Mean discharge estimated May 7–12.

Monthly discharge of Bull Run River near Bull Run, Oreg., for the year ending September 30, 1922

[Drainage area, 102 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	2,990	114	473	4.64	5.35	29,100
November	14,500	213	2,510	24.6	27.45	149,000
December	6,700	274	1,060	10.4	11.99	65,200
January	1,080	270	474	4.65	5.36	29,100
February	752	256	453	4.44	4.62	25,200
March	1,230	239	576	5.65	6.51	35,400
April	2,380	615	984	9.65	10.77	58,600
May	2,550	880	1,570	15.4	17.75	96,500
June	1,850	253	708	6.94	7.74	42,100
July	242	105	151	1.48	1.71	9,280
August	183	90	113	1.11	1.28	6,950
September	285	100	134	1.31	1.46	7,970
The year	14,500	90	766	7.51	101.99	554,000

LITTLE SANDY RIVER NEAR BULL RUN, OREG.

LOCATION.—In NE. ¼ sec. 10, T. 2 S., R. 5 E., three-eighths mile above Portland Electric 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.—May 21, 1911, to April 29, 1913, fragmentary; July 1, 1919, to September 30, 1922.

GAGE.—Stevens 8-day water-stage recorder on left bank, with inside and outside staff gages; inspected by employee of Portland Electric Power Co.

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

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 8.90 feet at midnight November 20 (discharge, 3,950 second-feet); minimum stage, 1.77 feet September 24 and 25 (discharge, 16 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of November 20. Rating curves used before and after change fairly well defined below and extended above 1,600 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table daily mean gage height determined by inspecting recorder graph, or for days of considerable variation in stage by averaging the discharge for intervals of a day. Records good.

Discharge measurements of Little Sandy River near Bull Run, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 21	Wendell Dawson	2.62	51	Apr. 5	K. N. Phillips	3.66	272
Dec. 3	do	3.98	354	Sept. 6	do	2.03	28.4
Mar. 4	Dawson and Phillips	2.50	66	26	G. H. Canfield	1.84	17.8
23	K. N. Phillips	3.48	226				

Daily discharge, in second-feet, of Little Sandy River near Bull Run, Oreg., for the year ending September 30, 1922

Day.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	30	75	1,130	94	88	61	189	181	436	53	19	28
2	28	62	590	92	85	61	212	199	399	50	19	22
3	27	52	378	80	90	65	413	248	402	48	19	20
4	26	46	305	78	110	67	406	382	347	45	19	22
5	25	43	260	98	115	67	293	328	290	42	19	24
6	24	42	210	112	120	66	236	275	263	39	19	27
7	22	42	185	94	124	68	328	239	266	37	19	45
8	21	38	154	92	124	77	382	212	189	35	19	31
9	21	36	140	127	118	69	269	179	254	34	18	24
10	21	35	150	150	102	85	233	173	222	34	19	21
11	20	34	233	130	95	80	201	167	193	34	36	19
12	20	38	311	118	95	77	173	187	191	31	35	19
13	24	35	410	104	89	90	169	251	187	30	36	19
14	30	52	260	94	77	89	161	326	169	28	24	18
15	36	69	195	95	79	106	159	392	143	28	30	17
16	33	62	156	95	97	120	165	492	141	27	26	17
17	206	57	140	102	159	114	159	520	127	26	22	17
18	74	59	132	84	143	121	152	396	126	24	22	17
19	52	302	115	80	144	183	156	287	126	24	22	17
20	54	2,740	108	75	136	197	154	257	116	24	22	17
21	54	2,520	96	76	126	228	165	248	108	24	19	17
22	44	1,160	88	76	116	266	185	269	104	24	19	17
23	40	690	82	74	108	230	173	248	92	24	19	17
24	48	468	77	122	89	193	165	245	90	23	19	16
25	64	452	73	187	79	159	171	281	88	23	18	16
26	134	448	72	208	78	140	183	242	80	23	18	20
27	194	520	74	175	74	128	175	220	73	22	18	28
28	440	410	81	136	67	144	171	329	65	21	17	68
29	188	615	78	120	-------	183	167	385	62	21	17	87
30	118	1,550	77	118	-------	245	163	440	56	21	19	67
31	86	-------	66	99	-------	212	-------	464	-------	20	33	-------

Monthly discharge of Little Sandy River near Bull Run, Oreg., for the year ending September 30, 1922

[Drainage area, 23.0 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	440	20	71.1	3.09	3.56	4,370
November	2,740	34	425	18.5	20.64	25,300
December	1,130	66	207	9.00	10.38	12,700
January	208	74	109	4.74	5.46	6,700
February	159	67	105	4.57	4.76	5,830
March	266	61	129	5.61	6.47	7,930
April	413	154	211	9.17	10.23	12,600
May	520	167	294	12.8	14.76	18,100
June	436	56	180	7.83	8.74	10,700
July	53	20	30.3	1.32	1.52	1,860
August	36	17	21.9	.952	1.10	1,370
September	87	16	26.5	1.15	1.28	1,580
The year	2,740	16	151	6.57	88.90	109,000

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.—2,050 square miles (revised; measured on map of Oregon issued by the United States Geological Survey; scale, 1:500,000).

RECORDS AVAILABLE.—June 1, 1919, to September 30, 1922. Record at Springfield November 27, 1911, to September 30, 1913.

GAGE.—Vertical staff graduated to tenths, fixed to first pier from left bank of highway bridge; read by Lee Goetschius for the United States Weather Bureau.

DISCHARGE MEASUREMENTS.—Made from highway bridge at Springfield, 4 miles by river above gage.

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 year, 14.5 feet at 9 p. m. November 21 (discharge, 50,300 second-feet); minimum stage recorded, 0.8 foot September 25 and 26 (discharge, 680 second-feet).

1919–1922: Maximum stage recorded, 16.5 feet December 30, 1920 (discharge, 63,000 second-feet); minimum discharge recorded, that of September 25 and 26, 1922.

The maximum stage in recent years from records of the United States Weather Bureau, 21.5 feet November 23, 1909 (discharge, about 96,000 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation rather unstable during high water. Rating curves used as follows: October 1 to December 3, fairly well defined; December 4 to March 8, fairly well defined; March 9–23, well defined; March 24 to September 30, well defined. Gage read to tenths once a day, with extra readings for stages above 10 feet. 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 9	K. N. Phillips	6.06	8,610	May 30	R. J. McKinney	5.56	8,070
27	G. H. Canfield	4.52	4,470	Aug. 30	K. N. Phillips	1.13	958
Mar. 11	R. J. McKinney	5.52	7,500	Sept. 30	Wendell Dawson	1.13	954
25	do	7.38	14,800				

Daily discharge, in second-feet, of Willamette River at Eugene, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	860	1,430	40,100	2,400	4.160	3.680	9,700	7,120	9,400	2,740	1,220	930
2	860	1,330	46,100	2,400	3,840	3,400	9,100	7,640	8,500	2,480	1,220	930
3	860	1,230	30,400	3,000	3,400	3,400	8,800	8,200	8,800	2,480	1,220	930
4	860	1,230	16,600	3,130	3,400	3,130	10,600	8,500	8,800	2,480	1,120	840
5	860	1,130	12,100	3,130	7,140	5,560	11,000	10,600	8,800	2,230	1,120	840
6	780	1,130	9,420	5,120	6,840	6,560	9,400	10,600	7,920	2,110	1,020	840
7	780	1,130	7,760	4,500	6,560	7,760	8,500	9,400	7,380	1,990	1,020	840
8	780	1,130	6,840	4,500	5,560	9,420	9,400	9,400	7,120	1,990	1,020	840
9	780	1,040	5,560	4,500	8,400	8,900	9,400	8,200	7,640	1,990	1,020	840
10	780	1,040	5,120	4,320	7,760	8,900	8,800	7,640	8,800	1,870	1,020	840
11	780	950	4,500	4,320	6,840	7,400	9,100	7,120	7,380	1,750	1,020	840
12	780	860	4,160	3,680	5,800	7,100	9,100	6,620	6,620	1,750	1,020	840
13	780	860	4,500	3,400	5,120	6,000	8,800	7,120	6,180	1,640	1,640	840
14	780	860	4,500	3,000	4,500	7,700	9,100	8,800	6,180	1,640	1,420	760
15	860	1,040	4,160	2,750	4,000	7,700	11,000	10,300	5,360	1,530	1,320	760
16	1,040	1,430	3,840	2,870	4,000	8,600	11,400	11,000	5,360	1,530	1,220	760
17	1,130	1,650	3,400	10,100	12,900	8,000	11,400	13,000	4,980	1,530	1,120	760
18	1,330	1,540	3,260	8,080	12,900	6,820	9,700	13,800	4,800	1,530	1,120	760
19	1,430	1,540	3,000	5,120	12,100	6,540	8,800	12,200	4,640	1,530	1,020	760
20	1,230	15,300	2,750	4,500	9,420	12,000	9,700	10,000	4,640	1,320	1,020	760
21	1,230	40,700	2,750	4,160	8,740	12,400	9,700	8,800	4,320	1,320	1,020	760
22	1,130	39,500	2,630	3,680	7,440	12,400	11,000	8,200	4,160	1,320	1,020	760
23	1,130	24,400	2,630	3,260	6.300	14,900	10,600	7,120	3,850	1,320	1,020	760
24	1,230	16,100	2,630	5,800	5,340	22,400	9,100	7,120	3,420	1,320	930	760
25	1,230	12,800	2,510	11,300	4,700	15,000	8,500	7,120	3,700	1,320	930	680
26	1,430	17,300	2,400	11,300	4,500	11,000	9,100	6,620	3,280	1,320	930	680
27	3,720	14,100	2,400	8,740	4,320	9,400	9,400	6,180	3,280	1,320	840	930
28	2,890	16,100	2,400	8,400	4,000	9,100	8,500	5,760	3,280	1,320	840	1,420
29	2,580	12,500	2,400	7,140	-------	9,400	7,640	6,180	3,000	1,220	840	1,220
30	1,890	33,400	2,400	5,800	-------	11,800	7,380	7,640	2,870	1,220	930	1,120
31	1,540	-------	2,400	4,900	-------	11,000	-------	8,800	-------	1,220	930	-------

Monthly discharge of Willamette River at Eugene, Oreg., for the year ending September 30, 1922

[Drainage area, 2,050 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,720	780	1,240	0.605	0.70	76,200
November	40,700	860	8,820	4.30	4.80	525,000
December	46,100	2,400	7,920	3.86	4.45	487,000
January	11,300	2,400	5,140	2.51	2.89	316,000
February	12,900	3,400	6,430	3.14	3.27	357,000
March	22,400	3,130	8,950	4.37	5.04	550,000
April	11,400	7,380	9,460	4.61	5.14	562,000
May	13,800	5,760	8,610	4.20	4.84	529,000
June	9,400	2,870	5,820	2.84	3.17	346,000
July	2,740	1,220	1,690	.824	.95	104,000
August	1,640	840	1,070	.522	.60	65,800
September	1,420	680	853	.416	.46	50,800
The year	46,100	680	5,480	2.67	36.31	3,970,000

WILLAMETTE RIVER AT ALBANY, OREG.

LOCATION.—In SW. ¼ sec. 6, T. 11 S., R. 3 E., 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, 1922; some fragmentary records 1883 to 1888.

GAGE.—Vertical staff in two sections on right bank; read by F. M. French for United States Weather Bureau.

DISCHARGE MEASUREMENTS.—Made from Southern Pacific Railroad 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, 23.2 feet at 4 p. m. November 23 (discharge, 122,000 second-feet); minimum stage recorded, 0.7 foot September 24–26 (discharge, 2,780 second-feet).

1878–1882; 1892–1922: 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 maximum stage ever known was 36.0 feet December 8, 1861 (discharge estimated from extension of rating curve, 302,000 second-feet).

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

DIVERSIONS.—Albany power canal has diverted water from South Santiam River near Lebanon and discharged it into Willamette River above gage and measuring section since the early nineties. It ordinarily carries between 200 and 250 second-feet.

REGULATION.—Practically none.

Accuracy.—Stage-discharge relation practically permanent during year. 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 the United States Weather Bureau.

Discharge measurements of Willamette River at Albany, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 5	K. N. Phillips	1.48	4,220	Feb. 11	McKinney and Phillips	6.53	19,400
Feb. 4	McKinney and Cooper	4.20	11,100	Aug. 31	K. N. Phillips	.91	3,200

Daily discharge, in second-feet, of Willamette River at Albany, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,480	5,400	57,500	8,940	15,300	11,500	24,900	14,200	17,100	6,360	3,680	3,120
2	3,300	5,160	103,000	9,480	12,500	10,900	22,300	13,900	18,300	6,120	3,680	3,120
3	3,300	4,720	116,000	10,600	11,500	10,400	20,700	15,300	17,100	5,880	3,680	3,120
4	3,300	4,280	101,000	10,600	10,900	11,200	20,300	15,600	16,700	5,640	3,680	3,120
5	3,300	4,280	58,000	10,900	12,500	15,000	22,700	16,400	17,500	5,400	3,680	3,120
6	3,120	4,080	40,200	13,900	16,400	17,500	21,500	21,100	16,700	5,400	3,480	3,300
7	3,120	3,880	31,600	19,900	15,600	18,700	19,900	20,700	15,300	5,160	3,480	3,300
8	3,120	3,880	25,800	19,500	16,400	21,900	18,300	18,700	13,900	5,160	3,480	3,300
9	3,120	3,680	21,500	16,700	19,900	22,700	19,500	17,500	13,200	4,940	3,480	3,120
10	3,120	3,680	20,700	14,600	23,300	20,700	18,700	16,400	15,300	4,940	3,480	3,120
11	3,120	3,680	16,700	13,200	20,300	20,300	18,300	14,600	16,000	4,940	3,480	3,120
12	3,120	3,680	15,300	12,500	18,300	17,500	18,300	13,900	13,900	4,940	3,480	3,120
13	3,120	3,680	14,600	11,800	17,100	16,000	18,300	13,200	12,800	4,940	3,680	3,120
14	3,300	3,680	17,500	10,600	16,000	17,500	18,300	12,200	12,200	4,720	4,080	3,120
15	3,300	3,880	17,100	10,000	15,000	19,500	21,500	15,000	11,500	4,720	4,500	2,940
16	3,300	3,880	15,300	9,760	14,600	22,700	24,900	17,900	10,600	4,500	3,880	2,940
17	3,300	4,280	14,200	10,300	21,500	24,400	25,800	20,700	10,600	4,500	3,680	2,940
18	3,300	4,940	12,800	10,300	32,600	21,500	24,400	24,000	10,000	4,280	3,480	2,940
19	3,480	4,940	11,800	13,900	34,400	20,300	21,100	25,800	9,480	4,080	3,480	2,940
20	3,680	12,500	11,200	13,900	32,600	22,300	19,500	22,700	9,480	4,080	3,480	2,940
21	3,680	51,000	10,600	12,200	28,500	28,000	18,300	19,500	9,200	3,880	3,480	2,940
22	3,680	87,000	10,000	10,900	24,000	28,500	18,300	17,100	8,940	3,880	3,480	2,940
23	3,880	120,000	9,480	10,300	20,300	29,000	20,700	15,600	8,680	3,680	3,300	2,940
24	3,880	103,000	8,680	10,300	16,700	33,000	20,300	14,200	8,160	3,680	3,300	2,780
25	3,880	65,200	8,160	15,300	14,200	40,600	17,900	14,600	7,640	3,680	3,300	2,780
26	4,280	51,000	8,420	21,100	13,900	33,900	17,100	14,200	7,380	3,680	3,300	2,780
27	4,940	55,000	8,160	23,100	13,200	26,200	17,900	13,900	7,380	3,680	3,300	3,120
28	7,120	54,000	9,480	23,100	12,200	22,300	17,500	13,900	7,120	3,680	3,120	3,680
29	7,640	52,500	9,760	20,300	-------	21,900	16,000	12,200	7,120	3,680	3,120	3,680
30	7,120	44,700	9,760	18,300	-------	23,100	15,000	12,500	6,600	3,680	3,120	3,480
31	6,860	-------	9,480	16,400	-------	27,200	-------	14,600	-------	3,680	3,120	-------

Monthly discharge of Willamette River at Albany, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	7,640	3,120	3,940	242,000
November	120,900	3,680	25,900	1,540,000
December	116,000	8,160	26,600	1,640,000
January	23,100	8,940	14,000	861,000
February	34,400	10,900	18,500	1,030,000
March	40,600	10,400	21,800	1,340,000
April	25,800	15,000	19,900	1,180,000
May	25,800	12,200	16,500	1,010,000
June	18,300	6,600	11,900	708,000
July	6,360	3,680	4,570	281,000
August	4,080	3,120	3,520	216,000
September	3,680	2,780	3,100	184,000
The year	120,000	2,780	14,100	10,200,000

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, 1922, with some breaks,

GAGE.—Vertical staff attached to right abutment of highway bridge at McKenzie Bridge; read by S. L. Taylor.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above ranger station.

CHANNEL AND CONTROL.—Bed rocky; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded and probable maximum for year, 4.7 feet November 21 (discharge, 7,500 second-feet); minimum stage recorded, 0.55 foot September 30 (discharge, 1,020 second-feet).

1910–1922: Maximum stage recorded, 5.2 feet December 30, 1920 (discharge, 8,600 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 changed probably during high water of November 21. Rating curves used before and after change fairly well defined below and poorly defined above 3,000 second-feet. Gage read to hundredths once a day at irregular intervals. Daily discharge, for days when gage heights are available, determined by applying daily gage height to rating table. Records fair.

The following discharge measurement was made by Wendell Dawson:
September 30, 1922: Gage height, 0.55 foot; discharge, 1,000 second-feet.

Daily discharge, in second-feet, of McKenzie River at McKenzie Bridge, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Jan.	Apr.	May	June	July	Aug.	Sept.
1	1,320	1,390			1,860	3,360	1,860		1,160
2	1,320	1,390		1,860		3,360	1,860	1,400	1,150
3	1,320			1,990	2,000	3,020	1,860		1,150
4				1,860		3,530	1,860		1,150
5					2,130	3,360	1,800	1,370	1,150
6	1,280	1,320			2,550	3,190	1,800	1,360	1,130
7					2,410	3,020	1,730	1,360	1,120
8						2,860	1,730	1,350	1,110
9			1,610			3,020	1,800	1,350	1,110
10		1,250				3,190	1,740	1,320	1,110
11	1,250	1,250	1,610			2,860	1,680	1,320	1,110
12			1,560			2,860	1,610	1,300	1,110
13	1,250		1,500				1,610	1,290	
14							1,560	1,280	
15	1,250				2,500	2,860	1,560	1,280	1,090
16		1,320					1,560		
17	1,280						1,560		
18		1,250				2,860			1,070
19	1,320	1,320				2,860			
20	1,280	4,240				2,550	1,530	1,220	
21	1,250	7,500				2,450			1,060
22	1,250					2,360	1,500		
23	1,280				2,700	2,270	1,500		1,050
24	1,300				2,860	2,270		1,170	
25	1,320			1,730		2,270			1,050
26		4,600		1,860		2,200			
27	1,390	4,420		1,860	3,000	2,130	1,460	1,160	1,150
28		3,880		1,860		2,060			1,170
29	1,460			1,860		1,990			1,170
30	1,430			1,860	3,190	1,990			1,020
31	1,420				3,360				

NOTE.—Gage not read Oct. 1; 4–10, 12–14, 16–18, 20, 23, 24, 26–28, 30, 31, May 2–4, 8–22, 25–29, June 9, 13–17, 21, 22, 26, 27, July 10, 11, 18–21, 24–31, Aug. 1–4, 6, 7, 12, 13, 16–23, 25–31, Sept. 1, 3, 6, 7, 13–17, 19–22, 24–26; discharge estimated or interpolated.

Monthly discharge of McKenzie River at McKenzie Bridge, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,460	1,250	1,300	80,000
May	3,360	1,860	2,570	158,000
June	3,530	1,990	2,740	163,000
July	1,860		1,610	99,000
August			1,270	78,100
September	1,170		1,100	65,500

LONG TOM RIVER NEAR MONROE, OREG.

LOCATION.—In sec. 21, T. 14 S., R. 5 W., at a highway bridge 1½ miles north of Monroe, Benton County.

DRAINAGE AREA.—400 square miles.

RECORDS AVAILABLE.—November 13, 1920, to September 30, 1922.

GAGE.—Vertical staff on right abutment of bridge; read by William Pfouts.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of silt and gravel. Banks low and wooded. Control 400 feet below gage; fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.9 feet (from high-water mark), November 22 or 23 (discharge, 6,500 second-feet); minimum stage recorded, 0.15 foot September 17 (discharge, 12 second-feet).

1920–1922: Maximum stage recorded, 11.1 feet December 12, 1920 (discharge, 6,900 second-feet); minimum stage, that of September 17, 1922.

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

DIVERSIONS.—None.

REGULATION.—Probably some fluctuation at low stages due to pondage at mill dam at Monroe.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Gage read once a day to hundredths at low stages and to tenths at high water. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Long Tom River near Monroe, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 20	R. J. McKinney	5.36	1,390	Feb. 10	Phillips and McKinney	6.90	2,190
Dec. 11	McKinney and Cooper	3.94	980	Aug. 19	F. F. Henshaw	.29	25.9

Daily discharge, in second-feet, of Long Tom River near Monroe, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	33	138	4,080	626	1,190	822	1,640	374	115	59	26	25
2	28	107	5,160	654	1,060	794	1,220	332	113	58	26	25
3	27	88	5,520	738	910	766	1,100	346	109	54	26	24
4	27	77	5,340	794	822	970	933	346	109	53	26	24
5	27	75	4,080	970	850	1,600	766	346	107	52	25	15
6	26	66	3,100	1,600	940	2,490	766	346	107	50	24	24
7	25	61	2,210	2,160	880	2,800	710	346	105	50	25	26
8	25	54	1,640	2,210	1,060	2,670	682	332	102	48	31	27
9	25	54	1,330	1,690	1,730	2,430	682	318	102	48	31	27
10	25	54	1,100	1,290	2,210	2,210	654	318	105	48	33	16
11	24	52	1,000	1,100	1,970	1,830	654	318	105	48	35	25
12	23	47	850	910	1,870	1,640	682	290	102	48	26	27
13	23	46	970	794	1,970	1,400	710	264	98	48	18	30
14	27	44	1,130	682	1,730	1,360	880	238	94	47	22	28
15	27	48	1,290	626	2,060	1,400	1,430	225	90	47	22	27
16	48	56	1,030	598	1,510	1,830	1,830	212	88	41	22	27
17	59	75	850	738	2,060	2,310	2,310	199	86	47	22	12
18	73	105	710	880	3,180	2,210	1,830	186	84	46	26	16
19	73	186	682	822	3,840	2,110	1,330	173	82	46	30	22
20	73	1,400	598	738	4,200	2,160	1,060	173	81	44	16	25
21	71	3,540	570	654	3,740	2,430	940	173	77	42	20	25
22	61	5,880	514	626	3,100	2,310	794	160	73	40	23	24
23	48	5,880	486	598	2,260	2,110	710	160	71	27	24	24
24	46	5,520	486	710	1,600	2,430	598	160	70	33	26	15
25	46	5,160	458	1,000	1,330	2,610	514	155	68	33	27	18
26	56	4,700	430	1,260	1,290	2,120	486	150	66	31	28	18
27	92	5,160	542	1,360	1,260	1,640	430	143	66	31	18	15
28	134	4,700	766	1,600	1,160	1,730	430	136	64	31	20	26
29	160	4,440	880	1,920	-------	1,830	430	134	63	30	25	30
30	173	3,960	766	1,730	-------	1,920	402	129	61	25	25	41
31	173	-------	654	1,430	-------	1,780	-------	120	-------	26	26	-------

Monthly discharge of Long Tom River near Monroe, Oreg., for the year ending September 30, 1922

[Drainage area, 400 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	173	23	57.4	0.144	0.17	3,530
November	5,880	44	1,730	4.32	4.82	103,000
December	5,520	430	1,590	3.98	4.59	97,800
January	2,210	598	1,080	2.70	3.11	66,400
February	4,200	822	1,850	4.62	4.81	103,000
March	2,800	766	1,890	4.72	5.44	116,000
April	2,310	402	920	2.30	2.57	54,700
May	374	120	236	.590	.68	14,500
June	115	61	88.8	.222	.25	5,280
July	59	25	42.9	.107	.12	2,640
August	35	16	25.0	.062	.07	1,540
September	41	12	23.6	.059	.07	1,400
The year	5,880	12	787	1.97	26.70	570,000

MUDDY CREEK NEAR CORVALLIS, OREG.

LOCATION.—In SW. ¼ sec. 29, T. 12 S., R. 5 W., at highway bridge 1½ miles east of Independence School and 3 miles south of Corvallis, Benton County.

DRAINAGE AREA.—120 square miles (from national-forest maps).

RECORDS AVAILABLE.—October 30, 1920, to June 30, 1921; November 1, 1921, to September 30, 1922.

GAGE.—Vertical staff nailed to pile of bridge. Chain gage on bridge used for high stages beginning December 10, 1921. Gages read by Mrs. C. G. Davis.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel deep, narrow, and very crooked. Banks below gage are overflowed at a stage of about 10 feet. Control not definite but apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 17.2 feet at 4.30 p. m. November 21 (discharge, 3,280 second-feet); minimum stage, −0.79 foot September 12–14 (discharge, 11 second-feet).

1920–1922: Maximum stage recorded, that of November 21, 1921; minimum stage recorded, that of September 12–14, 1922.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined below 2,000 second-feet. Gage read once a day to hundredths at low stages and to half-tenths at medium and high stages; four times a day to tenths November 20 to December 6. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records good.

Discharge measurements of Muddy Creek near Corvallis, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 10	McKinney and Cooper	7.02	305	Feb. 10	McKinney and Phillips	10.60	578
17	R. J. McKinney	5.36	218	Aug. 19	F. F. Henshaw	−.68	13.0

Daily discharge, in second-feet, of Muddy Creek near Corvallis, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50	1,420	199	264	209	350	103	40	22	14	12
2	50	1,980	209	234	179	308	99	38	21	14	12
3	50	1,800	209	214	131	274	99	36	20	14	12
4	40	1,300	254	214	362	244	99	36	19	14	12
5	34	1,070	362	209	545	219	99	36	19	13	12
6	31	776	760	204	640	199	95	34	19	13	13
7	31	584	808	204	676	179	91	32	19	13	13
8	31	429	746	460	584	199	85	32	19	13	13
9	31	362	422	545	500	204	80	32	19	13	14
10	29	314	387	604	460	199	79	32	19	13	15
11	27	290	326	554	422	209	79	32	19	13	14
12	27	254	269	616	387	214	78	32	19	13	11
13	27	259	244	492	368	219	74	32	19	13	11
14	27	302	204	422	368	296	73	31	19	14	11
15	29	290	184	368	468	387	68	30	19	14	12
16	37	254	179	545	564	444	64	30	18	14	12
17	37	219	204	960	500	476	62	29	17	14	12
18	43	194	179	1,270	518	401	60	28	17	14	12
19	73	184	147	1,200	808	332	60	28	16	14	12
20	746	174	209	1,010	960	279	58	28	15	14	13
21	3,140	164	151	690	986	234	54	28	15	14	13
22	2,300	155	143	509	676	204	54	27	15	14	13
23	1,680	151	143	415	628	184	54	27	15	13	13
24	1,380	147	219	350	574	164	54	27	15	13	13
25	1,340	139	274	308	509	151	54	27	15	13	13
26	1,520	143	344	284	408	143	50	27	15	12	14
27	1,520	184	387	264	356	135	50	26	15	12	17
28	1,270	224	429	239	401	123	49	25	15	12	17
29	1,170	229	429	-------	408	115	44	24	15	12	18
30	1,200	214	374	-------	422	111	43	23	15	12	21
31	-------	194	308	-------	401	-------	42	-------	15	12	-------

NOTE.—Discharge estimated Nov. 1–3.

Monthly discharge of Muddy Creek near Corvallis, Oreg., for the year ending September 30, 1922

[Drainage area, 120 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
November	3,140	27	599	4.99	5.57	35,600
December	1,980	139	484	3.87	4.46	28,500
January	808	143	313	2.61	3.01	19,200
February	1,270	204	487	4.06	4.23	27,000
March	986	131	497	4.14	4.77	30,600
April	476	111	240	2.00	2.23	14,300
May	103	42	69.5	.579	.67	4,270
June	40	23	30.3	.252	.28	1,800
July	22	15	17.4	.145	.17	1,070
August	14	12	13.2	.110	.13	812
September	21	11	13.3	.111	.12	791
The period						164,000

CALAPOOYA RIVER NEAR TANGENT, OREG.

LOCATION.—In sec. 32, T. 12 S., R. 3 W., at highway bridge, 1 mile southeast of bridge on Pacific Highway, and 4 miles southeast of Tangent, Linn County.

DRAINAGE AREA.—262 square miles (from national-forest map).

RECORDS AVAILABLE.—November 27, 1920, to May 31, 1922.

GAGE.—Chain gage on downstream side of highway bridge near center; read by Miss Alvadia Suiker.

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

CHANNEL AND CONTROL.—Channel narrow; fairly straight near gage. Banks wooded and are overflowed at stage of about 16 feet. Low-water control hardpan 300 feet below gage; fairly permanent. No definite control at high water.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1921, to May 31, 1922, 20.3 feet at 11 a. m. November 21 (discharge, 5,670 second-feet); minimum stage recorded, 1.10 feet October 11 and 12 (discharge, 4 second-feet, low flow due to ponding water at dam above).

1920–1922: Maximum stage recorded, that of November 21, 1921; minimum stage recorded, 1.00 foot August 26 and September 18, 1921 (discharge, 3 second-feet).

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

DIVERSIONS.—None.

REGULATION.—Small pondage at Thompson flouring mills several miles above causes considerable fluctuation at low stages.

ACCURACY.—Stage-discharge relation practically permanent during period. Rating curve well defined below 5,000 second-feet. Gage read to half-tenths once daily or, in times of considerable fluctuation, twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Calapooya River near Tangent, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 5	K. N. Phillips	2.35	125	Jan. 7	R. J. McKinney	12.65	1,490
29	R. J. McKinney	15.40	2,320	28	do	10.41	1,210
Dec. 16	do	6.10	548	Feb. 11	Phillips and McKinney	8.11	833

Daily discharge, in second-feet, of Calapooya River near Tangent, Oreg., for the period October 1, 1921, to May 31, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1	8	221	4,360	515	515	437	1,050	489
2	15	198	4,640	684	489	425	862	502
3	25	154	3,770	580	463	413	990	541
4	35	121	2,220	645	684	580	1,100	567
5	45	110	1,560	726	846	1,090	990	800
6	55	99	1,250	2,040	740	910	910	684
7	77	88	990	1,690	830	1,220	785	606
8	66	94	800	1,050	1,590	1,020	770	580
9	55	88	684	712	1,400	942	740	554
10	35	77	606	712	1,020	1,150	726	437
11	4	77	567	606	862	926	862	437
12	4	66	541	528	894	684	958	425
13	5	66	1,250	489	755	800	800	413
14	15	66	1,180	450	862	1,020	990	515
15	45	77	740	437	1,120	1,740	1,490	619
16	55	121	554	541	1,390	1,980	1,180	684
17	88	143	489	878	1,800	1,490	1,130	698
18	88	165	437	632	1,900	1,220	910	712
19	88	187	401	554	1,630	1,020	830	684
20	99	2,660	377	463	1,250	1,740	770	645
21	99	5,540	365	425	958	1,470	740	606
22	88	4,740	353	413	830	1,660	815	425
23	77	5,240	329	401	712	1,950	770	401
24	88	3,690	365	755	606	2,420	658	377
25	77	3,540	413	846	567	1,510	645	353
26	132	3,690	502	862	502	1,250	632	341
27	377	4,090	515	1,170	476	1,220	606	305
28	341	3,690	502	1,180	450	1,150	567	293
29	281	2,390	476	926	-------	1,120	541	305
30	257	2,430	450	740	-------	1,340	515	365
31	245	-------	482	554	-------	1,180	-------	350

Monthly discharge of Calapooya River near Tangent, Oreg., for the period October 1, 1921, to May 31, 1922

[Drainage area, 262 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	377	4	95.8	0.366	0.42	5,890
November	5,540	66	1,460	5.57	6.21	86,900
December	4,640	329	1,040	3.97	4.58	64,000
January	2,040	401	749	2.86	3.30	46,100
February	1,900	450	934	3.56	3.71	51,900
March	2,430	413	1,200	4.58	5.28	73,800
April	1,490	515	844	3.22	3.59	50,200
May	800	293	507	1.94	2.24	31,200
The period						410,000

OAK CREEK NEAR ALBANY, OREG.

LOCATION.—In sec. 34, T. 11 S., R. 3 W., at highway bridge 1 mile south of Fry station on Lebanon branch of Southern Pacific Railroad, and 5 miles southeast of Albany, Linn County.

DRAINAGE AREA.—39 square miles (from national-forest map).

RECORDS AVAILABLE.—November 1, 1920, to May 31, 1922.

GAGE.—Vertical staff fixed to downstream side of right abutment of highway bridge; read by Ralph Marquis.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Channel straight with high, clean banks above gage; crooked with wooded banks below. Bed composed of gravel and hardpan; subject to shift at high stages. Two channels above stage of 1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period November 1, 1921, to May 31, 1922, 7.3 feet on afternoon of November 20, determined from high-water marks (discharge, by extension of rating curve, 1,990 second-feet); minimum stage, 0.12 foot May 31 (discharge, 1.2 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent during year. Rating curve fairly well defined below 600 second-feet; extended above. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good, except for low water of May, for which they are fair.

Discharge measurements of Oak Creek near Albany, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 4	K. N. Phillips	0.23	3.1	Jan. 21	R. J. McKinney	0.76	22.9
Dec. 16	R. J. McKinney	1.01	39.4	28	do	2.57	202
Jan. 14	McKinney and Cooper	.78	22.8				

Daily discharge, in second-feet, of Oak Creek near Albany, Oreg., for the period November 1, 1921, to May 31, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May
1	2.6	1,110	119	45	19	53	6.7
2	2.6	265	87	34	18	45	6.4
3	2.6	125	69	49	37	108	7.6
4	2.6	97	102	92	177	53	14
5	2.6	78	153	82	201	49	14
6	2.4	65	265	61	102	36	9.7
7	2.6	53	114	45	201	32	8.5
8	2.2	45	92	379	114	49	9.4
9	2.0	37	69	114	87	32	7.9
10	1.9	49	57	114	153	61	6.7
11	1.8	49	45	114	87	53	6.7
12	1.7	36	38	114	61	92	6.4
13	1.6	252	36	92	177	53	4.6
14	1.6	108	16	65	125	177	4.0
15	3.2	69	29	61	910	147	3.6
16	7.6	45	78	278	306	153	3.2
17	9.1	38	108	201	130	102	3.0
18	6.1	42	45	265	87	82	2.8
19	74	45	15	114	379	53	3.8
20	1,660	49	20	78	130	42	3.2
21	1,010	25	27	74	108	35	3.2
22	322	22	22	53	165	28	3.2
23	379	21	26	45	359	22	2.0
24	292	31	177	34	141	18	2.0
25	401	22	87	33	102	15	2.8
26	339	37	102	49	69	12	2.0
27	815	108	130	36	61	11	1.9
28	201	78	189	24	97	9.7	1.7
29	153	53	87	-------	108	9.1	1.5
30	265	45	61	-------	102	7.6	1.3
31	-------	42	49	-------	69	-------	1.2

NOTE.—Discharge estimated Nov. 1–3.

Monthly discharge of Oak Creek near Albany, Oreg., for the period November 1, 1921, to May 31, 1922

[Drainage area, 39 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
November	1,660	1.6	199	5.11	5.70	11,800
December	1,110	2.1	101	2.59	2.99	6,200
January	265	15	81.1	2.08	2.40	4,990
February	379	24	98.0	2.52	2.62	5,040
March	910	18	158	4.05	4.67	9,720
April	177	7.6	54.6	1.41	1.57	3,250
May	14	1.2	5.0	.128	.15	307
The period						41,300

NORTH SANTIAM RIVER AT MEHAMA, OREG.

LOCATION.—In NW. ¼ sec. 18, T. 9 S., R. 2 E., at Mehama, Marion County, half a mile below mouth of Little North Santiam River and 1 mile north of Lyons railroad station.

DRAINAGE AREA.—740 square miles.

RECORDS AVAILABLE.—July 11, 1905, to March 31, 1907; October 11, 1910, to September 30, 1914; September 9, 1921, to September 30, 1922.

GAGE.—Staff in two sections on right bank; the lower section inclined, the upper vertical. Read by W. P. Mulkey.

DISCHARGE MEASUREMENTS.—Made from highway bridge 200 feet above gage.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the period September 9, 1921, to September 30, 1922, 17.5 feet about 6 p. m. November 20 (discharge, 62,000 second-feet); minimum stage recorded, 1.79 feet September 25 (discharge, 621 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during flood of November 20. Rating curve well defined below 15,000 second-feet; poorly defined between 15,000 and 30,000 second-feet; extended above. Gage read once a day to hundredths at low water, to half-tenths at medium stages, and to tenths at high stages. Daily discharge ascertained by applying daily gage height to rating table. Records good, except for extreme flood stages for which they are fair.

Discharge measurements of North Santiam River at Mehama, Oreg., during the period September 9, 1921, to September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1921		*Feet*	*Sec.-ft.*	1922		*Feet*	*Sec.-ft.*
Sept. 9	K. N. Phillips	2.19	824	May 20	R. J. McKinney	5.40	7,450
Nov. 7	do	2.76	1,390	27	do	4.27	4,520
				June 3	do	5.90	8,430
1922				Aug. 29	K. N. Phillips	1.92	725
Feb. 13	do	2.91	1,850				

Daily discharge, in second-feet, of North Santiam River at Mehama, Oreg., for the period September 9, 1921, to September 30, 1922

Day	1921				1922								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	-------	1,120	2,500	28,000	2,370	2,200	1,680	4,560	4,800	9,300	1,680	860	738
2	-------	1,070	2,160	25,500	2,540	2,040	1,610	4,340	5,280	9,000	1,610	860	720
3	-------	1,020	1,860	13,600	2,370	2,040	1,750	5,780	5,780	8,720	1,680	860	720
4	-------	1,020	1,720	10,200	2,370	2,540	1,820	7,600	6,280	8,720	1,610	860	720
5	-------	970	1,590	7,880	2,370	2,720	1,820	6,040	10,500	7,600	1,540	860	756
6	-------	970	1,520	6,560	2,720	2,370	1,750	5,280	8,160	6,820	1,480	860	765
7	-------	920	1,460	5,520	2,370	2,370	2,040	4,800	7,080	6,040	1,360	810	774
8	-------	920	1,340	4,800	2,370	2,370	2,040	7,080	6,560	5,280	1,360	810	765
9	820	890	1,280	4,120	2,370	2,540	2,040	5,520	5,280	5,230	1,240	310	738
10	820	880	1,230	3,900	2,900	2,370	2,200	4,800	4,800	5,780	1,240	810	720
11	820	870	1,230	4,120	2,540	2,200	1,960	4,340	4,340	4,800	1,240	860	720
12	775	860	1,180	4,340	2,370	2,040	1,960	3,900	3,900	4,800	1,180	960	720
13	775	890	1,180	7,600	2,370	1,890	2,370	3,690	5,780	4,560	1,120	1,010	702
14	775	900	1,120	5,040	2,200	1,890	2,370	3,690	7,600	4,560	1,120	910	702
15	775	1,120	1,460	5,280	2,040	1,750	2,540	3,490	9,600	4,120	1,060	910	702
16	775	1,340	1,460	4,340	2,200	4,120	2,720	3,690	11,100	3,690	1,060	860	684
17	775	1,180	1,340	3,900	2,720	4,120	2,540	3,490	12,300	3,490	1,010	860	675
18	820	3,050	1,280	3,690	2,200	3,900	2,370	3,090	12,300	3,490	1,010	810	630
19	4,300	1,930	1,400	3,290	2,040	3,490	3,900	3,290	9,300	3,290	1,010	810	675
20	3,450	1,590	43,000	2,900	2,040	3,090	4,340	3,290	7,340	3,290	1,010	810	675
21	2,330	1,720	50,500	2,720	1,890	2,720	4,800	3,900	6,300	2,900	960	810	630
22	3,250	1,460	30,500	2,540	1,890	2,540	6,820	5,280	6,040	2,540	960	810	630
23	2,160	1,340	18,800	2,370	1,750	2,200	6,300	5,040	5,520	2,370	960	765	630
24	1,660	1,340	12,600	2,370	2,370	2,040	6,040	4,560	5,520	2,370	960	765	630
25	1,590	1,590	13,200	2,200	3,690	2,040	4,560	4,800	5,780	2,370	910	765	621
26	1,520	2,330	16,400	2,040	4,560	1,890	3,900	5,520	5,040	2,370	910	765	630
27	1,460	4,300	14,400	2,040	3,900	1,750	3,490	5,040	4,560	2,200	910	765	810
28	1,400	9,760	11,100	2,370	3,490	1,680	3,490	4,560	5,280	2,200	910	738	960
29	1,280	6,260	12,300	2,040	2,900	-------	3,900	4,340	7,080	2,040	910	738	1,010
30	1,180	3,860	39,500	2,040	2,720	-------	8,440	4,120	7,880	1,750	860	720	810
31	-------	3,050	-------	2,040	2,370	-------	5,040	-------	9,000	-------	860	720	------

Monthly discharge of North Santiam River at Mehama, Oreg., for the year ending September 30, 1922

[Drainage area, 740 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	9,760	860	1,950	2.64	3.04	120,000
November	50,500	1,120	9,690	13.1	14.62	577,000
December	28,000	2,040	5,790	7.82	9.02	356,000
January	4,560	1,750	2,550	3.45	3.98	157,000
February	4,120	1,680	2,460	3.32	3.46	137,000
March	8,440	1,610	3,310	4.47	5.15	204,000
April	7,600	3,090	4,630	6.26	6.98	276,000
May	12,300	3,900	6,970	9.42	10.86	429,000
June	9,300	1,750	4,520	6.11	6.82	269,000
July	1,680	860	1,150	1.55	1.79	70,700
August	1,010	720	825	1.11	1.28	50,700
September	1,010	621	722	.976	1.09	43,000
The year	50,500	621	3,710	5.01	68.09	2,690,000

CLACKAMAS RIVER AT BIG BOTTOM, OREG.

LOCATION.—In SE. ¼ sec. 26, T. 6 S., R. 7 E., half a mile above proposed dam site, just below Pot Creek, 10 miles above mouth of Oak Grove Fork and 30 miles southeast of Estacada, Clackamas County.

DRAINAGE AREA.—136 square miles (measured on map of Mount Hood National Forest)

RECORDS AVAILABLE.—April 11, 1920, to September 30, 1922.

GAGE.—Stevens continuous water-stage recorder on right bank referenced to an outside gage; inspected by employees of Portland Electric Power Co.

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

CHANNEL AND CONTROL.—Bed composed of boulders; control fairly permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage, from water-stage recorder, 6.14 feet at 2 p. m. November 30 (discharge, 3,690 second-feet); minimum stage, 1.42 feet September 18-25 (discharge, 256 second-feet).

1920–1922: Maximum stage recorded, 6.2 feet January 3, 1921 (discharge, 3,760 second-feet); minimum stage, that of September 18–25, 1922.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge regulation permanent during year. Rating curve well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or, for days of considerable fluctuation, by averaging discharge for intervals of a day. Records excellent.

COOPERATION.—Field data furnished by Portland Electric Power Co.

Discharge measurements of Clackamas River at Big Bottom, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 24	K. N. Phillips	3.18	1,000	June 27	Sharp and Herring	1.89	410
24	do	3.23	1,050	Aug. 10	Canfield and Bauer	1.48	248
25	do	3.60	1,220	Sept. 8	Swanson and Bannister[a]	1.45	262
May 30	W. L. Sharp[a]	3.08	972				

[a] Engineer, Portland Electric Power Co.

Daily discharge, in second-feet, of Clackamas River at Big Bottom, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	298	328	2,730	425	334	304	393	530	1,240	373	274	268
2	295	320	1,920	401	328	304	405	572	1,240	365	274	268
3	295	314	1,360	389	328	304	470	618	1,240	357	274	265
4	292	307	1,100	381	328	307	506	715	1,240	349	271	265
5	292	304	965	385	328	307	478	815	1,160	342	271	268
6	289	301	840	373	324	304	461	790	1,040	338	268	268
7	289	298	765	361	324	310	488	790	965	331	274	268
8	289	295	690	361	324	304	542	740	915	324	274	265
9	289	298	640	377	324	304	510	690	1,130	320	274	262
10	286	295	618	373	320	304	488	640	965	317	274	262
11	286	295	665	357	320	301	465	618	865	314	292	259
12	283	298	765	349	317	304	449	618	815	307	295	259
13	289	295	815	345	310	307	437	690	790	304	289	259
14	304	310	765	342	307	304	429	790	740	301	283	259
15	310	310	690	342	314	307	417	940	690	298	283	259
16	310	304	618	345	369	307	409	1,100	640	292	277	259
17	331	298	595	328	361	304	393	1,300	618	289	277	259
18	331	301	572	304	357	307	385	1,330	595	286	277	256
19	304	388	526	328	342	349	385	1,160	572	283	274	256
20	304	1,930	510	345	334	349	385	1,040	550	280	274	256
21	314	3,280	518	331	331	365	401	965	530	280	277	256
22	301	2,250	496	324	324	381	445	915	506	280	274	256
23	295	1,330	478	320	320	389	457	890	474	280	274	256
24	304	1,100	461	361	317	377	457	890	457	280	271	256
25	307	1,240	449	385	314	365	474	865	441	280	271	256
26	334	1,160	437	377	314	361	501	815	429	280	268	262
27	385	1,100	433	361	307	357	506	790	417	280	268	283
28	506	915	417	353	307	365	501	840	409	280	268	295
29	413	965	409	349	-------	381	506	940	393	280	268	271
30	361	2,650	401	342	-------	401	506	1,020	381	277	271	265
31	338	-------	397	331	-------	397	-------	1,130	-------	277	271	-------

Monthly discharge of Clackamas River at Big Bottom, Oreg., for the year ending September 30, 1922

[Drainage area, 136 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	506	283	317	2.33	2.69	19,500
November	3,280	295	793	5.83	6.50	47,200
December	2,730	397	743	5.46	6.30	45,700
January	425	304	356	2.62	3.02	21,900
February	369	307	326	2.40	2.50	18,100
March	401	301	333	2.45	2.82	20,500
April	542	385	455	3.35	3.74	27,100
May	1,330	530	856	6.29	7.25	52,600
June	1,240	381	748	5.50	6.14	44,500
July	373	277	305	2.24	2.58	18,800
August	295	268	275	2.02	2.33	16,900
September	295	256	263	1.93	2.15	15,600
The year	3,280	256	481	3.54	48.02	348,000

CLACKAMAS RIVER ABOVE THREE LYNX CREEK, OREG.

LOCATION.—In NE. ¼ sec. 21, T. 5 S., R. 6 E., one-fourth mile above Three Lynx Creek and 25 miles above Estacada, Clackamas County.

DRAINAGE AREA.—488 square miles (measured on Forest Service map).

RECORDS AVAILABLE.—October 1, 1911, to December 31, 1913; October 1, 1921, to September 30, 1922.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by employees of Portland Electric Power Co. Vertical staff at practically the same location used 1911 to 1913.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

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

EXTREMES OF DISCHARGE.—Maximum stage during year, determined from high-water mark in gage well, 12.0 feet on afternoon of November 21 (discharge, 25,800 second-feet); minimum stage from water-stage recorder, 0.18 foot at 11 p. m. September 25 (discharge, 700 second-feet).

1911–1913; 1921–22: Maximum stage recorded, that of November 21, 1921; minimum discharge, 630 second-feet October 27 to November 4, 1911.

A stage of 14.5 feet (discharge, from extension of rating curve, 40,600 second-feet) was recorded November 22, 1909.

ICE.—Ice never forms.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly during high water of 1913 practically permanent during 1922. Rating curves used as follows: October 1, 1911, to March 30, 1913, well defined below 3,000 second-feet; March 31 to December 31, 1913, fairly well defined below 3,000 second-feet; for 1921 and 1922, well defined below 8,000 second-feet. Gage read once or twice daily to half-tenths 1911 to 1913; operation of water-stage recorder satisfactory during 1921 and 1922; record somewhat uncertain November 1–21. Daily discharge ascertained by applying to rating table daily gage height or mean daily gage height obtained by inspecting recorder graph. Records excellent for 1922, good for 1912 and 1913, fair for 1911 and for October and November, 1921.

COOPERATION.—Field data furnished by Portland Electric Power Co.

Discharge measurements of Clackamas River above Three Lynx Creek, Oreg., during the years ending September 30, 1912, 1913, and 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1912		*Feet*	*Sec.-ft.*	1912		*Feet*	*Sec.-ft.*
Jan. 21	H. S. Scupham	3.20	2,540	Sept. 10	H. S. Scupham	1.60	1,200
23	do	3.00	2,350	13	do	1.30	1,010
Feb. 27	do	3.10	2,440	Oct. 13	do	.90	691
28	do	3.00	2,340	13	do	.90	722
Mar. 11	do	1.90	1,410	20	do	1.50	1,090
12	do	1.90	1,400	20	do	1.50	1,070
18	do	2.20	1,610	23	do	2.40	1,810
19	do	2.10	1,550				
20	do	2.00	1,480	1913			
28	do	2.20	1,610	Sept. 23	E. S. Fuller	.94	844
29	do	2.30	1,700				
Apr. 2	do	2.50	1,880	1921			
4	do	2.60	1,940	Nov. 29	Phillips and Bannister	3.79	4,450
14	do	2.70	2,030				
26	do	2.40	1,760	1922			
30	do	3.10	2,450	Feb. 13	Laxton and Turel	.81	1,070
June 16	do	3.00	2,330	14	do	.79	1,080
July 11	do	1.50	1,050	Apr. 9	Sharp and Swanson	2.27	2,530
14	do	1.40	1,010	14	Swanson and Austin	1.67	1,840
18	do	1.30	944	20	Sharp and Ober	1.40	1,610
18	do	1.30	944	May 5	Sharp and Tobey	3.80	4,620
26	do	1.20	943	9	Sharp and Bannister	2.68	3,000
26	do	1.20	943	14	Sharp and Austin	3.32	3,900
Aug. 2	do	1.10	862	16	Swanson and Lenon	4.48	5,820
2	do	1.10	824	17	do	4.97	6,820
13	do	1.00	794	July 25	Sharp and Johnson	.48	887
25	do	1.00	812	Aug. 8	Canfield and Bauer	.37	809

NOTE—All measurements except those by Fuller, Phillips, and Canfield, made by employees of Portland Electric Power Co.

Daily discharge, in second-feet, of Clackamas River above Three Lynx Creek, Oreg., for the period October 1, 1911, to December 31, 1913, and the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept
1911–12												
1	670	630	1,310	1,230	4,010	2,150	1,630	2,570	2,930	1,390	830	1,470
2	720	630	1,310	1,060	3,440	2,060	1,880	2,690	2,810	1,310	830	1,390
3	770	630	1,230	1,160	3,180	1,970	1,880	2,570	2,810	1,310	830	1,310
4	770	630	1,160	1,090	2,930	1,880	1,970	2,350	2,570	1,310	830	1,310
5	770	670	1,160	1,090	3,180	1.790	1,880	2,460	2,690	1,310	830	1,310
6	770	670	1,310	1,090	3,310	1,710	1,790	2,460	2,810	1,310	830	1,390
7	720	1,090	1,470	1,090	3,050	1,790	1,880	2,690	2,810	1,160	800	1,390
8	720	1,790	1,790	1,160	3,050	1,790	1,970	3,180	2,690	1,160	830	1,310
9	745	2,060	1,790	1,390	5,880	1,630	2,150	3,580	2,350	1,160	830	1,310
10	745	1,550	1,630	2,150	6,680	1,470	3,050	3,310	2,150	1,160	800	1,160
11	720	1,390	1,630	1,970	5,880	1,390	2,690	3,310	2,060	1,090	800	1,020
12	695	1,630	1,550	8,880	5,130	1,390	2,350	3,440	2,150	1,090	800	985
13	670	2,570	1,470	12,900	5,490	1,390	2,150	3,580	2,460	1,020	770	950
14	695	4,800	1,390	9,850	5,130	1,310	2,060	3,860	2,810	1,020	770	890
15	695	4,480	1,550	6,890	4,800	1,390	1,970	3,860	2,810	1,020	770	890
16	720	3,860	1,790	5,130	7,100	1,470	1,880	3,720	2,350	985	1,090	860
17	720	3,720	1,790	4,160	8,420	1,550	1,790	3,580	2,060	985	1,090	860
18	695	3,580	1,630	3,720	6,680	1,630	1,880	3,310	1,970	950	950	830
19	695	3,050	1,630	3,310	5,490	1,550	1,790	3,440	1,970	985	890	830
20	670	2,570	1,630	2,810	4,480	1,470	1,790	3,720	1,970	950	830	800
21	670	2,150	1,630	2,570	4,010	1,390	1,630	3,580	2,150	985	830	800
22	670	1,970	1,470	2,570	3,580	1,390	1,630	3,310	1,970	950	830	770
23	670	1,790	1,390	2,350	3,310	1,390	1,630	2,810	1,790	950	800	770
24	650	1,790	1,310	2,930	3,050	1,390	1,790	2,690	1,710	920	800	770
25	650	1,790	1,390	7,100	2,810	1,390	1,790	2,810	1,630	920	770	745
26	650	1,880	1,470	5,880	2,460	1,470	1,790	3,860	1,630	890	770	745
27	650	1,790	1,470	4,640	2,460	1,550	1,790	3,860	1,550	890	770	745
28	630	1,630	1,470	4,960	2,350	1,630	1,880	3,580	1,470	890	950	745
29	630	1,470	1,470	4,960	2,150	1,710	2,250	4,010	1,470	860	920	745
30	630	1,390	1,390	5,490	-------	1,710	2,460	3,580	1,390	860	1,020	745
31	630	-------	1,310	4,800	-------	1,630	-------	3,050	-------	860	1,790	-------
1912–13												
1	770	1,230	1,230	4,960	1,710	1,390	7,310	2,590	4,640	2,000	1,030	850
2	770	1,160	1,230	4,320	1,710	1,470	4,960	2,480	4,960	1,910	1,030	850
3	770	1,160	1,390	5,310	1,710	1,710	3,720	2,480	4,960	2,000	1,000	1,500
4	800	1,230	1,790	4,160	1,790	1,880	4,010	2,480	4,480	1,910	1,000	
5	800	2,570	1,710	3,440	1,710	1,970	4,960	2,480	4,010	1,910	1,000	1,250
6	800	4,160	1,970	2,810	1,630	1,970	4,320	3,050	3,580	1,740	970	
7	800	4,800	1,390	2,810	1,630	2,060	3,720	3,720	3,440	1,660	970	1,000
8	800	4,480	1,310	3,310	1,470	2,150	3,720	4,010	3,440	1,580	970	1,000
9	800	5,130	1,310	2,810	1,390	2,350	3,440	4,640	3,180	1,580	970	1,000
10	770	4,480	1,310	2,350	1,390	2,350	3,180	4,320	2,810	1,500	970	970
11	745	6,680	1,310	2,350	1,310	2,350	3,440	4,640	2,700	1,420	940	940
12	720	11,600	1,310	2,350	1,310	2,150	4,320	4,960	2,700	1,420	940	910
13	720	7,750	1,390	2,460	1,310	1,970	4,010	4,320	2,700	1,420	940	910
14	720	5,490	1,550	2,570	1,470	1,880	3,720	4,480	2,700	1,420	970	910
15	695	4,160	1,710	2,350	2,150	1,790	3,440	4,480	2,480	1,340	970	880
16	695	3,440	2,060	2,060	2,570	1,880	3,310	3,720	2,380	1,270	940	880
17	830	2,810	3,050	1,970	3,310	1,970	3,180	3,720	2,180	1,270	940	880
18	800	2,350	4,480	1,970	2,930	1,970	3,440	3,720	2,280	1,270	940	880
19	1,160	2,350	3,310	1,790	2,460	1,880	3,440	4,010	2,480	1,200	910	880
20	1,090	2,150	3,050	1,710	2,250	1,880	3,440	3,860	2,700	1,160	910	880
21	950	1,970	2,570	1,710	2,060	1,880	3,440	3,860	2,810	1,160	910	880
22	1,880	1,790	2,150	1,790	1,880	1,790	3,440	4,320	3,180	1,160	910	910
23	1,790	1,630	1,970	1,790	1,790	1,790	3,440	4,960	3,440	1,160	880	880
24	1,550	1,550	2,150	2,060	1,630	1,790	3,440	5,130	3,180	1,200	880	850
25	1,550	1,470	2,250	2,250	1,630	1,710	3,440	5,130	2,930	1,130	880	820
26	1,470	1,390	1,880	1,970	1,550	1,470	3,580	5,130	2,480	1,130	880	820
27	1,390	1,310	1,790	1,970	1,550	1,470	3,720	4,960	2,280	1,100	880	820
28	1,390	1,310	1,970	1,970	1,470	1,790	3,860	4,640	2,090	1,060	850	880
29	1,470	1,310	3,310	1,790	-------	7,100	3,180	4,010	1,910	1,060	850	880
30	1,390	1,310	9,350	1,790	-------	9,350	2,700	3,720	2,000	1,060	850	850
31	1,310	-------	6,280	1,710	-------	7,310	-------	4,160	-------	1,030	850	-------

Daily discharge, in second-feet, of Clackamas River above Three Lynx Creek, Oreg., for the period October 1, 1911, to December 31, 1913, and the year ending September 30, 1922—Continued

Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.
1913				1913				1913			
1	820	1,060	2,700	11	1,660	1,660	1,420	21	1,270	1,270	1,160
2	820	1,000	2,180	12	1,420	1,580	1,420	22	1,160	1,420	1,160
3	820	940	1,910	13	1,820	1,500	1,420	23	1,130	4,010	1,160
4	820	940	1,820	14	1,820	1,420	1,420	24	1,100	3,180	1,160
5	820	1,130	1,660	15	1,740	1,160	1,420	25	1,060	2,590	1,130
6	1,500	2,090	1,580	16	2,000	1,160	1,340	26	1,030	2,480	1,130
7	4,160	2,000	1,580	17	1,740	1,200	1,340	27	1,060	2,590	1,100
8	2,000	1,910	1,500	18	1,580	1,200	1,270	28	1,000	2,480	1,100
9	1,910	1,820	1,420	19	1,420	1,200	1,270	29	1,000	3,580	1,420
10	1,820	1,740	1,420	20	1,340	1,270	1,200	30	1,000	3,180	1,420
								31	1,000		1,580

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1921–22											
1	1,140	15,200	1,500	1,250	1,060	1,930	2,480	5,480	1,330	830	758
2	1,100	11,200	1,460	1,250	1,060	1,930	2,770	5,480	1,290	830	764
3	1,060	6,880	1,370	1,210	1,060	2,450	2,890	5,480	1,250	830	758
4	1,030	5,120	1,370	1,250	1,060	2,770	3,530	5,480	1,210	830	764
5	1,030	4,310	1,370	1,210	1,060	2,480	4,630	4,790	1,250	830	770
6	995	3,710	1,370	1,210	1,030	2,310	4,000	4,310	1,140	800	800
7	960	3,220	1,330	1,210	1,100	2,390	3,710	4,000	1,140	800	770
8	925	2,890	1,290	1,210	1,100	2,770	3,430	3,710	1,100	800	758
9	925	2,650	1,410	1,210	1,100	2,530	3,020	3,850	1,060	800	752
10	890	2,530	1,460	1,170	1,100	2,310	2,710	3,570	1,060	800	740
11	890	2,710	1,410	1,170	1,060	2,140	2,530	3,150	1,060	860	734
12	860	3,120	1,370	1,140	1,060	1,980	2,530	3,020	1,030	890	734
13	860	3,710	1,330	1,140	1,140	1,880	3,080	2,960	1,030	860	722
14	860	3,360	1,290	1,100	1,140	1,830	4,000	2,890	995	830	722
15	960	2,830	1,250	1,100	1,170	1,780	4,950	2,650	960	830	722
16	960	2,590	1,290	1,570	1,210	1,730	6,070	2,420	960	800	728
17	960	2,360	1,330	1,730	1,170	1,640	7,090	2,360	960	800	716
18	890	2,200	1,170	1,730	1,170	1,590	6,880	2,310	925	770	716
19	1,030	2,040	1,170	1,590	1,680	1,590	5,300	2,260	925	770	710
20	5,000	1,930	1,290	1,500	1,730	1,590	4,630	2,140	925	770	710
21	22,000	1,880	1,210	1,370	1,880	1,780	4,150	2,040	890	770	710
22	12,900	1,830	1,170	1,330	2,090	2,090	4,000	1,880	890	770	710
23	7,500	1,730	1,140	1,250	2,090	2,140	3,710	1,780	890	770	705
24	5,670	1,680	1,330	1,170	1,980	2,090	3,710	1,680	890	758	705
25	6,880	1,590	1,590	1,170	1,730	2,200	3,710	1,680	890	752	705
26	6,470	1,540	1,730	1,140	1,640	2,360	3,360	1,640	860	746	716
27	5,870	1,500	1,640	1,100	1,540	2,360	3,220	1,590	860	746	800
28	4,630	1,500	1,540	1,060	1,590	2,310	3,570	1,500	860	746	925
29	5,000	1,460	1,410	-------	1,760	2,310	4,150	1,410	860	740	800
30	15,500	1,410	1,370	-------	2,040	2,260	4,630	1,370	860	746	752
31	-------	1,370	1,250	-------	1,930	-------	5,300	-------	830	764	-------

Monthly discharge of Clackamas River above Three Lynx Creek, Oreg., for the period October 1, 1911, to December 31, 1913, and the year ending September 30, 1922

[Drainage area, 488 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
1911–12						
October	770	630	694	1.42	1.64	42,700
November	4,800	630	1,990	4.08	4.55	118,000
December	1,790	1,160	1,480	3.03	3.49	91,000
January	12,900	1,060	3,880	7.95	9.16	239,000
February	8,420	2,150	4,260	8.73	9.42	245,000
March	2,150	1,310	1,590	3.26	3.76	97,800
April	3,050	1,630	1,970	4.04	4.51	117,000
May	4,010	2,350	3,250	6.66	7.68	200,000
June	2,930	1,390	2,200	4.51	5.03	131,000
July	1,390	860	1,050	2.15	2.48	64,600
August	1,790	770	879	1.80	2.08	54,000
September	1,470	745	995	2.04	2.28	59,200
The year	12,900	630	2,010	4.12	56.08	1,460,000
1912–13						
October	1,880	695	1,040	2.13	2.46	64,000
November	11,600	1,160	3,140	6.43	7.17	187,000
December	9,350	1,230	2,370	4.86	5.60	146,000
January	5,310	1,710	2,540	5.20	6.00	156,000
February	3,310	1,310	1,810	3.71	3.86	101,000
March	9,350	1,390	2,470	5.06	5.83	152,000
April	7,310	2,700	3,780	7.75	8.65	225,000
May	5,130	2,480	4,010	8.22	9.48	247,000
June	4,960	1,910	3,040	6.23	6.95	181,000
July	2,000	1,030	1,390	2.85	3.29	85,500
August	1,030	850	933	1.91	2.20	57,400
September	1,500	820	949	1.95	2.18	56,500
The year	11,600	695	2,280	4.68	63.67	1,660,000
1913						
October	4,160	820	1,410	2.89	3.33	86,700
November	4,010	940	1,830	3.75	4.18	109,000
December	2,700	1,100	1,450	2.97	3.42	89,200
The period						285,000
1921–22						
October			1,020	2.09	2.41	62,700
November	22,000	860	3,860	7.91	8.82	230,000
December	15,200	1,370	3,290	6.74	7.77	202,000
January	1,730	1,170	1,360	2.79	3.22	83,600
February	1,730	1,060	1,270	2.60	2.71	70,500
March	2,090	1,030	1,400	2.87	3.31	86,100
April	2,770	1,590	2,120	4.34	4.84	126,000
May	7,090	2,480	3,990	8.18	9.43	245,000
June	5,480	1,370	2,960	6.07	6.77	176,000
July	1,330	830	1,010	2.07	2.39	62,100
August	890	740	795	1.63	1.88	48,900
September	925	705	746	1.53	1.71	44,400
The year	22,000	705	1,990	4.08	55.26	1,440,000

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 Electric Power Co. and 3 miles southeast of Cazadero, Clackamas County.

DRAINAGE AREA.—685 square miles.

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1922.

GAGE.—Friez water-stage recorder referred to a vertical staff gage on right bank; inspected by employee of Portland Electric 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 determined from high-water mark, 46.0 feet about 8 p. m. November 20 (discharge, from extension of rating curve, 52,100 second-feet); minimum stage from water-stage recorder, 26.18 feet September 23–25 (discharge, 818 second-feet).

1909–1922: Maximum stage recorded, that of November 20, 1921; minimum discharge recorded, 705 second-feet September 21–23 and October 8–10, 1915.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent during year. Rating curve fairly well defined below 15,000 second-feet; extended upward through point at gage height 40.60 feet and discharge, 31,700 second-feet determined by discharge computed by a weir formula over dam at River Mill plant of the Portland Electric Power Co. Operation of recorder satisfactory except for short periods. March 6–22 recorder removed and staff gage read twice a day. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable fluctuation, by averaging the discharge for intervals of a day. Records good.

COOPERATION.—Part of field data furnished by Portland Electric Power Co.

Discharge measurements of Clackamas River near Cazadero, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 17	K. N. Phillips	26.67	1,150	Feb. 18	Laxton and Foke [a]	28.15	2,550
25	Wendell Dawson	32,82	9,340	24	G. H. Canfield	27.22	1,580
Dec. 2	G. H. Canfield	34.50	12,800	Mar. 20	Laxton and Crozier [a]	28.30	2,600
5	Wendell Dawson	30.42	4,920	May 12	Rands and Laxton [a]	28.8	3,300
11	do	28.80	3,100	July 8	E. E. Hopson [a]	26.85	1,320
30	do	27,49	1,650	17	Hopson and Sutton [a]	26.74	1,185
Feb. 4	Laxton and Jones [a]	27.35	1,680	Aug. 7	Canfield and Henshaw	26.41	975

[a] Engineers, Portland Electric Power Co.

Daily discharge, in second-feet, of Clackamas River near Cazadero, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,040	1,510	21,100	1,950	1,670	1,360	2,860	3,300	6,260	1,590	1,000	935
2	1,000	1,390	15,800	1,900	1,670	1,320	2,860	3,630	6,260	1,550	1,000	900
3	1,000	1,320	8,670	1,800	1,590	1,390	3,630	3,870	6,100	1,510	1,000	893
4	1,000	1,250	6,580	1,760	1,630	1,590	4,110	4,730	6,100	1,470	1,000	900
5	970	1,180	5,520	1,800	1,670	1,490	3,630	5,950	5,660	1,430	970	935
6	970	1,140	4,600	1,850	1,670	1,390	3,190	5,250	4,990	1,390	970	970
7	970	1,110	4,110	1,800	1,670	1,550	4,230	4,860	4,600	1,360	970	970
8	935	1,080	3,630	1,760	1,630	1,550	4,230	4,350	4,230	1,320	970	935
9	935	1,040	3,410	2,000	1,670	1,550	3,630	3,750	4,350	1,280	970	886
10	935	1,040	3,190	2,100	1,630	1,550	3,300	3,410	4,110	1,280	970	872
11	900	1,000	3,190	2,000	1,590	1,510	2,970	3,300	3,750	1,280	1,040	872
12	900	1,000	3,630	1,900	1,550	1,470	2,750	3,190	3,520	1,250	1,080	858
13	935	1,000	4,990	1,850	1,510	1,550	2,530	3,750	3,410	1,220	1,110	858
14	970	1,040	4,350	1,760	1,430	1,590	2,480	5,120	3,300	1,180	1,040	851
15	1,080	1,180	3,870	1,710	1,430	1,800	2,420	6,100	3,080	1,180	1,000	844
16	1,080	1,140	3,410	1,760	2,580	1,900	2,480	7,230	2,860	1,180	970	844
17	1,220	1,140	3,080	1,850	2,580	1,710	2,310	8,110	2,750	1,140	970	837
18	1,360	1,140	2,970		2,480	1,630	2,200	7,750	2,700	1,140	970	830
19	1,220	2,460	2,640	1,740	2,260	2,530	2,260	6,260	2,580	1,140	970	830
20	1,220	30,200			2,100	2,580	2,310	5,380	2,530	1,110	970	830
21	1,250	31,700	2,420	1,630	1,950	2,750	2,580	4,860	2,420	1,110	970	824
22	1,180	16,400		1,550	1,850	3,190	3,080	4,600	2,200	1,110	970	824
23	1,140	9,940	2,200	1,510	1,700	3,190	3,080	4,350	2,100	1,080	935	818
24	1,140	7,230	2,100	1,900	1,550	2,860	2,860	4,470	2,000	1,080	935	818
25	1,180	8,110	2,000	2,310	1,550	2,530	2,970	4,470	2,000	1,080	935	818
26	1,630	8,290	1,950	2,530	1,510	2,260	3,300	4,110	1,950	1,080	900	844
27	2,050	7,570	1,900	2,310	1,430	2,100	3,190	3,870	1,900	1,080	900	935
28	3,080	6,420	1,900	2,150	1,360	2,200	3,190	4,230	1,800	1,080	886	1,180
29	2,480	6,740	1,850	2,000	-------	2,420	2,970	4,990	1,710	1,040	886	1,040
30	1,900	22,400	1,760	1,850	-------	3,190	2,970	5,660	1,630	1,040	900	893
31	1,630	-------	1,710	1,710	-------	2,750	-------	6,100	-------	1,040	935	-------

NOTE.—Water-stage recorder not operating satisfactorily Dec. 20–22, Jan. 18–20, and Feb. 23; discharge interpolated.

Monthly discharge of Clackamas River near Cazadero, Oreg., for the year ending September 30, 1922

[Drainage area, 685 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,080	900	1,270	1.85	2.13	78,100
November	31,700	1,000	5,940	8.67	9.67	353,000
December	21,100	1,710	4,300	6.28	7.24	264,000
January	2,530	1,510	1,880	2.74	3.16	116,000
February	2,580	1,360	1,750	2.55	2.66	97,200
March	3,190	1,320	2,010	2.93	3.38	124,000
April	4,230	2,200	3,020	4.41	4.92	180,000
May	8,110	3,190	4,870	7.11	8.20	299,000
June	6,260	1,630	3,430	5.01	5.59	204,000
July	1,590	1,040	1,220	1.78	2.05	75,000
August	1,110	886	970	1.42	1.64	59,600
September	1,180	818	888	1.30	1.45	52,800
The year	31,700	818	2,630	3.84	52.09	1,900,000

OAK GROVE FORK AT TIMOTHY MEADOWS, 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 45 miles above Estacada, Clackamas County.

DRAINAGE AREA.—52 square miles.

RECORDS AVAILABLE.—February 25, 1913, to November 26, 1916; July 14, 1918, to September 30, 1922, somewhat fragmentary.

GAGE.—Stevens continuous water-stage recorder on right bank; inspected by employees of Portland Electric Power Co.

DISCHARGE MEASUREMENTS.—Made from footbridge 20 feet above gage.

CHANNEL AND CONTROL.—Bed composed of gravel. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage from water-stage recorder, 3.16 feet at 4 p. m. November 30 (discharge, 954 second-feet); minimum discharge, 121 second-feet November 10.

1913–1916; 1918–1922: Maximum stage recorded, that of November 30, 1921; 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 changed when obstructions on control were washed out by high water on November 30. Both rating curves fairly well defined. Operation of water-stage recorder satisfactory, except December 21–29. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph or, for days of considerable fluctuation, by averaging discharge for intervals of a day. Records good.

COOPERATION.—Field data furnished by Portland Electric Power Co.

Discharge measurements of Oak Grove Fork at Timothy Meadows, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Nov. 26	Phillips and Bannister[a]	1.45	316
June 28	Sharp and Herring[a]	.99	219
Aug. 9	Canfield and Bauer[a]	.75	159

[a] Employees of Portland Electric Power Co.

Daily discharge, in second-feet, of Oak Grove Fork at Timothy Meadows, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	135	135	810	205	170	152	147	224	448	208	173	160
2	135	135	644	205	170	152	150	244	480	205	170	160
3	135	135	496	203	168	152	160	235	480	203	170	160
4	135	135	432	200	168	152	163	241	496	200	168	160
5	135	135	386	200	168	152	160	277	480	197	165	155
6	135	123	353	195	168	152	160	275	463	195	165	155
7	135	123	324	192	168	152	165	277	432	192	163	152
8	135	123	303	192	165	147	181	263	416	192	160	150
9	123	123	289	192	165	147	176	247	401	192	160	147
10	123	121	277	189	165	147	173	249	401	192	163	147
11	123	123	283	189	165	147	173	247	371	189	163	147
12	123	123	306	189	163	147	170	252	356	189	163	147
13	123	123	356	186	160	147	165	277	338	186	163	147
14	123	123	326	184	160	147	165	295	329	183	165	144
15	123	123	300	181	160	147	165	303	318	183	165	144
16	123	123	272	181	163	147	163	326	306	183	165	142
17	135	123	261	184	163	144	160	365	292	181	163	140
18	135	123	255	181	163	144	157	401	280	181	160	140
19	135	135	249	178	160	144	155	401	275	181	160	140
20	135	355	241	178	160	144	155	401	266	178	160	140
21	123	684	}	178	157	144	160	401	263	178	160	140
22	123	624		178	157	147	165	386	255	176	160	140
23	123	415		178	155	147	170	386	252	173	160	140
24	123	330		181	155	144	176	386	244	173	160	140
25	135	330	224	184	152	144	184	386	238	173	160	140
26	135	316		184	152	142	197	386	233	173	160	140
27	135	316		181	151	142	205	368	230	173	160	144
28	135	276		181	150	142	205	371	224	173	160	155
29	135	303	}	176	-------	142	203	386	219	173	160	157
30	135	820	208	173	-------	147	203	401	216	173	160	157
31	135	-------	205	173	-------	147	-------	432	-------	173	160	-------

NOTE.—Braced figure gives estimated mean discharge for period indicated.

Monthly discharge of Oak Grove Fork at Timothy Meadows, Oreg., for the year ending September 30, 1922

[Drainage area, 52 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	135	123	130	2.50	2.88	7,990
November	820	121	239	4.59	5.12	14,200
December	810	205	309	5.94	6.85	19,000
January	205	173	186	3.58	4.13	11,400
February	170	150	161	3.09	3.22	8,940
March	152	142	147	2.83	3.26	9,040
April	205	147	171	3.29	3.67	10,200
May	432	224	325	6.25	7.21	20,000
June	496	216	333	6.41	7.15	19,800
July	208	173	185	3.56	4.10	11,400
August	173	160	163	3.13	3.61	10,000
September	160	140	148	2.85	3.18	8,810
The year	820	121	208	4.00	54.38	151,000

OAK GROVE FORK AT PORTLAND ELECTRIC POWER CO.'S INTAKE, 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 Electric Power Co. and 35 miles above Estacado, Clackamas County.

DRAINAGE AREA.—131 square miles (measured by Portland Electric Power Co.).

RECORDS AVAILABLE.—May 21, 1909, to September 30, 1922, with some breaks.

GAGE.—Stevens water-stage recorder on right bank; inspected by employees of Portland Electric Power Co.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed composed of boulders; irregular but apparently fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.60 feet at 2 p. m. November 30 (discharge, 2,740 second-feet); minimum stage from recorder, 0.88 foot September 18–26, 29, and 30 (discharge, 346 second-feet).

1909–1922: Maximum stage recorded, that of November 30, 1921; minimum discharge recorded, 313 second-feet November 12–14, 1920.

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. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or, for days of considerable fluctuation, by averaging discharge for intervals of a day. Records excellent.

COOPERATION.—Field data furnished by Portland Electric Power Co.

Discharge measurements of Oak Grove Fork at Portland Electric Power Co.'s intake, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 20	K. N. Phillips	2.33	1,400	May 24	W. L. Sharp[a]	1.95	1,080
20	do	2.73	1,760	28	Sharp and Laxton[a]	1.88	1,020
21	do	3.18	2,260	June 2	Sharp and Moberg[a]	2.21	1,220
22	do	2.63	1,600	25	Swanson and Kiggins[a]	1.32	609
23	do	2.21	1,220	July 9	Laxton and King[a]	1.10	464
27	do	1.88	951	Aug. 8	Canfield and Bauer	.96	386

[a] Employees of Portland Electric Power Co.

Daily discharge, in second-feet, of Oak Grove Fork at Portland Electric Power Co.'s intake, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	378	382	2,270	517	405	382	420	619	1,280	494	396	360
2	378	378	1,830	511	405	382	435	661	1,280	489	396	360
3	378	373	1,360	501	405	382	489	673	1,320	483	391	360
4	373	369	1,160	494	405	387	517	741	1,320	472	391	360
5	373	369	1,040	500	405	387	489	830	1,280	467	391	364
6	369	369	942	489	405	387	483	808	1,200	461	387	360
7	369	364	862	472	405	387	511	815	1,110	450	387	360
8	369	364	785	472	405	382	553	763	1,040	450	382	355
9	369	360	741	472	405	382	529	720	1,010	450	382	355
10	369	360	713	472	405	382	511	699	974	445	382	355
11	369	360	741	456	400	382	500	679	902	440	391	355
12	369	360	808	450	400	382	483	699	854	440	391	355
13	373	360	926	445	396	382	472	792	830	435	387	350
14	378	369	846	445	391	382	461	878	823	430	387	350
15	382	378	770	440	391	382	456	982	763	425	382	350
16	378	378	727	440	415	378	450	1,110	734	420	378	350
17	400	373	699	440	420	373	445	1,280	713	420	378	350
18	387	378	679	420	420	378	440	1,280	699	420	378	346
19	373	422	619	410	410	396	450	1,240	679	420	373	346
20	378	1,480	613	425	405	396	450	1,160	661	415	373	346
21	378	2,220	613	425	405	410	472	1,110	643	415	373	346
22	373	1,780	601	420	400	415	505	1,050	631	410	369	346
23	373	1,280	589	420	391	415	505	1,050	601	410	369	346
24	373	1,020	571	430	382	405	517	1,050	589	410	369	346
25	378	1,040	553	435	387	396	541	1,050	577	405	364	346
26	400	998	547	435	387	396	565	990	559	405	364	346
27	410	974	541	430	387	396	571	974	547	405	364	355
28	435	878	529	425	382	400	571	1,020	529	400	364	373
29	405	934	523	425	-------	405	565	1,070	517	400	360	346
30	391	2,280	511	410	-------	420	577	1,160	505	400	364	346
31	387	-------	505	405	-------	420	-------	1,200	-------	400	360	-------

Monthly discharge of Oak Grove Fork at Portland Electric Power Co.'s intake, Oreg., for the year ending September 30, 1922

[Drainage area, 131 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	435	369	381	2.91	3.36	23,400
November	2,280	360	732	5.59	6.24	43,600
December	2,270	505	813	6.21	7.16	50,000
January	517	405	449	3.43	3.95	27,600
February	420	382	401	3.06	3.19	22,300
March	420	373	392	2.99	3.45	24,100
April	577	420	498	3.81	4.25	29,600
May	1,280	619	940	7.18	8.28	57,800
June	1,320	505	839	6.41	7.15	49,900
July	494	400	432	3.30	3.80	26,600
August	396	360	378	2.89	3.33	23,200
September	373	346	353	2.69	3.00	21,000
The year	2,280	346	551	4.21	57.16	399,000

79564—26†—WSP 554——10

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, Clark County.

DRAINAGE AREA.—665 square miles (measured on map in Water-Supply Paper 253, p. 74, and checked on Forest Service map).

RECORDS AVAILABLE.—January 20, 1911, to September 30, 1922.

GAGE.—Inclined and vertical staffs on left bank; read by J. M. 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, 9.8 feet at 8 a. m. December 12 (discharge, 34,400 second-feet); minimum stage recorded, 0.20 foot September 25 and 26 (discharge, 960 second-feet).

1911–1922: 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.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of December 12. Both rating curves fairly well defined. Gage read to hundredths at low stages, to half-tenths at medium stages, and to tenths at high stages twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Lewis River near Amboy, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	Wendell Dawson	0.37	1,010	July 26	Henshaw and Phillips	0.64	1,380
July 19	Henshaw and Davenport	.82	1,550	26	Phillips and Henshaw	.62	1,370
				Aug. 24	Canfield and Phillips	.39	1,130

Daily discharge, in second-feet, of Lewis River near Amboy, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,160	4,670	28,400	2,450	2,030	1,660	4,460	5,630	10,600	3,060	1,330	1,280
2	1,160	3,790	18,000	2,600	2,100	2,100	4,690	5,630	11,300	2,900	1,330	1,180
3	1,110	3,400	12,000	2,450	2,100	2,230	9,360	6,660	11,300	2,900	1,280	1,230
4	1,110	3,220	10,300	2,450	2,100	2,030	7,800	10,600	11,000	2,750	1,280	1,330
5	1,140	3,040	8,720	2,380	2,160	1,900	6,930	10,600	10,000	2,600	1,230	1,550
6	1,080	2,870	7,500	2,300	2,230	1,780	5,630	9,360	8,720	2,450	1,230	1,660
7	1,030	2,630	6,010	2,160	2,380	1,780	5,880	8,100	8,100	2,160	1,230	2,100
8	1,010	2,550	5,510	2,160	2,450	1,720	6,930	7,500	7,210	2,100	1,230	1,660
9	1,020	2,400	4,690	2,160	2,450	1,660	5,760	6,530	6,930	2,030	1,230	1,440
10	1,010	2,400	3,690	2,160	2,450	1,550	5,390	6,010	6,530	1,840	1,230	1,330
11	970	2,320	16,000	2,160	2,380	1,600	5,030	5,510	6,400	1,900	1,330	1,230
12	970	1,970	32,000	2,230	2,300	2,030	4,560	5,510	6,140	1,900	1,380	1,230
13	1,110	1,900	25,000	2,230	2,160	2,030	4,220	6,400	5,880	1,840	1,440	1,180
14	1,420	2,040	14,800	2,300	2,160	2,030	4,000	7,500	5,630	1,780	1,440	1,140
15	1,600	2,110	11,300	2,230	2,100	2,160	3,790	10,000	5,510	1,720	1,440	1,140
16	1,480	2,110	8,410	2,160	2,520	2,030	3,690	12,300	5,270	1,720	1,380	1,140
17	1,660	2,250	6,800	2,160	2,750	1,900	3,590	12,300	5,150	1,660	1,330	1,100
18	1,970	2,400	5,510	2,100	3,310	2,900	3,590	12,000	4,910	1,660	1,230	1,100
19	1,660	2,550	5,030	2,100	2,980	5,150	3,790	10,000	4,690	1,550	1,230	1,050
20	1,600	3,130	4,670	2,030	2,750	4,110	3,900	8,410	4,670	1,550	1,180	1,050
21	1,480	16,400	4,440	1,900	2,450	3,900	4,220	8,100	4,560	1,500	1,180	1,030
22	1,420	15,600	4,000	1,780	2,450	4,110	5,150	7,500	4,440	1,440	1,180	1,010
23	1,420	14,100	3,900	1,780	2,300	3,900	4,440	6,800	4,330	1,440	1,100	1,000
24	1,480	12,300	3,790	1,840	2,100	3,500	4,440	6,930	4,220	1,440	1,140	1,000
25	1,720	12,000	3,500	2,600	1,960	3,060	5,150	6,660	4,110	1,380	1,140	960
26	5,630	13,700	3,220	3,220	2,030	2,900	5,510	6,400	4,000	1,380	1,140	960
27	7,500	15,600	2,900	3,140	1,780	2,750	5,390	5,760	3,900	1,330	1,140	1,500
28	14,100	12,300	2,750	2,750	1,660	2,600	5,150	6,530	3,790	1,330	1,140	1,900
29	10,600	11,600	2,600	2,520	-------	3,220	5,270	7,500	3,590	1,330	1,120	1,500
30	7,800	29,600	2,600	2,300	-------	4,000	5,630	8,410	3,220	1,330	1,100	1,330
31	5,270	-------	2,450	2,160	-------	4,220	-------	9,680	-------	1,330	1,380	-------

Monthly discharge of Lewis River near Amboy, Wash., for the year ending September 30, 1922

[Drainage area, 665 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	14,100	970	2,700	4.06	4.68	166,000
November	29,600	1,900	6,900	10.38	11.60	411,000
December	32,000	2,450	8,730	13.13	15.10	537,000
January	3,220	1,780	2,290	3.44	3.97	141,000
February	3,310	1,660	2,310	3.47	3.61	128,000
March	5,150	1,550	2,660	4.00	4.61	164,000
April	9,360	3,590	5,110	7.68	8.57	304,000
May	12,300	5,510	7,960	11.97	13.83	489,000
June	11,300	3,220	6,200	9.32	10.40	369,000
July	3,060	1,330	1,850	2.78	3.20	114,000
August	1,440	1,100	1,250	1.88	2.17	76,900
September	2,100	960	1,280	1.92	2.14	76,200
The year	32,000	960	4,110	6.18	83.88	2,980,000

LEWIS RIVER NEAR ARIEL, WASH.

LOCATION.—In SE. ¼ sec. 33, T. 6 N., R. 2 E., 3½ miles southwest of Ariel post office, Cowlitz County, and 12 miles by road above mouth of river.

DRAINAGE AREA.—733 square miles.

RECORDS AVAILABLE.—July 27 to September 30, 1922, at present site; July 7 to November 30, 1909, for station at Ariel, 3½ miles upstream.

GAGE.—Vertical staff on right bank; read by J. F. Bane.

DISCHARGE MEASUREMENTS.—Made from boat held in place by light cable near gage.

CHANNEL AND CONTROL.—Bed composed of gravel; smooth and fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 27 to September 30, 1922, 4.80 feet September 7 (discharge, 2,200 second-feet); minimum stage recorded, 3.95 feet September 25 (discharge, 1,030 second-feet).

1909 and 1922: Maximum stage recorded, 10.90 feet at station at Ariel, November 30, 1909 (discharge not determined); minimum discharge recorded, 940 second-feet October 18, 1909.

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

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

Discharge measurements of Lewis River near Ariel, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
July 27	Fred F. Henshaw	4.31	1,380
Aug. 24	Phillips and Canfield	4.10	1,170

Daily discharge, in second-feet, of Lewis River near Ariel, Wash., for the year ending September 30, 1922

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		1,320	1,260	11		1,620	1,300	21		1,160	1,060
2		1,320	1,180	12		1,640	1,250	22		1,130	1,050
3		1,300	1,120	13		1,490	1,230	23		1,120	1,040
4		1,270	1,260	14		1,260	1,190	24		1,130	1,050
5		1,240	1,460	15		1,390	1,160	25		1,150	1,030
6		1,230	1,720	16		1,260	1,150	26		1,130	1,120
7		1,210	2,200	17		1,230	1,120	27	1,390	1,160	1,340
8		1,200	1,750	18		1,200	1,110	28	1,370	1,150	2,010
9		1,210	1,450	19		1,240	1,090	29	1,340	1,090	1,520
10		1,200	1,380	20		1,190	1,080	30	1,330	1,140	1,320
								31	1,320	1,380	

Monthly discharge of Lewis River near Ariel, Wash., for the year ending September 30, 1922

[Drainage area, 733 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
July 27–31	1,390	1,320	1,350	1.84	0.34	13,400
August	1,640	1,090	1,250	1.71	1.97	76,900
September	2,200	1,030	1,300	1.77	1.98	77,400
The period						168,000

CANYON CREEK NEAR AMBOY, WASH.

LOCATION.—In SW. ¼ sec. 4, T. 5 N., R. 4 E., at wagon bridge, 2 miles above mouth and 6 miles northeast of Amboy, Clark County.

DRAINAGE AREA.—64 square miles.

RECORDS AVAILABLE.—July 25 to September 30, 1922.

GAGE.—Vertical staff on right bank, 20 feet above bridge; read by J. C. Hanley and W. F. Lawffer.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 1.38 feet, September 7 (discharge, 165 second-feet); minimum stage recorded, 0.43 foot, August 29 and 30 (discharge, 32 second-feet).

ICE.—None.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths once a day prior to September 5; every other day thereafter. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of no gage-height record. Records good.

Discharge measurements of Canyon Creek near Amboy, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
July 25	Henshaw and Phillips	0.60	46.8
Aug. 23	Phillips and Canfield	.49	38.3

Daily discharge, in second-feet, of Canyon Creek near Amboy, Wash., for the year ending September 30, 1922

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		42	78	11		78	66	21		39	41
2		41	50	12		60	62	22		38	41
3		40	45	13		68	57	23		37	41
4		39	44	14		55	54	24		36	40
5		38	92	15		50	50	25	47	36	40
6		37	128	16		47	48	26	46	35	56
7		36	165	17		43	46	27	45	34	72
8		36	128	18		42	45	28	44	33	76
9		35	92	19		41	44	29	43	32	81
10		36	79	20		40	42	30	43	32	68
								31	42	45	

Monthly discharge of Canyon Creek near Amboy, Wash., for the year ending September 30, 1922

[Drainage area, 64 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
July 25–31	47	42	44.3	0.692	0.18	615
August	78	32	42.0	.656	.76	2,580
September	165	40	65.7	1.03	1.15	3,910
The period						7,100

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.—184 square miles (measured on Mount Saint Helens quadrangle and map of Columbia National Forest).

RECORDS AVAILABLE.—July 6, 1911, to January 11, 1912; December 1, 1912, to September 30, 1913; August 19, 1916, to September 30, 1922.

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.

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

CHANNEL AND CONTROL.—Control is rock reef and bar of coarse gravel 100 feet below gage; may shift in extreme floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 7.5 feet at 7 a. m. November 21 (discharge, 6,510 second-feet); minimum stage recorded, 0.79 foot October 11 and 12 (discharge, 227 second-feet).

1911–1913; 1916–1922: Maximum stage recorded, 10.3 feet December 18, 1917 (discharge, 11,700 second-feet); minimum stage recorded, 0.60 foot September 3 and 4, 1920 (discharge, 166 second-feet).

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 during high water of November. Well-defined rating curves used October 1 to November 21 and November 22 to September 30. Gage read to hundredths once a day at low water and to half-tenths at medium and high stages. Daily discharge obtained by applying daily gage height to rating table. Records good.

Discharge measurements of Kalama River near Kalama, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Oct. 8	Wendell Dawson	0.88	254
Aug. 25	K. N. Phillips	.86	280

Daily discharge, in second-feet, of Kalama River near Kalama, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	300	1,050	5,770	760	660	1,210	1,340	1,340	1,860	520	325	360
2	286	870	6,360	760	660	1,090	1,340	1,410	1,690	498	310	325
3	272	812	3,270	760	660	1,090	2,950	2,150	1,690	475	310	325
4	272	870	2,650	760	810	1,210	2,450	3,050	1,620	475	310	395
5	272	870	2,150	760	810	1,210	1,950	2,450	1,340	475	310	435
6	258	870	1,770	760	810	1,150	1,480	2,050	1,340	455	310	435
7	255	812	1,550	760	910	1,090	1,950	1,950	1,270	435	310	415
8	252	812	1,410	760	1,270	970	2,150	1,620	1,270	435	295	475
9	244	812	1,340	760	1,480	1,090	1,770	1,550	1,270	415	295	475
10	236	812	1,340	760	1,270	1,090	1,690	1,410	1,270	415	310	455
11	227	756	4,660	810	1,340	1,090	1,620	1,270	1,210	395	542	435
12	227	756	6,060	760	1,210	1,090	1,620	1,150	1,090	395	395	378
13	258	756	4,660	760	1,150	1,090	1,690	1,150	970	395	360	342
14	812	812	3,050	760	1,030	1,270	1,770	1,550	970	395	325	325
15	460	812	2,650	760	1,030	1,210	1,620	1,950	970	378	325	325
16	380	812	2,550	710	1,340	1,270	1,480	2,350	970	378	325	325
17	700	812	2,350	710	1,480	1,270	1,410	2,550	970	378	325	310
18	600	812	2,150	710	1,480	3,050	1,340	2,150	860	360	310	310
19	505	1,610	1,950	660	1,410	3,050	1,270	1,950	860	360	310	295
20	439	2,950	1,690	660	1,340	2,250	1,210	1,690	810	360	310	295
21	439	6,360	1,480	660	1,340	2,050	1,210	1,690	760	342	310	289
22	439	5,490	1,340	660	1,340	1,770	1,210	1,410	760	342	295	283
23	418	3,160	1,340	660	1,270	1,620	1,950	1,340	710	342	295	283
24	505	3,390	1,210	660	1,270	1,340	1,860	1,270	660	342	295	277
25	600	4,140	1,090	760	1,210	1,270	1,770	1,340	660	342	289	271
26	1,950	4,660	970	1,270	1,210	1,210	1,620	1,210	660	342	283	283
27	2,450	4,530	910	910	1,210	1,150	1,620	1,090	660	342	283	475
28	4,140	5,070	860	810	1,210	1,270	1,480	1,150	635	325	283	395
29	2,950	3,510	860	760	-------	1,270	1,480	1,150	565	325	277	395
30	1,690	6,360	760	760	-------	1,210	1,340	1,550	542	325	310	395
31	1,180	-------	760	710	-------	1,340	-------	1,770	-------	325	395	-------

Monthly discharge of Kalama River near Kalama, Wash., for the year ending September 30, 1922

[Drainage area, 184 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	4,140	227	775	4.21	4.85	47,700
November	6,360	756	2,200	12.0	13.39	131,000
December	6,360	760	2,290	12.4	14.30	141,000
January	1,270	660	759	4.12	4.75	46,700
February	1,480	660	1,150	6.25	6.51	63,900
March	3,050	970	1,400	7.61	8.77	86,100
April	2,950	1,210	1,660	9.02	10.06	98,800
May	3,050	1,090	1,670	9.08	10.47	103,000
June	1,860	542	1,030	5.60	6.25	61,300
July	520	325	390	2.12	2.44	24,000
August	542	277	320	1.74	2.01	19,700
September	475	271	359	1.95	2.18	21,400
The year	6,360	227	1,170	6.36	85.98	845,000

COWLITZ RIVER BASIN

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, 1922.

GAGE.—Friez water-stage recorder on left bank, installed August 3, 1918; inspected by J. A. Combs.

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 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 recorded during year, from water-stage recorder, 3.88 feet at 10 a. m. December 12 (discharge, 631 second-feet); minimum stage from recorder, 1.14 feet on March 10, 11, 13, 18, 19, and 23–26 (discharge, 33 second-feet).

1911–1922: Maximum stage, estimated 6.0 feet December 18, 1917 (discharge not determined); minimum discharge recorded, 30 second-feet 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 May 19. Both rating curves well defined below 350 second-feet; extended above. 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. Records excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Portland Electric Power Co.

Discharge measurements of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 12	J. A. Combs	1.14	33.4	May 21	Combs and Jennings	1.92	180
12	do	1.14	34.6	July 5	J. A. Combs	1.71	145
Nov. 22	do	2.60	349	22	do	1.52	97.9
Dec. 17	do	1.97	224	Aug. 17	Kilgore and Combs	1.44	75.2
Jan. 17	do	1.28	45.9	17	Combs and Kilgore	1.44	72.9

Daily discharge, in second-feet, of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	71	80	450	65	40	35	35	52	239	202	95	95
2	59	65	380	65	39	35	35	57	338	183	92	102
3	56	57	338	61	40	35	36	61	368	167	89	92
4	52	54	278	57	41	35	36	65	368	153	89	97
5	48	52	221	57	40	35	36	71	348	142	81	97
6	46	52	184	56	40	35	36	83	318	142	76	97
7	45	54	158	52	37	34	36	95	288	138	73	108
8	44	52	141	52	38	34	37	98	258	136	68	97
9	43	48	126	54	37	34	41	106	250	131	63	84
10	41	46	158	54	36	34	41	106	233	129	61	78
11	36	46	482	54	36	33	41	112	230	127	73	78
12	34	45	609	56	36	34	41	120	226	125	73	76
13	35	46	532	56	36	34	40		228	118	74	70
14	42	46	422	56	35	34	39		231	108	74	68
15	57	44	328	57	35	34	37	160	224	105	74	65
16	63	43	264	57	35	35	37		216	108	75	63
17	80	43	224	61	36	34	36	221	212	118	76	57
18	83	42	184	61	36	34	36	256	210	108	76	56
19	74	42	147	58	36	34	35	230	210	102	78	54
20	77	41	138	56	36	34	35	210	214	100	76	48
21	74	149	129	53	35	34	35	190	216	99	73	45
22	57	338	120	50	35	34	36	171	210	97	65	45
23	50	318	110	48	35	33	37	153	194	92	59	43
24	46	288	101	45	35	33	38	144	189	89	57	42
25	46	288	92	45	35	33	39	142	198	87	57	42
26	46	278	83	45	35	33	40	140	214	81	59	42
27	48	278	74	46	35	34	41	131	222	78	68	41
28	65	268	68	44	35	35	42	118	222	78	73	46
29	92	268	63	42	-------	35	43	122	239	81	78	48
30	92	350	61	42	-------	35	45	150	228	87	81	45
31	83	-------	61	42	-------	35	-------	181	-------	89	87	-------

NOTE.—Water-stage recorder not operating Nov. 30, Dec. 1, 2, 20–26, Jan. 19–23, Mar. 4–9, May 6, 13–16 July 20–21, and Aug. 13–17; discharge Nov. 30 to Dec. 2 and May 13–16 determined from comparison with records of near-by streams; discharge for other periods estimated by interpolation.

Monthly discharge of Lake Creek at outlet of Packwood Lake, near Lewis, Wash., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	92	34	57.6	3,540
November	350	41	127	7,560
December	609	61	217	13,300
January	65	42	53.1	3,260
February	41	35	36.6	2,030
March	35	33	34.2	2,100
April	45	35	38.1	2,270
May	256	52	136	8,360
June	368	189	245	14,600
July	202	78	116	7,130
August	95	57	74.0	4,550
September	108	41	67.4	4,010
The year	609	33	101	72,700

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, 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, 1922.

GAGE.—Friez water-stage recorder on left bank, installed October 1, 1918; inspected by J. A. Combs.

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

CHANNEL AND CONTROL.—Channel composed of small boulders. Low-water control is riffle 40 feet below gage; at high stages, a considerable length of channel forms control. Banks steep and not subject to overflow. Channel curved above and fairly straight for 300 feet below gage. Stage of zero flow, according to measurements made August 18, 1922, gage height −0.70 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year occurred on December 12 while water-stage recorder was not operating; minimum stage from recorder, 0.45 foot at 6 p. m. October 8 (discharge, 30 second-feet).

1907–1914; 1918–1922: Maximum stage occurred December 12, 1921, while water-stage recorder was not operating (mean discharge for day estimated 2,800 second-feet); 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 slightly during spring high water; probably June 1. Both rating curves fairly well defined below 700 second-feet. Operation of water-stage recorder fairly satisfactory except as explained in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records good except for periods when recorder was not operating, for which they are fair.

COOPERATION.—Gage-height record and some discharge measurements furnished by Portland Electric Power Co.

Discharge measurements of Johnson Creek at mouth, near Lewis, Wash., during the year ending September 30, 1922.

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 16	J. A. Combs	0.85	79.8	July 10	J. A. Combs	1.08	126
23	do	.75	68.0	19	do	.88	95.5
25	do	.78	70.1	Aug. 18	R. B. Kilgore	.60	54.0
July 2	do	1.46	239	Sept. 23	J. A. Combs	.47	36.5

Daily discharge, in second-feet, of Johnson Creek at mouth, near Lewis, Wash., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	55	89	2,100	105	61	44	70	184		244	71	54
2	49	81	1,050	99	61	44	92	196	930	244	69	54
3	45	76	652	92	61	42	121	240		244	68	51
4	42	72	540	92	61	41	123	284		225	68	50
5	41	72	1,180	92	56	40	119	327	804	206	68	50
6	40	72	371	90	56	40	114	371	759	188	68	49
7	39	73	319	94	55	40	119	415	694	169	67	48
8	32	68	283	105	55	40	153	459	633	150	65	48
9	45	66	272	107	52	40	137	464	588	148	65	48
10	44	62	302	101	52	39	126	479	534	140	65	48
11	44	62	1,220	96	50	38	107	464	485	113	65	48
12	42	62	2,800	94	48	38	101	433	454	100	64	48
13	45	62	1,940	92	49	40	94	418	464	100	64	46
14	49	64	1,560	90	50	39	90	418	469	102	62	45
15	56	67	1,180	86	50	39	86	459	418	108	62	45
16	56	66	926	84	54	38	82	626	409	106	61	44
17	64	62	744	81	54	38	76	812	404	102	60	42
18	67	58	614	78	55	39	72	694	399	100	55	41
19	54	62	518	76	55	40		496	399	98	54	40
20	52	60	428	74	54	40		404	404	95	54	39
21	52	137	366	73	52	41	110	323		92	54	38
22	50	344	327	72	52	42		283		90	54	39
23	48	276	287	68	52	44		257	370	89	54	39
24	48	240	261	68	49	40	150	247		89	54	38
25	50	227	237	72	50	40	153	234		88	50	39
26		231	212	72	50	39	156	247	344	87	48	42
27	70	224	190	72	49	39	161	276	327	84	48	44
28		224	167	70	46	41	170	298	298	82	45	44
29	114	227	150	68	-------	41	176	409	276	79	42	39
30	105	1,470	135	68	-------	46	181	564	257	78	41	36
31	96	-------	119	64	-------	50	-------	673	-------	74	51	-------

NOTE.—Water-stage recorder not operating Oct. 26–28, Dec. 12, Apr. 19–23, May 3–7, June 1–5, 21–25, July 4–7, 23, 24, and Aug. 16; discharge estimated by comparison with records of flow of near-by streams or by interpolation.

Monthly discharge of Johnson Creek at mouth, near Lewis, Wash., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	-------	32	55.9	3,440
November	1,470	58	165	9,820
December	2,800	119	692	42,500
January	107	64	83.7	5,150
February	61	46	53.2	2,950
March	50	38	40.7	2,500
April	181	----------	119	7,080
May	812	184	402	24,700
June	-------	257	513	30,500
July	244	74	126	7,750
August	71	41	58.6	3,600
September	54	36	44.5	2,650
The year	2,800	32	197	143,000

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, Cowlitz County, and 9 miles northeast of Castle Rock.

DRAINAGE AREA.—472 square miles (measured on Plate XV, Water-Supply Paper 253).

RECORDS AVAILABLE.—October 1, 1919, to October 25, 1921; May 10 to September 30, 1922. 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. Au water-stage recorder used May 10 to July 28, 1922.

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, from water mark in well, 16.85 feet probably occurred on December 12 (discharge, 13,800 second-feet); minimum stage during year, from recorder, 0.54 foot at midnight September 24 (discharge, 318 second-feet).

1910–1912; 1920–1922: Maximum stage recorded, 11.0 feet on March 2, 1910, at gage near Castle Rock (discharge, 35,600 second-feet); minimum stage recorded, 0.46 foot from 5 to 6 p. m. August 26, 1920 (discharge, 293 second-feet).

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 unsatisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspecting recorder graph. Records fair.

COOPERATION.—Gage-height record furnished by J. C. Stevens.

Discharge measurements of Toutle River near Silver Lake, Wash., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Oct. 6	John McCombs	0.92	461
7	do	.90	440
Aug. 2	R. B. Kilgore	.98	475

Daily discharge, in second-feet, of Toutle River near Silver Lake, Wash., for the year ending September 30, 1922

Day	Oct.	May	June	July	Aug.	Sept.
1			4,510	1,620	476	601
2			4,670	1,560	472	580
3	600		4,750	1,530	453	488
4			4,670	1,500	446	601
5			4,190	1,440	438	644
6	450		3,640	1,410	420	779
7	442		3,360	1,350	413	898
8			3,150	1,270	410	733
9			3,220	1,220	413	622
10	418	2,660	2,870	1,170	476	559
11		2,590	2,660	1,140	779	519
12		2,520	3,290	1,120	733	488
13	644	2,520	2,590		733	461
14	802	2,870	2,590		559	442
15	874	3,500	2,520		559	424
16	948	4,510	2,380		519	406
17	948	5,390	2,310		476	388
18	1,020	5,070	2,240		469	385
19	923	4,190	2,170		476	371
20	898	3,500	2,170		450	364
21	923	3,570	2,100	800	424	347
22	898	3,500	1,960		406	337
23	826	3,080	1,890		399	337
24	850	2,940	1,820		399	331
25	1,050	2,870	1,820		399	327
26		2,730	1,890		396	420
27		2,590	1,890		392	688
28		2,660	1,820		378	826
29		3,150	1,750	488	371	601
30		3,570	1,680	484	406	515
31		4,030		480	802	

NOTE.—Water-stage recorder not operating satisfactorily Oct. 1–5, 8–12, and July 13–28; discharge interpolated or estimated.

Monthly discharge of Toutle River near Silver Lake, Wash., for the year ending September 30, 1922

[Drainage area, 472 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October 1–25	1,050		703	1.49	1.39	34,900
May 10–31	5,390	2,520	3,360	7.12	5.83	147,000
June	4,750	1,680	2,750	5.83	6.50	164,000
July	1,620	480	987	2.09	2.41	60,700
August	802	371	482	1.02	1.18	29,600
September	898	327	516	1.09	1.22	30,700

STREAMS BETWEEN COLUMBIA RIVER AND KLAMATH RIVER

ROGUE RIVER BASIN

ROGUE RIVER BELOW PROSPECT, OREG.

LOCATION.—In center of the 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 below Prospect, Jackson County, and 47 miles northeast of Medford.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 3, 1913, to September 30, 1922.

GAGE.—Vertical staff on right bank 40 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, 7.0 feet at 4 p. m. November 30 (discharge, 4,800 second-feet; total, including discharge of flume, 4,980 second-feet); minimum stage recorded, 2.55 feet September 25 and 26 (discharge, 548 second-feet; minimum including flume, 739 second-feet).

1913–1922: Maximum stage recorded, that of November 30, 1921; minimum stage recorded, 2.3 feet January 1, 1919 (discharge, 330 second-feet; total, including flume, 487 second-feet).

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

DIVERSIONS.—The California-Oregon Power Co.'s flume diverts around this station; a record is kept of this diversion. (See p.147.)

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly well defined below 2,000 second-feet; extended above. Gage read to half-tenths twice a day. Daily discharge obtained by applying mean daily gage height to rating table. Records fair.

The following discharge measurements was made by G. H. Canfield:
October 29, 1921: Gage height, 2.91 feet; discharge, 708 second-feet.

Daily discharge, in second-feet, of Rogue River below Prospect, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	620	670	3,110	830	695	695	960	1,670	2,350	1,030	670	570
2	620	645	2,670	830	695	720	1,030	1,850	2,350	960	670	595
3	620	645	2,050	800	695	720	1,170	1,670	2,350	960	670	595
4	620	645	1,760	800	720	720	1,330	1,950	2,350	890	670	595
5	620	645	1,580	800	670	720	1,170	2,250	2,250	890	670	595
6	620	645	1,410	800	670	695	1,100	2,150	2,250	890	670	595
7	620	620	1,330	745	670	720	1,100	2,150	2,050	890	670	595
8	620	620	1,250	720	695	670	1,250	1,850	2,250	830	670	595
9	620	620	1,170	770	695	670	1,170	1,670	2,250	830	670	595
10	620	620	1,100	745	670	670	1,100	1,580	1,950	830	645	595
11	620	620	1,030	720	670	670	1,030	1,490	1,850	770	645	595
12	620	620	1,030	720	670	670	1,030	1,490	1,850	770	670	570
13	670	620	1,030	720	670	695	890	1,850	1,850	770	645	570
14	645	620	960	720	670	695	960	2,150	1,850	770	645	570
15	670	620	960	720	670	695	890	2,350	1,670	770	645	570
16	670	620	890	745	720	695	860	2,450	1,670	770	645	570
17	670	620	890	745	770	670	830	2,780	2,670	745	645	570
18	720	645	860	620	745	670	830	2,890	1,670	745	645	570
19	645	620	860	570	770	670	890	2,670	1,490	745	645	570
20	645	890	830	670	770	670	960	2,450	1,490	745	645	570
21	645	2,670	830	670	770	720	1,100	2,150	1,490	745	620	570
22	645	2,050	800	670	745	770	1,490	2,050	1,330	720	620	570
23	645	1,490	830	770	720	1,170	1,490	2,050	1,330	720	620	570
24	645	1,170	800	800	720	1,250	1,490	2,050	1,330	720	620	570
25	670	1,330	770	800	720	1,030	1,670	2,050	1,250	720	620	548
26	830	1,490	770	800	745	1,030	1,850	1,850	1,250	720	620	548
27	720	1,330	770	770	720	960	1,850	1,850	1,170	720	620	670
28	720	1,170	770	770	720	960	1,670	1,850	1,100	720	595	620
29	720	1,670	770	745	-------	960	1,670	2,050	1,100	720	595	570
30	720	4,400	800	720	-------	960	1,670	2,250	1,030	695	570	570
31	670	-------	770	695	-------	1,030	-------	2,350	-------	670	570	-------

Monthly discharge of Rogue River below Prospect, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	830	620	658	40,500
November	4,400	620	1,050	62,500
December	3,110	770	1,140	70,100
January	830	570	742	45,600
February	770	670	709	39,400
March	1,250	670	795	48,900
April	1,850	830	1,220	72,600
May	2,890	1,490	2,060	127,000
June	2,350	1,030	1,730	103,000
July	1,030	670	789	48,500
August	670	570	639	39,300
September	670	548	582	34,600
The year	4,400	548	1,010	732,000

Combined monthly discharge of Rogue River and California-Oregon Power Co.'s flume near Prospect, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,010	790	834	51,300
November	4,580	790	1,230	73,200
December	3,290	940	1,320	81,200
January	1,010	720	914	56,200
February	950	840	882	49,000
March	1,420	850	973	59,800
April	2,030	1,010	1,400	83,300
May	3,080	1,670	2,250	138,000
June	2,530	1,210	1,910	114,000
July	1,210	850	973	59,800
August	850	761	825	50,700
September	861	739	773	46,000
The year	4,580	720	1,190	862,000

ROGUE RIVER AT RAYGOLD, NEAR CENTRAL POINT, OREG.[3]

LOCATION.—In sec. 18, T. 36 S., R. 2 W., at Raygold railroad station, just below dam and power house of California-Oregon Power Co., half a mile below mouth of Bear Creek, and 6 miles northwest of Central Point, Jackson County.

DRAINAGE AREA.—2,020 square miles.

RECORDS AVAILABLE.—August 30, 1905, to September 30, 1922.

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.—Bed composed of rock and boulders; practically permanent. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 9.10 feet at 8 p. m. November 30 (discharge, 19,600 second-feet); minimum stage due to sudden decrease in power load, 0.33 foot, at 10 p. m. September 18 (discharge, 861 second-feet).

[3] Previously published as "Rogue River near Tolo, Oreg."

1905–1922: Maximum stage recorded, 20.00 feet at 7.30 a. m. November 23, 1909 (discharge estimated by extension of rating curve at 60,000 second-feet); minimum stage indeterminate, 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. Rating curve fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height or, for days of considerable fluctuation, by averaging discharge for intervals of a day. Records good.

Discharge measurements of Rogue River at Raygold, near Central Point, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 19	G. H. Canfield	2.93	3,840
Aug. 25	F. F. Henshaw	1.00	1,480

Daily discharge, in second-feet, of Rogue River at Raygold, near Central Point, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,580	1,530	14,700	2,000	2,230	2,670	4,230	4,710	5,570	2,170	1,430	1,380
2	1,580	1,580	11,500	2,230	2,170	2,670	4,080	5,050	5,570	2,170	1,430	1,380
3	1,580	1,580	6,380	2,230	2,170	2,670	4,550	4,880	5,390	2,060	1,430	1,340
4	1,580	1,580	4,880	2,120	2,350	3,210	5,390	4,880	5,220	2,060	1,430	1,340
5	1,580	1,580	4,080	2,060	2,670	3,490	4,880	5,770	4,880	2,060	1,380	1,340
6	1,530	1,480	3,560	3,520	2,480	3,860	4,230	5,770	4,550	2,000	1,430	1,340
7	1,580	1,430	3,210	3,070	2,480	3,860	4,230	5,570	4,390	2,000	1,380	1,340
8	1,430	1,430	2,930	2,410	2,740	3,490	4,390	5,220	4,390	1,950	1,430	1,340
9	1,530	1,580	2,740	2,410	3,490	3,350	4,230	4,880	5,220	1,950	1,430	1,340
10	1,480	1,430	2,600	2,350	3,210	3,280	3,930	4,390	4,880	1,900	1,340	1,340
11	1,480	1,530	2,600	2,230	3,070	3,140	3,860	4,080	4,550	1,900	1,430	1,340
12	1,480	1,680	2,480	2,120	2,800	3,070	3,630	3,860	4,230	1,840	1,430	1,300
13	1,530	1,430	2,410	2,120	2,600	3,140	3,560	4,230	4,080	1,780	1,430	1,300
14	1,630	1,530	2,350	2,060	2,410	3,560	3,930	5,050	3,930	1.730	1,430	1,300
15	1,630	1,530	2,290	2,060	2,290	3,420	3,860	5,390	3,780	1,730	1,430	1,250
16	1,630	1,580	2,230	2,060	2,860	3,860	3,860	6,170	3,630	1,730	1,430	1,250
17	1,630	1,580	2,230	2,930	4,080	3,700	3,490	6,820	3,490	1,680	1,430	1,200
18	1,730	1,580	2,290	2,670	5,220	3,210	3,350	7,260	3,350	1,680	1,380	1,250
19	1,630	1,580	2,230	1,950	6,170	2,930	3,350	7,040	3,210	1,630	1,380	1,200
20	1,530	1,680	2,230	2,120	5,570	2,860	3,700	7,040	3,070	1,580	1,380	1,200
21	1,430	3,890	2,170	2,120	4,230	3,210	4,080	6,170	2,930	1.530	1,380	1,200
22	1,580	6,570	2,120	1,840	3,490	3,490	4,880	5,390	2,740	1,480	1,380	1,200
23	1,530	3,860	2,060	1,900	3,070	6,620	4,880	5,050	2,600	1,480	1,380	1,250
24	1,530	2,930	2,000	2,480	2,860	7,720	4,880	5,050	2,540	1,480	1,380	1,250
25	1,580	3,000	1,950	2,930	3,140	5,570	5,050	4,880	2,540	1,480	1,340	1,250
26	1,730	3,350	2,060	2,930	3,210	4,710	3,930	4,710	2,540	1,480	1,380	1,250
27	1,950	3,420	2,120	2,930	3,070	4,230	3,930	4,390	2,410	1,480	1,380	1,380
28	1,780	3,420	2,120	2,670	2,800	4,390	3,630	4,390	2,290	1,430	1,380	1,430
29	1,730	4,560	2,000	2,600	-------	4,230	4,880	4,550	2,350	1,430	1,380	1,340
30	1,730	15,400	2,120	2,350	-------	4,230	4,710	4,880	2,230	1,430	1,380	1,430
31	1,680	-------	2,170	2,350	-------	4,390	-------	5,390	-------	1,430	1,380	-------

Monthly discharge of Rogue River at Raygold, near Central Point, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,950	1,430	1,600	98,400
November	15,400	1,430	2,710	161,000
December	14,700	1,950	3,320	204,000
January	3,520	1,840	2,380	146,000
February	6,170	2,170	3,180	177,000
March	7,720	2,670	3,810	234,000
April	5,390	3,350	4,190	249,000
May	7,260	3,860	5,260	323,000
June	5,570	2,230	3,750	223,000
July	2,170	1,430	1,730	106,000
August	1,430	1,340	1,400	86,100
September	1,430	1,200	1,300	77,400
The year	15,400	1,200	2,880	2,080,000

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 fore bay and 2 miles below Prospect, Jackson County.

RECORDS AVAILABLE.—August 1, 1913, to September 30, 1922.

GAGE.—Vertical staff in stilling box on right side of flume, 500 feet above fore bay.

DISCHARGE MEASUREMENTS.—Made from collar of flume.

CHANNEL AND CONTROL.—Wooden flume at end of which there is a free fall into fore bay.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 2.6 feet several times during March, April, May, June, and August (discharge, 198 second-feet); minimum stage recorded, 2.0 feet June 1–3 (discharge, 120 second-feet).

1913–1922: Maximum stage recorded, 2.7 feet April 25, 26, 30, May 1, 2, 1916, and December 12, 1919 (discharge, 212 second-feet). Flume dry at times.

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

ACCURACY.—Stage-discharge relation probably permanent, although no meter measurements were made during year to verify the rating curve. Rating curve fairly well defined. Gage read to hundredths once a day. Daily discharge obtained by applying daily gage height to rating table. Records fair.

No discharge measurements were made at this station during year.

Daily discharge, in second-feet, of California-Oregon Power Co.'s flume near Prospect, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	177	177	184	184	184	170	177	191	120	184	184	191
2	177	177	170	177	170	170	177	184	120	184	184	191
3	177	177	177	170	177	177	191	184	120	184	184	191
4	177	184	177	170	177	177	184	198	184	184	184	191
5	177	184	177	177	177	177	177	177	184	184	184	191
6	177	177	177	177	177	177	177	184	191	184	184	191
7	177	177	170	177	170	177	177	184	184	184	184	191
8	177	170	177	170	177	177	198	177	191	184	184	191
9	177	170	177	170	170	177	177	177	184	184	184	191
10	177	170	170	170	170	177	184	177	177	184	184	191
11	170	170	177	164	170	177	177	184	177	184	184	191
12	170	177	177	164	170	177	184	191	184	184	184	191
13	177	170	177	170	170	177	184	191	184	184	184	191
14	170	170	177	177	170	177	184	191	184	184	184	191
15	177	170	177	177	170	177	184	184	198	184	184	191
16	177	170	177	184	184	177	184	170	191	184	184	191
17	177	177	170	184	177	177	184	177	191	184	184	191
18	170	177	170	184	177	177	184	191	191	184	184	191
19	170	177	170	150	170	177	184	184	191	184	184	191
20	170	170	170	150	170	177	198	177	184	184	184	191
21	170	177	170	157	170	184	184	177	184	184	184	191
22	184	177	177	164	177	198	198	177	184	184	184	191
23	184	170	177	170	170	198	191	184	184	184	184	191
24	184	170	177	184	170	170	184	184	184	184	184	191
25	177	170	177	177	170	177	184	184	191	184	184	191
26	177	177	177	177	170	177	184	184	191	184	184	191
27	170	177	177	164	170	177	184	184	184	184	184	191
28	177	170	170	177	170	177	184	198	184	184	198	191
29	177	177	170	170	-------	184	184	191	184	184	198	191
30	170	177	170	170	-------	177	184	184	184	184	191	191
31	170	-------	177	170	-------	177	-------	184	-------	184	191	-------

Monthly discharge of California-Oregon Power Co.'s flume near Prospect, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	184	170	175	10,800
November	184	170	174	10,400
December	184	170	175	10,800
January	184	150	172	10,600
February	184	170	173	9,610
March	198	170	178	10,900
April	198	177	184	10,900
May	198	170	184	11,300
June	198	120	179	10,700
July	184	184	184	11,300
August	198	184	185	11,400
September	191	191	191	11,400
The year	198	120	180	130,000

SOUTH FORK OF BIG BUTTE CREEK NEAR BUTTE FALLS, OREG.

LOCATION.—In SW. 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, 1922, when station was discontinued.

GAGE.—Vertical staff on pier near left bank; read by C. W. Jackson and W. T. Berrian.

DISCHARGE MEASUREMENTS.—Made by wading. Flood measurements can be made from bridge.

CHANNEL AND CONTROL.—Bed composed of rock and gravel; may shift.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.8 feet at 5 p. m. November 30 (discharge, 900 second-feet); minimum stage recorded, 1.40 feet July 7 and 8 (discharge, 104 second-feet).

1910–11; 1915; 1918–1922: Maximum stage recorded, 3.4 feet February 21, 1921 (discharge, 1,480 second-feet); minimum stage recorded, 1.2 feet August 29, 1920 (discharge, 83 second-feet).

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

DIVERSIONS.—Canal diverts water above station for use in State fish hatchery. Its discharge, 4.0 second-feet, measured on September 25, 1919, remains practically constant. A small amount of land is irrigated above this station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined below 300 second-feet; extended above. Gage read to hundredths once a day. Daily discharge ascertained by applying daily gage height to rating table. Records good below and fair above 300 second-feet.

The following discharge measurement was made by F. F. Henshaw:
August 23, 1922: Gage height, 1.48 feet; discharge, 121 second-feet.

Daily discharge, in second-feet, of South Fork of Big Butte Creek near Butte Falls, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	124	124	810	154	148	154	318	227	235	124	120	124
2	124	124	690	148	148	188	430	227	235	124	118	124
3	124	124	370	142	148	208	318	188	231	124	118	120
4	120	124	243	142	154	188	500	188	227	120	118	120
5	120	124	219	142	154	188	430	188	227	116	118	120
6	120	124	204	161	154	208	370	188	235	112	118	120
7	120	124	188	154	148	227	318	188	248	104	118	120
8	120	124	181	148	168	227	318	188	256	104	120	122
9	120	124	168	148	168	227	430	188	231	114	118	122
10	120	124	161	142	168	196	370	168	235	124	120	120
11	120	124	154	136	161	188	318	154	231	124	120	120
12	120	124	154	136	154	188	269	154	227	124	120	120
13	124	124	154	130	154	181	269	154	231	124	116	122
14	124	124	148	130	154	181	227	227	235	124	118	122
15	124	130	148	130	161	188	227	227	227	124	116	120
16	124	142	148	136	188	219	269	227	227	127	116	120
17	124	136	142	161	188	196	227	318	227	124	116	120
18	124	130	136	154	188	188	227	318	227	124	116	122
19	124	130	136	154	227	227	227	318	219	124	116	122
20	124	130	136	148	227	235	227	430	219	124	122	122
21	124	269	136	148	227	227	227	318	219	124	124	120
22	124	168	136	148	188	227	227	318	219	124	124	124
23	124	161	136	148	188	730	227	269	208	122	122	124
24	124	154	136	161	208	318	318	269	188	124	122	
25	124	154	136	154	188	227	318	269	188	120	120	
26	154	154	136	154	188	227	318	256	188	124	120	124
27	142	181	136	148	188	227	318	227	188	124	120	
28	136	196	130	148	154	730	318	318	192	124	124	
29	130	269	130	148	-------	430	318	269	192	124	124	
30	124	900	130	148	-------	500	227	227	188	120	124	
31	124	-------	136	148	-------	318	-------	231	-------	120	124	-------

NOTE.—Braced figure gives estimated mean discharge for period indicated.

Monthly discharge of South Fork of Big Butte Creek near Butte Falls, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	154	120	125	7,690
November	900	124	171	10,200
December	810	130	199	12,200
January	161	130	147	9,040
February	227	148	175	9,720
March	730	154	263	16,200
April	500	227	304	18,100
May	430	154	240	14,800
June	256	188	220	13,100
July	127	104	121	7,440
August	124	116	120	7,380
September	124	120	122	7,260
The year	900	104	184	133,000

SOUTH FORK OF LITTLE BUTTE CREEK NEAR LAKE CREEK, OREG.

LOCATION.—In SE. ¼ sec. 29,[4] T. 36 S., R. 2 E., one-fourth mile above intake of Rogue River Valley Canal Co.'s South Fork canal and 1½ miles southeast of Lake Creek post office, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 29, 1921, to September 30, 1922. At station in sec. 11, T. 37 S., R. 2 E., 5 miles above Lake Creek post office, November 26, 1910, to April 19, 1913.

GAGE.—Stevens eight-day recorder on left bank; inspected by employees of Rogue River Valley Canal Co.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; somewhat shifting in floods.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.30 feet at 2 a. m. May 20 (discharge, 800 second-feet); minimum stage recorded, 1.09 feet September 18 and 19 (discharge, 12 second-feet).

1921–22: Maximum stage recorded, 3.58 feet May 17, 1921 (discharge, 1,070 second-feet); minimum stage recorded, that of September 18 and 19, 1922.

ICE.—None during period of record.

DIVERSIONS.—Several hundred acres irrigated in small tracts above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed March 24. Both rating curves fairly well defined below 500 second-feet. Operation of water-stage recorder satisfactory except November 6 to December 28, when it was not attended. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection of recorder graph. Records good.

[4] Location published in Water-Supply Paper 534 is in error.

Discharge measurements of South Fork of Little Butte Creek near Lake Creek, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 31	G. H. Canfield	1.25	23.2	May 2	G. H. Canfield	2.56	381
Dec. 29	Le Tourneau and Brophy	1.30	26.2	July 13	Brophy and Smith	1.31	30.6
Mar. 28	do	2.00	170	Aug. 30	do	1.17	18.3
Apr. 13	G. H. Canfield	2.00	159	Sept. 12	do	1.16	18.4

NOTE.—Le Tourneau, Brophy, and Smith are employees of Rogue River Valley Canal Co.

Daily discharge, in second-feet, of South Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	23	23		33	37	46	146	395	364	45	22	17
2	23	23		37	36	45	166	395	355	44	22	15
3	22	23		36	37	44	187	382	325	44	23	17
4	22	23		33	55	49	291	414	312	42	24	19
5	22	23		33	74	65	240	443	286	40	24	22
6	21			55	67	122	209	458	261	37	22	21
7	21			48	69	115	224	448	249	32	19	20
8	21			44	89	90	240	410	299	32	19	19
9				45	94	83	205	373	308	32	19	18
10				41	81	79	187	338	240	31	19	17
11	22			31	67	76	175	308	213	30	19	16
12				33	56	69	166	321	198	29	21	15
13				34	51	83	163	360	175	27	20	17
14				33	46	90	184	405	160	26	19	17
15	25			34	52	83	201	443	143	26	20	16
16	25			34	64	112	184	483	130	25	21	15
17	25			76	74	92	163	539	118	25	19	15
18	25	40		51	90	81	154	572	109	26	17	14
19	25			74	161	74	169	616	99	27	19	13
20	25			98	115	77	194	698	91	27	19	14
21	25				89	92	240	572	87	26	20	15
22	25				69	112	329	498	82	25	21	15
23	25			80	56	376	342	458	73	25	20	17
24	25				59	278	364	434	66	25	20	15
25	25				61	201	400	419	61	26	19	15
26	28			56	64	184	453	378	55	26	18	18
27	27			58	58	166	438	342	52	23	18	21
28	25			48	51	157	405	329	51	22	18	19
29	24		29	37		149	378	329	49	23	19	18
30	23		31	36		146	373	342	48	22	19	17
31	23		32	37		152		355		21	19	

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of South Fork of Little Butte Creek near Lake Creek, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	28		23.6	1,450
November			37.2	2,210
December			[a] 50.0	3,070
January		31	50.8	3,120
February	161	36	68.6	3,810
March	376	44	116	7,130
April	453	146	252	15,000
May	698	308	428	26,300
June	364	48	169	10,100
July	45	21	29.4	1,810
August	24	17	19.9	1,220
September	22	13	16.9	1,010
The year	698	13	105	76,200

[a] Estimated.

LITTLE BUTTE CREEK ABOVE EAGLE POINT, OREG.

LOCATION.—In NW. ¼ sec. 5, T. 36 S., R. 1 E., at Bieberstedt's ranch, 1 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, 1922. Station at Tronson ranch, below intake of Eagle Point ditch, was maintained July 13, 1907, to April 30, 1916.

GAGE.—Vertical staff on right bank; read by Carl Bieberstedt. A staff gage one-fourth mile below was used April 24, 1916, to February 9, 1920.

CHANNEL AND CONTROL.—Channel composed of bedrock overlain on one side by firm gravel; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.15 feet at 2 p. m. March 23 (discharge, 2,630 second-feet); minimum stage recorded, 0.18 foot July 8 and 9 (discharge, 6.4 second-feet).

1916–1922: Maximum stage recorded, 11.3 feet at former location January 12, 1918 (discharge, 6,200 second-feet); minimum discharge recorded, that of July 8 and 9, 1922.

ICE.—Stage-discharge relation apparently unaffected by ice.

DIVERSIONS.—The Rogue River Valley Canal diverts water above 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 Canal diverts just below this station, but above the old station at Tronson ranch; for records, see page 163.

REGULATION.—Water was being stored in Fish Lake Reservoir during November to May and released during July, August, and September; for records, see page 154.

ACCURACY.—Stage-discharge relation practically permenent during year except as affected by temporary obstruction on control October 13 to November 8. Rating curve well defined between 15 and 2,000 second-feet. Gage read to hundredths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

Discharge measurements of Little Butte Creek above Eagle Point., Oreg, during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 31	G. H. Canfield	1.13	90	May 1	LeTourneau and Brophy	2.49	512
31	do	1.13	89	June 3	Brophy and Ryan	2.24	427
Jan. 6	LeTourneau and Brophy	2.78	649	Aug. 24	F. F. Henshaw	.46	17.9
Mar. 27	do	1.98	315	Sept. 1	Brophy and Smith	.44	16.5
Apr. 13	G. H. Canfield	1.84	297				

NOTE.—LeTourneau, Brophy, and Smith are employees of Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Little Butte Creek above Eagle Point, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	70	88	904	-------	-------	130	279	534	464	11	14	16
2	96	88	490	-------	-------	116	291	554	452	13	13	15
3	96	88	260	-------	-------	116	367	514	430	12	8.6	14
4	92	88	201	-------	-------	251	575	575	405	12	9.0	15
5	92	88	167	-------	-------	391	441	575	367	13	11	16
6	92	86	150	662	-------	575	374	575	307	14	12	17
7	92	84	140	-------	-------	391	377	554	317	13	15	16
8	92	94	133	-------	-------	270	419	526	514	7.4	15	17
9	94	100	125	-------	-------	228	381	522	618	8.6	15	16
10	92	100	123	-------	-------	245	374	449	405	13	17	14
11	92	98	118	-------	-------	273	343	398	353	26	18	13
12	92	98	118	-------	-------	201	327	394	314	21	25	14
13	92	96	112	-------	-------	212	317	423	214	20	23	13
14	94	96	109	-------	-------	257	596	490	172	19	18	14
15	94	98	109	-------	-------	212	554	534	142	17	19	17
16	92	102	98	-------	-------	510	441	575	121	16	17	18
17	94	105	98	-------	------	301	340	640	105	14	16	19
18	92	102	98	-------	-------	234	304	684	86	15	14	21
19	92	100	98	-------	-------	206	311	730	72	16	14	18
20	90	105	98	-------	-------	201	347	957	59	18	16	25
21	92	234	98	-------	-------	231	384	778	53	18	18	40
22	92	145	100	-------	-------	260	518	684	50	17	20	63
23	92	118	102	-------	-------	1,290	575	618	43	19	20	82
24	92	112	98	-------	-------	790	554	575	38	19	19	92
25	92	109	98	-------	-------	475	575	554	30	18	19	80
26	118	107	98	-------	-------	384	640	514	25	18	17	96
27	102	167	100	-------	-------	340	618	452	20	19	16	112
28	96	121	100	-------	142	337	575	430	15	16	16	107
29	92	340	98	-------	-------	295	554	423	13	16	16	114
30	92	827	109	-------	-------	285	518	441	10	16	15	102
31	88	-------	105	-------	-------	314	-------	464	-------	16	16	-------

Monthly discharge of Little Butte Creek above Eagle Point, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	118	70	92.9	5,710
November	827	88	139	8,270
December	904	98	157	9,650
January	.....	.....	a150	9,220
February	.....	.....	a180	10,000
March	1,290	116	333	20,500
April	640	279	442	26,300
May	957	394	553	34,000
June	618	10	207	12,300
July	26	7.4	15.8	972
August	25	8.6	16.2	996
September	114	13	40.5	2,410
The year	1,290	7.4	194	140,000

a Estimated from records of flow of North and South forks.

FISH LAKE RESERVOIR NEAR LAKE CREEK, OREG.

LOCATION.—At dam of Fish Lake Reservior, 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, 1922.

GAGE.—Vertical staff on outside of new outlet tower read since January 17, 1922. Temporary gage used during early part of year. Gages read by George Compton and C. W. Hawkins.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4,817.05 feet June 26 to July 4 (storage, 4,190 acre-feet); minimum stage recorded, 4,801.49 feet November 6–14 (storage, 145 acre-feet).

1915–1922: Maximum stage recorded, 4,820.38 feet (sea-level datum) June 4, 1917 (storage, 5,260 acre-feet).

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 year ending September 30, 1922

Date	Gage height	Contents	Loss or gain in storage during month	Date	Gage height	Contents	Loss or gain in storage during month
	Feet	*Acre-feet*	*Acre-feet*		*Feet*	*Acre-feet*	*Acre-feet*
Oct. 31	4,801.50	146	−73	May 31	4,816.80	4,105	+915
Nov. 30	4,802.70	284	+138	June 30	4,817.05	4,191	+86
Dec. 31	4,802.80	297	+13	July 31	4,813.20	2,940	−1,251
Jan. 31	4,807.20	1,227	+930	Aug. 31	5,808.60	1,594	−1,346
Feb. 28	4,809.95	1,969	+742	Sept. 30	4,803.66	434	−1,160
Mar. 31	4,812.40	2,694	+725				
Apr. 30	4,814.00	3,190	+496	The year	.....	.....	+215

NORTH FORK OF LITTLE BUTTE CREEK AT FISH LAKE, NEAR LAKE CREEK, OREG.

LOCATION.—In SE. ¼ sec. 4, 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, 1922.

GAGE.—Lietz water-stage recorder 500 yards below dam and 6 feet upstream from old location installed September 30, 1921, and gage datum lowered 1.00 foot. Recorder inspected by employees of Rogue River Valley Canal Co.

DISCHARGE MEASUREMENTS.—Made by wading.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.18 feet at 2 p. m. September 28 (discharge, 115 second-feet); minimum stage recorded, 1.26 feet at 6 a. m. March 12 (discharge, 5.0 second-feet).

1914–1922: Maximum stage recorded, that of September 28, 1922; minimum discharge, 3 second-feet April 17, 1920.

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

DIVERSIONS.—None.

REGULATION.—Discharge is controlled by reservoir dam at outlet of Fish Lake 500 yards upstream; a record has been kept of the height of water in reservoir and monthly run-off corrected.

ACCURACY.—Stage-discharge relation apparently permanent during year. Rating curve fairly well defined between 20 and 100 second-feet. Operation of water-stage recorder satisfactory except November 27 to December 9. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records fair.

COOPERATION.—Gage-height record and some 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 3	F. W. Scheffel	2.32	52.5	Aug. 8	Brophy and Smith	2.45	65.9
June 27	Brophy and Smith	2.07	37.6	Sept. 9	do	1.98	38.8
July 1	do	1.79	23.3	11	Scheffel and Denzer	1.98	30.9

NOTE.—Scheffel and Denzer engineers for Medford Irrigation District; Brophy and Smith engineers or Rogue River Valley Canal Co.

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Daily discharge, in second-feet, of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	53	48		37	5.3	10.8	9.0	17.2	59	36	61	43
2	53	48		37	5.3	7.8	9.6	17.2	58	37	60	35
3	51	48		38	5.5	7.2	9.6	17.6	58	37	59	35
4	51	48		36	5.8	7.2	9.6	17.6	58	37	58	34
5	50	48	43	36	6.0	7.5	9.6	19.2	58	36	57	34
6	50	46		21	6.3	7.5	9.9	20	53	36	59	33
7	51	46		11.7	6.9	7.8	10.2	20	50	42	60	33
8	49	46		13.6	6.9	7.8	10.2	20	49	45	58	33
9	50	46		8.4	6.9	8.1	10.5	20	49	51	58	32
10	49	45	43	9.0	7.2	8.4	10.5	20	50	60	57	32
11	49	45	43	10.5	7.2	7.2	10.8	20	50	62	59	32
12	49	45	43	10.8	7.2	5.3	10.8	22	49	62	60	32
13	49	45	42	10.2	7.5	5.5	11.1	23	43	62	60	32
14	49	45	42	10.2	8.1	5.5	11.4	24	33	62	60	32
15	49	45	41	10.2	8.1	5.8	11.1	25	33	61	58	33
16	53	45	32	10.2	8.1	5.5	11.4	27	33	61	58	37
17	52	45	40	10.5	8.1	6.0	11.4	27	33	61	58	39
18	52	45	41	10.5	8.4	6.6	11.4	27	33	61	57	39
19	51	45	41	10.8	8.4	6.3	11.7	28	33	60	55	38
20	50	50	41	10.5	8.7	6.0	12.0	35	34	60	54	38
21	50	51	37	10.2	9.0	5.8	12.8	49	39	61	49	52
22	51	50	37	9.9	9.6	5.8	13.2	58	39	63	43	80
23	52	48	36	7.2	9.6	6.0	13.2	61	39	62	42	87
24	49	48	36	6.3	9.9	6.0	13.6	61	38	61	41	86
25	49	46	36	6.3	10.5	7.2	14.8	62	37	61	41	86
26	51	45	37	6.0	10.8	8.4	14.8	66	37	60	41	87
27	51		39	6.3	11.1	8.7	15.2	66	37	60	42	86
28	50	45	39	6.0	11.7	8.7	16.0	63	37	60	41	93
29	50		39	6.6	-------	8.7	16.0	60	37	63	47	102
30	49		39	5.8	-------	9.0	16.0	60	37	61	49	90
31	49	-----	39	5.3	-------	9.0	-------	60	-------	61	48	-------

NOTE.—Discharge estimated Nov. 27 to Dec. 9.

Monthly discharge of North Fork of Little Butte Creek at Fish Lake, near Lake Creek, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet		
	Maximum	Minimum	Mean	Observed	Stored	Without storage
October	53	49	50.4	3,100	−73	3,030
November	51	45	46.4	2,760	+138	2,900
December	----------	39	40.3	2,480	+13	2,490
January	38	5.3	13.8	848	+930	1,780
February	11.7	5.3	8.00	444	+742	1,190
March	10.8	5.3	7.20	443	+725	1,170
April	16.0	9.0	11.9	708	+496	1,200
May	66	17.2	35.9	2,210	+915	3,120
June	59	37	43.1	2,560	+86	2,650
July	63	36	54.9	3,380	−1,251	2,130
August	61	41	53.2	3,270	−1,346	1,920
September	102	32	51.5	3,060	−1,160	1,900
The year	102	5.3	34.9	25,300	+215	25,500

NORTH FORK OF LITTLE BUTTE CREEK ABOVE MEDFORD INTAKE, NEAR LAKE CREEK, OREG

LOCATION.—In SW. ¼ sec. 25, T. 36 S., R. 2 E., 200 yards above intake of city of Medford water-supply pipe and 5 miles above Lake Creek post office Jackson County, and mouth of South Fork.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—September 10, 1911, to March 31, 1913; May 26 to September 30, 1922.

GAGE.—Stevens 8-day water-stage recorder on right bank; inspected by employees of Rogue River Valley Canal Co.

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

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period May 26 to September 30, 1922, 2.32 feet May 26 (discharge, 138 second-feet); minimum stage recorded, 1.75 feet September 6-10 (discharge, 64 second-feet).

1911–1913 and 1922: Maximum discharge recorded, about 435 second-feet February 17, 1912; minimum discharge, 43 second-feet December 21 and 22, 1911.

Minimum discharge recorded at this station, 37.5 second-feet at time of discharge measurement September 18, 1915.

ICE.—None.

DIVERSIONS.—Some minor diversions for irrigation above station. Hanley ditches and water-supply pipe line of city of Medford divert just below gage.

REGULATION.—Flow is controlled by storage in Fish Lake, 12 miles upstream; a record has been kept of stage in the reservoir and monthly run-off corrected.

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

Discharge measurements of North Fork of Little Butte Creek above Medford intake, near Lake Creek, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 12	LeTourneau and Brophy	1.54	35.6	May 31	L. S. Brophy	2.23	121
Mar. 30	do	1.84	70	Aug. 5	do	1.95	93
Apr. 25	do	2.05	97	Sept. 4	do	1.80	68
May 2	G. H. Canfield	1.96	92	22	do	2.08	111

NOTE.—LeTourneau and Brophy were employees of Rogue River Valley Canal Co.

Daily discharge, in second-feet, of North Fork of Little Butte Creek above Medford intake, near Lake Creek, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1		121	74	86	78	16		99	92	88	69
2		118	77	85	74	17		90	91	86	71
3		116	77	86	69	18		87	90	87	71
4		116	76	86	69	19		87	90	87	70
5		116	76	87	66	20		86	88	88	70
6		117	76	87	64	21		87	87	87	82
7		114	77	87	64	22		87	96	83	109
8		117	83	87	64	23		87	96	83	113
9		117	83	87	64	24		83	95	82	108
10		114	86	90	64	25		81	92	79	104
11		116	92	92	66	26	138	81	91	77	103
12		114	96	95	67	27	135	78	90	76	102
13		107	95	92	68	28	134	77	92	74	104
14		100	92	91	68	29	128	77	98	77	113
15		99	91	91	68	30	128	76	92	79	112
						31	125		88	79	

Monthly discharge of North Fork of Little Butte Creek above Medford intake, near Lake Creek, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet		
	Maximum	Minimum	Mean	Observed	Stored	Without storage
May 26–31	138	125	131	1,560	−35	1,520
June	121	76	98.8	5,880	+86	5,970
July	98	74	87.7	5,390	−1,251	4,140
August	95	74	85.2	5,240	−1,346	3,890
September	113	64	80.5	4,790	−1,160	3,630
The period				22,900	−3,710	19,200

NORTH FORK OF LITTLE BUTTE CREEK ABOVE INTAKE OF ROGUE RIVER VALLEY CANAL, NEAR LAKE CREEK, OREG.

LOCATION.—In NW. ¼ 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, and April 13, 1921, to September 30, 1922.

GAGE.—Stevens 8-day water-stage recorder on right bank; inspected by employees of Rogue River Valley Canal Co.

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 stage during year from water-stage recorder, 2.60 feet at 3 p. m. March 23 (discharge, 483 second-feet); minimum stage from recorder, 0.72 foot at 2 a. m. January 24 (discharge, 28 second-feet).

1916–1919; 1921–22: Maximum stage from high-water marks, 6.02 feet January 12, 1918 (discharge not computed); minimum discharge, 16 second-feet, December 17, 1918.

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 gage. Several hundred acres irrigated above station.

REGULATION.— Water was stored in Fish Lake Reservoir, 15 miles above station on which a gage-height record has been kept. (See p. 154 for record of storage.)

ACCURACY.—Stage-discharge relation practically permanent during year. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except November 6 to December 31 when it was not attended. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good.

Discharge measurements of North Fork of Little Butte Creek above intake of Rogue River Valley Canal, near Lake Creek, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 31	G. H. Canfield	1.20	71	Apr. 13	G. H. Canfield	1.28	85
Dec 30	LeTourneau and Brophy [a]	1.14	62	June 14	L. S. Brophy	1.23	78
Jan. 26	do	.95	43.2	July 28	Brophy and Smith [a]	1.26	83
Mar. 29	do	1.24	83				

[a] Employees of Rogue River Valley Canal Co.

Daily discharge, in second-feet, of North Fork of Little Butte Creek above intake of Rogue River Valley Canal, near Lake Creek, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	66	62	39	48	76	105	122	56	79	56
2	66	66	62	37	46	79	101	124	58	83	57
3	66	66	59	39	44	112	101	122	60	81	52
4	62	66	59	69	51	145	105	117	57	76	52
5	62	66	61	65	72	101	103	112	56	74	52
6	62		115	51	74	90	105	105	56	76	49
7	61		53	52	74	94	105	110	59	78	48
8	62		51	60	61	103	105	148	65	78	50
9	62		45	81	60	99	127	175	65	76	48
10	62		43	59	62	101	117	122	71	76	47
11	64		41	53	61	92	105	110	76	78	49
12	66		41	48	59	84	103	101	79	81	47
13	81		40	46	61	84	103	88	79	79	46
14	83		38	44	65	135	110	74	81	78	44
15	78		38	46	61	124	107	71	81	76	45
16	74		40	56	99	105	103	66	83	72	49
17	72		69	65	74	84	105	62	81	74	51
18	72	80	52	88	64	81	114	61	78	74	52
19	72		83	110	60	84	122	61	79	74	51
20	72		127	79	62	96	200	60	79	74	51
21	69		150	66	68	110	180	61	78	78	61
22	72		153	57	81	137	183	64	81	66	92
23	72		53	52	268	145	180	64	81	62	103
24	72		37	56	192	132	178	60	81	62	107
25	72		44	56	124	135	180	61	81	61	103
26	83		44	61	103	143	175	60	81	61	117
27	74		46	53	88	130	166	59	81	59	127
28	71		44	50	84	117	153	59	79	59	130
29	71		42	-------	79	112	140	59	81	60	145
30	70		40	-------	76	107	130	57	81	65	130
31	68	-------	39	-------	79	-------	127	-------	79	62	-------

NOTE.—Mean discharge estimated Nov. 6-30 by comparison with records of flow for Little Butte Creek above Eagle Point.

Monthly discharge of North Fork of Little Butte Creek above intake of Rogue River Valley Canal, near Lake Creek, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet		
	Maximum	Minimum	Mean	Observed	Stored	Without storage
October	83	61	69.6	4,280	−73	4,210
November	----------	----------	77.7	4,620	+138	4,760
December	----------	----------	[a]80.0	4,920	+13	4,930
January	153	37	60.4	3,710	+930	4,640
February	110	37	58.4	3,240	+742	3,980
March	268	44	80.7	4,960	+725	5,680
April	145	76	108	6,430	+496	6,930
May	200	101	130	7,990	+915	8,900
June	175	57	87.2	5,190	+86	5,280
July	83	56	73.6	4,530	−1,251	3,280
August	83	59	72.0	4,430	−1,346	3,080
September	145	44	70.4	4,190	−1,160	3,030
The year	268	37	80.8	58,500	+215	58,700

[a] Estimated by comparison with discharge of Little Butte Creek above Eagle Point.

ROGUE RIVER VALLEY CANAL NEAR BROWNSBORO, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 36 S., R. 1 E., at head of Bradshaw drop, 50 feet below intake of Medford Irrigation District Canal, 2 miles southwest of Brownsboro, 8 miles below intake, and 16 miles from Medford, Jackson County.

RECORDS AVAILABLE.—Irrigation seasons of 1913, 1915 to 1919, 1921, and 1922.

GAGE.—Stevens 8-day water-stage recorder on right bank, a few feet downstream from location of gage used during irrigation season of 1921.

DISCHARGE MEASUREMENTS.—Made by wading or from plank.

CHANNEL AND CONTROL.—Bed composed of solid rock reef 50 feet below gage; practically permanent.

EXTREMES OF DISCHARGE.—Maximum stage during season from water-stage recorder, 1.97 feet at 4 p. m. June 26 (discharge, 54 second-feet); canal dry up to about May 1 and June 11 and 12.

1913-1922: Maximum discharge recorded, that of June 26, 1922. Canal dry each winter.

ACCURACY.—Stage-discharge relation practically 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. Records excellent.

The Rogue River Valley Canal diverts water from North Fork of Little Butte Creek in NE. ¼ sec. 20, 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 year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 9	L. S. Brophy	1.38	19.8	Aug. 3	F. W. Scheffel	1.69	34.8
20	do	.74	2.7	3	do	1.69	35.2
20	do	1.42	22.1	3	Brophy and Smith	1.69	35.4
June 7	do	1.67	35.0	15	Denzer and Vincent	1.46	22.4
21	do	1.82	42.8	24	Henshaw and Scheffel	1.35	19.6
July 5	do	1.65	34.0	Sept. 5	Brophy and Smith	1.56	28.7
Aug. 1	F. W. Scheffel	1.65	32.7	8	do	1.50	26.8

NOTE.—Brophy and Smith were employees of Rogue River Valley Canal Co.; Scheffel and Denzer, of Medford Irrigation District.

Daily discharge, in second-feet, of Rogue Valley River Canal near Brownsboro, Oreg., for the year ending September 30, 1922

Day	May	June	uly	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1	-------	31	39	32	25	16	21	39	40	23	14
2	-------	32	38	34	29	17	21	38	37	23	17
3	-------	37	37	35	25	18	20	37	34	24	20
4	-------	37	36	31	26	19	20	38	35	24	20
5	-------	34	35	28	27	20	21	39	33	25	20
6	23	33	32	28	26	21	16	43	33	26	22
7	21	37	32	29	22	22	23	45	35	24	34
8	20	29	36	27	22	23	26	46	32	20	29
9	21	.4	33	28	20	24	25	46	32	19	29
10	23	.1	35	27	21	25	26	44	34	15	29
11	23	0	31	24	22	26	26	48	34	14	31
12	23	0	35	25	21	27	26	46	30	16	29
13	23	30	37	27	19	28	26	43	29	16	30
14	20	36	37	29	15	29	31	41	32	14	32
15	21	38	38	26	11	30	32	41	33	19	33
						31	32	-------	33	18	-------

Monthly discharge of Rogue River Valley Canal near Brownsboro, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 6–31	32	16	23.5	1,210
June	48	0	33.6	2,000
July	40	29	34.4	2,120
August	35	14	24.2	1,490
September	33	11	24.0	1,430
The period				8,250

MEDFORD IRRIGATION DISTRICT CANAL NEAR BROWNSBORO, OREG.

LOCATION.—In SW. ¼ sec. 8, T. 36 S., R. 1 E., 100 yards below diversion from Rogue River Valley Canal and 2 miles southwest of Brownsboro, Jackson County.

RECORDS AVAILABLE.—May 14 to September 21, 1922.

GAGE.—Lietz water-stage recorder on right bank; inspected by L. S. Brophy.

DISCHARGE MEASUREMENTS.—Made from footbridge near gage.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 1.98 feet at 4 p. m. July 31 (discharge, 52 second-feet). Canal dry at times.

REGULATION.—Flow regulated at diversion from Rogue River Valley Canal.

ACCURACY.—Stage-discharge relation slightly affected by growth of aquatic plants July 29 to September 9, for which period indirect-shifting control, method was used. Well-defined rating curve used during remainder of season. 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.

Medford Irrigation District Canal diverts water from Rogue River Valley Canal in SW. ¼ sec. 8, just above Bradshaw drop, and extends along east side of Rogue River Valley to Phoenix, where its waters are conducted across Bear Creek in a siphon into Phoenix Canal. About 6,100 acres were irrigated in 1922.

Discharge measurements of Medford Irrigation District Canal near Brownsboro, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 9	L. S. Brophy	1.25	27.4	Aug. 3	Scheffel and Denzer	1.93	49.5
15	E. Summers	1.25	25.7	3	do	1.93	49.1
20	L. S. Brophy	.67	6.2	3	Brophy and Smith	1.93	49.2
June 7	do	1.43	34.2	15	Denzer and Vincent	1.80	42.5
15	do	1.61	39.6	24	Scheffel and Henshaw	1.73	39.7
20	F. W. Scheffel	1.66	39.6	Sept. 5	Brophy and Smith	1.27	26.4
21	L. S. Brophy	1.67	41.7	5	Scheffel and Denzer	1.28	25.6
29	F. W. Scheffel	1.78	44.6	6	do	1.26	27.8
July 22	Scheffel and Denzer	1.81	49.4	8	Brophy and Smith	1.32	25.7
Aug. 1	do	1.91	48.8				

NOTE.—Brophy and Summers were employees of Rogue River Valley Canal Co.; Scheffel and Denzer of Medford Irrigation District.

Daily discharge, in second-feet, of Medford Irrigation District Canal near Brownsboro, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1		9.3	44	49	32	16	26	38	44	41	27
2		20	43	49	24	17	26	38	47	43	27
3		0	43	49	25	18	26	39	45	44	27
4		0	43	48	26	19	26	40	45	44	27
5		14	42	46	26	20	26	40	45	43	19
6		30	42	45	25	21	27	42	45	43	.8
7		32	42	46	26	22	27	43	48	42	
8		28	43	45	27	23	29	43	50	40	
9		3.3	41	44	27	24	29	43	48	39	
10		0	42	45	28	25	29	42	47	39	
11		0	40	43	28	26	29	40	47	40	
12		0	43	44	28	27	28	41	47	40	
13		29	43	44	27	28	28	44	47	39	
14	26	33	43	44	27	29	12	45	49	39	
15	26	38	43	42	28	30	0	44	48	40	
						31	0		49	41	

Monthly discharge of Medford Irrigation District Canal near Brownsboro, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 14–31	29	0	23.3	832
June	45	0	28.6	1,700
July	50	40	44.8	2,760
August	49	39	43.2	2,660
September 1–21	32	.8	25.3	1,050
The period				9,000

EAGLE POINT CANAL NEAR EAGLE POINT, OREG.

LOCATION.—In SE. ¼ sec. 31, T. 35 S., R. 1 E., halfway between point of diversion and point where canal crosses Eagle Point-Brownsboro road, 100 feet above intake of Pelouze lateral, and 2½ miles east of Eagle Point, Jackson County.

RECORDS AVAILABLE.—Irrigation season 1920 to 1922.

GAGE.—Vertical staff fixed to an alder tree on left bank; read by Carl Bieberstedt and assistant water master.

CHANNEL AND CONTROL.—Artificial earth channel. Banks high and uniform. A fish wheel just above head gate of Pelouze lateral acts as control; changes in this structure or accumulation of moss on the screens may change stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.06 feet June 1 (discharge, 27 second-feet); canal dry at times in winter.

1920–1922: Maximum discharge recorded, that of June 1, 1922. Canal dry at various times.

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

DIVERSIONS.—None.

REGULATION.—Flow in canal regulated by head gates.

ACCURACY.—Stage-discharge relation unstable due to operation of flashboards and fish wheel. Fairly well defined rating curves used April 22 to July 7 and August 5 to September 30; shifting-control method used October 1–31 and July 8 to August 4. Gage read to hundredths three times a week October 1–31, May 17 to July 14, and September 16–30; daily, July 16 to September 14. Daily discharge ascertained by applying the daily gage height to rating table. Records fair.

The Eagle Point Canal of the Little Butte Irrigation Co. diverts water from Little Butte Creek, in SE. ¼ sec. 31, T. 35 S., R. 1 E.; water is used for irrigating near Eagle Point.

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Discharge measurements of Eagle Point Canal near Eagle Point, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 22	Le Tourneau and Ryan	0.83	4.0	Aug. 10	Brophy and Smith	[a] 1.84	16.7
27	Brophy and Ryan	.85	3.5	11	Scheffel and Denzer	[b] 1.80	15.6
June 6	do	1.82	21.4	14	Brophy and Smith	[a] 1.93	19.2
July 10	F. W. Scheffel	1.48	11.5	16	do	1.83	17.6
13	Brophy and Smith	1.81	21.1	18	do	[a] 1.78	16.0
Aug. 5	do	[a] 1.52	9.1	24	Scheffel and Henshaw	[a] 1.87	16.2
9	do	1.72	14.5	30	Brophy and Smith	[a] 1.69	13.4

[a] Stage-discharge relation affected by moss on fish wheel.
[b] Stage-discharge relation affected by board on fish wheel.

Daily discharge, in second-feet, of Eagle Point Canal near Eagle Point, Oreg., for the year ending September, 30, 1922

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1	19			27	11	14	15
2					12	13	14
3	18			22	14	7.2	15
4					14	6.5	14
5	18			22	15	8.4	15
6					15	11	16
7	19			21	13	16	15
8					7.7	15	15
9	19			24	10	15	14
10					12	16	13
11	19			22	22	16	14
12					19	22	9.9
13	19			20	21	20	8.4
14					20	17	10
15	19			19	18	17	12
16					17	16	14
17	14		16	19	16	16	15
18			16		16	16	16
19	11			19	15	15	15
20			17		15	15	17
21	11			18	15	17	22
22		4.0	16		15	18	14
23	7			18	15	18	6.2
24			15		16	17	6.7
25	6			20	15	17	7.1
26			15		15	16	7.5
27	6	4.2		17	15	15	7.6
28			15		15	15	7.7
29	5			14	15	15	7.6
30			15		15	13	7.4
31	5				15	15	

Monthly discharge of Eagle Point Canal near Eagle Point, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	19	5	13.4	824
May	17	15	15.6	464
June	27	14	20.1	1,200
July	22	7.7	15.1	928
August	22	6.5	15.1	928
September	22	6.2	12.4	738

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 8 miles by road above Ashland, Jackson County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—January 27 to June 30, 1920, November 23, 1920, to July 15, 1921, and November 1, 1921, to July 1, 1922.

GAGE.—Stevens 8-day water-stage recorder on left bank; inspected by R. E. Robinson.

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

CHANNEL AND CONTROL.—Bed composed of gravel; fairly straight.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, from water-stage recorder, 5.80 feet at 6 p. m. March 23 (discharge, 236 second-feet). Stream bed reported dry up to October 21 and after about August 1.

1920–1922: Maximum stage, from water-stage recorder, 7.65 feet February 13, 1921 (discharge, 900 second-feet). Creek bed dry each summer.

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

DIVERSIONS.—Station is above practically all diversions in Rogue River Valley.

REGULATION.—None.

ACCURACY.—Stage-discharge relation apparently permanent during year. Rating curve 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, except for days of considerable variation, for which the mean of hourly discharge was used. Records good above about 20 second-feet; fair for low stages.

Discharge measurements of Emigrant Creek near Ashland, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 1	Canfield and Scheffel [a]	3.66	0.4	Apr. 24	Judd and Dillard [b]	5.12	108
Mar. 22	Boyden and Seaman [b]	5.02	88	June 9	Boyden and Seaman	4.70	52
23	do	5.26	123	July 1	do	3.70	1.4
Apr. 14	Canfield and Powell [a]	4.74	48.7				

[a] Employees of Medford Irrigation District.
[b] Employees of Talent Irrigation District.

Daily discharge, in second-feet, of Emigrant Creek near Ashland, Oreg., for the year ending September 30, 1922

Day	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
1	0.6	33	7.4	5.2	16	71	79	18	1.0
2	.6	28	7.1	6.8	15	86	78	18	
3	.6	13	6.3	5.2	14	96	79	17	
4	.4	9.4	5.0	5.8	16	96	79	15	
5	.4	7.8	4.7	8.1	18	78	79	15	
6	.4	6.3	6.0	9.7	23	79	76	13	
7	.4	5.2	5.0	13	39	93	68	18	
8	.6	4.2	4.7	21	31	87	62	46	
9	.7	4.0	5.8	25	31	69	60	42	
10	.6	3.8	5.2	20	33	64	57	25	
11	.6	3.8	5.2	15	33	58	60	19	
12	.6	3.6	4.7	11	33	55	63	16	
13	.5	3.4	5.0	10	33	54	64	14	
14	.5	3.2	5.0	9.4	37	54	68	13	
15	.7	3.1	4.5	12	39	58	71	11	
16	.7	2.9	5.2	52	49	64	70	10	
17	.9	2.5	7.8	55	42	70	68	8.7	
18	1.0	2.5	5.2	54	37	79	62	8.2	
19	1.1	2.9	5.0	136	37	88	59	6.5	
20	1.1	3.2	5.0	93	50	97	110	6.0	
21	9.1	3.2	4.7	53	71	118	76	6.0	
22	7.4	3.2	4.7	36	94	144	59	5.2	
23	3.8	3.2	4.7	26	170	127	49	5.0	
24	3.2	2.9	5.0	23	140	118	44	3.8	
25	6.5	2.9	5.5	22	89	120	43	2.9	
26	5.0	3.1	7.1	26	71	115	37	2.7	
27	6.3	7.1	6.8	22	62	97	32	2.7	
28	6.5	6.5	7.4	19	76	90	28	2.5	
29	6.5	5.2	6.3		71	83	25	2.3	
30	15	5.2	5.2		74	79	22	2.3	
31		6.5	6.0		80		20		

Monthly discharge of Emigrant Creek near Ashland, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
November	15	0.4	2.74	163
December	33	2.5	6.28	386
January	7.8	4.7	5.59	344
February	136	5.2	28.4	1,580
March	170	14	52.4	3,220
April	144	54	86.2	5,130
May	110	20	59.6	3,660
June	46	2.3	12.5	744
The period				15,200

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, 1922; with some breaks during low-water periods.

GAGE.—Lietz water-stage recorder at southeast corner of Page theater building, on left bank; installed September 20, 1918. Gage inspected by employees of Rogue River Valley Canal Co.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of loose gravel. A concrete sewer passing under stream forms an incomplete control.

EXTREMES OF DISCHARGE.—Maximum stage during year from water-stage recorder, 3.30 feet at 4 a. m. March 24 (discharge, 634 second-feet); minimum stage from recorder, 0.46 foot August 1 (discharge, about 0.1 second-foot; very uncertain).

1915–1922: Maximum stage determined from high-water marks, 6.8 feet in forenoon of Feburary 9, 1919 (discharge, estimated from extension of rating curve, 2,400 second-feet); stream bed practically dry at times.

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

DIVERSIONS.—A large area is irrigated above station.

REGULATION.—None.

ACCURACY.—Stage-discharge regulation apparently permanent during year. Rating curve well defined above 3 second-feet. Operation of water-stage recorder fairly satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph. Records good, except estimates for period when recorder was not operating which are fair.

Discharge measurements of Bear Creek at Medford, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 30	G. H. Canfield	[a] 0.96	17.4	Jan. 14	LeTourneau and Brophy [b]	1.11	34.6
Nov. 1	do	.88	14.6				
1	do	.88	14.7	Mar. 24	do	2.64	387
Dec. 21	do	1.04	31.6	May 1	G. H. Canfield	2.04	199
Jan. 9	LeTourneau and Brophy [b]	1.16	39.4	June 2	Brophy and Ryan [b]	1.49	86
				Sept. 9	Scheffel and Denzer [c]	.70	4.4

[a] Stage-discharge relation affected by rocks piled by boys under bridge.
[b] Employees of Rogue River Valley Canal Co.
[c] Employees of Medford Irrigation District.

Daily discharge, in second-feet, of Bear Creek at Medford, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.4	12		37	38	76	198	222	94	3.2	0.2	4.1
2	3.5	12		40	37	72	195	216	92		.2	5.7
3	2.7	12		42	37	71	210	213	87		.4	
4	3.2	10		38	40	76	230	203	74	3	.5	4.8
5	3.0	10		36	48	81	238	213	74		.5	
6	3.2			36	50	89	208	200	76	2.7	.8	4.4
7	3.0			43	52	115	216	180	76	2.1	.7	4.8
8	3.8			40	64	121	230	173	114	2.4	.8	4.1
9	1.8			38	90	119	206	183	206	2.7	.8	4.8
10	2.7			39	92	112	193	185	155	2.1	1.1	3.0
11	2.4		40	38	84	106	193	180	119	1.3	1.4	
12	2.4			39	66	94	176	178	114	1.4	1.1	3.2
13	2.4			38	58	98	176	180	102	1.3	1.3	3.5
14	3.8			36	53	108	171	185	94	1.1	1.1	3.8
15	5.7			36	53	117	166	198	92	.8	.9	2.1
16	6.1			37	82	123	185	198	82	.7	.4	1.3
17	7.0			45	142	129	178	188	74	.7	.9	1.1
18	7.0	20		51	168	119	195	185	56	.7	1.3	1.3
19	7.8			31	250	112	206	180	45	.8	2.1	1.1
20	7.8			36	306	114	233	247	26	.7	2.1	1.5
21	7.8		29	39		155	241	265	20	.7	2.7	2.7
22	8.2		29	39		183	290	224	20	.5	3.0	2.4
23			29	36	170	362	316	206	16	.8	2.1	1.8
24			28	35		509	274	195	13	.9	3.5	1.8
25			27	44		313	290	178	9.3	.5	3.8	1.8
26	12		28	50	102	241	300	174	7.3	.5	3.8	2.4
27			31	51	96	211	306	157	6.1	.4	3.8	3.2
28			35	46	84	195	265	136	4.4	.3	4.4	3.8
29			35	45	-------	193	244	119	4.1	.5	3.8	4.1
30	16		34	42	-------	183	227	110	4.1	.2	3.2	4.1
31	14	-------	35	39	-------	211	-------	101	-------	.5	3.5	-------

NOTE.—Water-stage recorder not operating satisfactorily Oct. 17, 18, 23-29, 31, Nov. 6 to Dec. 20 Feb. 21-25, Apr. 3, 4, July 2-5, Sept. 3-5, 11, and 12; discharge Nov. 6, to Dec. 20 estimated by comparison with records of flow of Emigrant Creek, discharge for other periods estimated or interpolated.

Monthly discharge of Bear Creek at Medford, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	16	1.8	6.83	420
November	-------	-------	18.5	1,100
December	-------	-------	36.8	2,260
January	51	31	40.1	2,470
February	306	37	105	5,830
March	509	71	155	9,530
April	316	166	225	13,400
May	265	101	186	11,400
June	206	4.1	65.2	3,880
July	3.2	.2	1.37	84
August	4.4	.2	1.81	111
September	5.7	1.1	3.18	189
The year	509	.2	70.1	50,700

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.—Irrigation seasons of 1920 to 1922.

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

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Channel excavated in earth and gravel; shifts slightly due to growth of aquatic plants.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.27 feet at midnight May 6 (discharge, 26 second-feet). Canal dry at times.

1920–1922: Maximum discharge recorded, that of May 6, 1922. Canal dry at various times.

ACCURACY.—Stage-discharge relation affected by moss after June 20. Rating curve fairly well defined. Operation of water-stage recorder satisfactory except for short periods; not operated prior to May 5 and after July 29. Daily discharge ascertained by applying to rating table, directly or by method of shifting channel, the mean daily gage height; discharge estimated for periods when recorder was not operating. Records good.

Talent lateral diverts water from Bear Creek above mouth of Ashland Creek, but Ashland Creek may be diverted to enter Bear Creek above Talent lateral. Water from Talent lateral irrigated 2,000 acres of Bear Creek Valley land in 1922, that lies principally on the left or southwest side of Bear Creek.

Discharge measurements of Talent lateral near Ashland, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 22	Boyden and Seaman[a]	-------	[b]22.2	June 9	Boyden and Seaman	1.53	12.1
Apr. 27	Brophy and Ryan[c]	0.90	2.4	12	O. Arnspiger	2.22	25.6
May 3	O. Arnspiger[a]	1.05	7.2	12	----do	.91	3.8
3	G. H. Canfield	1.87	17.3	26	Brophy and Smith	1.02	4.0
31	O. Arnspiger	1.94	18.4	July 12	Boyden and Seaman	1.09	2.8
June 1	Brophy and Ryan	1.95	19.8	15	Brophy and Smith	.94	2.9
2	----do	1.93	19.7	19	----do	.97	2.7

[a] Employees of Talent Irrigation District.
[b] Turned in for rating flume; water wasted back into creek.
[c] Employees of Rogue River Valley Canal Co.

Daily discharge, in second-feet, of Talent lateral near Ashland, Oreg., for the year ending September 30, 1922

Day	May	June	July	Day	May	June	July	Day	May	June	July
1	-------	19	2.2	11	21	10	2.4	21	12	16	2.8
2	-------	18	2.0	12	21	11	2.5	22	11	15	2.9
3	-------	18	2.2	13	21	9.4	4.4	23	11	11	2.7
4	-------	16	2.4	14	22	9.1	4.0	24	10	8.6	2.3
5	20	16	2.6	15	22	12	3.3	25		5.4	2.4
6	24	16	2.3	16	21	19	3.2	26	11	3.9	2.9
7	25	20	2.5	17	21	18	3.1	27		3.7	2.5
8	23	17	2.5	18	20	18	2.9	28		3.5	2.3
9	15	11	2.8	19	20	17	2.7	29	11	3.2	2.0
10	14	11	2.6	20	11	16	2.8	30	14	2.9	2.0
								31	17	-------	

Monthly discharge of Talent lateral near Ashland, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 5-31	25		16.7	894
June	20	2.9	12.5	744
July	4.4	2.0	2.65	163
The period				1,800

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, 1922.

GAGE.—Stevens 8-day water-stage recorder on right bank referred to vertical staff at end of concrete-lined section, 50 feet downstream. Gage inspected by employees of Rogue River Valley Canal Co.

DISCHARGE MEASUREMENTS.—Made from footbridge.

CHANNEL AND CONTROL.—Concrete lining extends only a few feet below gage. No well-defined control. Earth channel subject to moss growth.

EXTREMES OF DISCHARGE.—Maximum stage recorded during season, 2.18 feet June 13–15 (discharge, 34 second-feet). Canal dry in winter.

1916–1922: Maximum discharge recorded, 48 second-feet May 28, 1921. Canal dry at various times.

ACCURACY.—Stage-discharge relation permanent prior to about June 15 and continually changing thereafter, owing to growth of moss and flat gradient of canal. Well-defined rating curve used to June 15; indirect method for shifting control used thereafter. Gage read once a day to hundredths up to July 12. Water-stage recorder operated satisfactorily thereafter. Daily discharge ascertained by applying to rating table, either directly or by shifting-control method, the daily gage height or the mean daily gage height determined by inspecting recorder graph. Records good for May to July; fair thereafter.

The Phoenix ditch diverts water from Bear Creek in NW. ¼ sec. 23, T. 38 S., R. 1 W., and furnishes a supplemental water supply for the portion of the Medford Irrigation District lands lying west of Bear Creek.

Discharge measurements of Phoenix ditch at Talent, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 6	J. E. LeTourneau	1.25	13.7	June 9	Brophy and Jennings	1.91	28.3
10	Summers and Compton	1.25	13.8	22	Scheffel and Denzer	1.83	23.7
10	do	.87	8.4	26	Brophy and Smith	1.52	16.0
10	do	.47	2.3	29	F. W. Scheffel	1.54	14.9
10	do	.77	5.4	30	do	1.52	14.8
17	do	1.84	25.2	July 5	Brophy and Smith	1.49	13.0
20	do	2.11	32.9	13	Scheffel and Denzer	.99	3.4
20	do	1.90	26.4	14	Brophy and Smith	.90	3.1
20	do	1.70	23.3	29	F. W. Scheffel	.84	2.0
20	do	1.35	16.0	Aug. 7	do	.80	1.1
20	do	1.04	10.4	16	Denzer and Vincent	.70	.5
20	do	.83	5.1	21	Scheffel and Denzer	.65	.8
20	do	.44	1.4	22	F. F. Henshaw	.68	.8
29	Scheffel and Denzer	1.39	17.5	Sept. 9	F. W. Scheffel	.66	1.3
30	do	1.38	17.3				

NOTE.—Le Tourneau, Summers, Compton, Brophy, Jennings, and Smith were employees of Rogue River Valley Canal Co.; Scheffel and Denzer of Medford Irrigation District.

Daily discharge, in second-feet, of Phoenix ditch at Talent, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.
1		16	21	1.1	0.8
2		25	17	1.1	1.0
3	12	25	16	1.2	1.0
4		24	14	1.4	.7
5		24	14	1.7	1.3
6	14	24	8.1	1.6	3.0
7	14	25	6.8	1.2	3.6
8	14	30	6.7	1.1	2.8
9	14	25	9.0	.9	1.4
10	14	27	8.6	1.0	1.4
11	13	26	7.4	1.4	1.5
12	13	25	7.4	1.4	.9
13		34	2.9	.8	1.0
14		34	3.1	.8	.8
15	13	34	3.7	.8	.6
16		33	4.7	1.0	.3
17	27	32	4.0	.8	.6
18	27	28	2.3	.7	1.1
19	26	26	2.3	.7	1.4
20	33	25	2.0	.8	1.3
21	17	25	2.3	.7	1.6
22	16	26	2.9	1.0	1.5
23	14	25	3.8	1.2	
24	12	24	4.2	1.3	
25	11	24	3.6	.8	
26	10	20	3.5	.5	1.5
27	8.4	20	2.6	.4	
28	7.0	19	2.2	.4	
29	6.0	20	1.9	.4	
30	18	19	1.7	.5	
31	17	------	1.1	.6	------

NOTE.—Braced figures give estimated mean discharge for periods indicated.

Monthly discharge of Phoenix ditch at Talent, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May	33	7.0	14.8	906
June	34	16	25.5	1,520
July	21	1.1	6.15	378
August	1.7	.4	.95	58
September	3.6	.3	1.39	82
The period				2,940

JUMPOFF JOE CREEK NEAR MERLIN, OREG.

LOCATION.—In NW. ¼ sec. 31, T. 34 S., R. 5 W., at dam site of proposed reservoir, 6 miles northeast of Merlin, Josephine County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—December 19, 1921, to September 2, 1922, when station was discontinued.

GAGE.—Vertical staff on right bank; gage read by G. A. Miles.

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

CHANNEL AND CONTROL.—Bed composed of gravel and sand; shifts at high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period of record, 3.90 feet at 5 p. m. February 17 (discharge, 885 second-feet); minimum stage recorded, 0.04 foot August 22–24 (discharge, 0.2 second-foot).

ICE.—None.

DIVERSIONS.—A little water used for irrigation above station. No diversions past gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water of February 16 and 17. Two rating curves, well defined below 400 second-feet, were used. Gage read to hundredths once a day; twice daily during high water. Daily discharge ascertained by applying daily or mean daily gage height to rating table. Records good.

Discharge measurements of Jumpoff Joe Creek near Merlin, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 20	Canfield and Fultz[a]	0.73	7.8	Feb. 18	C. C. Fultz	2.88	371
30	C. C. Fultz	1.06	19.8	21	do	2.05	134
Jan. 6	do	1.96	98	24	do	1.62	76
11	do	1.16	28.6	Mar. 15	do	1.96	116
19	do	1.16	24.4	Apr. 11	G. H. Canfield	1.49	63
30	do	1.23	30.6	June 5	C. C. Fultz	.58	7.6

[a] Employee of W. T. Reed.

Daily discharge, in second-feet, of Jumpoff Joe Creek near Merlin, Oreg., for the period December 19, 1921, to September 2, 1922

Day	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		25	31	74	125	69	8.8	3.0	0.7	0.7
2		40	19	69	125	74	9.6	1.8	.5	.8
3		30	20	64	140	69	9.6	1.8	.5	
4		23	23	80	140	69	8.0	1.8	.5	
5		20	44	85	110	64	7.4	1.6	.5	
6		105	44	85	91	60	8.0	1.6	.5	
7		65	44	125	85	57	8.0	1.8	.5	
8		46	135	110	97	51	8.0	1.8	.5	
9		37	135	97	69	46	19	1.8	.4	
10		34	93	85	74	41	14	1.6	.5	
11		29	71	85	63	37	12	1.6	1.0	
12		24	52	74	64	35	10	1.4	1.6	
13		21	54	85	55	38	9.6	1.2	1.6	
14		20	49	140	64	41	8.0	1.0	1.6	
15		17	49	118	64	41	6.2	1.0	.6	
16		17	300	140	60	35	6.8	1.0	.6	
17		50	830	104	64	31	5.0	1.0	.5	
18		40	402	85	69	26	4.2	1.0	.5	
19	7.0	28	300	80	74	26	3.4	1.0	.5	
20	7.9	24	235	91	85	32	3.4	1.0	.4	
21	7.9	20	132	125	97	25	3.0	1.0	.3	
22	7.9	20	110	125	118	23	3.4	1.0	.2	
23	8.2	20	85	360	97	21	3.4	1.2	.2	
24	8.2	24	74	300	91	19	3.4	1.2	.2	
25	9.4	33	74	180	91	18	3.0	1.0	.4	
26	14	30	110	132	97	18	3.0	1.0	.5	
27	13	37	97	110	85	17	4.2	1.0	.5	
28	23	37	85	110	74	15	2.6	1.0	.4	
29	24	30		118	74	14	2.6	1.0	.4	
30	22	33		110	69	12	3.0	1.0	.7	
31	21	25		125		11		.7	.7	

Monthly discharge of Jumpoff Joe Creek near Merlin, Oreg., for the period December 19, 1921, to August 31, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
December 19-31	24	7.0	13.3	354
January	105	17.0	32.4	1,990
February	830	19.0	132	7,330
March	360	64	118	7,260
April	140	55	87.0	5,180
May	74	11	36.6	2,250
June	19	2.6	6.69	398
July	3.0	.7	1.32	81
August	1.6	.2	.597	37
The period				24,900

COQUILLE RIVER BASIN

SOUTH FORK OF COQUILLE RIVER AT POWERS, OREG.

LOCATION.—In SW. ¼ sec. 13, T. 31 S., R. 12 W., 1,000 feet below Salmon Creek, 200 feet above Bingham Creek, one-fourth mile due west of Powers post office, Coos County, 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, 1922.

GAGE.—Inclined staff in three sections on left bank under footbridge; read by Ray Brown.

DISCHARGE MEASUREMENTS.—Made by wading or from footbridge.

CHANNEL AND CONTROL.—Bed composed of gravel and solid rock; shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.2 feet at 10 a. m. November 21 (discharge, 8,440 second-feet); minimum stage recorded, 2.38 feet September 21-23 (discharge, 24 second-feet).

1916-1922: Maximum stage recorded, 13.0 feet January 17, 1919 (discharge, 12,000 second-feet); minimum discharge, 18 second-feet September 26, 28, October 1-4, and 24-26, 1918.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during winter, the change affecting only low water. Well-defined rating curves used October 1 to June 30 and July 1 to September 30. Gage read daily to half-tenths October 26 to June 16, every other day to hundredths the rest of year. Daily discharge ascertained by applying daily gage height to rating table or by interpolation. Records good.

Discharge measurements of South Fork of Coquille River at Powers, Oreg., during the year ending September 30, 1922

[Made by Ray Brown]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 30	3.70	286	Dec. 10	4.15	489	May 27	4.00	407
Nov. 2	3.30	155	Mar. 6	6.00	1,860	June 10	3.50	203
5	3.10	110	May 7	5.25	1,150	24	3.00	94
Dec. 7	4.65	792	21	4.55	727	Aug. 8	2.50	33.1

Daily discharge, in second-feet, of South Fork of Coquille River at Powers, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	44	175	3,860	500	650	960	2,960	1,170	500	72	38	27
2	39	150	4,850	550	575	830	2,130	1,170	400	71	38	27
3	39	127	2,700	770	525	890	1,830	1,240	378	71	37	27
4	39	116	1,740	800	710	1,650	2,240	1,240	332	71	36	28
5	38	106	1,240	770	1,320	1,400	2,030	1,560	310	68	35	29
6	36	97	890	2,580	1,100	1,740	1,560	1,320	270	64	34	31
7	36	97	740	1,650	960	1,830	1,480	1,100	252	61	34	33
8	35	88	650	1,320	4,510	1,560	1,650	1,030	235	58	33	32
9	34	88	562	960	2,810	1,400	1,560	890	220	58	33	31
10	34	80	475	860	2,240	1,320	1,560	925	205	58	33	30
11	34	73	425	770	1,560	1,170	1,320	770	190	55	33	29
12	33	66	378	650	1,240	1,030	1,240	890	175	52	33	28
13	32	66	355	575	1,100	1,560	1,240	1,100	162	52	32	27
14	32	66	332	525	960	1,650	1,740	1,400	150	52	31	26
15	180	73	310	500	960	2,030	2,130	1,480	150	52	32	25
16	332	190	270	575	3,100	1,830	1,740	1,560	138	52	33	25
17	270	205	252	1,560	3,390	1,480	1,650	1,560	132	52	33	25
18	205	175	235	1,240	3,860	1,320	1,240	1,650	127	52	33	25
19	160	162	235	960	2,960	2,700	1,240	1,170	116	50	33	25
20	106	1,240	235	710	2,350	3,100	1,240	860	106	47	33	24
21	100	6,690	252	625	1,930	2,580	1,320	680	106	44	32	24
22	88	3,540	270	550	1,480	2,030	1,480	625	106	42	31	24
23	130	2,350	270	1,400	1,100	2,820	1,320	600	99	42	31	24
24	175	1,930	270	1,560	960	2,820	1,240	575	92	42	31	24
25	550	2,350	252	1,650	960	2,130	1,320	550	88	42	31	24
26	925	3,390	290	1,560	1,170	1,560	1,560	500	85	41	31	24
27	710	4,340	550	1,560	1,320	1,320	1,320	425	79	41	30	42
28	550	2,960	890	1,320	1,170	1,650	1,170	450	73	40	29	52
29	400	1,930	770	1,100	-------	2,130	1,100	525	73	40	29	42
30	270	6,120	600	890	-------	2,030	1,100	525	73	39	29	42
31	205	-------	500	770	-------	3,100	-------	550	-------	38	28	-------

Monthly discharge of South Fork of Coquille River at Powers, Oreg., for the year ending September 30, 1922

[Drainage area, 168 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	925	32	189	1.12	1.29	11,600
November	6,690	66	1,300	7.74	8.64	77,400
December	4,850	235	827	4.92	5.67	50,800
January	2,580	500	1,030	6.13	7.07	63,300
February	4,510	525	1,680	10.0	10.41	93,300
March	3,100	830	1,790	10.7	12.34	110,000
April	2,960	1,100	1,560	9.29	10.36	92,800
May	1,650	425	971	5.78	6.66	59,700
June	500	73	181	1.08	1.20	10,800
July	72	38	52.2	.311	.36	3,210
August	38	28	32.6	.194	.22	2,000
September	52	24	29.2	.174	.19	1,740
The year	6,690	24	796	4.74	64.41	577,000

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 up 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, 1922.

GAGE.—Staff in five sections. Low-water section inclined, the others vertical. Datum lowered 0.52 foot September 2, 1910. Gage read by H. H. Gilbreth.

DISCHARGE MEASUREMENTS.—Made from car on ferry cable 100 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; somewhat shifting. Control consists of rock; practically permanent except as affected by growth of aquatic plants in summer.

EXTREMES OF DISCHARGE.—Maximum stage recorded during the year, 22.0 feet at 5 p. m. November 30 (discharge, 76,000 second-feet); minimum discharge recorded, 1,040 second-feet September 18 and 19.

1905–1922; 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 practically permanent except as affected by growth of aquatic plants. Rating curve well defined below 40,000 second-feet. Indirect shifting-control method used July 23 to September 30. Gage read to tenths twice a day. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

The following measurement was made by Wendell Dawson:
October 2, 1921: Gage height, 0.20 foot; discharge, 1,170 second-feet.

Daily discharge, in second-feet, of Umpqua River near Elkton, Oreg., for the year ending September 30, 1922

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,430	1,620	58,000	4,900	8,600	11,700	15,400	13,200	10,800	2,990	1,300	1,080
2	1,430	1,950	45,100	5,260	9,600	12,000	14,400	14,400	10,200	2,690	1,250	1,080
3	1,430	2,420	60,200	6,800	11,700	13,800	13,200	13,200	9,600	2,420	1,250	1,080
4	1,570	2,420	43,100	10,200	14,100	15,700	12,300	12,600	9,100	2,300	1,250	1,080
5	1,730	1,950	27,200	13,500	17,100	16,400	11,700	12,000	8,360	2,060	1,250	1,080
6	2,180	1,780	18,500	18,500	20,600	15,700	12,600	12,600	8,600	1,950	1,250	1,080
7	2,180	1,780	23,800	15,000	19,600	15,000	13,200	13,800	8,120	1,950	1,250	1,080
8	1,780	1,780	18,500	12,600	18,500	13,200	12,300	13,800	7,660	1,900	1,250	1,080
9	1,680	1,620	12,000	11,700	17,100	11,700	11,400	12,600	7,660	1,780	1,200	1,080
10	1,570	1,570	16,800	10,800	18,200	10,500	11,400	11,400	7,660	1,680	1,200	1,120
11	1,480	1,680	16,800	9,600	17,400	9,600	13,500	11,100	7,220	1,620	1,200	1,080
12	1,480	1,780	12,900	9,100	15,700	9,600	15,700	10,200	6,800	1,520	1,200	1,120
13	1,780	1,950	12,000	8,360	15,700	10,500	17,800	9,600	6,400	1,480	1,250	1,120
14	2,180	1,900	9,600	7,220	16,000	12,600	19,900	9,600	6,400	1,340	1,380	1,120
15	2,180	1,730	8,120	9,600	19,200	13,200	21,300	13,200	6,200	1,430	1,340	1,120
16	2,420	1,620	7,440	18,500	24,100	11,700	21,000	15,000	6,010	1,430	1,300	1,120
17	2,690	1,840	6,800	15,000	25,500	10,800	19,200	15,000	5,630	1,380	1,300	1,120
18	2,420	2,180	6,800	8,850	19,200	10,800	16,400	13,800	5,260	1,380	1,300	1,040
19	1,950	2,300	6,200	7,890	17,100	15,000	13,800	13,200	4,900	1,380	1,120	1,040
20	1,730	3,290	5,630	7,660	12,000	39,100	12,600	12,000	4,730	1,430	1,160	1,080
21	1,380	16,800	5,260	8,120	11,400	23,800	15,700	11,400	4,560	1,430	1,160	1,080
22	1,480	55,800	4,900	9,100	9,900	24,100	18,200	10,800	4,560	1,340	1,160	1,080
23	1,780	35,100	4,900	16,400	9,100	17,400	17,400	9,900	3,910	1,380	1,200	1,080
24	2,690	18,500	4,560	23,800	9,600	15,400	15,700	9,600	3,590	1,380	1,120	1,080
25	3,910	17,400	4,560	24,100	10,200	14,400	14,700	9,100	3,290	1,380	1,120	1,080
26	2,990	15,700	4,900	21,000	9,600	14,700	12,900	8,120	3,290	1,380	1,120	1,120
27	2,420	27,600	5,260	18,500	9,600	17,100	12,300	8,120	2,990	1,380	1,160	1,120
28	1,950	25,500	6,010	16,000	11,400	17,800	12,000	8,120	3,290	1,380	1,120	1,120
29	1,680	31,100	6,200	14,700	-------	15,700	11,400	8,600	3,140	1,380	1,120	1,250
30	1,570	64,800	6,200	11,400	-------	14,700	11,400	9,600	2,990	1,340	1,080	1,200
31	1,480	-------	5,440	8,850	-------	14,100	-------	11,400	-------	1,380	1,080	-------

Monthly discharge of Umpqua River near Elkton, Oreg., for the year ending September 30, 1922

[Drainage area, 3,680 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,910	1,380	1,960	0.532	0.61	121,000
November	64,800	1,570	11,600	3.15	3.51	690,000
December	60,200	4,560	15,300	4.16	4.80	941,000
January	24,100	4,900	12,400	3.37	3.88	762,000
February	25,500	8,600	14,900	4.05	4.22	828,000
March	39,100	9,600	15,100	4.10	4.73	928,000
April	21,300	11,400	14,700	3.99	4.45	875,000
May	15,000	8,120	11,500	3.13	3.61	707,000
June	10,800	2,990	6,100	1.66	1.85	363,000
July	2,990	1,340	1,650	.448	.52	101,000
August	1,380	1,080	1,210	.329	.38	74,400
September	1,250	1,040	1,100	.299	.33	65,500
The year	64,800	1,040	8,910	2.42	32.89	6,460,000

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, Douglas County, just off main road to Roseburg.

DRAINAGE AREA.—1,210 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—September 1, 1915, to May 1, 1920; October 1, 1921, to October 17, 1922, when station was discontinued.

GAGE.—Vertical staff on left bank, just below the ferry landing; read by J. H. Hayes.

DISCHARGE MEASUREMENTS.—Made from ferry up to a stage of about 6 feet. Flood measurements have been made from bridge at Winchester, 20 miles downstream, and 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 period October 1, 1921, to October 17, 1922, 14.4 feet at 11 a. m. November 21 (discharge, 50,000 second-feet); minimum discharge recorded, 1,070 second-feet, October 1–14, November 12 and 13, 1921, and October 17, 1922.

1915–1920; 1921–22: Maximum stage recorded, that of November 21, 1921; 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 permanent. Rating curve well defined. Gage read to hundredths once daily at low stages; to tenths once daily at high stages. Daily discharge ascertained by applying daily gage height to rating table. Records good.

The following discharge measurement was made by K. N. Phillips:

September 21, 1921: Gage height, 0.66 foot; discharge, 1,310 second-feet.

Daily discharge, in second-feet, of North Umpqua River near Glide, Oreg., for the period October 1, 1921, to October 17, 1922

Day	Oct.	Nov.	Dec.	May	June	July	Oct.
1	1,070	1,280	19,900	6,100	6,600	2,080	
2	1,070	1,280	18,100	6,100	6,600	2,040	
3	1,070	1,220	10,600	6,100	6,100	2,000	
4	1,070	1,220	8,100	6,600	6,000	1,860	
5	1,070	1,170	6,100	7,350	5,900	1,720	
6	1,070	1,170	5,300	9,100	5,100	1,650	
7	1,070	1,170	4,510	8,980	4,900	1,790	
8	1,070	1,120	3,780	8,850	4,900	1,650	
9	1,070	1,120	3,440	6,880	5,700	1,650	
10	1,070	1,120	3,100	4,900	5,180	1,650	
11	1,070	1,120		5,750	4,660	1,580	1,220
12	1,070	1,070		6,600	4,140	1,580	
13	1,070	1,070		6,100	4,140	1,580	
14	1,070	1,120		7,850	4,140	1,580	
15	1,170	1,120		8,600	3,610	1,580	
16	1,170	1,220		9,300	3,610	1,550	
17	1,170	1,220		10,000	3,610	1,520	1,070
18	1,650	1,280		10,600	3,440	1,520	
19	1,280	1,280		8,100	3,270	1,520	
20	1,170	17,800		7,350	3,180	1,450	
21	1,170	49,500		6,020	3,100	1,450	
22	1,120	15,600		5,700	2,780	1,450	
23	1,280	11,200		5,500	2,780		
24	1,280	6,850		5,300	2,730		
25	1,280	6,850		5,100	2,670		
26	2,620	10,300		4,900	2,620		
27	2,460	9,100		4,320	2,500		
28	2,380	8,100		4,810	2,380		
29	1,930	11,500		5,300	2,300		
30	1,520	45,500		5,950	2,220		
31	1,390			6,600			

NOTE.—Gage not read May 1, 2, 7, 9, 11, 16, 21, 25, 28, 30; June 1, 4, 10, 11, 13, 18, 20, 24, 25, 27, 29; July 2, 4, 9, 12, 16, 21; discharge estimated or interpolated.

Monthly discharge of North Umpqua River near Glide, Oreg., for the year ending September 30, 1922

[Drainage area, 1,210 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	2,620	1,070	1,320	1.09	1.26	81,200
November	49,500	1,070	7,160	5.92	6.60	426,000
December 1-10	19,900	3,100	8,290	6.85	2.55	164,000
May	10,600	4,320	6,800	5.62	6.48	418,000
June	6,600	2,220	4,030	3.33	3.72	240,000
July 1-22	2,080	1,450	1,660	1.37	1.12	72,300

LAKE CREEK AT DIAMOND LAKE, NEAR FORT KLAMATH, OREG.

LOCATION.—In SW. ¼ sec. 30, T. 27 S., R. 6 E., 150 yards below outlet of Diamond Lake and 35 miles north of Fort Klamath, Klamath County.

DRAINAGE AREA.—56 square miles.

RECORDS AVAILABLE.—May 24 to September 30, 1922.

GAGE.—Vertical staff on right bank; read by Sam Padgett and P. B. Motschenbacher.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

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

EXTREMES OF DISCHARGE.—Maximum stage recorded during period May 24 to September 30, 2.04 feet June 10 and 11 (discharge, 109 second-feet); minimum discharge recorded, 29 second-feet, August 28 to September 6.

ICE.—None.

DIVERSIONS.—None.

REGULATION.—Temporary wooden dam about 100 yards above gage may cause considerable fluctuation in discharge, water was being stored and discharge of creek was small for several weeks prior to beginning of record; stage of lake said to have been raised about 1 foot. Dam partly removed at 10 a. m. September 7.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for estimated periods, for which they are fair.

COOPERATION.—Gage-height record furnished by State Fish Commission.

Discharge measurements of Lake Creek at Diamond Lake, near Fort Klamath, Oreg., during the year ending September 30, 1922

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
June 11	K. N. Phillips	2.03	106	Aug. 10	Wendell Dawson	1.32	32.0
11	do	2.03	107	11	do	1.34	32.3
11	do	1.87	82				

Daily discharge, in second-feet, of Lake Creek at Diamond Lake, near Fort Klamath, Oreg., for the year ending September 30, 1922

Day	May	June	July	Aug.	Sept.	Day	May	June	July	Aug.	Sept.
1		72	63		29	16		88	46	32	53
2		82	59		29	17		86	46	31	52
3		84	58	36	29	18		87	42	31	51
4		82	56		29	19		86	41	31	49
5		84	54		29	20		84	39	31	48
6		84	53	34	29	21		82	38	30	47
7		84	51	34	55	22		77	38	30	46
8		93	51	34	67	23		75			45
9		104	51	34	65	24	57	74			44
10		109	50	32	63	25	61	71		30	48
11		109	49	33	61	26	63	66	36		43
12		105	48	33	60	27	63	67			45
13		104	48	32	59	28	63	66		30	45
14		99	47	32	57	29	63	63		29	45
15		94	47	32	55	30	63	63		29	44
						31	62			29	

NOTE.—Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Lake Creek at Diamond Lake, near Fort Klamath, Oreg., for the year ending September 30, 1922

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 24-31	63	57	61.9	972
June	109	63	84.1	5,000
July	63		45.1	2,780
August		29	32.0	1,970
September	67	29	47.2	2,810
The period				13,500

CALAPOOYA CREEK NEAR SUTHERLIN, OREG.

LOCATION.—In SW. ¼ sec. 10, T. 25 S., R. 4 W., at diversion dam of Sutherlin Irrigation District, 9 miles east of Sutherlin, Douglas County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 15, 1912, to October 13, 1913; August 20 to September 15, 1922, when station was discontinued.

GAGE.—Vertical staff on left bank of creek, 250 feet below diversion dam. Vertical staff on Sutherlin Canal 200 feet below intake used for determining amount diverted by canal.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Creek bed rocky and permanent. Canal choked in places with débris and brush.

DIVERSIONS.—None from creek above that of Sutherlin Canal.

ACCURACY.—Stage-discharge relation practically permanent during period of record for both creek and canal. Both rating curves fairly well defined. Gages read to hundredths every other day. Daily discharge ascertained by applying daily gage reading to rating table. Records good.

Discharge measurements of Calapooya Creek and Sutherlin Canal near Sutherlin, Oreg., during 1922

Date	Made by—	Calapooya Creek		Sutherlin Canal	
		Gage height	Discharge	Gage height	Discharge
		Feet	*Sec.-ft.*	*Feet*	*Sec.-ft.*
Aug. 20	F. F. Henshaw	0.02	1.6	1.75	10.7
Oct. 1	Wendell Dawson	.30	6.2	1.51	5.6

Daily discharge, in second-feet, of Calapooya Creek and Sutherlin Canal near Sutherlin, Oreg., for the year ending September 30, 1922

Date	Calapooya Creek	Sutherlin Canal	Combined	Date	Calapooya Creek	Sutherlin Canal	Combined
Aug. 20	1.6	11	12.6	Sept. 4	1.4	17	18.4
23	4.6	11	15.6	6	1.4	17	18.4
25	1.4	14	15.4	8	1.5	13	14.5
27	1.5	13	14.5	11	1.5	13	14.5
29	1.5	13	14.5	13	1.6	12	13.6
31	1.4	14	15.4	15	1.5	11	12.5
Sept. 2	1.4	14	15.4				

MISCELLANEOUS DISCHARGE MEASUREMENTS

In addition to the records of stream flow obtained at gaging stations and reported in the preceding pages, measurements of flow were made at a number of other points, as shown by the following table:

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the year ending September 30, 1922

Umatilla River Basin

Date	Stream	Tributary to—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
June 26	Stanfield drain	Umatilla River	Near outlet, at Stanfield, Oreg.	1.19	15.0
July 14	do	do	do	.92	9.3
Aug. 31	do	do	do	.78	61
June 27	Hermiston drain	do	Near outlet, near Hermiston, Oreg.	1.74	51.4
Aug. 22	do	do	do	2.26	68.8

Deschutes River Basin

July 10	Deschutes River	Columbia River	Graft ranch, above Davis Creek, sec. 3, T. 22 S., R. 8 E., Oreg.		732
17	do	do	do		699
Aug. 3	do	do	do		717
May 26	Cultus River	Deschutes River	Above Cultus Creek, in sec. 29, T. 20 S., R. 8 E., Oreg.	0.71	67
June 19	Quinn River	Cultus River	Near head, in sec. 1, T. 21 S., R. 7 E., Crane Prairie, Oreg.	.70	21.8
Aug. 24	do	do	do	.78	27.7
May 26	Charlton Creek	Quinn River	Above Crane Prairie, Oreg.	.53	9.0
June 19	Rock Creek	Cultus River	Below forks, in Crane Prairie, Oreg.		11.0
July 11	Davis Creek	Deschutes River	Bridge at mouth, sec. 10, T. 22 S., R. 8 E., Oreg.		258
13	do	do	do		250
Aug. 4	do	do	do		255
24	do	do	do		251
May 5	Fall River	do	In SE. ¼ sec. 33, T. 20 S., R. 10 E., just above falls, near Lapine, Oreg.	.70	126
28	do	do	do	.70	126
Aug. 7	do	do	do	.62	114
30	do	do	do	.62	113
8	Crescent Creek	East Fork	Outlet of Crescent Lake, Oreg		59
9	Cold Creek	Crescent Creek	Mouth, 2 miles northeast of Crescent Lake.		17.3
7	Spring River	Deschutes River	Mouth, in sec. 6, T. 20 S., R. 11 E.		150
Sept. 13	do	do	do		161
Feb. 11	Bear Creek	Crooked River	Carlin ranch, in sec. 2, T. 19 S., R. 17 E., Oreg.	0.20	0.3
May 10	do	do	do	.34	17.9
18	do	do	do	.63	4.2
Feb. 8	Ochoco Creek	do	Discontinued gaging station, above Mill Creek, near Prineville, Oreg.	1.10	26.0
13	do	do	do	.84	12.6
May 9	do	do	do	2.56	210
11	do	do	do	2.31	148
17	do	do	do	2.44	181
Sept. 19	do	do	do	.30	1.4
Feb. 7	Mill Creek	Ochoco Creek	Discontinued gaging station, near mouth, above Prineville, Oreg.	.24	4.4
13	do	do	do	.24	4.3
May 9	do	do	do	1.47	87
11	do	do	do	1.21	58
17	do	do	do	1.66	100
Sept. 19	do	do	do	.06	.2

Miscellaneous discharge measurements in lower Columbia River and Pacific slope drainage basins in Oregon during the year ending September 30, 1922—Continued

Deschutes River Basin—Continued

Date	Stream	Tributary to—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Aug. 18	Ochoco Irrigation District Canal.	Diverts from Ochoco Creek.	Near intake, above Prineville, Oreg.	4.80	160
Sept. 19	do	do	do	4.10	104
19	do	do	do	3.20	60
19	do	do	do	2.65	44.2
Feb. 6	McKay Creek	Ochoco Creek	Discontinued gaging station, near Prineville, Oreg.	.69	.8
May 8	do	do	do	1.72	51
16	do	do	do	1.28	22.8
July 26	Warm Springs River	Deschutes River	Discontinued gaging station, near Warm Spring, Oreg.	.98	283

Willamette River Basin

Aug. 31	Albany power canal	Diverts from South Santiam River.	Discontinued gaging station, near Albany, Oreg.	1.53	148
9	Molalla River	Willamette River	Proposed irrigation diversion, near Molalla Oreg.		66
9	do	do	Discontinued gaging station, in sec. 21, T. 5 S., R. 2 E., near Molalla, Oreg.	.96	63

Rogue River Basin

Dec. 21	Emigrant Creek	Bear Creek	Above Walker Creek, near Ashland, Oreg.	0.91	2.7
Jan. 13	do	do	do	.95	3.7
Mar. 22	do	do	do	1.86	70
Apr. 14	do	do	do	1.74	57
29	do	do	do	1.95	83
June 1	do	do	do	1.34	23.2
26	do	do	do	.79	1.2
July 14	do	do	do	.68	.5
Jan. 9	Bear Creek	Rogue River	Former gaging station, at Talent, Oreg.	1.74	34.7
14	do	do	do	1.69	30.3
Mar. 22	do	do	do	3.35	368
Apr. 29	do	do	do	2.88	226
May 17	do	do	do	2.76	191
June 8	do	do	do	2.61	145
July 6	do	do	do	1.75	10.9
14	do	do	do	1.50	2.8
Aug. 22	do	do	do	1.62	1.1
Oct. 31	do	do	Central Point, Oreg.	1.34	18.4
Jan. 7	do	do	do	1.68	52
Mar. 25	do	do	do	2.67	302
Apr. 3	do	do	do	2.56	254
June 12	do	do	do	1.99	107
Sept. 15	do	do	do	1.07	3.8
Jan. 6	Louse Creek	Jumpoff Joe Creek	Merlin, Oreg	2.80	35.4
18	do	do	do	1.95	6.7
Apr. 11	do	do	do	1.98	24.6
June 6	do	do	do	1.34	2.6

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