DEPARTMENT OF THE INTERIOR
Hubert Work, Secretary

U. S. GEOLOGICAL SURVEY
George Otis Smith, Director

WATER-SUPPLY PAPER 592

SURFACE WATER SUPPLY OF THE UNITED STATES

1924

PART XII. NORTH PACIFIC SLOPE DRAINAGE BASINS

A. PACIFIC BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN

NATHAN C. GROVER, Chief Hydraulic Engineer
G. L. PARKER and W. A. LAMB, District Engineers

Prepared in cooperation with the States of
WASHINGTON, MONTANA, AND IDAHO

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ILLUSTRATIONS

SURFACE WATER SUPPLY OF PACIFIC SLOPE BASINS IN WASHINGTON AND UPPER COLUMBIA RIVER BASIN, 1924

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, 1924.

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

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

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

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

Annual appropriations for the fiscal years ending June 30, 1895–1925

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 to 1923, inclusive	180, 000. 00
1924	170, 000. 00
1925	170, 000. 00

In this work many private and State organizations have cooperated, either by furnishing records 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 5,800 points in the United States and also at many points in Alaska and the Hawaiian Islands. In July, 1924, 1,670 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 the 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.

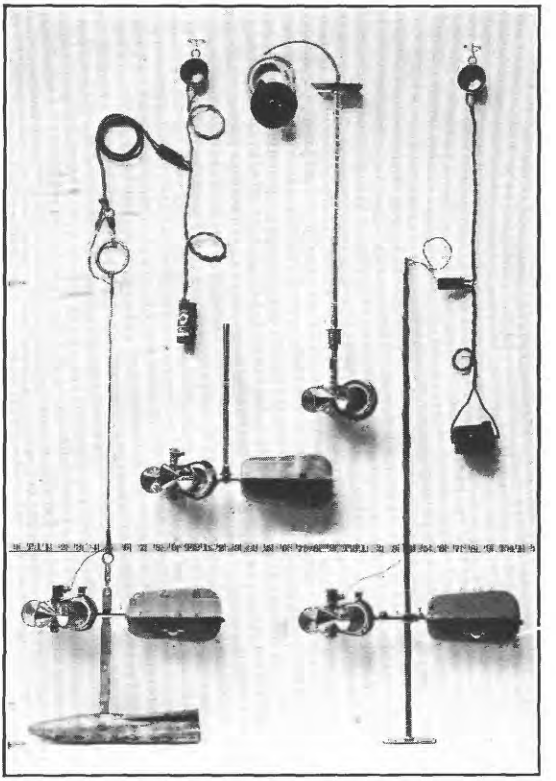
An "acre-foot," equivalent to 43,560 cubic feet, is the quantity required to cover an acre to the depth of 1 foot. The term is commonly used in connection with storage for irrigation.

The following terms not in common use are here defined:

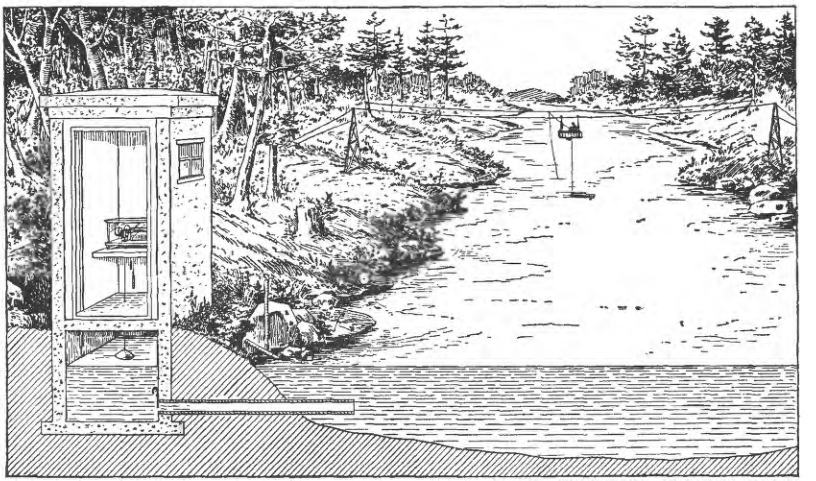
"Stage-discharge relation"; an abbreviation for the term "relation of gage height to discharge."

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

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

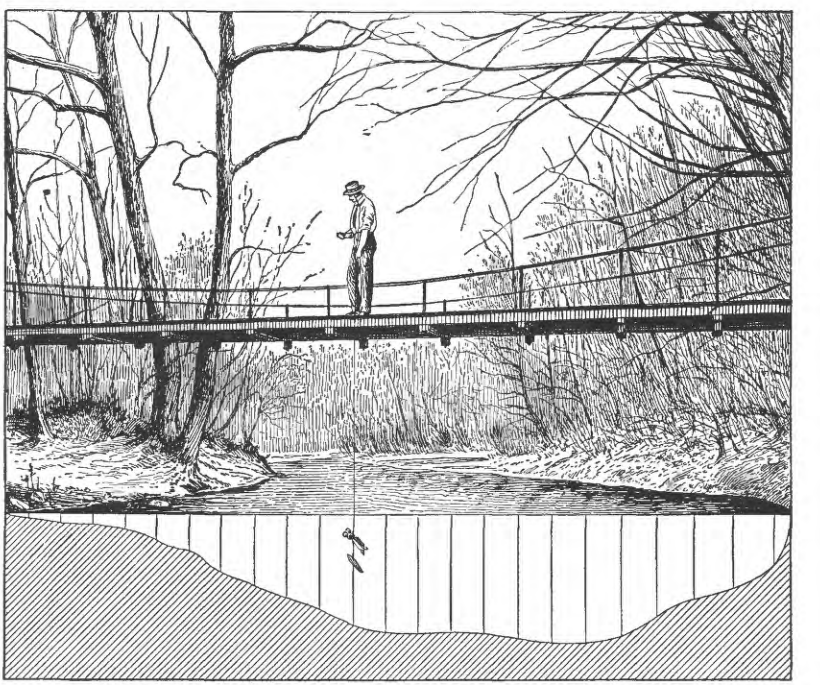


A. PRICE CURRENT METERS



B. TYPICAL GAGING STATION

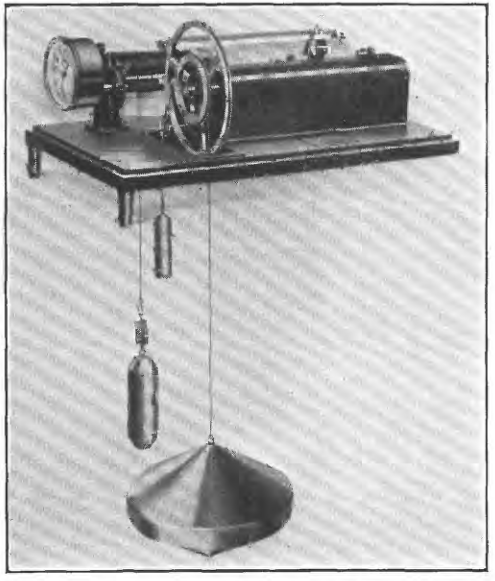
A



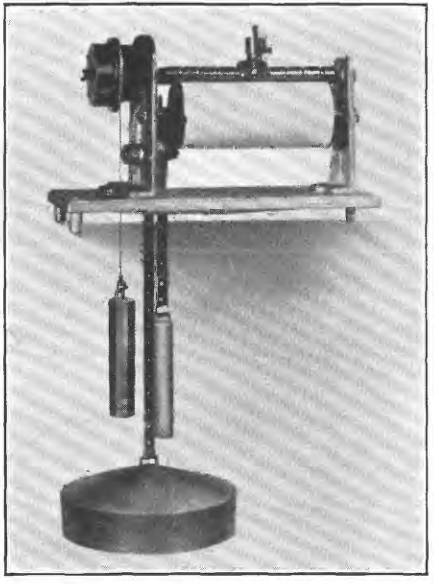
B

TYPICAL GAGING STATIONS

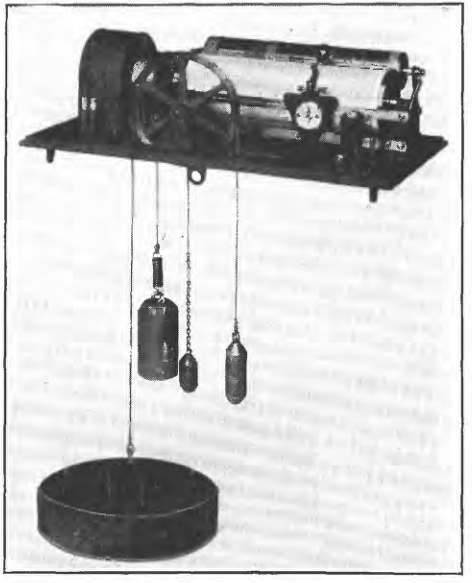
***A*, For wading measurement; *B*, for bridge measurement**



A



B



C

WATER-STAGE RECORDERS

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

EXPLANATION OF DATA

The data presented in this report cover the year beginning October 1, 1923, and ending September 30, 1924. 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 the 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. 1–3.) 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 height to these rating tables gives the daily discharge from which the monthly and yearly mean discharge is determined.

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

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

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

The table of daily discharge gives, in general, the discharge in second-feet corresponding to the mean of the gage heights read each day. At stations on streams subject to sudden or rapid diurnal fluctuation the discharge obtained from the rating table and 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

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daily discharge may be obtained by averaging quantities of discharge for regular intervals during the day, or by means of a discharge integrator, an instrument operating on the principle of the planimeter and containing as an essential element the rating curve of the station.

In the table of monthly discharge the column headed "Maximum" gives the mean flow for the day when the mean gage height was highest. As the gage height is the mean for the day it does not indicate correctly the stage when the water surface was at crest height, and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column headed "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet per second during the month. On this average flow computations recorded in the remaining columns, which are defined on pages 2 and 3, 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, measurement of flow, and interpretation of records.

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

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

The monthly means for any station may represent with high accuracy the quantity of water flowing past the gage, but the figures showing discharge per square mile and run-off in inches may be subject to gross errors caused by the inclusion of large noncontributing districts in the measured drainage area, by lack of information concerning water diverted for irrigation or other use, or by inability to interpret the effect of artificial regulation of the flow of the river above the station. "Second-feet per square mile" and "run-off in inches" are therefore not computed if such errors appear probable. The computations are also omitted for stations on streams draining 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 by the Survey in earlier reports 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 sections of the United States are located 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 station 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, monographs, and annual reports.

The results of stream-flow measurements are now published annually in 12 parts, each part covering an area whose boundaries coincide with natural drainage features as indicated below:

PART I. North Atlantic slope basins (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.
IX. Colorado River basin.
X. Great Basin.
XI. Pacific slope basins in California.

PART XII. North Pacific slope basins; in three volumes:

A. Pacific slope basins, in Washington and upper Columbia River basin.

B. Snake River basin.

C. Lower Columbia River basin and Pacific slope basins in Oregon.

Water-supply papers and other publications of the United States Geological Survey containing data in regard to the water resources of the United States may be obtained or consulted as indicated below:

1. Copies may be purchased at nominal cost from the Superintendent of Documents, Government Printing Office, Washington, D. C., who will on application 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., State House.
Charlottesville, Va., c/o University of Virginia.
Asheville, N. C., 316 Jackson Building.
Chattanooga, Tenn., 37 Municipal Building.
Columbus, Ohio, Engineering Experiment Station, Ohio State University.
Madison, Wis., c/o Railroad Commission of Wisconsin.
Chicago, Ill., 940 Transportation Building.
Ames, Iowa, State Highway Commission Building.
Rolla, Mo., Rolla Building, School of Mines and Metallurgy.
Topeka, Kans., 23 Federal Building.
Austin, Tex., Capitol Building.
Helena, Mont., 45–46 Federal Building
Denver, Colo., 403 Post Office Building.
Tucson, Ariz., 106 College of Law Building, University of Arizona.
Salt Lake City, Utah, 313 Federal Building.
Boise, Idaho, Federal Building.
Idaho Falls, Idaho, 228 Federal Building.
Tacoma, Wash., 404 Federal Building.
Portland, Oreg., 606 Post Office Building.
San Francisco, Calif., 303 Customhouse.
Los Angeles, Calif., 600 Federal Building.
Honolulu, Hawaii, 25 Capitol Building.

A list of the Geological Survey's publications may be obtained by applying to the Director of the United States Geological Survey, Washington, D. C.

Stream-flow records have been obtained at about 5,800 points in the United States, and the data obtained have been published in the reports tabulated below:

Stream-flow data in reports of the United States Geological Survey
[A=Annual Report; B=Bulletin; W=Water-Supply Paper]

Report	Character of data	Year
10th A, pt. 2	Descriptive information only	
11th A, pt. 2	Monthly discharge and descriptive information	1884 to September, 1890.
12th A, pt. 2	do	1884 to June 30, 1891.
13th A, pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A, pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A, pt. 2	Descriptive information only	
B 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W 11	Gage heights (also gage heights for earlier years)	1896.
18th A, pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for some earlier years).	1895 and 1896
W 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897
19th A, pt. 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	1915.
W 431 to 444	do	1916.
W 451 to 464	do	1917.
W 471 to 484	do	1918.
W 501 to 514	do	1919–20.
W 521 to 534	do	1921.
W 541 to 554	do	1922.
W 561 to 574	do	1923.
W 581 to 594	do	1924.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

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

The following table gives, by years and drainage basin, the numbers of papers on surface-water supply published from 1899 to 1924. The data for any particular station will be found in the reports covering the years during which the station was maintained. For example, data for 1902 to 1921 for any station in the area covered by Part III are published in Water-Supply Papers 83, 98, 128, 169, 205, 243, 263, 283, 303, 323, 353, 383, 403, 433, 453, 473, 503, and 523, which contain records for the Ohio River basin for those years. Results of miscellaneous measurements are published by drainage basins.

Numbers of water-supply papers containing results of stream measurements, 1899–1924

[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] 169, 173	174	175, [s] 177	176, [r] 177	177	178	178	[t] 177, 178
1906	[n] 201, [o] 202, [p] 203	[p] 203, 204	205	206	207	208	[k] 205, 209	210	211	212, [r] 213	213	214	214	214
1907–8 [u]	241	242	243	244	245	246	247	248	249	250, [r] 251	251	252	252	252
1909	261	262	263	264	265	266	267	268	269	270, [r] 271	271	272	272	272
1910	281	282	283	284	285	286	287	288	289	290	291	292	292	292
1911	301	302	303	304	305	306	307	308	309	310	311	312	312	312
1912	321	322	323	324	325	326	327	328	329	330	331	332A	332B	332C
1913	351	352	353	354	355	356	357	358	359	360	361	362A	362B	362C
1914	381	382	383	384	385	386	387	388	389	390	391	392	393	394
1915	401	402	403	404	405	406	407	408	409	410	411	412	413	414
1916	431	432	433	434	435	436	437	438	439	440	441	442	443	444
1917	451	452	453	454	455	456	457	458	459	460	461	462	463	464
1918	471	472	473	474	475	476	477	478	479	480	481	482	483	484
1919–20	501	502	503	504	505	506	507	508	509	510	511	512	513	514
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
1923	561	562	563	564	565	566	567	568	569	570	571	572	573	574
1924	581	582	583	584	585	586	587	588	589	590	591	592	593	594

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39. Tables of monthly discharge for 1899 in Twenty-first Annual Report, Part IV.
[b] James River only.
[c] Gallatin River.
[d] Green and Gunnison rivers and Grand River above junction with Gunnison.
[e] Mohave River only.
[f] Kings and Kern rivers and south Pacific slope 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.
[m] Hudson Bay only.
[n] New England rivers only.
[o] Hudson River to Delaware River, inclusive.
[p] Susquehanna River to Yadkin River, inclusive.
[q] Platte and Kansas rivers.
[r] Great Basin in California except Truckee and Carson River basins.
[s] Below junction with Gila
[t] Rogue, Umpqua, and Siletz rivers only.
[u] Tables of monthly discharge for 1907–8 in Twenty-eighth Annual Report, Part IV.

COOPERATION

The work in Washington, Montana, and Idaho 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, division of water resources.

Acknowledgments are due to C. S. Heidel, State engineer of Montana, and to W. G. Swendsen, commissioner of reclamation of Idaho, for cooperation with their respective States.

Acknowledgments are also due to the United States Bureau of Reclamation, the United States Forest Service, and the United States Office of Indian Affairs for assistance, suggestions, and the freest use of data gathered exclusively for them and paid for by them. The United States Weather Bureau furnished hydrographic and climatologic data used in discharge computation for a number of streams.

Acknowledgments are also due to the Hydrometric Survey of British Columbia for complete records of Columbia River at Trail, B. C.

Special acknowledgments are due to the following municipalities, corporations, and individuals who have aided in the collection of records by paying for all or a portion of the work: Inter-County River Improvement Commission of King and Pierce Counties; the cities of Aberdeen, Everett, Seattle, and Tacoma; Chelan Electric Co.; Grays Harbor Railway & Light Co.; Hugh L. Cooper Co.; Greater Wenatchee Irrigation District; Inland Portland Cement Co.; Interurban Land Co.; Methow-Okanogan Irrigation District; Northwest Power & Manufacturing Co.; Puget Sound Power & Light Co.; Sound Power Co.; Spokane Valley Farms Co.; Stevens County Power & Light Co.; Stone-Webster Engineering Corporation; Washington Coast Utilities Co.; Washington Water Power Co.; Whitestone Irrigation District; Washington Irrigation & Development Co.; West Okanogan Valley Irrigation District; and J. L. Keeler.

DIVISION OF WORK

Data for stations in Washington were collected and prepared for publication under the direction of G. L. Parker, district engineer, assisted by D. J. F. Calkins, R. B. Kilgore, J. S. Gatewood, A. C. Baldwin, C. O. Dueval, K. N. Vaksvik, and J. M. Rogers.

Data for stations in Montana were collected and prepared for publication under the direction of W. A. Lamb, district engineer, assisted by A. H. Tuttle.

Data for stations in the Yakima River basin, exclusive of those in the Yakima Indian Reservation, were collected and results computed and prepared for publication by Paul Taylor, engineer in charge of hydrometric work, United States Bureau of Reclamation, assisted by D. E. Ball and R. O. Crawford.

The manuscript was assembled and reviewed by J. H. Morgan.

GAGING-STATION RECORDS

DRAINAGE BASINS BETWEEN COLUMBIA RIVER AND PUGET SOUND

CHEHALIS RIVER BASIN

WYNOOCHEE RIVER NEAR MONTESANO, WASH.

LOCATION.—In sec. 36, T. 20 N., R. 8 W., at Waters ranch, 14 miles north of Montesano, Grays Harbor County.

DRAINAGE AREA.—105 square miles, at measuring section (measured on map of Olympic National Forest, edition of 1923).

RECORDS AVAILABLE.—February 1, 1923, to September 30, 1924.

GAGE.—A vertical staff in two sections on left bank, at Waters ranch.

DISCHARGE MEASUREMENTS.—Made from suspension bridge 2½ miles below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel. Control is riffle on gravel and solid rock several hundred feet below gage. Shifts at high stages. Banks high, not subject to overflow. Stage of zero flow, according to measurement made September 4, 1924, gage height 0.4 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage during period of record, 17.0 feet at 6 p. m. February 11, 1924, discharge not determined; minimum stage recorded, 1.44 feet on September 17, 1924 (discharge, 106 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed by high water December 6, 1923, and February 11, 1924. Rating curves used prior to February 11, 1924, poorly defined; curve used after that date, well defined below 7,500 second-feet. Gage read to tenths once daily until May 28, 1924, and to hundredths twice daily after August 15, 1924. Daily discharge ascertained by applying mean daily gage height to rating table. Records poor to August 14, 1924; good thereafter.

Discharge measurements of Wynoochee River near Montesano, Wash., for the years ending September 30, 1923 and 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1923		*Feet*	*Sec.-ft.*	1924		*Feet*	*Sec.-ft.*
Sept. 19	Watkins and Malinowski	1.90	143	Feb. 12	Watkins and Taylor	10.62	11,900
Dec. 28	do	4.00	2,450	Aug. 15	Parker and Watkins	1.46	112
1924				Sept. 4	Kilgore and Watkins	1.47	116
Feb. 1	Watkins and Lord	7.38	6,420	4	do	1.47	109
				20	S. C. Watkins	1.45	108
				20	do	1.45	108

Daily discharge, in second-feet, of Wynoochee River near Montesano, Wash., for the years ending September 30, 1923 and 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923												
1					555	393	1,160	1,010	866	393	250	174
2					393	342	1,080	937	733	393	250	143
3					393	342	1,080	866	733	393	250	143
4					393	555	1,080	866	733	393	210	143
5					250	446	1,080	798	733	393	210	143
6					250	671	1,500	866	733	446	210	143
7					250	866	1,320	1,010	733	393	210	143
8					250	1,010	1,240	1,010	671	393	210	143
9					250	866	1,080	1,010	671	393	210	143
10					210	1,160	1,010	1,010	671	393	210	143
11					210	2,000	1,010	937	612	342	210	143
12					210	1,600	1,010	798	555	342	210	143
13					210	1,410	937	733	555	342	210	143
14					210	1,240	866	733	500	342	210	143
15					342	1,010	866	733	500	342	210	143
16					446	1,160	937	733	500	342	210	143
17					555	1,160	937	733	446	342	210	143
18					1,010	1,160	1,010	733	446	294	210	143
19					866	1,240	1,240	671	446	294	210	143
20					733	1,160	1,240	671	446	294	210	174
21					1,010	1,010	1,240	612	446	294	210	294
22					555	937	1,160	612	446	294	210	250
23					446	866	1,080	555	446	294	210	250
24					446	866	1,080	555	446	294	210	342
25					393	1,010	1,010	612	446	294	210	210
26					342	1,010	1,010	612	393	250	210	210
27					250	937	937	612	393	250	174	210
28					250	1,010	866	866	393	250	174	210
29						1,080	866	1,080	393	250	174	210
30						1,160	866	1,080	393	250	174	210
31						1,320		937		250	174	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923-24												
1	174	555	798	2,050	6,590	1,740	470	360				117
2	174	733	733	2,050	4,990	1,430	470	360				115
3	174	555	1,010	1,860	4,390	1,430	470	360				115
4	174	500	2,710	1,770	4,630	1,170	470	415				115
5	174	393	3,090	1,680	6,030	1,010	470	415				115
6	210	342	12,600	1,500	3,590	1,010	470	415		180		115
7	210	294	5,500	1,680	4,150	930	530	415				115
8	210	294	3,370	2,150	3,260	930	530	360			120	115
9	210	294	2,950	2,050	2,750	930	530	415				115
10	210	294	3,260	5,760	2,450	855	530	415	200			111
11	210	250	3,480	3,150	19,600	785	530	470				111
12	174	446	2,050	2,950	13,400	715	470	470				108
13	174	671	1,590	2,250	5,650	650	470	470				108
14	174	671	2,750	1,950	3,550	650	470	415				108
15	210	612	6,450	1,950	3,310	590	470	360			111	108
16	1,500	500	4,630	1,950	3,190	590	470	310		160	111	108
17	1,320	393	3,700	1,950	2,950	530	415	310			155	106
18	1,080	393	4,630	1,500	2,400	530	1,170	310	310		470	113
19	733	446	3,810	1,500	2,070	530	930	310	215		360	111
20	612	393	2,750	1,590	1,850	470	930	310			215	108
21	500	393	2,450	1,500	1,850	470	785	310			188	135
22	393	446	1,500	1,500	1,740	470	530	310			161	4,340
23	393	798	2,450	1,680	1,430	470	530	310			151	4,070
24	500	3,940	2,350	1,590	1,430	470	530	310			145	2,510
25	500	1,900	3,260	1,500	2,180	470	470	260	190		140	1,850
26	500	1,700	2,450	1,500	2,290	470	470	215		140	135	1,090
27	500	1,160	2,450	1,500	2,290	470	415	215			135	820
28	500	1,240	2,450	2,750	2,730	470	415	215			127	682
29	446	1,010	2,950	7,020	2,180	470	415				124	590
30	446	1,700	2,650	6,030		470	360	210			119	855
31	446		2,250	14,600		470					119	

NOTE.—Water surface below gage May 29 to June 17 and June 20 to Aug. 14, 1924; discharge estimated by comparison with records of North Fork of Skohomish River near Hoodsport. Braced figures show mean discharge from periods indicated.

Monthly discharge of Wynoochee River near Montesano, Wash., for the years ending September 30, 1923 and 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1923				
February	1,010	210	417	23,200
March	2,000	342	1,000	61,500
April	1,500	866	1,060	63,100
May	1,080	555	806	49,600
June	866	393	549	32,700
July	446	250	330	20,300
August	250	174	208	12,800
September	342	143	177	10,500
The period				274,000
1923-24				
October	1,500	174	427	26,300
November	3,940	250	777	46,200
December	12,600	733	3,200	197,000
January	14,600	1,500	2,720	167,000
February	19,600	1,430	4,100	236,000
March	1,740	470	730	44,900
April	1,170	360	540	32,100
May	470		337	20,700
June	310		200	11,900
July			159	9,780
August	470		150	9,220
September	4,340	106	639	38,000
The year	19,600	106	1,160	839,000

QUINAULT RIVER BASIN

QUINAULT RIVER AT QUINAULT LAKE, WASH.

LOCATION.—In sec. 25. T. 23 N., R. 10 W., at outlet of Quinault Lake, 4 miles southwest of Quinault and 33 miles north of Hoquiam, Grays Harbor County.

DRAINAGE AREA.—264 square miles (measured on Pl. I, U. S. Geol. Survey Prof. Paper 7).

RECORDS AVAILABLE.—October 29, 1911, to December 21, 1922; July 18 to November 5, 1924, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank 350 feet below Olympic Highway crossing at outlet of Quinault Lake; installed September 27, 1916, at different datum from previous gage; reinstalled July 18, 1924; inspected by F. P. Zoffman.

DISCHARGE MEASUREMENTS.—Made from cable 700 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders. Well-defined control 600 feet below gage. Left bank high and wooded; not subject to overflow; right bank high, wooded, and subject to overflow above gage height about 20 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period July 18 to November 5, 1924, 8.99 feet at 9.30 a. m. October 25 (discharge, 14,600 second-feet); minimum stage, 0.74 foot from 4 to 10 p. m. September 20 (discharge, 285 second-feet).

1911–1922; 1924: Maximum stage recorded, 16.3 feet at 5 p. m. December 12, 1921 (discharge, 37,000 second-feet); minimum stage recorded September 20, 1924.

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

DIVERSIONS.—None.

REGULATION.—None except from natural storage in lake.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined above 300 second-feet. Operation of water-stage recorder satisfactory. Discharge ascertained by applying to rating table mean daily gage height obtained by inspecting gage height graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent.

Discharge measurements of Quinault River at Quinault Lake, Wash., during the period July 18 to November 5, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
July 18	Parker and Zoffman	1.44	633	Sept. 5	R. B. Kilgore	0.90	347
Sept. 5	R. B. Kilgore	.90	363	Nov. 5	do	6.19	7,400

Daily discharge, in second-feet, of Quinault River at Quinault Lake, Wash., for the period July 18 to November 5, 1924

Day	July	Aug.	Sept.	Oct.	Nov.	Day	July	Aug.	Sept.	Oct.	Nov.
1	-------	476	371	5,030	7,570	16	-------	394	297	8,000	-------
2	-------	466	361	6,350	6,950	17	-------	430	293	6,150	-------
3	-------	455	357	5,390	6,550	18	640	568	297	4,550	-------
4	-------	445	352	4,030	6,950	19	623	606	293	3,560	-------
5	-------	430	352	3,110	7,570	20	601	601	289	2,900	-------
6	-------	419	352	2,480	-------	21	590	574	343	2,480	-------
7	-------	414	348	2,090	-------	22	568	546	2,600	2,280	-------
8	-------	404	348	1,910	-------	23	546	514	7,570	2,160	-------
9	-------	399	343	1,790	-------	24	535	482	6,350	6,130	-------
10	-------	399	335	1,620	-------	25	535	466	4,640	13,700	-------
11	-------	399	326	1,460	-------	26	541	455	3,260	11,100	-------
12	-------	399	318	1,680	-------	27	541	445	2,480	9,600	-------
13	-------	399	313	1,970	-------	28	535	430	1,970	8,440	-------
14	-------	399	309	4,300	-------	29	525	414	1,620	10,300	-------
15	-------	399	305	7,780	-------	30	503	394	1,680	10,300	-------
						31	492	390	-------	9,130	-------

Monthly discharge of Quinault River at Quinault Lake, Wash., for the period July 18 to November 5, 1924

[Drainage area, 264 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
1924						
July 18–31	640	492	555	2.10	1.09	15,400
August	606	390	452	1.71	1.97	27,800
September	7,570	289	1,300	4.92	5.49	77,400
October	13,700	1,460	5,220	19.8	22.83	321,000
November 1–5	7,570	6,550	7,120	27.0	5.02	70,600
The period						512,000

QUILLAYUTE RIVER BASIN

SOLEDUCK RIVER AT SNIDER RANGER STATION, NEAR BEAVER, WASH.

LOCATION.—In sec. 28, T. 30 N., R. 11 W., at Snider ranger station, 9 miles below South Fork and 11 miles above Beaver, Clallam County.

DRAINAGE AREA.—111 square miles (measured on Pl. I, U. S. Geol. Survey Prof. Paper 7).

RECORDS AVAILABLE.—November 13, 1921, to September 30, 1924; winter records for 1922 and 1923 fragmentary.

GAGE.—Vertical staff in two sections on right bank a few hundred feet above ranger station; installed February 5, 1922; read by H. O. Milbourn and W. L. Danz.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Right bank high, not subject to overflow; left bank subject to overflow at extremely high stages. Channel straight for several hundred feet above and below gage. Control is gravel and boulder riffle about 500 feet below gage; will shift at high stages. Gage height of zero flow, September 14, 1924, 0.4 foot ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 11.7 feet on January 31 (discharge, 15,300 second-feet); minimum stage recorded, 1.17 feet from 6 p. m. September 16 to 6 p. m. September 17 (discharge, 34 second-feet).

1922–1924: Maximum stage recorded, 14.7 feet at noon on December 12, 1921 (discharge, 23,500 second-feet); minimum stage recorded on September 16 and 17, 1924.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water February 12; not affected by ice. Rating curve used prior to February 12 well defined between 100 and 5,000 second-feet, and fairly well defined below; curve used since February 12 well defined below 5,000 second-feet. Curves extended above 5,000 second-feet. Gage read to hundredths once daily, twice over long period during fall and late summer. Daily discharge ascertained by applying mean daily gage height to rating table. Records good below 5,000 second-feet.

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

Discharge measurements of Soleduck River at Snider ranger station, near Beaver, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 5	1.30	65	Feb. 2	5.28	2,470	July 20	1.58	99
6	1.50	102	5	5.54	2,800	Sept. 11	1.20	38.7
Feb. 1	6.18	3,550	July 19	1.58	102	14	1.18	34.4

Daily discharge, in second-feet, of Soleduck River at Snider ranger station, near Beaver, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	65	117	425	620	3,600	1,100	235	300	300	151	67	43
2	65	425	472	470	2,400	940	235	400	284	151	67	41
3	64	324	520	436	1,670	780	267	302	267	151	65	40
4	68	224	1,860	402	3,210	720	267	267	267	145	64	40
5	65	198	1,250	}	2,850	620	251	251	267	139	62	38
6	92	174	2,800	700	1,860	670	235	267	251	139	61	37
7	82	162	2,510	}	1,410	570	235	251	243	139	61	37
8	75	150	2,140	960	1,220	520	235	267	235	127	59	41
9	66	139	1,780	1,410	1,030	495	220	302	235	116	57	43
10	63	132	1,410	2,180	840	470	220	380	251	105	56	40
11	63	153	3,500	1,800	11,600	425	235	425	236	105	54	37
12	61	174	1,600	1,410	6,630	402	267	448	220	105	53	37
13	60	186	1,410	1,030	2,730	380	302	470	205	95	51	36
14	61	211	1,410	645	2,290	370	267	470	212	127	51	35
15	302	211	4,480	582	1,670	360	235	448	220	127	51	35
16	1,100	174	1,960	520	1,410	340	235	425	205	112	51	35
17	780	156	2,730	495	1,490	321	267	402	235	109	81	34
18	470	139	4,200	470	1,250	302	1,410	402	235	103	114	47
19	340	302	1,410	448	1,100	302	520	380	191	101	99	48
20	304	238	1,120	436	1,030	284	493	425	177	99	85	45
21	268	224	840	425	1,100	276	466	340	177	93	64	64
22	241	211	900	425	840	267	438	340	177	87	59	2,620
23	213	960	825	402	840	251	411	360	164	83	54	1,960
24	186	3,470	750	402	780	235	384	340	164	81	51	1,410
25	162	2,180	950	400	1,170	235	356	302	151	80	51	670
26	150	900	670	520	1,100	235	329	267	151	78	50	425
27	139	695	670	}	1,100	235	302	251	151	78	48	321
28	130	1,200	840	1,600	1,860	267	}	235	146	78	45	267
29	121	900	750	}	1,250	235	320	267	151	74	45	235
30	117	670	660	}	-------	205	}	267	151	72	44	235
31	117	-------	570	15,300	-------	220	-------	284	-------	72	43	-------

NOTE.—Gage not read Oct. 20, 22, 23, 26, Nov. 3, 11, 17, 25, 28, 29, Dec. 2, 8, 9. 11, 12, 18, 20, 23, 25, 30, Jan. 3, 5–7, 11–13, 15, 20, 25, 27–30, Feb. 8, Mar. 2, 14, 21, Apr. 20–26, 28–30, May 1, 2, June 1, 4, 7, 11, 14, and July 4. Discharge Nov. 28–29, Dec. 11, 12, 18, 25, Jan. 5–7, 25, 27–30, Apr. 28 to May 2, and June 1 estimated by comparison with records of nearby streams; other gaps in record filled by interpolation. Braced figures show mean discharge for periods indicated.

Monthly discharge of Soleduck River at Snider ranger station, near Beaver, Wash., for the year ending September 30, 1924

[Drainage area, 111 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,100	60	196	1.77	2.04	12,100
November	3,470	117	513	4.62	5.16	30,500
December	12,800	425	1,850	16.7	19.25	114,000
January	15,300	----------	1,310	11.8	13.60	80,600
February	11,600	780	2,110	19.0	20.49	121,000
March	1,100	205	420	3.78	4.36	25,800
April	1,410	220	343	3.09	3.45	20,400
May	470	235	340	3.06	3.53	20,900
June	----------	146	211	1.90	2.12	12,600
July	151	72	107	.964	1.11	6,580
August	114	43	60.1	.541	.62	3,700
September	2,620	34	300	2.70	3.01	17,900
The year	15,300	34	643	5.79	78.74	466,000

LYRE RIVER BASIN

LAKE CRESCENT AT PIEDMONT, WASH.

LOCATION.—In sec. 14, T. 30 N., R. 9 W., on dock at Log Cabin Hotel at Piedmont, Clallam County.

DRAINAGE AREA.—49.1 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 1, 1919, to September 30, 1924.

GAGE.—Vertical staff on dock; read by J. A. Martin.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2.70 feet February 13; minimum stage recorded, 0.00 foot September 20.

1919–1924: Maximum stage recorded, 5.46 feet December 13–14, 1921; minimum stage recorded September 20, 1924.

ACCURACY.—Gage read to hundredths once daily. Records excellent.

COOPERATION.—Gage-height record furnished by Northwest Power & Manufacturing Co.

Daily gage height, in feet, of Lake Crescent at Piedmont, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	0.24	0.28	0.60	1.16	1.94	1.70	0.84	0.70	0.50	0.32	0.16	0.08
2	.24	.28	.54	1.10	2.04	1.70	.84	.72	.50	.30	.16	.08
3	.24	.28	.70	1.06	2.04	1.68	.82	.68	.50	.30	.16	.08
4	.26	.28	.70	1.04	2.00	1.62	.82	.66	.48	.28	.14	.08
5	.26	.30	.82	1.00	2.12	1.54	.80	.66	.48	.26	.14	.06
6	.24	.30	1.20	.98	2.12	1.52	.78	.64	.48	.24	.12	.06
7	.24	.30	1.32	1.00	2.10	1.48	.78	.64	.46	.24	.12	.06
8	.24	.30	1.32	1.02	2.05	1.46	.75	.62	.46	.24	.12	.05
9	.22	.28	1.34	1.06	2.00	1.40	.75	.62	.46	.22	.10	.05
10	.22	.28	1.38	1.10	1.95	1.36	.74	.62	.44	.22	.10	.05
11	.22	.26	1.40	1.14	2.12	1.34	.74	.60	.44	.22	.10	.05
12	.20	.26	1.42	1.12	2.65	1.30	.74	.60	.42	.22	.10	.05
13	.20	.28	1.42	1.10	2.70	1.24	.72	.6	.42	.22	.10	.05
14	.22	.30	1.48	1.10	2.64	1.20	.70	.60	.42	.22	.10	.05
15	.30	.30	1.64	1.06	2.58	1.18	.72	.60	.42	.22	.10	.05
16	.34	.30	1.68	1.04	2.54	1.18	.76	.60	.42	.24	.10	.04
17	.40	.30	1.72	.98	2.50	1.15	.82	.60	.42	.26	.10	.02
18	.44	.30	1.74	.98	2.44	1.10	.82	.58	.40	.26	.12	.02
19	.44	.30	1.72	.98	2.30	1.06	.82	.58	.40	.28	.12	.02
20	.44	.30	1.70	.98	2.24	1.04	.80	.56	.40	.26	.12	.00
21	.44	.30	1.64	1.00	2.08	1.02	.80	.54	.40	.26	.12	.10
22	.42	.32	1.60	1.00	1.98	1.00	.78	.54	.40	.24	.12	.42
23	.40	.34	1.56	1.00	1.90	.98	.76	.52	.40	.24	.12	.60
24	.36	.38	1.52	.94	1.90	.96	.76	.50	.38	.22	.12	.84
25	.34	.42	1.48	.96	1.85	.94	.74	.50	.38	.22	.10	.76
26	.32	.46	1.42	.90	1.80	.92	.72	.50	.36	.20	.10	.68
27	.30	.50	1.38	.96	1.76	.92	.70	.50	.36	.20	.10	.60
28	.30	.54	1.36	1.04	1.74	.90	.70	.50	.34	.20	.10	.58
29	.30	.56	1.32	1.08	1.72	.90	.68	.50	.34	.18	.10	.60
30	.30	.58	1.28	1.20	-------	.88	.68	.50	.34	.18	.08	.64
31	.28	-------	1.20	1.52	-------	.86	-------	.50	-------	.18	.08	-------

LYRE RIVER AT PIEDMONT, WASH.

LOCATION.—In NE. ¼ sec. 15, T. 30 N., R. 9 W., a quarter of a mile below outlet of Lake Crescent and half a mile west of Piedmont, Clallam County.

DRAINAGE AREA.—49.5 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1917, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank except for period October 17, 1922, to September 30, 1923, when staff gage in Lake Crescent at Piedmont was used. Recorder inspected by E. Brooks and A. A. Firkins. Lake Crescent gage read by J. A. Martin.

DISCHARGE MEASUREMENTS.—Made by wading or from cable, 1,000 feet above gage.

CHANNEL AND CONTROL.—Channel composed of bedrock and boulders. Banks wooded. Control formed by series of rapids over bedrock and by contracted channel between railroad bridge abutments.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year ending September 30, 1923, 3.4 feet January 10–11 (discharge, 1,180 second-feet); minimum stage recorded, 0.16 foot September 17–19 (discharge, 39 second-feet).

Maximum stage during year ending September 30, 1924, 8.31 feet from 8 to 10 p. m. February 12 (discharge, 862 second-feet); minimum stage, 4.05 feet at 7 p. m. September 19 (discharge, 18 second-feet).

1918–1924: Maximum stage recorded, 3.4 feet on Lake Crescent gage January 10–11, 1923. Minimum stage recorded on September 19, 1924.

ICE.—None.

DIVERSIONS.—None.

REGULATION.—Flow is very uniform because of natural regulation in Lake Crescent. Channel at mouth of lake cleared of driftwood and deepened July 25 to August 7, 1922.

ACCURACY.—Stage-discharge relation changed with change of gages October 17, 1922, gradually at high water December 24, 1922, to January 11, 1923; with change of gages again October 1, 1923, and due to artificial filling on control April 7–15. Rating curves fairly well defined. Staff gage read to hundredths once daily October 17, 1922, to September 30, 1923. Operation of water-stage recorder for other periods satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying daily gage height to rating table during period staff gage was read; otherwise by applying to rating table mean daily gage height determined from recorder graph by inspection. Shifting-control method used December 24, 1922, to January 11, 1923. Records good.

Discharge measurements of Lyre River at Piedmont, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Lake Crescent gage height	River gage height	Discharge	Date	Lake Crescent gage height	River gage height	Discharge	Date	Lake Crescent gage height	River gage height	Discharge
	Feet	*Feet*	*Sec.-ft*		*Feet*	*Feet*	*Sec.-ft.*		*Feet*	*Feet*	*Sec.-ft.*
Oct. 1	0.24	2.48	54	Feb. 6	2.12	7.02	638	Sept. 11	0.06	4.18	23
7	.24	2.47	51	July 17	.27	4.82	60	Sept. 15	.05	4.16	23
Feb. 1	1.95	6.64	564	July 20	.25	4.74	54				

Daily discharge, in second-feet, of Lyre River at Piedmont, Wash., for the years ending September 30, 1923 and 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1922–23												
1	93	105	74	958	426	304	198	212	198	157	79	57
2	89	105	74	1,000	389	288	198	212	198	157	75	57
3	84	101	74	1,040	389	288	198	212	185	152	72	53
4	82	101	70	1,000	354	288	198	198	198	152	72	53
5	78	97	70	1,000	337	272	212	198	198	152	68	53
6	73	97	74	1,090	320	304	212	198	198	157	68	53
7	70	93	74	1,090	320	320	212	198	198	162	68	53
8	66	93	74	1,090	304	320	212	198	198	157	64	50
9	64	89	74	1,130	288	320	212	198	198	152	64	50
10	60	89	70	1,180	288	320	212	212	198	147	60	50
11	59	89	70	1,180	272	320	212	212	212	147	60	46
12	56	81	70	1,130	257	320	212	212	212	142	60	46
13	55	77	74	1,090	272	320	212	212	212	142	60	46
14	51	74	74	1,000	288	304	212	227	198	138	57	43
15	49	74	74	1,000	354	304	212	227	198	133	57	43
16	48	85	74	916	372	288	212	227	198	129	57	43
17	51	89	74	790	389	288	212	212	185	124	57	39
18	48	93	77	790	389	257	212	227	185	120	57	39
19	48	93	89	748	408	257	212	227	172	120	57	39
20	48	93	101	748	389	242	227	212	172	116	57	46
21	48	89	150	707	389	242	227	212	167	111	57	53
22	44	89	185	707	372	242	212	212	167	111	68	57
23	44	85	272	707	354	227	212	198	167	107	75	60
24	51	85	372	625	354	227	198	198	162	103	75	60
25	89	85	426	584	337	272	198	198	162	103	72	57
26	105	81	464	543	337	242	198	212	160	99	68	57
27	109	81	584	543	320	227	198	198	160	95	68	57
28	113	81	748	503	320	212	198	198	157	87	64	57
29	109	77	748	503	-------	212	198	212	157	83	64	57
30	109	77	790	484	-------	198	198	212	157	83	60	53
31	105	-------	874	464	-------	198	-------	212	-------	79	60	-------
1923–24												
1	54	63	116	276	564	455	178	142	106	70	41	28
2	54	68	112	257	612	440	178	138	102	69	41	26
3	54	65	110	242	596	426	178	138	102	67	41	26
4	55	63	124	242	612	398	178	138	102	66	39	26
5	54	63	146	227	646	384	178	138	102	65	39	24
6	56	62	178	227	629	384	178	138	99	60	39	24
7	55	61	300	223	629	370	167	138	96	57	37	24
8	54	61	335	219	596	349	160	134	96	57	36	22
9	52	60	328	219	548	335	160	134	96	56	36	22
10	52	58	314	243	548	332	157	134	92	53	36	23
11	50	60	307	261	697	337	157	134	96	51	36	24
12	49	63	335	261	841	320	157	134	96	51	36	24
13	49	63	384	255	860	304	152	130	96	50	35	24
14	52	64	412	249	841	288	147	130	96	57	36	24
15	58	63	470	243	822	288	152	130	99	59	34	22
16	79	62	470	240	790	288	162	130	96	58	33	23
17	84	61	470	237	790	272	171	130	99	59	34	20
18	81	61	485	227	731	257	184	130	102	59	38	22
19	84	63	470	227	707	242	176	126	99	59	37	20
20	84	62	440	227	666	242	171	126	92	57	35	20
21	83	62	426	227	625	227	171	126	91	56	35	26
22	79	64	398	227	584	227	171	122	87	54	34	75
23	76	73	384	227	543	214	166	122	86	53	34	126
24	73	110	370	212	506	201	162	122	81	53	33	146
25	71	126	356	212	485	195	158	118	80	51	33	142
26	69	131	370	198	470	189	154	114	78	50	33	134
27	68	126	342	212	470	184	150	114	76	50	33	130
28	64	126	335	242	500	184	142	110	74	47	32	122
29	63	124	335	250	485	184	142	110	73	45	30	118
30	62	121	314	274	-------	178	146	110	72	44	28	126
31	61	-------	294	455	-------	179	-------	106	-------	44	28	-------

NOTE.—Water-stage recorder not operating satisfactorily Jan. 1–7, 18–28, Feb. 16–23, Mar. 11–12, Sept. 2–9, 1924; river control changed markedly during period Apr. 7–15, 1924, owing to gravel being dumped from bridge; discharge for these periods determined by use of Lake Crescent gage heights.

Monthly discharge of Lyre River at Piedmont, Wash., for the years ending September 30, 1923 and 1924

[Drainage area, 49.5 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
1922-23						
October	113	44	70.9	1.43	1.65	4,360
November	105	74	88.3	1.78	1.99	5,250
December	874	70	230	4.65	5.36	14,100
January	1,180	464	850	17.2	19.83	52,300
February	426	257	342	6.91	7.20	19,000
March	320	198	272	5.49	6.33	16,700
April	227	198	208	4.20	4.69	12,400
May	227	198	209	4.22	4.86	12,900
June	212	157	184	3.72	4.15	10,900
July	162	79	126	2.55	2.94	7,750
August	79	57	64.5	1.30	1.50	3,970
September	60	39	50.9	1.03	1.15	3,030
The year	1,180	39	225	4.55	61.65	163,000
1923-24						
October	84	49	63.8	1.29	1.49	3,920
November	131	58	77.0	1.56	1.74	4,580
December	485	110	330	6.67	7.69	20,300
January	455	198	243	4.91	5.66	14,900
February	860	470	634	12.8	13.80	36,500
March	455	178	286	5.78	6.66	17,6 0
April	184	142	163	3.29	3.67	9,700
May	142	106	127	2.57	2.96	7,810
June	106	72	92.1	1.86	2.08	5,480
July	70	44	55.7	1,13	1.30	3,420
August	41	28	35.2	.711	.82	2,160
September	146	20	53.8	1.09	1.22	3,200
The year	860	20	179	3.62	49.09	130,000

ELWHA RIVER BASIN

ELWHA RIVER AT McDONALD BRIDGE, NEAR PORT ANGELES, WASH.

LOCATION.—In NE. ¼ NW. ¼ sec. 33, T. 30 N., R. 7 W., at McDonald Bridge, 6½ miles above mouth and 8 miles southwest of Port Angeles, Clallam County.

DRAINAGE AREA.—262 square miles (measured on Pl. I, U. S. Geol. Survey Prof. Paper 7).

RECORDS AVAILABLE.—October 8, 1897, to December 31, 1901; October 1, 1918, to September 30, 1924.

GAGE.—Since October 17, 1918, Stevens water-stage recorder on left bank; inspected by A. J. Hooper. Gage datum 206.29 feet above mean sea level.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel, shifting. Banks high.

EXTREMES OF DISCHARGE.—Maximum stage during year, 7.7 feet from 7 to 8 a. m. and 1 to 2 p. m. January 31 (discharge, 13,000 second-feet); minimum stage, 0.12 foot from 2 p. m. September 20 to 4 a. m. September 21 (discharge, 305 second-feet).

1897–1901; 1918–1924: Maximum stage recorded, 10.6 feet November 27, 1901 (discharge, 23,800 second-feet); minimum stage recorded, 0.80 foot October 18, 1897 (discharge, 170 second-feet).

ICE.—Stage-discharge relation only slightly affected by ice during severe winters.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water December 6 and gradually December 18 to January 23, January 29 to February 6, and February 12–14; affected by drift or other obstruction on control March 24 to May 10; not affected by ice. Rating curves used direct or as standard form for shifting control prior to January 31, well defined below 5,000 second-feet; curves used subsequent to January 31, fairly 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 gage height graph or, for days of considerable variation in stage, by averaging results obtained by applying gage heights for shorter intervals. Shifting-control method used December 18 to January 23, January 29 to February 5, February 12–14, and April 16 to May 10. Records good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Northwestern Power & Manufacturing Co.

Discharge measurements of Elwha River at McDonald Bridge, near Port Angeles, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 10	A. J. Hooper	0.46	362	Apr. 15	A. J. Hooper	0.95	726
Nov. 6	do	.58	445	May 9	do	1.66	1,160
Dec. 17	do	2.98	3,440	June 11	do	1.74	1,530
Jan. 22	do	.94	826	July 16	Kilgore and Hooper	.80	713
31	Kilgore and Hooper	7.60	12,800	Aug. 18	A. J. Hooper	.74	685
Feb. 6	do	3.33	3,800	Sept. 3	do	.34	418
Mar. 10	A. J. Hooper	1.28	1,070	9	Kilgore and Hooper	.23	358

Daily discharge, in second-feet, of Elwha River at McDonald Bridge, near Port Angeles, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	425	522	694	1,040	7,980	1,960	655	855	2,140	1,370	629	395
2	446	880	680	1,040	5,400	1,800	677	1,030	2,270	1,370	609	422
3	457	514	680	1,010	3,950	1,640	661	970	2,200	1,320	590	439
4	462	474	1,270	952	4,710	1,470	627	892	2,080	1,180	570	444
5	430	435	1,180	984	5,220	1,370	627	802	1,800	1,090	550	474
6	490	425	6,710	1,080	3,950	1,320	661	766	1,580	938	530	439
7	415	410	3,780	1,300	3,550	1,220	752	752	1,420	855	510	417
8	380	390	2,550	1,160	3,100	1,180	773	825	1,470	832	549	428
9	376	385	2,040	1,120	2,810	1,120	759	1,220	1,520	862	582	380
10	376	376	2,160	2,340	2,670	1,080	862	1,640	1,580	915	614	360
11	358	380	3,290	1,710	9,260	1,020	892	1,860	1,470	873	582	370
12	349	440	2,480	1,450	10,200	994	900	2,200	1,370	830	614	395
13	344	496	2,280	1,300	6,310	954	862	2,810	1,270	788	588	406
14	380	608	2,520	1,210	4,870	922	802	2,670	1,220	862	582	390
15	570	490	4,260	1,120	4,030	885	731	2,460	1,180	832	556	375
16	1,120	440	3,590	1,040	3,400	862	717	2,360	1,180	717	542	365
17	885	425	3,520	1,030	3,100	832	788	2,270	1,220	703	640	340
18	641	415	4,090	945	2,670	810	1,300		1,150	689	668	360
19	641	601	3,060	878	2,460	802	848	2,300	1,040	703	651	335
20	736	496	2,550	850	2,270	780	738		1,080	696	634	310
21	680	474	2,220	822	2,140	745	696	2,300	1,140	668	617	636
22	596	452	2,040	836	1,910	731	668	2,460	1,070	627	600	3,680
23	496	923	1,980	878	1,800	725	608	2,460	1,040	634	583	2,750
24	462	2,460	1,760	808	1,640	715	588	2,400	994	710	566	1,660
25	440	1,430	1,820	786	2,080	696	568	2,080	1,030	745	549	1,070
26	430	1,100	1,600	1,080	2,020	689	588	1,800	1,010	788	542	878
27	410	978	1,500	1,260	2,370	703	647	1,580	994	752	536	802
28	390	1,120	1,550	1,450	2,810	710	795	1,520	986	689	462	788
29	385	876	1,400	3,090	2,270	689	848	1,580	1,030	689	406	738
30	380	764	1,260	4,900	-------	654	892	1,580	1,180	669	380	1,330
31	376	-------	1,120	12,000	-------	661	-------	1,860	-------	649	380	-------

NOTE.—Recorder not operating May 16–21, June 10, July 11, 12, 30, 31, Aug. 1–7, 17–26; discharge May 16, July 11, 12, July 30 to Aug. 6, Aug. 19–24, and 26 estimated by interpolation; May 17, Aug. 7, 18, and 25 from staff gage readings; May 18–21 by comparison with flow of neighboring streams; and June 10 and Aug. 17, from recorded range of stage. Braced figure shows mean discharge for period indicated.

Monthly discharge of Elwha River at McDonald Bridge, near Port Angeles, Wash., for the year ending September 30, 1924

[Drainage area, 262 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,120	344	494	1.89	2.18	30,400
November	2,460	376	673	2.57	2.87	40,000
December	6,710	680	2,310	8.82	10.17	142,000
January	12,000	786	1,660	6.34	7.31	102,000
February	10,200	1,640	3,830	14.6	15.75	220,000
March	1,960	654	992	3.79	4.37	61,000
April	1,300	568	751	2.87	3.20	44,700
May	2,810	752	1,770	6.76	7.79	109,000
June	2,270	986	1,360	5.19	5.79	80,900
July	1,370	627	840	3.21	3.70	51,600
August	668	380	562	2.15	2.48	34,600
September	3,680	310	739	2.82	3.15	44,000
The year	12,000	310	1,320	5.04	68.76	960,000

DUNGENESS RIVER BASIN

DUNGENESS RIVER NEAR SEQUIM, WASH.

LOCATION.—In sec. 12, T. 29 N., R. 4 W., half a mile above State fish hatchery, 4½ miles southwest of Sequim, and 11 miles above mouth, Clallam County.

DRAINAGE AREA.—150 square miles (measured on Olympic National Forest map, 1923 edition).

RECORDS AVAILABLE.—June 1, 1923, to September 30, 1924; July 5, 1897, to July 31, 1898, at a station about 1½ miles below; July 29, 1898, to December 31, 1900, at a station at Dungeness, 1 mile above mouth.

GAGE.—Vertical and inclined staff on left wall of canyon about 100 feet above McLeay Lindsey canal intake; read by W. H. Knapman. Previous gages as follows: July 5, 1897, to July 31, 1898, wire gage on highway bridge about 1½ miles below; July 29, 1898, to December 31, 1900, wire gage on highway bridge at Dungeness about 10 miles below. Relation between gages at different sites not determined.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Channel in winding gorge, bed composed of gravel and solid rock. Control is gravel riffle, modified since installation of gage, by canal headworks; shifts easily.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period June 1, 1923, to September 30, 1924, 6.0 feet February 12 (discharge 5,140 second-feet); minimum stage recorded, 0.16 foot September 21, 1924 (discharge, 90 second-feet).

1897–1900, 1923–1924: Maximum stage recorded February 12, 1924; minimum stage recorded, 3.8 feet December 26, 1897 (discharge, 85 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water January 31 and February 12 and due to construction of wing dam on control March 19 and August 15, 1924. Rating curve used prior to January 31 fairly well defined; subsequent curves poorly defined. Prior to November 11, gage read to tenths two or three times a week; thereafter to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records fair, except those for February 12 to March 18 which are poor.

Discharge measurements of Dungeness River near Sequim, Wash., during the years ending September 30, 1923 and 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
1923	*Feet*	*Sec.-ft.*	1924	*Feet*	*Sec.-ft.*	1924	*Feet*	*Sec.-ft.*
Sept. 28	1.62	164	Jan. 29	2.50	429	July 15	1.05	285
Oct. 9	1.49	137	30	2.76	554	21	.88	245
			Feb. 7	2.68	752	Sept. 8	.66	150
			7	2.65	720	16	.38	120

Daily discharge, in second-feet, of Dungeness River near Sequim, Wash., for the years ending September 30, 1923 and 1924

Day	June	July	Aug.	Sept.	Day	June	July	Aug.	Sept.
1923					1923				
1		880	308	247	16	521	587	330	158
2		780	292	247	17	542	570	384	158
3		743	276	234	18	570	522	371	158
4	750	707	276	221	19	570	474	357	364
5		670	276	215	20	570	452	344	570
6		670	276	210	21	570	429	507	384
7		670	276	204	22	570	414	670	198
8	1,130	670	276	198	23	570	399	620	188
9	1,020	670	276	191	24	570	384	570	177
10	910	670	276	184	25	570	384	483	168
11	845	670	284	177	26	670	384	395	158
12	780	653	292	171	27	825	384	308	158
13	725	637	287	164	28	980	384	278	158
14	670	620	281	158	29	980	384	247	158
15	596	603	276	158	30	980	359	247	152
					31		333	247	

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923-24												
1	147	141	177	158	2,150	387	156	298	455	438	205	131
2	141	221	168	158	1,280	356	156	312	534	420	205	154
3	141	177	168	158	955	326	165	326	556	420	205	154
4	141	141	158	168	1,030	341	156	298	556	420	205	162
5	141	141	247	188	1,280	326	156	285	534	387	205	171
6	141	141	2,080	198	885	272	148	272	474	356	205	162
7	141	141	840	221	760	272	165	260	404	326	195	154
8	141	133	521	210	655	260	195	248	404	285	195	154
9	141	125	384	210	532	248	216	298	404	298	205	138
10	141	125	308	308	510	260	226	455	438	298	205	131
11	141	125	474	247	2,970	248	260	534	404	285	195	125
12	141	125	406	221	5,140	237	248	578	387	272	205	131
13	141	125	364	221	2,740	226	260	790	372	272	195	145
14	170	188	344	221	1,760	226	272	760	372	298	195	138
15	198	150	308	234	920	205	226	730	372	285	171	125
16	344	141	384	221	790	205	216	702	372	260	171	119
17	271	141	344	198	675	205	216	675	356	248	162	113
18	198	133	344	198	625	205	237	625	356	248	171	107
19	237	133	546	198	556	205	226	602	341	248	162	107
20	276	133	452	198	455	216	216	602	326	248	145	102
21	258	133	384	198	387	205	205	625	326	248	145	90
22	239	133	344	188	372	195	205	602	326	237	145	349
23	221	198	326	188	326	185	195	578	326	237	145	413
24	199	452	308	177	356	185	185	578	326	260	154	291
25	177	276	308	177	438	185	185	556	326	272	162	241
26	165	210	276	210	420	175	185	493	326	248	171	199
27	153	210	247	198	404	195	216	455	312	272	180	180
28	141	198	276	198	438	175	260	420	312	260	162	180
29	141	198	234	384	404	175	248	387	326	248	145	180
30	141	188	221	546	-------	165	298	420	387	226	131	171
31	141	-------	198	4,820	-------	165	-------	438	-------	216	119	-------

NOTE.—Stage-discharge relation not defined June 1–7, 1923; gage not read June 9, 11, 13, 15, 17, 19, 21 23, 24, 27, 29, July 1, 3, 4, 6, 7, 9, 10, 12, 13, 15, 16, 18, 20, 22, 23, 25, 26, 28, 30, 31, Aug. 2, 4, 5, 7, 9, 11, 13, 14, 16, 18, 19, 21, 23, 25, 26, 28, 30, Sept. 1, 3, 5–7, 9, 10, 12, 13, 15, 17, 19, 21, 23, 25, 27, 28, 30, Oct. 1, 3, 5, 7, 8, 10–12, 14, 17, 19, 21, 22, 24, 26, 27, 29, 31, and Nov. 5, 6, 8, and 10, 1923. Discharge June 1–7, 1923, estimated by comparison with records of Elwha River at McDonald Bridge; for other dates mentioned, discharge interpolated. Braced figures show mean discharge for period indicated.

Monthly discharge of Dungeness River near Sequim, Wash., for the years ending September 30, 1923 and 1924

[Drainage area, 150 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
1923						
June			733	4.89	5.46	43,600
July			553	3.69	4.25	34,000
August			341	2.27	2.62	21,00
September			210	1.40	1	12,50
The period						111,000
1923-24						
October	344	141	178	1.19	1.37	10,900
November	452	125	169	1.13	1.26	10,100
December	2,080	158	392	2.61	3.01	24,100
January	4,820	158	368	2.45	2.82	22,600
February	5,140	326	1,040	6.93	7.47	59,800
March	387	165	233	1.55	1.79	14,300
April	298	148	210	1.40	1.56	12,500
May	790	248	490	3.27	3.77	30,100
June	556	312	390	2.60	2.90	23,200
July	438	216	291	1.94	2.24	17,900
August	205	119	176	1.17	1.35	10,800
September	413	90	167	1.11	1.24	9,940
The year	5,140	90	340	2.27	30.78	246,000

PUGET SOUND BASINS

DOSEWALLIPS RIVER BASIN

DOSEWALLIPS RIVER AT BRINNON, WASH.

LOCATION.—In sec. 2, T. 25 N.,[1] R. 2 W., at old highway bridge, half a mile above mouth, at Brinnon, Jefferson County.

DRAINAGE AREA.—130 square miles (measured on Olympic National Forest map, edition of 1923).

RECORDS AVAILABLE.—October 30, 1910, to October 31, 1911; July 14 to September 30, 1924.

GAGE.—Vertical staff on left bank 15 feet downstream from old highway bridge; read by B. L. Snyder. Gage used prior to resumption of records in 1924 was a vertical staff on right bank, immediately below highway bridge, and at different datum.

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

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders; two or more channels at extreme high stage. Low-water control is riffle formed by gravel and small boulders; will shift easily. High-water control not defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded July 14 to September 30, 1924, 2.1 feet on September 23 (discharge, 830 second-feet); minimum stage recorded, 0.70 foot September 20 (discharge, 88 second-feet).

1910–1911; 1924: Maximum stage recorded, 6.2 feet November 20, 1910 (discharge, 4,920 second-feet); minimum stage recorded September 20, 1924.

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

DIVERSIONS.—None.

REGULATION.—A flash dam about 4 miles above used occasionally during low water periods in the interest of the logging industry.

[1] Erroneously described in Water-Supply Paper 312 as sec. 3, T. 23 N.

ACCURACY.—Stage-discharge relation changed because of logging operation August 10–16. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used August 10–16. Records fair.

Discharge measurements of Dosewallips River at Brinnon, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
July 15	1.35	269	Sept. 8	0.90	141	Sept. 17	0.79	112
21	1.19	204	16	.74	98.5			

Daily discharge, in second-feet, of Dosewallips River at Brinnon, Wash., for the year ending September 30, 1924

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1	-------	207	130	11	-------	198	124	21	211	161	277
2	-------	204	141	12	-------	211	135	22	219	158	715
3	-------	204	141	13	-------	194	124	23	223	168	830
4	-------	204	135	14	272	203	141	24	242	161	860
5	-------	200	161	15	268	204	124	25	255	168	349
6	-------	179	161	16	238	164	103	26	272	168	175
7	-------	182	130	17	234	168	113	27	268	175	141
8	-------	186	144	18	226	183	103	28	250	175	141
9	-------	186	130	19	219	241	103	29	238	155	141
10	-------	202	130	20	234	161	88	30	219	141	161
								31	223	135	-------

Monthly discharge of Dosewallips River at Brinnon, Wash., for the year ending September 30, 1924

[Drainage area, 130 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
July 14–31	272	211	240	1.85	1.24	8,570
August	241	135	182	1.40	1.61	11,200
September	830	88	195	1.50	1.67	11,600
The period	----------	----------	----------	----------	----------	31,400

SKOKOMISH RIVER BASIN

NORTH FORK OF SKOKOMISH RIVER BELOW STAIRCASE RAPIDS, NEAR HOODSPORT, WASH.

LOCATION.—In SW. ¼ sec. 3, T. 23 N., R. 5 W., 300 feet below Staircase Rapids, 2 miles above Dry Creek, and 10½ miles northwest of Hoodsport, Mason County.

DRAINAGE AREA.—60 square miles (measured on city of Tacoma's map of Cushman power project).

RECORDS AVAILABLE.—July 30 to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank, inspected by employees of Cushman power project.

CHANNEL AND CONTROL.—Bed composed of gravel; control is well-defined riffle in gravel and angular boulders; will shift only during high stages. Gage height of zero flow, September 12, 1924, 0.2 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage during period of record, 6.71 feet, some time September 22 (discharge, 4,100 second-feet); minimum flow probably occurred during the period September 15–20, when water-stage recorder was not operating; stage and discharge not determined.

ICE.—No ice during the period of record.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; rating curve 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 from recorder graph by inspection. Records good.

Discharge measurements of North Fork of Skokomish River below Staircase Rapids, near Hoodsport, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Aug. 12	Bullard and Clements	1.48	59.2
Sept. 12	Parker and Shinkle	1.30	34.6
25	Bullard and Clements	2.91	472

Daily discharge, in second-feet, of North Fork of Skokomish River below Staircase Rapids, near Hoodsport, Wash., for the year ending September 30, 1924

Day	July	Aug.	Sept.	Day	July	Aug.	Sept.	Day	July	Aug.	Sept.
1		76	43	11		59	36	21		62	
2		74	43	12		59	36	22		59	600
3		76	43	13		60	37	23		58	
4		72	45	14		60	37	24		58	
5		67	45	15		59	39	25		55	561
6		67	42	16		59		26		53	377
7		67	40	17		70		27		50	302
8		64	39	18		128	600	28		48	260
9		59	37	19		92		29		45	225
10		59	37	20		70		30	79	43	748
								31	79	43	

NOTE.—Water-stage recorder not operating Aug. 25–28 and Sept. 16–24; discharge Aug. 25–28 ascertained by interpolation. Braced figures, which were estimated from recorded range of stage and from records of South Fork near Potlatch and North Fork near Hoodsport, show mean discharge for period indicated.

Monthly discharge of North Fork of Skokomish River below Staircase Rapids, near Hoodsport, Wash., for the year ending September 30, 1924

[Drainage area, 60 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
August	128	43	63.6	1.06	1.22	3,910
September			122	2.03	2.26	7,260

NORTH FORK OF SKOKOMISH RIVER NEAR HOODSPORT, WASH.

LOCATION.—In NE. ¼ sec. 8, T. 22 N., R. 4 W., 1 mile below Cushman reservoir dam site, 3½ miles west of Hoodsport, Mason County, and 5 miles below Lake Cushman.

DRAINAGE AREA.—92 square miles[2] (measured on Pl. I, U. S. Geol. Survey Prof. Paper 7, and township plats).

RECORDS AVAILABLE.—October 1, 1923, to September 30, 1924, at present site; August 17, 1910, to September 22, 1911; February 1, 1913, to September 30, 1923, at Forest Service trail bridge, 1 mile above.

GAGE.—Stevens water-stage recorder on left bank; inspected by I. B. Shinkle. Fragmentary records 1910–11 obtained from vertical staff about 300 feet above Cushman reservoir dam site, a mile above present gage; February 1, 1913, to September 30, 1923, Stevens water-stage recorder on left bank at practically same site as previous gage and at different datum from present.

DISCHARGE MEASUREMENTS.—Made from cable 1,200 feet above gage or by wading.

CHANNEL AND CONTROL.—Channel curved above gage, straight below gage for 200 feet. Banks high, not subject to overflow. Control composed of boulders and gravel, slightly shifting at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 19.0 feet at 3.30 p. m. January 31 (discharge, 12,400 second-feet); minimum stage, 1.05 feet at 11.45 a. m. September 5 (discharge, 72 second-feet).

1913–1924: Maximum stage estimated at 23.5 feet January 6, 1914, during part of day when recorder was not operating (discharge estimated at 14,000 second-feet); minimum stage recorded on September 5, 1924.

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

DIVERSIONS.—None.

REGULATIONS.—Flow regulated by natural storage at Lake Cushman and very slightly during June to September, 1924, as a result of work in connection with dam construction above.

ACCURACY.—Stage-discharge relation changed frequently as a result of sluicing operations and other work at Cushman dam site. Rating curves fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating tables mean daily gage height determined from recorder graph by inspection, or for days when variation in stage was considerable, by averaging results obtained by applying mean gage heights for shorter intervals. Shifting-control method used February 6–7 and September 24–26. Records good.

Discharge measurements of North Fork of Skokomish River near Hoodsport, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Sept. 26	R. B. Kilgore	2.93	307	Feb. 8	R. B. Kilgore	7.08	1,620
Oct. 12	do	1.76	133	14	Dautoff and Chapman	8.06	2,340
Dec. 4	Gatewood and Smith	4.28	564	July 11	R. B. Kilgore	1.94	157
7	do	8.79	2,600	22	do	1.74	139
Feb. 1	Gatewood and Dautoff	12.21	5,540	Sept. 2	G. L. Parker	1.26	91.6
2	Dautoff and Gatewood	9.39	3,240	13	Parker and Johnson	1.20	83.6
2	Gatewood and Dautoff	8.93	2,960	23	R. F. Bullard and others	8.80	2,800
3	J. S. Gatewood	7.99	2,290	26	Bullard and Koerner	4.84	787
4	Gatewood and Foster	7.93	2,230				

[2] 91 square miles at former location at dam site.

Daily discharge, in second-feet, of North Fork of Skokomish River near Hoodsport, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	154	143	432	562	6,570	1,140	276	352	408	204	122	95
2	143	234	385	507	3,280	1,020	276	363	420	204	120	92
3	143	234	363	456	2,230	915	276	374	432	204	120	90
4	143	190	531	432	2,530	846	267	363	420	204	119	91
5	143	165	846	408	3,460	780	258	342	385	197	116	89
6	165	154	3,200	432	2,290	731	267	322	352	184	112	92
7	190	143	2,650	507	2,230	683	276	312	332	177	110	92
8	165	143	1,430	562	1,680	652	312	322	322	161	110	90
9	154	133	1,060	534	1,380	621	332	385	312	160	110	90
10	143	133	1,020	1,090	1,220	576	352	520	312	160	110	89
11	133	133	1,510	1,100	4,840	548	352	606	322	160	111	88
12	133	199	1,430	846	7,730	520	352	690	312	160	112	87
13	128	456	1,140	683	3,610	507	342	796	294	160	110	85
14	128	534	1,180	591	2,350	494	332	764	285	154	113	84
15	165	456	1,890	534	1,930	468	303	636	267	160	111	85
16	840	363	1,830	481	1,680	444	294	591	258	160	110	85
17	1,260	285	1,930	481	1,630	432	294	591	250	160	115	83
18	780	250	2,530	432	1,430	408	432	591	267	154	138	83
19	534	234	1,830	408	1,300	408	420	576	258	148	154	79
20	408	234	1,340	363	1,220	408	363	548	242	143	148	80
21	363	219	1,100	363	1,220	385	322	562	234	143	133	103
22	303	219	950	342	1,180	363	303	591	234	138	125	1,730
23	250	370	880	363	1,100	352	285	576	226	133	117	3,250
24	219	1,750	846	342	1,020	342	276	562	219	133	110	2,030
25	190	1,420	915	322	1,140	322	267	507	212	133	108	1,260
26	177	1,020	880	408	1,340	312	267	444	212	133	107	798
27	165	747	780	715	1,300	303	276	396	212	138	105	576
28	154	652	780	1,180	1,530	303	312	374	204	133	103	456
29	154	591	780	2,930	1,340	303	332	363	197	133	100	374
30	143	507	715	4,740	-------	285	352	363	197	125	98	500
31	133	-------	621	10,300	-------	285	-------	374	-------	124	97	-------

Monthly discharge of North Fork of Skokomish River near Hoodsport, Wash., for the year ending September 30, 1924

[Drainage area, 92 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,260	128	268	2.91	3.36	16,500
November	1,750	133	410	4.46	4.98	24,400
December	3,200	363	1,220	13.3	15.33	75,000
January	10,300	322	1,080	11.7	13.49	66,400
February	7,730	1,020	2,270	24.7	26.64	131,000
March	1,140	285	521	5.66	6.52	32,000
April	432	258	312	3.39	3.78	18,600
May	796	312	489	5.32	6.13	30,100
June	432	197	287	3.12	3.48	17,100
July	204	124	157	1.71	1.97	9,650
August	154	97	115	1.25	1.44	7,070
September	3,250	79	428	4.65	5.19	25,500
The year	10,300	79	623	6.77	92.31	453,000

65904—26—WSP 592——3

SOUTH FORK OF SKOKOMISH RIVER NEAR POTLATCH, WASH.

LOCATION.—In NW. ¼ sec. 22, T. 22 N., R. 5 W., at head of canyon, 2 miles below Brown Creek and 7½ miles west of Potlatch, Mason County.

DRAINAGE AREA.—68 square miles (measured on map of Skokomish River watershed of city of Tacoma's Cushman power project, scale 1 inch=1 mile).

RECORDS AVAILABLE.—October 1, 1923, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank, about 300 feet below head of canyon; inspected by employees of city of Tacoma.

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

CHANNEL AND CONTROL.—Channel winding; bed composed of light gravel to heavy boulders. Banks high and not subject to overflow. Control varies with stage; for low water it is of light gravel, shifting; for medium and high stages, heavy boulder riffles, shifting at high stages only.

EXTREMES OF DISCHARGE.—Maximum stage, 14.86 feet, some time January 31 (discharge from extension of rating curve, 9,950 second-feet); minimum stage, 1.92 feet from 6 p. m. September 19 to midnight September 20 (discharge, 44 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water January 31, due to excavation for intake pipe July 12 and August 5, and at medium high water September 22–23; rating curve used directly until January 31, and as standard form thereafter, fairly well defined. Operation of water-stage recorder fairly 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 and corrected in accordance with results of discharge measurements; or for days of considerable variation in stage, by averaging results obtained by applying to rating table mean gage heights for shorter intervals. Records fair.

Discharge measurements of South Fork of Skokomish River near Potlatch, Wash., during the period August 30, 1923, to September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
1923		*Feet*	*Sec.-ft.*	1924		*Feet*	*Sec.-ft.*
Aug. 30	Calkins and Shinkle	1.88	71.3	May 13	Bullard and Clements	2.36	234
30	Shinkle and Calkins	1.88	71.7	July 12	R. B. Kilgore	2.00	75.8
Nov. 8	Shinkle and Dickenson	2.24	132	Sept. 3	Parker and Shinkle	2.00	53.1
Dec. 5	Shinkle and Gatewood	4.22	824	24	R. F. Bullard and others	5.33	1,280
6	do	9.76	4,440				

Daily discharge, in second-feet, of South Fork of Skokomish River near Potlatch, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		123	357	416	3,260		243	207	116	79		51
2		129	341	373	2,100		243	207	116	78	60	51
3		188	351	341	1,800		240	204	112	78		53
4		168	899	316	2,400	700	231	210	108	77		53
5		131	877	301	2,710		234	188	104	76	53	53
6		142	3,150	347	1,920		245	186	101	76	55	51
7	75	140	1,800	475	1,920	530	251	186	99	75	55	50
8		136	1,100	493	1,560	511	254	183	96	74	56	50
9		131	806	512	1,290	493	245	199	94	73	56	49
10		125	975	1,560	1,230	475	245	210	92	72	57	49
11		127	1,500	901	5,600	440	243	229	103	72	56	48
12		268	1,080	650		430	231	240	104	71	56	47
13		399	926	548		413	220	245	101		56	47
14	73	373	1,310	475		399	212	218	96		56	47
15	120	298	2,240	416		390	196	193	94		57	47
16	1,190	248	1,500	386	2,000	370	193	188	92		57	47
17	853	215	1,560	376		360	226	183	98	70	69	46
18	458	193	1,860	332		347	530	183	121		121	46
19	316	210	1,180	310		344	354	173	106		94	45
20	260	193	901	292		338	292	165	98		77	44
21	231	191	738	277		322	271	163	96		69	121
22	183	196	671	277		310	248	165	96		65	2,420
23	156	896	628	289		298	240	158	96		65	2,120
24	151	1,800	587	280		289	229	151	92		62	1,350
25	138	1,120	760	271	1,000	274	218	142	89		60	783
26	133	830	650	396		266	212	136	84	60	59	440
27	138	628	568	608		260	207	127	83		57	310
28	125	530	693	1,180		263	215	119	83		56	223
29	119	458	715	2,800		260	215	117	82		55	178
30	116	396	568	3,080	-------	245	218	117	80		54	584
31	119	-------	475	7,150	-------	243	-------	116	-------		53	-------

NOTE.—Water-stage recorder not operating satisfactorily Oct. 1–13, Feb. 12–29, Mar. 1–6; intake clogged July 1–11, 13–31, and Aug. 1–4. Discharge July 1–11 estimated by interpolation; discharge for the other periods estimated by comparison with records of North Fork near Hoodsport. Braced figures show mean discharge for periods indicated.

Monthly discharge of South Fork of Skokomish River near Potlatch, Wash., for the year ending September 30, 1924

[Drainage area, 68 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,190	----------	189	2.78	3.20	11,600
November	1,800	123	366	5.38	6.00	21,800
December	3,150	341	1,020	15.0	17.29	62,700
January	7,150	271	853	12.5	14.41	52,400
February	----------	----------	1,820	26.8	28.90	105,000
March	----------	243	422	6.21	7.16	25,900
April	530	193	247	3.63	4.05	14,700
May	245	116	178	2.62	3.02	10,900
June	121	80	97.7	1.44	1.61	5,810
July	----------	----------	68.7	1.01	1.16	4,220
August	121	----------	62.1	.913	1.05	3,820
September	2,420	44	317	4.66	5.20	18,900
The year	7,150	44	465	6.84	93.05	338,000

NISQUALLY RIVER BASIN

NISQUALLY RIVER NEAR LA GRANDE, WASH.

LOCATION.—In sec. 9, T. 15 N., R. 4 E., 1,200 feet below diversion dam of city of Tacoma's municipal power plant and 2½ miles southeast of La Grande, Pierce County.

DRAINAGE AREA.—287 square miles (measured on topographic map of Rainier National Park, map of Rainier National Forest, edition of 1918, and Pl. IV, Water-Supply Paper 313).

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1924. September 5, 1906, to October 31, 1911, fragmentary records showing total flow.

GAGE.—Stevens long-distance recorder on left bank 1,200 feet below dam; also vertical staff on left bank at head of low-water control for use during periods of low water when silt interferes with normal stage-discharge relation. Recorder inspected and gage read by head-gate attendants.

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

CHANNEL AND CONTROL.—Bed composed of bedrock and boulders. Banks high. A considerable amount of glacial silt is deposited during summer, causing control to change temporarily.

EXTREMES OF DISCHARGE.—Maximum stage during year, 12.7 feet at noon on February 12 (discharge, 12,400 second-feet). Possibly no flow at gage for parts of several days during October and November, when entire flow may have been diverted into power conduit.

1920–1924: Maximum stage, 15.6 feet from 3.30 to 6 a. m. December 12, 1921 (discharge, 19,200 second-feet). Possibly no flow at gage for parts of days when entire flow is diverted into power conduit.

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

DIVERSION.—City of Tacoma diverts water 1,200 feet above gage for power purposes. (See pp. 33–35 for records of this division.) Total monthly discharge is computed from determinations of combined flow of river and power conduit.

ACCURACY.—Stage-discharge relation changed by high water February 12; affected by silt washed from settling basin and behind dam as indicated in footnote to table of daily discharge. Rating curves for normal-control conditions well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator except for extreme high water when discharge was determined by applying mean daily gage height to rating table or, for days of considerable variation in gage height, by averaging results obtained by applying mean gage height for shorter intervals. Records good except for low water when amount of backwater effect is doubtful.

Discharge measurements of Nisqually River near La Grande, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 13	J. S. Gatewood	9.40	5,830	July 8	R. B. Kilgore	• 1.11	51.5
14	do	7.58	3,400	9	do	• 1.76	150
22	H. R. Lanning	4.15	751	Sept. 30	do	• .38	5.4

• Auxiliary staff gage.

Daily discharge, in second-feet, of Nisqually River near La Grande, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1			215	588	7,340	840	90	376	682	496		
2			209	460	4,560	838	100	522	749	664		
3			131	383	3,180	592	184	530	828	610		
4			140	270	3,420	490		527	914	618		
5	6	5	262	192	4,550	398		396	615	590	10	120
6			6,580	261	3,420	370	120	277	531	504		
7			3,820	220	2,540	336		261	480	102		
8			2,040	316	1,920	275	225	356	368	70		
9			1,400	234	1,480	346	230	505	340	88		
10			914	1,710	1,320	184	259	780	329	106	150	
11	3	2	779	1,780	2,300	151	344	1,060	327	70	82	
12			583	1,240	9,700	106	332	1,400	374	70	67	
13			440	965	6,300	95	459	1,530	325	270	64	
14			638	662	3,540	112	256	1,110	250	147		5
15			785	646	2,460	129	201	945	348	87		
16	841		746	517	1,850	142	198	858	149			
17	2,390		629	468	1,880		188	754	121			
18	992		746	357	1,480		511	938	154		10	
19	471	3	652	305	1,170		492	642	100	50		
20	326		496	300	1,010	40	489	597	41			
21	382		419	234	974		319	651	43			
22	190		472	235	884		291	638	198	161		
23		432	528	386	871	116	232	537	106	178		
24		2,590	513	348	900		171	636	127	256		
25		1,760	1,060	252	773		192	610	232	298		
26	10	977	811	286	956		198	474	230	292	35	7
27		610	688	378	900	50	458	358	122	309		
28		637	1,620	666	1,240		589	378	131	151		
29		622	2,340	1,440	1,030		331	354	280			
30		368	1,470	2,540	------		412	424	320	30		
31		------	952	7,710	------		------	488	------			------

NOTE.—Braced figures show mean discharge for periods indicated when stage-discharge relation was affected by deposition of silt. Except for March and April, flow for these periods estimated from gage height graph constructed from gage-height records at regular and auxiliary gages and from notes of visiting engineers and of power-plant attendants. Discharge Mar. 11 and 13, determined from interpolation of combined flow of river and Tacoma power conduit, and Mar. 17–22, 24–31, and Apr. 1, 2, and 4–7 by comparison of combined flow with records of Puyallup River at Alderton.

Monthly discharge of Nisqually River and Tacoma power conduit near La Grande, Wash., for the year ending September 30, 1924

[Drainage area, 287 square miles]

Month	Discharge in second-feet						Combined run-off	
	Maximum (combined)	Minimum (combined)	Mean		Combined		Inches	Acre-feet
			River	Power conduit	Mean	Per square mile		
October	2,840	------	186	416	602	2.10	2.42	37,000
November	3,050	------	269	385	654	2.28	2.54	38,900
December	7,210	755	1,070	596	1,670	5.82	6.71	103,000
January	8,320	823	850	620	1,470	5.12	5.90	90,400
February	10,300	1,380	2,550	604	3,150	11.0	11.86	181,000
March	1,470	------	199	535	734	2.56	2.95	45,100
April	1,140	544	274	549	823	2.87	3.20	49,000
May	2,050	700	641	480	1,120	3.90	4.50	68,900
June	1,250	503	327	425	752	2.62	2.92	44,700
July	1,120	------	211	480	691	2.41	2.78	42,500
August	------	------	27.7	537	565	1.97	2.27	34,700
September	------	------	40.2	405	445	1.55	1.73	26,500
The year	10,300	------	546	503	1,050	3.66	49.78	762,000

NOTE.—Combined results are comparable with results previously published for Nisqually River below Little Nisqually River near La Grande, Wash.; also for Nisqually River near and at La Grande, Wash.

LITTLE NISQUALLY RIVER NEAR ALDER, WASH.

LOCATION.—In NW. ¼ sec. 16, T. 15 N., R. 4 E., in Thurston County, 1,500 feet above mouth, 3,000 feet from diversion dam of city of Tacoma's power plant, and 1½ miles southwest of Alder, Pierce County.

DRAINAGE AREA.—28.5 square miles (measured on Forest Service map).

RECORDS AVAILABLE.—August 1, 1920, to September 30, 1924.

GAGE.—Stevens water-stage recorder on left bank; installed April 16, 1921; inspected by employees of city of Tacoma.

DISCHARGE MEASUREMENTS.—Made by wading or from cable.

CHANNEL AND CONTROL.—One channel at all stages. Banks high; not subject to overflow. Control is riffle in heavy boulders 100 feet below gage. At extremely high stage, gage is in riffle.

EXTREMES OF DISCHARGE.—Maximum stage during year, 5.69 feet at 11 a. m. December 6 (discharge, 1,800 second-feet); minimum stage 0.87 foot on September 3 (discharge, 5.2 second-feet).

1920–1924: Maximum stage, 6.4 feet at 3 p. m. January 7, 1923 (discharge, 2,220 second-feet); minimum discharge occurred in 1924.

ICE.—Stage-discharge relation affected by ice during severe winters. Flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined below 1,500 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Discharge ascertained by applying to rating table mean daily gage height obtained from recorder graph by inspection. Records excellent.

Discharge measurements of Little Nisqually River near Alder, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 12	J. S. Gatewood	4.79	1,310	Feb. 28	H. R. Lanning	2.14	191
13	do	3.33	586	July 9	R. B. Kilgore	.94	7.75

Daily discharge, in second-feet, of Little Nisqually River near Alder, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	12	22	62	155	906	130	36	44	14	8.9	6.8	5.5
2	11	29	56	132	580	113	45	44	14	7.6	7.2	5.5
3	12	23	50	108	411	98	56	44	12	7.2	7.1	5.2
4	14	22	59	85	445	87	53	45	12	7.2	7.1	5.5
5	14	21	84	77	540	80	52	44	11	7.6	7.0	5.5
6	22	19	1,160	74	393	75	53	39	11	7.6	6.9	5.8
7	22	18	640	78	346	70	60	36	12	8.0	6.9	5.8
8	16	17	339	92	269	68	69	35	11	7.6	6.8	5.8
9	14	17	221	90	210	66	68	34	11	7.6	7.2	5.8
10	12	18	160	323	182	60	68	34	11	7.2	7.2	5.8
11	11	18	139	311	365	57	69	35	9.6	6.8	7.2	5.8
12	10	17	117	218	1,200	54	66	34	9.6	6.8	7.2	5.8
13	10	16	105	165	682	53	60	34	9.6	6.8	7.2	5.8
14	11	17	172	132	393	47	57	33	9.6	6.8	7.2	5.8
15	21	15	208	109	269	45	50	30	9.6	7.6	7.6	5.8
16	403	15	182	94	210	42	46	26	9.6	8.0	8.0	5.8
17	556	15	165	87	235	40	49	24	9.6	7.6	7.2	5.8
18	257	14	169	75	216	36	103	22	15	7.6	8.8	5.5
19	146	14	148	66	177	35	103	22	12	7.6	11	5.5
20	96	14	119	60	148	36	84	21	11	8.0	8.4	5.5
21	75	14	100	59	146	34	72	20	10	7.6	7.2	5.5
22	60	15	89	59	139	34	66	18	10	6.8	6.8	5.8
23	49	125	84	62	122	34	59	18	9.6	6.8	6.8	30
24	44	441	82	62	107	32	52	18	9.2	6.8	6.4	26
25	36	275	198	60	109	31	46	18	8.8	6.8	6.4	29
26	33	174	150	70	124	30	46	18	8.8	6.8	6.0	18
27	30	122	128	87	132	32	45	17	8.8	7.2	6.0	14
28	28	100	393	195	177	39	44	17	9.2	7.2	5.8	11
29	25	94	486	388	153	40	44	16	9.2	6.8	5.5	10
30	23	78	290	562	-------	36	47	16	8.8	7.2	5.5	15
31	22	-------	205	1,140	-------	35	-------	15	-------	6.8	5.5	-------

NOTE.—Recorder not operating Jan. 2, 3, Apr. 22–24, and Aug. 3–7. Discharge estimated by interpolation.

Monthly discharge of Little Nisqually River near Alder, Wash., for the year ending September 30, 1924

[Drainage area, 28.5 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	556	10	67.6	2.37	2.73	4,160
November	441	14	60.0	2.11	2.35	3,570
December	1,160	50	212	7.44	8.58	13,000
January	1,140	59	170	5.96	6.87	10,500
February	1,200	107	324	11.4	12.30	18,600
March	130	30	53.8	1.89	2.18	3,310
April	103	36	58.9	2.07	2.31	3,500
May	45	15	28.1	.986	1.14	1,730
June	15	8.8	10.6	.372	.42	631
July	8.0	6.8	7.29	.256	.30	448
August	11	5.5	7.03	.247	.28	432
September	30	5.2	9.25	.325	.36	550
The year	1,200	5.2	83.2	2.92	39.82	60,400

TACOMA POWER CONDUIT NEAR LA GRANDE, WASH.

LOCATION.—In sec. 9, T. 15 N., R. 4 E., in Thurston County, 750 feet below head gate at diversion dam of city of Tacoma's municipal power plant and 2½ miles southeast of La Grande, Pierce County.

RECORDS AVAILABLE.—October 1, 1919, to September 30, 1924.

GAGE.—Stevens long-distance recorder on right side of conduit 750 feet below head gate; inspected by head-gate attendants.

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

CHANNEL AND CONTROL.—Open concrete-lined canal for 50 feet below gage merging into concrete-lined tunnel 1.9 miles in length.

EXTREMES OF DISCHARGE.—Maximum stage during year, 9.65 feet 10.40 a. m. to noon February 18, and from 6.45 to 9 a. m. May 10 (discharge, 791 second-feet); no flow when operating gates are closed or when waste gates are opened wide for cleaning settling basin.

1920–1924: Maximum stage 10.0 feet February 16, 1920, and January 3, 1921 (discharge, 878 second-feet). No flow when operating gates are closed and when waste gates are opened wide.

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

REGULATION.—Flow regulated at headgate to meet requirements of power plant.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined; revised slightly for use after February 24. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator. Records excellent.

Canal diverts water from left bank of Nisqually River in SW. ¼ sec. 9, T. 15 N., R. 4 E. Willamette meridian. Water used for municipal power.

Discharge measurements of Tacoma power conduit near La Grande, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Feb. 14	J. S. Gatewood	9.10	730	July 8	R. B. Kilgore	7.39	537
20	H. R. Lanning	9.25	752	Sept. 30	do	5.60	357

Daily discharge, in second-feet, of Tacoma power conduit near La Grange, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	377	344	633	647	620	630	454	589	268	469	537	380
2	452	482	568	668	620	466	465	532	336	452	556	484
3	488	438	624	658	581	620	466	562	348	454	490	520
4	446	372	632	650	623	616	467	522	333	378	519	510
5	366	388	643	670	614	606	476	543	432	408	475	462
6	421	369	632	562	654	628	481	565	428	368	583	527
7	361	368	644	630	595	628	574	529	339	486	608	504
8	334	358	531	642	644	630	573	484	267	538	594	492
9	268	347	452	646	608	511	583	557	337	556	604	494
10	332	341	586	636	507	635	596	568	404	574	508	378
11	346	330	622	644	622	626	596	516	408	572	604	433
12	327	309	646	639	600	629	586	512	402	588	620	530
13	330	295	622	576	598	607	450	524	418	385	606	554
14	326	328	622	626	603	556	618	542	417	574	618	520
15	424	312	584	570	621	549	611	483	302	574	590	580
16	457	293	566	592	634	488	602	568	484	434	613	575
17	455	299	616	622	493	578	607	534	540	380	408	479
18	544	274	614	608	612	542	598	337	522	391	584	296
19	516	289	630	600	638	542	597	440	490	448	582	248
20	494	264	644	564	614	527	494	490	462	434	402	210
21	370	298	628	595	630	447	598	492	498	446	379	200
22	538	286	610	637	604	456	590	507	408	430	438	219
23	528	419	564	630	571	397	596	493	502	420	496	366
24	499	458	618	622	529	465	600	462	506	412	512	376
25	480	433	520	632	604	464	586	396	526	420	612	354
26	446	551	481	610	616	454	518	352	507	512	621	276
27	476	566	472	550	626	448	378	408	505	490	606	246
28	392	557	620	630	608	482	547	342	460	558	586	278
29	400	556	636	620	625	474	628	346	418	574	506	314
30	369	617	585	618		416	579	352	477	573	425	346
31	348		643	612		454		338		586	356	

NOTE.—Faulty gage height record for very few days completed from record of gate openings and used for determination of flow.

Monthly discharge of Tacoma power conduit near La Grange, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	544	268	416	25,600
November	617	264	385	22,900
December	646	452	596	36,600
January	670	550	620	38,100
February	654	498	604	34,700
March	635	397	535	32,900
April	628	378	549	32,700
May	589	337	480	29,500
June	540	267	425	25,300
July	588	368	480	29,500
August	621	356	537	33,000
September	580	200	405	24,100
The year	670	200	503	365,000

PUYALLUP RIVER BASIN

PUYALLUP RIVER NEAR ELECTRON, WASH.

LOCATION.—In NE. ¼ NW. ¼ sec. 3, T. 16 N., R. 6 E., 1,000 feet above intake of Puget Sound Power & Light Co.'s flume, a quarter of a mile below Mowich River, and 10 miles southeast of Electron, Pierce County.

DRAINAGE AREA.—91 square miles (measured on Pl. IV., Water-Supply Paper 313).

RECORDS AVAILABLE.—January 1, 1909, to September 30, 1924.

GAGE.—Friez water-stage recorder on left bank at gaging bridge 1,000 feet above intake; inspected by William Chambers. Datum lowered 1.00 foot March 9, 1918.

DISCHARGE MEASUREMENTS.—Made from gaging bridge at gage.

CHANNEL AND CONTROL.—Channel straight for 150 feet above and below gage. Banks high and wooded. One channel at all stages. Bed composed of boulders and glacial débris; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year, 5.38 feet at 5.30 p. m. January 31 (discharge, 3,350 second-feet); minimum stage 1.02 feet at noon September 20 (discharge, 151 second-feet).

1909–1924: Maximum stage estimated from incomplete gage-height record, 6.4 feet at noon December 18, 1917 (discharge, 4,800 second-feet); minimum discharge estimated 100 second-feet on December 12, 1922, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation slightly affected by ice except during mild winters. Flow estimated from observers' notes and weather records.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed frequently prior to February 10; was practically permanent thereafter; not affected by ice. Rating curve developed in 1923 and well defined below 1,500 second-feet used to February 10 as standard form of curve for this station. The curve developed and used directly since February 11 is fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage height for shorter intervals. Shifting-control method used October 1 to February 10. Records excellent.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co.

65904—26—WSP 592——4

Discharge measurements of Puyallup River near Electron, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 7	William Chambers	1.52	263	Apr. 4	William Chambers	1.14	186
22	do	2.07	471	21	Chambers and Barber	1.48	268
Nov. 4	do	1.44	216	May 8	William Chambers	1.67	335
20	do	1.24	161	15	do	2.62	815
Dec. 2	do	1.75	300	June 5	do	2.08	528
12	do	1.90	350	24	do	1.77	385
Jan. 14	do	1.92	367	July 17	do	1.68	327
20	do	1.61	261	26	do	2.55	792
Feb. 16	do	2.17	587	Aug. 12	do	2.01	516
21	do	1.84	400	22	do	1.69	347
Mar. 14	do	1.30	233	Sept. 1	do	1.54	292
20	do	1.15	192	22	do	1.11	172

Daily discharge, in second-feet, of Puyallup River near Electron, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	302	212	320	331	1,650	382	169	374	693	961	475	404
2	338	324	305	317	928	358	206	435	826	1,100	496	513
3	334	242	287	299	699	332	206	408	768	984	518	552
4	308	222	299	281	1,150	304	185	378	713	796	470	618
5	278	214	296	296	1,350	279	182	343	570	636	490	686
6	317	209	1,230	331	883	279	212	318	485	470	552	612
7	261	204	805	355	639	261	279	308	408	435	570	570
8	237	199	520	345	498	252	279	370	395	485	540	612
9	248	195	394	361	434	249	276	524	422	582	648	354
10	248	185	341	950	390	237	298	673	450	552	673	288
11	229	176	383	639	812	223	314	999	440	502	654	354
12	229	174	355	482	2,100	215	304	1,320	540	564	673	435
13	232	174	344	414	1,340	220	301	1,280	460	552	618	450
14	250	202	344	369	946	223	285	1,050	413	570	630	426
15	324	183	410	376	740	209	261	1,010	399	445	570	502
16	817	176	394	331	588	202	264	900	399	339	496	404
17	1,180	167	402	314	546	195	282	796	426	358	417	328
18	571	158	422	293	465	187	417	761	422	390	618	246
19	470	174	366	273	422	187	339	754	354	485	558	177
20	474	164	330	264	404	187	301	761	354	450	395	160
21	525	160	305	270	404	177	285	789	399	435	395	158
22	486	167	299	296	378	174	279	768	422	470	460	201
23	383	448	352	383	346	169	261	706	413	513	518	382
24	334	898	355	366	343	164	243	719	408	612	552	261
25	308	520	410	327	378	162	238	582	496	761	648	252
26	290	422	344	331	374	162	243	465	460	976	693	190
27	273	352	327	341	435	177	261	413	422	796	630	187
28	258	502	702	380	507	187	292	390	445	600	540	235
29	239	454	588	615	426	167	332	413	529	540	422	288
30	229	380	454	931	------	167	374	465	673	513	358	370
31	214	------	383	2,100	------	169	------	564	------	502	343	------

Monthly discharge of Puyallup River near Electron, Wash., for the year ending September 30, 1924

[Drainage area, 91 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,180	214	361	3.97	4.58	22,200
November	898	158	275	3.02	3.37	16,400
December	1,230	287	421	4.63	5.34	25,900
January	2,100	264	450	4.95	5.71	27,700
February	2,100	343	709	7.79	8.40	40,800
March	382	162	221	2.43	2.80	13,600
April	417	169	272	2.99	3.34	16,200
May	1,320	308	646	7.10	8.19	39,700
June	826	354	487	5.35	5.97	29,000
July	1,100	339	593	6.52	7.52	36,500
August	693	343	536	5.89	6.79	33,000
September	686	158	373	4.10	4.57	22,200
The year	2,100	158	445	4.89	66.58	223,000

PUYALLUP RIVER AT ALDERTON, WASH.

LOCATION.—On line between sec. 25, T. 20 N., R. 4 E., and sec. 30, T. 20 N., R. 5 E., at highway bridge 1 mile north of Alderton, Pierce County, and 1½ miles above Stuck River.

DRAINAGE AREA.—410 square miles (measured on Pl. IV, Water-Supply Paper 313).

RECORDS AVAILABLE.—November 20, 1914, to September 30, 1924.

GAGE.—Chain gage on highway bridge; installed December 15, 1920; read by Mrs. H. D. Foster.

DISCHARGE MEASUREMENTS.—Made from bridge at gage.

CHANNEL AND CONTROL.—Bed composed of silt and gravel; shifting. Right bank is overflowed at gage height about 9 feet; left bank high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage during year, 6.5 feet February 12 (discharge, 10,200 second-feet); minimum stage recorded, 0.28 foot September 22 (discharge, 228 second-feet).

1915–1924: Maximum stage recorded, 11.5 feet at 11 a. m. December 12, 1921 (discharge, 21,200 second-feet); minimum stage recorded on September 22, 1924.

ICE.—Stage-discharge relation slightly affected by ice for a few days during severe winters.

DIVERSION.—None.

REGULATION.—The operation of the Puget Sound Power & Light Co.'s plant at Electron does not materially affect the natural flow as the pondage utilized is small.

ACCURACY.—Stage-discharge relation changed December 7, January 31 to February 1, and gradually February 14 to June 12. Standard rating curve fairly well defined. Gage read to hundredths once daily. Some diurnal fluctuation. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used February 14 to June 12. Records good.

Discharge measurements of Puyallup River at Alderton, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 15	J. S. Gatewood	0.65	432	Mar. 10	J. S. Gatewood	1.17	941
Jan. 29	do	2.12	1,800	June 13	do	1.39	1,050
Feb. 1	D. J. Calkins	4.10	5,330	Aug. 11	R. B. Kilgore	1.34	954

Daily discharge, in second-feet, of Puyallup River at Alderton, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	428	675	1,370	1,470	5,310	1,580	788	948	1,270	1,270	865	788
2	495	825	990	1,270	4,940	1,370	948	990	1,370	1,580	865	788
3	530	825	1,170	1,270	5,120	1,270	905	1,040	1,470	1,690	865	750
4	565	530	1,270	1,270	5,310	1,270	788	1,170	1,370	1,470	905	788
5	530	530	1,580	1,220	6,670	1,080	712	905	1,270	1,220	825	825
6	565	495	2,040	1,220	3,570	990	788	865	1,040	990	905	865
7	565	495	4,760	1,270	2,550	905	1,040	750	990	825	905	712
8	565	428	4,230	1,270	2,420	865	990	948	825	825	948	712
9	600	395	2,160	1,370	2,040	865	905	1,120	905	948	948	675
10	565	395	1,690	3,570	1,690	948	948	1,370	948	1,040	990	675
11	600	460	1,920	3,570	1,580	825	948	1,690	865	990	990	530
12	600	495	1,370	2,040	10,200	825	948	1,690	990	948	1,040	712
13	565	565	1,800	1,690	5,310	825	1,040	2,420	1,040	990	1,040	788
14	600	565	1,690	1,580	3,730	865	1,040	2,970	1,040	1,120	1,040	788
15	675	495	1,580	1,170	3,260	788	948	2,160	1,040	990	948	788
16	1,040	530	1,580	1,080	2,970	750	1,220	2,040	990	865	948	788
17	3,730	382	990	1,080	2,970	638	1,690	2,040	905	825	825	675
18	2,290	343	1,470	1,080	2,290	638	1,800	1,800		788	948	565
19	2,550	428	1,270	1,040	1,920	600	1,370	1,690		750	1,270	428
20	2,290	460	1,270	990	1,690	638	1,220	1,580	950	1,220	788	388
21	2,420	495	1,270	825	1,690	600	1,120	1,580		1,120	712	300
22	1,170	495	905	1,270	1,690	600	990	1,580		1,080	675	228
23	865	750	990	1,580	1,580	600	990	1,470	990	1,040	788	565
24	825	3,570	1,580	1,690	1,270	600	948	1,690	990	990	990	600
25	825	2,160	1,580	1,580	2,040	600	948	1,470	905	1,370	1,080	712
26	788	1,690	1,690	1,370	1,580	565	905	1,040	1,080	1,370	1,120	600
27	750	1,170	1,920	1,370	1,690	638	865	948	990	1,080	1,080	495
28	712	1,690	2,970	1,370	1,920	675	825	1,040	865	948	1,040	530
29	712	1,800	3,260	1,580	1,690	638	788	1,120	1,040	948	788	495
30	675	1,580	2,160	2,970	-------	638	865	1,120	1,120	948	638	530
31	530	-------	2,160	3,570	-------	638	-------	1,170	-------	865	712	-------

NOTE.—Gage not read June 18–22; discharge interpolated. Braced figure shows mean discharge for period indicated.

Monthly discharge of Puyallup River at Alderton, Wash., for the year ending September 30, 1924.

[Drainage area, 410 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,730	428	988	2.41	2.78	60,800
November	3,570	343	857	2.09	2.33	51,000
December	4,760	905	1,830	4.46	5.14	113,000
January	3,570	825	1,600	3.90	4.50	98,400
February	10,200	1,270	3,130	7.63	8.23	180,000
March	1,580	565	817	1.99	2.29	50,200
April	1,800	712	1,010	2.46	2.74	60,100
May	2,970	750	1,430	3.49	4.02	87,900
June	1,470	825	1,040	2.54	2.83	61,900
July	1,690	750	1,070	2.61	3.01	65,800
August	1,270	638	919	2.24	2.58	56,500
September	865	228	636	1.55	1.73	37,800
The year	10,200	228	1,270	3.10	42.18	923,000

PUYALLUP RIVER AT PUYALLUP, WASH.

LOCATION.—Since November 16, 1919, in NE. ¼ sec. 20, T. 20 N., R. 4 E., seven-eighths of a mile below Puget Sound Electric Co.'s railway bridge, 1 mile northwest of Puyallup, Pierce County, three-fourths of a mile above Clark Creek, and 3½ miles below mouth of Stuck River.

DRAINAGE AREA.—914 square miles (measured on Pls. IV and XI, Water-Supply Paper 313).

RECORDS AVAILABLE.—May 1, 1914, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank since December 3, 1919; inspected by C. J. Phillips.

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

CHANNEL AND CONTROL.—Stream bed composed of light silt; shifting at all stages. Control formed by section of stream bed extending some distance downstream.

EXTREMES OF DISCHARGE.—Maximum stage during year 12.0 feet at 6 p. m. February 12 (discharge, 21,700 second-feet); minimum stage probably within 0.05 foot of 1.70 feet about 5 p. m. November 18 during period of few hours when intake was clogged (discharge, 1,240 second-feet).

1914–1924: Maximum stage recorded, 34.15 feet at 4.45 p. m. December 18, 1917 (discharge, 40,500 second-feet); minimum stage recorded, 17.36 feet at 8 p. m. November 18, 1917 (discharge, 726 second-feet).

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

DIVERSIONS.—Two hydroelectric plants, owned by Puget Sound Power & Light Co., divert water above station. Water for the Electron plant is diverted from Puyallup River 10 miles above Electron into an equalizing basin having a capacity of 185 acre-feet; water used at this plant is returned directly to river. Water for the Dieringer plant is diverted from White River at Buckley into Lake Tapps (capacity 51,000 acre-feet), and after use is discharged into Stuck River.

REGULATION.—See "Diversions."

ACCURACY.—Stage-discharge relation changed frequently. Well-defined rating curve developed during 1921 used as standard form of curve for this station and changes in control indicated by frequent discharge measurements have been assumed to yield curves parallel to this. 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 and corrected as to time and amount of shift in accordance with results of discharge measurements. Records good.

Discharge measurements of Puyallup River at Puyallup, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 14	Gatewood and Baldwin	2.42	1,550	Mar. 10	J. S. Gatewood	3.46	2,310
Jan. 29	J. S. Gatewood	4.10	3,190	May 28	Parker and Carson	4.17	2,990
Feb. 1	D. J. F. Calkins	8.41	12,600	Aug. 11	R. B. Kilgore	2.97	2,250

Daily discharge, in second-feet, of Puyallup River at Puyallup, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1		1,690	1,750	2,720	12,500	3,160	2,110	2,190	2,820	2,720	2,270	1,410
2		1,750	1,630	2,620	8,050	2,820	2,190	2,270	3,410	3,040	2,190	1,750
3		1,630	1,690	2,620	6,200	2,930	2,270	2,190	3,550	3,040	1,890	1,750
4	1,750	1,460	1,690	2,530	8,290	2,720	2,190	1,890	3,550	2,720	2,190	1,820
5		1,630	1,890	2,350	11,200	2,440	2,110	3,040	3,410	2,720	2,190	1,890
6		1,630	6,890	2,030	8,530	2,720	1,630	3,160	3,160	2,270	2,270	1,820
7		1,570	9,010	2,440	6,430	3,280	2,030	2,930	2,720	2,270	2,110	1,630
8	1,820	1,570	4,650	2,620	4,870	3,040	2,190	2,930	2,530	2,270	2,030	1,960
9		1,570	2,530	2,620	4,030	2,620	2,190	3,410	2,530	2,350	2,030	1,750
10		1,630	2,440	6,660	3,280	2,190	2,270	4,030	2,530	2,350	1,890	1,690
11		1,410	2,440	7,350	4,030	2,190	2,440	4,220	2,440	2,350	2,110	1,630
12		1,510	2,440	4,220	14,800	2,190	2,270	5,530	2,530	2,190	2,190	1,630
13	1,850	1,630	2,530	3,280	14,500	2,190	1,890	6,200	2,530	2,720	2,110	1,630
14		1,510	3,040	3,280	9,010	2,190	2,270	5,310	2,440	2,350	2,110	1,460
15		1,510	3,040	3,280	7,120	2,030	2,190	4,430	2,350	2,350	2,030	1,690
16		1,510	2,190	3,410	5,310	1,750	2,110	4,430	2,530	2,190	1,960	1,750
17	6,890	1,460	2,440	2,930	3,700	2,030	2,190	3,860	2,270	2,190	1,690	1,690
18	3,860	1,320	2,930	2,820	3,700	2,110	2,440	3,410	2,440	2,190	1,960	1,630
19	2,620	1,460	2,440	2,620	3,410	2,110	2,350	3,700	2,190	2,190	1,960	1,630
20	2,350	1,410	2,350	2,270	3,160	2,190	1,890	4,030	2,110	1,960	1,690	1,630
21	2,110	1,460	2,270	2,530	3,160	2,110	2,110	4,220	2,350	2,110	1,750	1,410
22	2,530	1,410	2,190	2,530	3,160	2,030	2,190	4,220	2,110	2,190	1,750	1,630
23	2,350	1,630	1,960	2,820	3,160	1,630	2,110	4,030	2,440	2,270	1,750	1,630
24	2,190	3,410	2,530	3,160	3,040	2,030	2,030	4,030	2,190	2,350	1,690	1,630
25	2,030	2,720	2,820	2,930	3,160	2,110	2,110	3,550	2,350	2,440	1,960	1,570
26	2,030	2,110	2,720	2,720	3,160	2,190	1,890	3,160	2,350	2,620	2,030	1,570
27	2,030	1,820	2,720	2,530	3,160	2,190	1,570	2,930	2,190	2,270	2,030	1,460
28	1,750	2,030	4,430	3,040	3,860	2,270	1,960	2,720	2,350	2,440	1,960	1,360
29	1,890	2,110	7,350	3,040	3,410	2,270	2,110	2,440	2,190	2,350	1,890	1,460
30	1,820	1,890	4,030	4,650	-------	1,750	2,270	2,350	2,440	2,350	1,690	1,510
31	1,750	-------	3,160	8,290	-------	2,110	-------	2,720	-------	2,270	1,510	-------

NOTE.—Intake partly clogged Oct. 1-7, 9-16, and for portions of several other days during October, November, and September; discharge estimated from partial graph, records of Puyallup River at Alderton, and from general information. Braced figures show mean discharge for periods indicated.

Monthly discharge of Puyallup River at Puyallup, Wash., for the year ending September 30, 1924

[Drainage area, 914 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	-------	-------	2,160	-------	-------	133,000
November	3,410	1,320	1,720	-------	-------	102,000
December	9,010	1,630	3,100	-------	-------	191,000
January	8,290	2,030	3,320	-------	-------	204,000
February	14,800	3,040	5,910	-------	-------	340,000
March	3,280	1,630	2,310	-------	-------	142,000
April	2,440	1,570	2,120	-------	-------	126,000
May	6,200	1,890	3,530	-------	-------	217,000
June	3,550	2,110	2,570	-------	-------	153,000
July	3,040	1,960	2,390	-------	-------	147,000
August	2,270	1,510	1,960	-------	-------	121,000
September	1,960	1,360	1,640	-------	-------	97,600
The year	14,800	1,320	2,720	2.98	40.56	1,970,000

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. Yearly figures represent natural flow closely.

WHITE RIVER AT BUCKLEY, WASH.

LOCATION.—In SE. ¼ sec. 34, T. 20 N., R. 6 E., at Northern Pacific Railway bridge 1 mile northeast of Buckley, Pierce County.

DRAINAGE AREA.—424 square miles (measured on Pl. XI, Water-Supply Paper 313).

RECORDS AVAILABLE.—April 22, 1899, to August 31, 1903 (gage-height record only January 1, 1902, to August 31, 1903); June 8 to December 31, 1911; January 18, 1913, to September 30, 1924.

GAGE.—Stevens eight-day water-stage recorder on left bank 40 feet below railway bridge at end of concrete wall protecting abutment of bridge; installed January 9, 1917; inspected by O. E. Osgood. Record from this gage supplemented during extremely low water by readings from chain gage on railway bridge.

DISCHARGE MEASUREMENTS.—Measurements made by wading or from railway bridge.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifting; gradient steep. One channel prior to flood of January 23, 1919; two channels thereafter. Right bank of main channel low and flat; left bank protected by concrete wing wall. Various types of protection to under crossing of city of Tacoma's municipal water supply have also been factors in control for this station.

EXTREMES OF DISCHARGE.—Maximum combined daily discharge of river and flume, 6,530 second-feet February 13; minimum combined daily discharge, 375 second-feet November 22.

1899–1901, 1911, and 1913–1924: Maximum daily discharge, including flume, 18,100 second-feet December 18, 1917; minimum daily discharge, including flume, 349 second-feet November 19, 1917.

ICE.—Stage-discharge relation slightly affected by ice during severe winters.

DIVERSIONS.—White River flume diverts water from river one-half mile above gage. Total monthly discharge is computed from determinations of combined flow of river and flume.

ACCURACY.—Stage-discharge relation for main channel changed continually during year. Rating curves developed in 1923 used as standard form, fairly well defined. Operation of water-stage recorder satisfactory. Daily discharge ascertained by shifting-control method. Records good.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co.

Discharge measurements of White River at Buckley, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	Marschke and Osgood	620.99	22	May 10	Marschke, O'Brien, and Randa	625.4	2,280
25	Nearhood and Osgood	621.10	39				
Nov. 26	Marschke and Haydon	621.72	100	24	Marschke, Baumgardner, and Randa	624.8	1,450
Dec. 10	Marschke and Osgood	621.88	118				
27	do	622.21	210	June 13	Marschke and Osgood	622.5	339
Jan. 16	do	621.72	108	27	Marschke and Hinkleman	621.5	102
25	Marschke and Nearhood	622.13	204				
Feb. 5	Marschke, Nearhood, and Osgood	626.53	4,180	July 10	do	621.3	63
				25	do	621.2	56
25	Marschke and Osgood	622.31	257	Aug. 11	do	621.1	35
Mar. 10	Marschke and Haydon	621.39	72	25	do	621.0	29
25	Marschke and Osgood	621.16	41	Sept. 11	do	620.9	30
Apr. 10	Marschke and O'Brien	621.4	67	25	do	621.0	29
25	do	621.1	42				

Daily discharge, in second-feet, of White River at Buckley, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	20	29	77	678	4,950	586	34	59	1,100	307	43	31
2	20	31	73	140	3,090	659	36	81	1,100	394	45	29
3	18	30	63	69	2,400	332	37	108	995	500	46	27
4	22	28	53	65	2,900	186	37	190	930	930	48	27
5	21	27	50	51	4,090	83	36	1,420	1,030	840	56	32
6	24	28	2,910	61	2,990	749	36	1,310	533	840	37	33
7	25	30	2,420	63	2,120	995	46	1,310	532	107	37	32
8	24	29	1,420	65	1,520	1,030	78	1,420	966	108	36	33
9	22	27	264	64	1,200	621	69	1,800	246	64	36	31
10	22	26	100	2,660	995	73	77	2,320	273	59	36	76
11	23	26	73	2,080	1,240	63	92	2,400	223	56	35	29
12	24	25	66	1,230	638	54	73	2,400	335	56	37	29
13	24	24	474	900	5,910	54	74	2,470	324	52	36	30
14	24	23	1,240	496	4,460	53	64	2,000	823	47	34	29
15	25	18	861	426	3,510	50	56	1,800	1,060	49	34	30
16	43	24	76	351	2,280	46	44	1,590	438	49	32	30
17	976	23	280	101	1,420	45	34	1,480	171	48	30	30
18	191	20	551	115	1,060	46	37	1,380	149	49	32	29
19	55	19	66	130	714	46	59	1,280	107	49	33	29
20	43	19	60	269	408	49	56	1,560	137	56	30	29
21	45	19	59	76	503	48	45	1,670	576	50	30	29
22	70	19	58	70	900	46	48	1,590	589	54	30	27
23	52	26	133	137	701	44	45	1,480	383	55	30	30
24	41	877	600	342	1,060	43	49	1,450	146	56	29	29
25	37	329	1,040	212	520	44	214	1,370	199	58	29	29
26	35	107	439	240	515	40	42	900	166	61	30	28
27	34	83	384	540	486	42	42	738	180	61	32	27
28	33	93	1,870	260	926	45	45	450	500	60	32	26
29	31	97	2,690	572	606	41	47	352	485	58	30	24
30	30	90	1,650	1,420	-------	37	73	666	205	50	30	25
31	29	-------	574	2,720	-------	36	-------	810	-------	53	29	-------

Monthly discharge of White River and flume at Buckley, Wash., for the year ending September 30, 1924

[Drainage area, 424 square miles]

Month	Discharge in second-feet						Combined run-off	
	Maximum (combined)	Minimum (combined)	Mean		Combined		Inches	Acre-feet
			River	Flume	Mean	Per square mile		
October	2,470	466	67.2	725	792	1.87	2.16	48,700
November	2,740	375	74.9	688	763	1.80	2.01	45,400
December	4,620	834	667	967	1,630	3.84	4.43	100,000
January	3,720	877	536	903	1,440	3.40	3.92	88,500
February	6,530	1,350	1,870	929	2,800	6.60	7.12	161,000
March	1,580	698	203	752	955	2.25	2.59	58,700
April	1,600	724	57.5	1,120	1,180	2.78	3.10	70,200
May	4,070	1,310	1,290	931	2,220	5.24	6.04	136,000
June	1,990	947	497	821	1,320	3.11	3.47	78,600
July	1,380	787	170	875	1,040	2.45	2.82	64,000
August	961	546	35.0	777	812	1.92	2.21	49,900
September	854	397	30.6	550	581	1.37	1.53	34,600
The year	6,530	375	453	837	1,290	3.04	41.40	936,000

WHITE RIVER FLUME AT BUCKLEY, WASH.

LOCATION.—In sec. 35, T. 20 N., R. 6 E., 800 feet below intake, on left side of White River, half a mile above Northern Pacific Railway crossing and 1 mile northeast of Buckley, Pierce County.

RECORDS AVAILABLE.—January 18, 1913, to September 30, 1924.

GAGE.—Stevens long-distance water-stage recorder with transmitter at stilling well on right side of flume 800 feet below head gate and recorder in gatehouse; installed January 12, 1918; inspected by O. E. Osgood.

DISCHARGE MEASUREMENTS.—Made from footbridge 8 feet below gage.

CHANNEL AND CONTROL.—Control formed by long section of flume bottom below gage. A rock spill a quarter of a mile below gage is incomplete control also. Stage-discharge relation affected by variable quantity of rocks which work their way from intake to rock spill.

EXTREMES OF DISCHARGE.—Maximum discharge during year 2,350 second-feet from 9 to 9.30 p. m. October 16. No flow in flume when head gates are closed for cleaning flume or on account of high water.

1913–1924: Maximum stage October 16, 1924. No flow in flume when head gates are closed.

ICE.—Stage-discharge relation affected by ice during severe winters.

REGULATION.—Gates at intake are operated frequently to control flow.

ACCURACY.—Stage-discharge relation changed continuously throughout the year; not affected by ice. Rating curve developed in 1918 used as standard form of curve for this station and changes in control indicated by frequent discharge measurements have been assumed to yield curves parallel to this. Operation of water-stage recorder satisfactory. Daily discharge ascertained by shifting-control method. Records good.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co.

Flume diverts water from left bank of White River in SE. ¼ sec. 35, T. 20 N., R. 6 E. Water is used for development of power at Dieringer and is discharged into Stuck River.

Discharge measurements of White River flume at Buckley, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 9	Marschke and Osgood	2.38	531	May 13	Marschke and O'Brien	6.07	1,600
25	Nearhood and Osgood	2.98	762	24	Marschke and Baumgardner	3.76	851
Nov. 10	Marschke and Osgood	2.06	448	June 13	Marschke and Osgood	4.39	1,060
26	Marschke and Haydon	5.14	1,390	25	Marschke and Hinkleman	4.01	944
Dec. 10	Marschke and Osgood	5.50	1,500	July 10	do	3.97	981
26	do	3.50	833	25	do	3.67	885
Jan. 11	Marschke and Neargood	3.79	912	Aug. 11	do	3.35	777
25	do	3.96	1,010	25	do	3.04	685
Feb. 25	Marschke and Osgood	4.22	991	Sept. 11	do	2.27	495
Mar. 10	Marschke and Haydon	3.97	925	25	do	2.29	527
25	Marschke and Osgood	3.22	672				
Apr. 10	Marschke and O'Brien	4.99	1,180				
25	do	4.27	957				

Daily discharge, in second-feet, of White River flume at Buckley, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	472	517	890	334	638	994	690	1,460	644	958	822	562
2	517	674	822	937	884	775	805	1,670	870	983	822	642
3	594	594	771	1,030	531	1,020	904	1,660	998	868	805	690
4	626	547	788	900	943	897	822	1,370	972	382	754	754
5	547	517	890	856	955	1,140	771	37	722	328	751	822
6	626	502	1,710	839	873	436	805	37	1,090	453	839	706
7	642	487	1,070	856	857	112	1,050	0	819	920	856	706
8	547	472	1,270	863	864	47	1,180	14	407	904	822	771
9	502	457	1,800	813	805	464	1,140	0	1,030	1,000	856	532
10	487	457	1,540	1,050	754	934	1,220	0	1,060	1,030	900	455
11	457	442	1,540	938	990	907	1,510	420	1,050	938	859	502
12	457	427	1,350	949	887	876	1,520	1,290	1,070	944	893	578
13	442	427	407	722	617	870	1,480	1,600	1,050	983	893	626
14	442	427	0	861	674	876	1,370	1,540	557	1,030	927	610
15	532	427	562	955	594	866	1,220	1,510	272	873	839	626
16	1,110	398	1,400	941	1,070	839	1,180	1,520	813	738	805	594
17	1,490	384	1,070	1,170	1,380	822	1,160	1,500	1,060	771	642	547
18	1,540	384	960	1,030	1,350	805	1,460	1,520	1,050	776	738	457
19	1,030	370	1,300	854	1,370	788	1,380	1,520	972	904	839	472
20	924	370	1,140	645	1,460	805	1,220	1,040	883	976	658	398
21	958	370	1,070	856	1,330	788	1,140	788	504	856	658	370
22	1,260	356	994	869	738	738	1,100	805	479	907	642	370
23	994	790	1,070	1,120	645	722	1,050	822	727	873	690	562
24	856	1,860	871	1,060	582	706	983	809	914	951	738	502
25	771	1,800	444	1,030	1,000	674	760	535	951	1,020	805	517
26	706	1,350	805	915	1,030	658	941	921	944	1,130	839	472
27	658	1,030	788	610	1,080	754	976	883	816	1,090	859	427
28	626	1,260	722	958	946	822	1,160	1,020	447	980	805	412
29	578	1,440	594	1,060	1,100	771	1,240	1,040	530	876	674	398
30	547	1,100	442	972	-------	706	1,440	771	917	856	562	412
31	532	-------	905	998	-------	690	-------	763	-------	822	517	-------

Monthly discharge of White River flume at Buckley, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,540	442	725	44,600
November	1,860	356	688	40,900
December	1,800	0	967	59,500
January	1,170	334	903	55,500
February	1,460	531	929	53,400
March	1,140	47	752	46,200
April	1,520	690	1,120	66,600
May	1,670	0	931	57,200
June	1,090	272	821	48,900
July	1,130	328	875	53,800
August	927	517	777	47,800
September	822	370	550	32,700
The year	1,860	0	837	607,000

LAKE WASHINGTON BASIN

CEDAR RIVER AT CEDAR FALLS, WASH.

LOCATION.—In sec. 4, T. 22 N., R. 8 E., below Seattle municipal power plant at Cedar Falls, King County, and 3½ miles above Taylor Creek.

DRAINAGE AREA.—83 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 9, 1914, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank, 0.7 mile below power plant; installed April 8, 1914; inspected by E. C. Hoffstrom.

DISCHARGE MEASUREMENTS.—Made from cable 90 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifts at extremely high water. Banks high. One channel at all stages. Gage height of zero flow, September 25 and 26, 1922, 3.7 feet.

EXTREMES OF DISCHARGE.—Maximum stage during year, 6.44 feet at 5.30 p. m February 12 (discharge, 915 second-feet); minimum stage, 3.82 feet at 1.15 a. m. August 8 (discharge, 5.0 second-feet).

1914–1924: Maximum stage recorded, 11.4 feet at 9 a. m. December 19, 1917 (discharge, 6,290 second-feet); no flow at 4 p. m. November 25, 1917, and August 18, 1923.

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

DIVERSIONS.—Seattle municipal power plant diverts water directly from Cedar Lake through a pressure pipe and returns it to river at plant above gage. Practically entire low-water flow is carried through plant.

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of Seattle municipal power plant.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined. Operation of water-stage recorder excellent except as noted in footnote to table of daily discharge. Daily discharge ascertained by use of discharge integrator. Records excellent.

Discharge measurements of Cedar River at Cedar Falls, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 17	F. H. and E. C. Hoffstrom	5.18	256	June 13	R. B. Kilgore	5.42	356
Nov. 19	R. B. Kilgore	4.74	115	July 12	F. H. Hoffstrom	3.96	12.7
20	do	4.88	153	16	do	4.47	56.5
27	F. H. and E. C. Hoffstrom	5.29	305				

Daily discharge, in second-feet, of Cedar River at Cedar Falls, Wash., for the year ending September 30, 1924

Day	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	38	158	298	378	496	530	311	292	298	283	46	225
2	38	226	246	466	469	454	308	292	378	297	44	257
3	38	184	299	438	336	558	305	278	396	214	45	264
4	51	170	298	360	497	547	310	278	388	107	48	262
5	52	171	297	331	495	534	298	353	382	89	37	257
6	54	98	289	256	532	538	257	372	353	80	34	260
7	49	92	214	292	474	530	305	331	310	38	30	240
8	60	88	371	308	498	514	307	312	268	13	24	254
9	44	88	328	306	494	420	311	318	300	90	22	264
10	38	83	445	395	360	502	316	305	302	13	10	266
11	32	68	463	442	530	524	309	261	302	13	23	267
12	54	91	453	466	686	536	304	327	296	13	22	200
13	47	115	468	384	598	491	270	364	306	11	22	234
14	47	100	460	474	564	492	321	368	279	29	22	178
15	36	86	426	470	550	432	324	348	91	56	21	133
16	147	88	339	457	563	350	330	332	136	58	8.5	165
17	241	72	451	458	474	452	332	328	164	52	7	124
18	238	44	402	448	558	454	339	296	279	48	8.5	186
19	238	119	415	439	592	388	316	348	292	50	45	183
20	260	108	361	386	590	344	262	378	288	50	59	156
21	274	103	301	420	554	342	322	384	282	60	58	116
22	272	78	265	370	485	328	314	397	242	68	59	98
23	278	193	254	349	507	281	303	402	282	66	42	96
24	282	280	289	390	456	318	298	393	282	64	18	88
25	283	244	214	394	561	319	294	328	291	64	15	94
26	274	266	312	401	569	324	267	389	284	61	10	101
27	282	272	352	324	576	327	204	415	284	57	9.5	128
28	234	288	422	406	554	328	292	399	279	57	121	71
29	270	275	452	435	590	306	306	391	238	52	231	92
30	270	294	364	456	-------	275	300	312	274	50	284	88
31	198	-------	436	492	-------	308	-------	315	-------	48	224	-------

NOTE.—Water-stage recorder not operating Dec. 10–17 and Sept. 27–30; intake clogged July 7–12 Discharge estimated from power-plant output by Seattle officials.

Monthly discharge of Cedar River at Cedar Falls, Wash., for the year ending September 30, 1924

[Drainage area, 83 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	283	32	152			9,350
November	294	44	151			8,980
December	468	214	354			21,800
January	492	256	400			24,600
February	686	336	524			30,100
March	558	275	421			25,900
April	339	204	301			17,900
May	415	261	342			21,000
June	396	91	285			17,000
July	297	11	72.6			4,460
August	284	7.0	53.2			3,270
September	267	71	178			10,600
The year	686	7.0	269	3.24	44.10	195,000

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. Yearly figures represent the natural flow closely.

CEDAR RIVER NEAR LANDSBERG, WASH.

LOCATION.—In sec. 17, T. 22 N., R. 7 E., 1¾ miles above intake of Seattle water-supply system at Landsberg, King County, 3 miles northeast of Ravensdale, and 5 miles below Taylor Creek.

DRAINAGE AREA.—135 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 30, 1914, to September 30, 1924; July 25, 1895, to September 30, 1898, at Clifford Bridge, 2 miles below present gage; March 24, 1901, to April 30, 1912, at intake of Seattle water-supply system, 1¾ miles below present gage. Early records not exactly comparable with those for present site because of small difference in drainage area.

GAGE.—Stevens continuous water-stage recorder on right bank; installed April 29, 1914; inspected by T. S. Beals.

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

CHANNEL AND CONTROL.—Bed composed of large boulders and gravel. Control formed by broad riffle about 1,200 feet below gage; shifts at extremely high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 9.2 feet at 10.35 a. m. February 12 (discharge, 3,100 second-feet); minimum stage 4.10 feet at 11.45 a. m. November 20 (discharge, 170 second-feet). Stage may have been slightly lower at some time November 16–20, for which period gage-height graph for low water is of doubtful accuracy.

1914–1924: Maximum stage, 13.55 feet at 10 p. m. December 29, 1917 (discharge, 7,500 second-feet); minimum stage, 4.35 feet at 1 a. m. October 15, 1914 (discharge, 162 second-feet).

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

DIVERSION.—None above station.

REGULATION.—Flow partly controlled by storage and release of water in Cedar Lake reservoir to accommodate requirements of Seattle municipal power plant.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined between 200 and 7,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator. Records excellent.

Discharge measurements of Cedar River near Landsberg, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge
	Feet	*Feet*
Nov. 20	4.60	281
June 13	5.62	596

Daily discharge, in second-feet, of Cedar River near Landsberg, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	206	290	468	668	1,300	1,070	681	560	542	500	242	372
2	205	386	437	696	1,180	982	724	574	590	508	239	405
3	206	362	496	642	928	1,060	718	560	616	464	236	406
4	210	322	507	574	1,180	1,050	711	558	607	384	235	390
5	220	322	518	534	1,300	1,020	689	624	608	342	226	404
6	208	246	952	473	1,220	1,020	661	626	577	334	216	406
7	222	244	685	501	1,110	1,000	700	595	552	296	208	393
8	213	234	671	528	1,060	986	700	572	521	259	204	409
9	216	252	600	516	1,020	876	690	566	539	318	200	410
10	194	245	650	921	878	948	705	548	547	259	198	408
11	192	239	676	870	1,250	964	736	525	546	248	196	410
12	188	234	652	796	2,410	975	715	551	538	246	196	365
13	198	262	648	684	1,710	928	682	588	541	242	196	387
14	192	258	648	742	1,460	944	727	589	532	245	196	348
15	200	234	657	799	1,320	872	721	561	402	282	196	302
16	324	219	584	776	1,280	775	730	565	430	295	196	313
17	468	203	652	772	1,190	864	722	548	446	286	194	281
18	409	187	639	753	1,220	862	824	519	522	281	195	343
19	388	228	628	712	1,230	796	750	550	542	277	237	339
20	390	238	574	659	1,210	759	687	573	536	280	240	316
21	413	255	518	692	1,180	740	705	575	528	278	224	272
22	420	220	476	670	1,090	746	676	591	496	284	224	265
23	416	343	480	779	1,060	685	643	594	516	284	214	268
24	412	524	546	804	1,020	718	634	593	515	284	199	259
25	420	450	499	770	1,110	708	621	550	517	280	189	264
26	410	452	546	760	1,140	708	601	585	511	276	187	261
27	415	444	591	692	1,140	782	539	607	509	270	185	275
28	373	469	951	798	1,160	773	588	596	502	267	230	233
29	410	495	1,020	875	1,140	723	590	596	484	261	354	214
30	399	492	747	964	-------	682	590	542	496	252	427	240
31	364	-------	748	1,270	-------	700	-------	531	-------	249	372	-------

Monthly discharge of Cedar River near Landsberg, Wash., for the year ending September 30, 1924

[Drainage area, 135 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	468	188	306			18,800
November	524	187	312			18,600
December	1,020	437	628			38,600
January	1,270	473	732			45,000
February	2,410	878	1,220			70,200
March	1,070	682	862			53,000
April	824	539	682			40,600
May	626	519	571			35,100
June	616	402	527			31,400
July	508	242	301			18,500
August	427	185	227			14,000
September	410	214	332			19,800
The year	2,410	185	556	4.12	56.08	404,000

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. Yearly figures represent natural flow closely.

SNOHOMISH RIVER BASIN

SOUTH FORK OF SKYKOMISH RIVER NEAR INDEX, WASH.

LOCATION.—In N. E. ¼ sec. 29, T. 27 N., R. 10 E., 300 feet above Sunset Falls and 2 miles southeast of Index and mouth of North Fork, Snohomish County.

DRAINAGE AREA.—355 square miles (revised; measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1902, to September 30, 1905; April 26, 1911, to September 30, 1924.

GAGE.—Inclined and vertical staff gage on right bank; installed April 19, 1914; read by Mrs. George Bingham.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Sunset Falls, 300 feet below gage, forms solid rock control. Stage-discharge relation changed by blasting at falls in July, 1914, and by shifting of channel above falls during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from high-water marks, 21.8 feet on February 12 (discharge, 43,500 second-feet); minimum stage recorded 0.86 foot on September 17 and 22 (discharge, 320 second-feet).

1902–1905; 1911–1924: Maximum stage recorded, 22.6 feet at 9 a. m. December 18, 1917 (discharge, 47,000 second-feet); minimum stage recorded, 0.54 foot September 30, 1915 (discharge, 262 second-feet).

ICE.—Stage-discharge relation slightly affected by ice during severe winters. Discharge estimated from gage height and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice. Rating curve well defined below 16,000 second-feet. Staff gage read to hundredths once daily. Daily discharge ascertained by applying daily gage heights to rating table. Records good.

The following discharge measurement was made by R. B. Kilgore:

September 21, 1924: Gage height, 0.94 foot; discharge, 344 second-feet.

Daily discharge, in second-feet, of South Fork of Skykomish River near Index, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	387	594	1,960	1,260	9,290	2,480	843	3,160	3,930	2,040	633	359
2	387	2,760	1,720	1,200	6,510	2,210	1,200	3,810	4,050	1,880	594	359
3	359	1,380	2,210	1,140	4,290	1,960	1,140	3,590	4,290	1,880	594	387
4	387	1,090	2,040	1,040	3,810	1,720	990	3,260	4,050	1,720	556	387
5	359	990	2,570	990	7,650	1,650	1,040	2,660	3,370	1,580	556	387
6	387	890	19,000	990	4,800	1,580	1,140	2,390	3,160	1,380	519	387
7	449	798	5,910	1,040	3,700	1,440	1,720	2,300	2,760	1,200	519	359
8	449	713	3,700	1,040	3,060	1,440	1,880	2,760	2,390	1,140	519	417
9	417	673	2,760	990	2,570	1,380	1,800	4,050	2,760	1,140	519	417
10	417	633	2,040	6,360	2,210	1,320	2,040	5,200	2,960	1,090	519	387
11	387	594	2,210	3,260	16,200	1,260	2,040	6,990	2,660	1,040	483	359
12	359	594	2,570	2,210	31,000	1,260	1,880	8,530	2,860	990	483	346
13	359	556	2,210	1,880	10,900	1,200	2,120	10,700	2,760	990	483	359
14	346	556	3,160	1,580	6,670	1,200	1,880	7,150	2,570	940	483	346
15	417	594	3,370	1,440	5,060	1,200	1,650	5,910	2,660	990	449	333
16	1,720	556	3,370	1,380	3,930	1,140	1,580	5,620	2,390	990	449	333
17	3,590	519	2,960	1,440	3,810	1,090	1,720	5,760	2,390	890	449	320
18	2,390	483	3,160	1,320	3,370	1,090	4,170	6,830	2,480	843	594	346
19	1,440	594	2,570	1,090	2,860	1,040	2,660	5,200	3,210	843	1,260	417
20	1,380	843	2,210	1,040	2,570	1,040	2,040	4,410	1,960	990	753	359
21	1,380	753	1,880	990	2,660	990	1,880	5,200	2,210	890	594	346
22	1,720	940	1,260	1,040	2,390	940	1,800	5,060	2,040	843	556	320
23	1,320	2,040	2,120	1,440	2,210	890	1,650	5,060	1,880	798	519	798
24	1,320	7,990	2,390	1,580	2,040	890	1,440	4,930	1,880	753	483	1,440
25	1,080	5,060	2,300	1,440	1,880	843	1,440	4,290	2,040	753	483	1,040
26	843	4,170	1,960	1,260	2,040	843	1,440	3,370	1,880	753	483	798
27	753	2,760	1,720	1,260	2,210	890	1,720	3,810	1,720	753	449	673
28	713	3,810	2,300	1,800	4,290	890	2,210	4,540	1,650	753	449	633
29	673	2,960	2,040	2,390	2,960	890	2,570	4,290	1,720	713	417	594
30	633	2,480	1,650	4,410	-------	843	2,370	3,060	1,880	673	387	713
31	594	-------	1,320	16,700	-------	843	-------	3,370	-------	633	387	-------

NOTE.—Gage not read Oct. 25; discharge interpolated.

Monthly discharge of South Fork of Skykomish River near Index, Wash., for the year ending September 30, 1924

[Drainage area, 355 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,590	346	884	2.49	2.87	54,400
November	7,990	483	1,650	4.65	5.19	98,200
December	19,000	1,260	2,990	8.42	9.71	184,000
January	16,700	990	2,160	6.08	7.01	133,000
February	31,000	1,880	5,410	15.2	16.39	311,000
March	2,480	843	1,240	3.49	4.02	76,200
April	4,170	843	1,800	5.07	5.66	107,000
May	10,700	2,300	4,750	13.4	15.45	292,000
June	4,290	1,650	2,590	7.30	8.14	154,000
July	2,040	633	1,060	2.99	3.45	65,200
August	1,260	387	536	1.51	1.74	33,000
September	1,440	320	491	1.38	1.54	29,200
The year	31,000	320	2,120	5.97	81.17	1,540,000

OLNEY CREEK NEAR STARTUP, WASH.

LOCATION.—In SE. ¼ sec. 12, T. 28 N., R. 8 E., 1½ miles above Stickney Bridge, 5 miles northeast of Startup, Snohomish County.

DRAINAGE AREA.—10.0 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 1, 1922, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank; installed April 20, 1923; inspected by Dale Annis.

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

CHANNEL AND CONTROL.—Banks high; not subject to overflow. Channel straight for 300 feet below gage. Control is of boulders and solid rock outcroppings; may shift at high water. Gage height of zero flow, 0.0 foot ± 0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 6.1 feet at 5 a. m. February 12 (discharge, 1,520 second-feet); minimum stage, 0.78 foot October 12 (discharge, 7.0 second-feet). Stage very slightly, if any, lower October 13 to 14 for which actual stage can not be determined because of torn recorder paper.

1923–1924: Maximum stage recorded February 12, 1924; minimum stage, 0.68 foot September 17–19, 1923 (discharge, 5.5 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; not affected by ice during year. Rating curve well defined between 15 second-feet and 200 second-feet, extended above and below. 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 gage-height graph by inspection or for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter periods. Records good October and July to September, otherwise excellent.

Discharge measurements of Olney Creek near Startup, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 20	1.35	34.7	Jan. 24	2.11	127	June 16	1.32	33.0
Nov. 7	1.12	20.1	Feb. 14	2.22	140	Aug. 1	.90	10.5
Jan. 21	1.41	39.6	14	2.24	147	Sept. 22	.91	9.5

Daily discharge, in second-feet, of Olney Creek near Startup, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.0	40	49	52	330	92	36	77	65	23	10	12
2	8.0	141	47	47	230	72	49	82	67	21	10	12
3	8.0	43	200	41	168	63	42	63	61	18	14	12
4	9.0	32	166	37	279	54	34	65	46	17	17	12
5	9.0	26	135	46	256	46	47	68	51	16	14	12
6	25	23	332	96	150	55	}	57	103	16	11	11
7	22	20	191	117	148	50		57	63	14	10	11
8	14	18	114	122	106	44		77	52	14	10	14
9	10	18	85	102	82	47	120	96	56	14	9.0	16
10	9.0	16	82	425	68	46		105	49	13	9.0	12
11	7.5	15	135	177	525	42	}	127	44	12	9.0	10
12	7.0	14	99	114	855	36	151	138	59	12	8.5	9.5
13	}	{ 14	81	82	233	39	156	90	46	11	8.0	9.0
14	} 15	{ 17	141	68	153	61	102	54	42	11	8.0	8.0
15	}	{ 16	259	74	125	47	82	47	37	14	8.0	8.0
16	53	14	168	65	95	40	94	56	35	14	8.0	8.0
17	262	14	133	56	112	36	105	77	93	19	10	8.0
18	153	13	155	48	86	34	181	63	121	15	204	14
19	54	46	98	42	72	37	114	56	81	26	85	20
20	36	36	74	38	72	35	82	59	57	21	45	13
21	37	34	61	40	115	34	67	79	47	16	32	11
22	86	54	106	67	95	30	58	59	42	14	26	10
23	45	207	266	219	72	29	50	55	38	13	22	}
24	32	276	156	128	61	27	43	55	37	12	19	
25	28	311	112	95	81	27	40	52	35	11	18	} 180
26	24	189	88	117	88	26	44	39	32	10	16	
27	21	105	95	122	180	29	59	38	30	11	14	}
28	20	131	181	171	199	33	68	44	27	21	14	19
29	19	82	127	198	112	30	77	53	27	16	12	15
30	18	62	82	336	-------	30	110	57	26	12	12	50
31	16	-------	61	553	-------	30	-------	69	-------	11	11	-------

NOTE.—Water-stage recorder not operating satisfactorily Oct. 13–15, Apr. 6–11, Sept. 23–27, 29 and 30. Discharge estimated by comparison with records of near-by streams. Braced figures show mean discharge for periods indicated.

Monthly discharge of Olney Creek near Startup, Wash., for the year ending September 30, 1924

[Drainage area, 10.0 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	262	7.0	35.0	3.50	4.04	2,150
November	311	13	67.6	6.76	7.54	4,020
December	332	47	132	13.2	15.22	8,120
January	553	37	126	12.6	14.53	7,750
February	855	61	178	17.8	19.20	10,200
March	92	26	42.0	4.20	4.84	2,580
April	181	34	87.0	8.70	9.71	5,180
May	138	38	68.2	6.82	7.86	4,190
June	121	26	52.3	5.23	5.84	3,110
July	26	10	15.1	1.51	1.74	928
August	204	8.0	22.7	2.27	2.62	1,400
September	----------	8.0	41.2	4.12	4.60	2,450
The year	855	7.0	71.7	7.17	97.74	52,100

SULTAN RIVER NEAR SULTAN, WASH.

LOCATION.—In sec. 8, T. 28 N., R. 8 E., at Horseshoe Bend, 4½ miles north of Sultan and mouth of river, in Snohomish County.

DRAINAGE AREA.—88 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 18, 1911, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank a quarter of a mile above Horseshoe Bend; inspected by Jesse Reese. Prior to October 29, 1915, Lietz water-stage recorder at Camp Habecker 1½ miles upstream.

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

CHANNEL AND CONTROL.—In canyon; control formed by large rocks, boulders, and heavy gravel; not likely to change except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from high-water mark in well, 16.9 feet on February 12 (discharge, 21,200 second-feet); minimum stage, 0.30 foot from 10 to 12 p. m. September 15 (discharge, 67 second-feet).

1911–1924: Maximum stage recorded from high-water mark in well, 18.5 feet on December 12, 1921 (discharge, 24,600 second-feet); minimum stage recorded, 0.02 foot at 1 a. m. September 19, 1923 (discharge, 51 second-feet).

ICE.—Stage-discharge relation seldom affected by ice. Water in well freezes during very cold weather.

DIVERSIONS.—City of Everett diverts water above station for municipal use. (See results of discharge measurements of Everett water supply conduit, p. 175.)

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined between 80 and 10,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection, or for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent except for extremely low discharge, and for periods represented by flat estimates of discharge.

Discharge measurements of Sultan River near Sultan, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Nov. 9	1.35	188	Feb. 15	4.24	1,230	Sept. 23	3.74	978
Jan. 22	2.29	413	Sept. 19	.99	130	24	4.16	1,210
23	3.92	1,080	20	.82	108			

Daily discharge, in second-feet, of Sultan River near Sultan, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	77	246		332	4,270	832	265	832	744	414	113	85
2	73	2,070		326	2,300	660	445	975	744	384	110	84
3	69	644		285	1,500	581	476	810	723	356	109	80
4	74	429	{2,200	260	2,060	509	384	723	620	329	110	77
5	74	332		258	3,400	429	444	681	475	292	107	77
6	103	278		329	1,620	476	581	581	834	256	101	77
7	151	241			1,410	460	1,000	526	581	211	99	75
8	186	213	1,020		1,050	414	900	660	492	184	98	81
9	139	187	788		810	429	723	1,000	640	183	95	95
10	114	167	702		681	429	766	1,200	640	186	94	85
11	102	155	1,180		9,320	384	788	1,480	581	170	92	79
12	93	145	918		11,900	359	788	1,790	620	161	91	76
13	87	136	660	750	2,750	356	950	1,570	600	155	89	71
14	80	148	940		1,580	460	723	1,100	509	154	90	69
15	140	140	2,050		1,290	414	600	900	526	157	97	69
16	1,250	129	1,640		975	367	620	855	444	157	88	69
17	2,100	120	1,230		1,100	334	702	950	615	160	92	72
18	1,570	114	1,510		878	314	2,190	1,000	908	166	780	94
19	723		1,020	299	723	334	1,080	723	640	188	642	129
20	581		744	285	660	321	744	660	526	269	397	114
21	476		581	287		302	620	900	492	187	262	102
22	812		681	384	{600	280	581	925	429	157	202	103
23	544		1,260	960		258	492	810	414	136	167	900
24	399		1,150	744		243	429	788	414	130	143	1,160
25	316	{1,400	900	562	620	232	414	723	444	128	127	640
26	269		702	640	681	222	444	492	399	129	117	429
27	236		620	788	1,250	245	562	414	339	131	110	316
28	207		925	1,280	2,060	306	744	399	314	151	104	265
29	181		801	1,570	1,100	283	766	429	356	143	97	216
30	160		526	3,630	-------	247	1,020	526	399	128	93	423
31	147	-------	414	8,570	-------	239	-------	640	-------	117	89	-------

NOTE.—Water-stage recorder not operating Nov. 19 to Dec. 7, Jan. 7–18, and Feb. 21–24; discharge estimated by comparison with records of near-by streams. Braced figures show mean discharge for periods indicated.

Monthly discharge of Sultan River near Sultan, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	2,100	69	372	22,900
November	----------	114	756	45,000
December	----------	----------	1,240	76,200
January	8,570	258	993	61,100
February	11,900	----------	2,010	116,000
March	832	222	378	23,200
April	2,190	265	708	42,100
May	1,790	399	841	51,700
June	908	314	549	32,700
July	414	117	196	12,100
August	780	88	161	9,900
September	1,160	69	207	12,300
The year	11,900	69	695	505,000

MIDDLE FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ SE. ¼ sec. 10, T. 23 N., R. 8 E., 1 mile southeast of North Bend, King County, and 2¾ miles above junction with North Fork.

DRAINAGE AREA.—173 square miles (revised; measured on topographic maps).

RECORDS AVAILABLE.—August 10, 1907, to February 29, 1908; August 25, 1908, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank; installed August 7, 1915; inspected by employees of Puget Sound Power & Light Co. Prior to August 7, 1915, various gages at highway bridge 2¼ miles below present site were used.

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

CHANNEL AND CONTROL.—Bed composed of large boulders. Channel slightly curved above and below station. Control shifts at extremely high water. Left bank high; right bank low and heavily wooded. Gage height of zero flow, September 11, 1919, −0.7 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 11.87 feet at 9.20 a. m. February 12 (discharge, 17,200 second-feet); minimum stage, 1.51 feet at 4 p. m. October 12 (discharge, 176 second-feet).

1907–1924: Maximum stage recorded, 12.2 feet at 10 a. m. December 18, 1917 (discharge, 18,300 second-feet); discharge may have been greater during floods of November, 1909, and November, 1910; minimum stage, 1.50 feet at 1 p. m. September 30, 1915 (discharge, 146 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve fairly well defined below 7,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection, or for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records fair.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co.

Discharge measurements of Middle Fork of Snoqualmie River near North Bend, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Jan. 30	Hatcher, Butler, and Beery	4.63	2,780
May 13	Butler and Beery	5.35	4,180
Aug. 5	....do	1.83	238

Daily discharge, in second-feet, of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	235	322	1,170	870	4,700	1,260	450	1,600	2,080	1,050	290	189
2	238	1,430	1,090	719	3,460	1,090	722	1,950	2,140	1,000	283	189
3	232	946	1,220	729	2,410	978	771	1,720	2,140	938	273	192
4	215	715	1,400	608	2,920	878	632	1,550	1,950	893	273	192
5	226	590	1,600	578	4,800	785	584	1,350	1,550	743	263	196
6	204	514	3,760	656	3,060	757	715	1,170	1,450	638	247	199
7	330	460	3,700	813	2,340	729	1,050	1,090	1,220	554	244	192
8	326	425	2,140	834	1,830	670	1,050	1,400	1,050	508	244	202
9	263	385	1,500	764	1,450	650	946	2,200	1,200	508	241	213
10	226	357	1,260	4,600	1,260	620	1,050	2,840	1,400	519	247	189
11	196	339	1,450	2,200	5,140	578	1,170	3,860	1,130	486	241	196
12	182	322	1,450	1,500	12,800	554	1,090	4,610	1,350	450	232	204
13	186	306	1,130	1,250	5,150	584	1,130	4,100	1,400	435	238	196
14	192	314	1,170	1,130	3,300	676	1,000	3,220	1,170	430	238	194
15	310	314	2,010	1,090	2,550	644	878	2,620	1,130	440	238	204
16	2,160	290	2,080	986	1,950	590	1,050	2,690	1,050	440	218	207
17	4,780	276	1,660	946	2,010	554	1,550	2,840	1,170	405	215	210
18	2,410	266	1,660	863	1,720	514	2,990	2,840	1,500	460	306	238
19	1,350	351	1,350	722	1,450	508	1,830	2,140	1,260	536	908	481
20	1,220	502	1,090	663	1,300	519	1,350	2,010	1,090	715	602	339
21	1,220	455	938	632	1,350	480	1,130	2,550	1,130	515	410	253
22	1,220	554	885	729	1,220	450	1,130	2,550	1,090	445	330	226
23	938	1,680	1,500	1,830	1,090	425	994	2,340	1,000	400	290	584
24	715	4,180	1,720	1,550	986	405	930	2,340	978	375	270	1,130
25	596	2,760	1,300	1,130	1,000	390	799	1,890	1,050	375	256	892
26	519	2,410	1,130	1,090	1,090	390	827	1,450	938	375	250	689
27	465	1,550	1,010	1,050	1,300	497	1,010	1,260	841	375	244	524
28	425	2,690	2,530	1,400	2,270	554	1,350	1,220	813	380	241	465
29	380	2,270	2,140	2,080	1,600	508	1,450	1,300	834	370	229	420
30	348	1,600	1,450	3,140	-------	465	1,830	1,500	966	322	213	415
31	322	-------	1,090	4,340	-------	440	-------	1,830	-------	298	199	-------

NOTE.—Water-stage recorder not operating Jan. 10–13; discharge estimated by comparison with records of North and South forks.

Monthly discharge of Middle Fork of Snoqualmie River near North Bend, Wash., for the year ending September 30, 1924

[Drainage area, 173 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	4,780	182	730	4.22	4.86	44,900
November	4,180	266	986	5.70	6.36	58,700
December	3,760	885	1,600	9.25	10.66	98,400
January	4,600	578	1,340	7.75	8.94	82,400
February	12,800	986	2,670	15.4	16.61	154,000
March	1,260	390	617	3.57	4.12	37,900
April	2,990	450	1,120	6.47	7.22	66,600
May	4,610	1,090	2,190	12.7	14.64	135,000
June	2,140	813	1,270	7.34	8.19	75,600
July	1,050	298	528	3.05	3.52	32,500
August	908	199	289	1.67	1.92	17,800
September	1,130	189	334	1.93	2.15	19,900
The year	12,800	182	1,130	6.53	89.19	824,000

NORTH FORK OF SNOQUALMIE RIVER NEAR NORTH BEND, WASH.

LOCATION.—In NE. ¼ sec. 26, T. 24 N., R. 8 E., at Gabriel ranch, 2 miles above mouth and 3½ miles northeast of North Bend, King County.

DRAINAGE AREA.—105 square miles (revised; measured on topographic maps).

RECORDS AVAILABLE.—July 4, 1907, to September 30, 1924.

GAGE.—Friez water-stage recorder on right bank 200 yards southeast of ranch house; installed September 26, 1916; inspected by employees of Puget Sound Power & Light Co.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 200 yards above mouth.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high stages. Left bank not subject to overflow; right bank fairly high, not subject to overflow except at extremely high stages. Gage height of zero flow, August 25, 1922, 0.0±0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 11.1 feet at 9 a. m. February 12 (discharge, 10,300 second-feet); minimum stage, 1.75 feet September 16 (discharge, 56 second-feet).

1907–1924: Maximum stage, determined by leveling to high-water mark, 14.5 feet November 18, 1911 (discharge, 11,100 second-feet); water above gage November 18, 19, 23, 24, 29, and 30, 1909, and stage may have exceeded that reached in 1911. Minimum discharge, 56 second-feet September 26–28, 1910, and September 16, 1924.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed February 13. Rating curve used prior to change well defined below 3,000 second-feet; that used after February 13 fairly well defined below 3,000 second-feet. Operation of water stage recorder fairly 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 gage-height graph by inspection, or for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good, except for extreme high water and for periods when intake was clogged.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co

Discharge measurements of North Fork of Snoqualmie River near North Bend, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Mar. 5	Hatcher, Butler, and Beery	3.20	483
Aug. 5	Beery and Butler	2.12	112

Daily discharge, in second-feet, of North Fork of Snoqualmie River near North Bend, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	70	142	790	556	3,800	836	228	869	812	323	105	94
2	70	550	660	514	2,000	700	280	875	812	297	106	90
3	79	430	700	502	1,600	620	319	850	772	276	110	88
4	96	350	750	455	1,450	556	283	795	684	256	110	82
5	92	290	900	422	2,050	499	266	740	530	231	114	79
6	122	259	2,300	520	1,880	470	294	644	543	201	108	78
7	144	223	1,900	687	1,700	448	577	628	487	179	99	75
8	178	200	1,140	687	1,300	418	606	812	495	166	96	80
9	135	181	857	609	956	394	518	1,130	655	158	91	70
10	118	168	708	2,200	857	367	570	1,350	875	153	88	70
11	110	160	897	1,520	1,100	346	700	1,800	575	143	84	68
12	97	151	825	1,050	7,170	327	644	2,620	850	129	78	63
13	90	145	660	849	2,730	331	724	1,900	875	125	75	61
14	89	140	729	708	1,830	371	606	1,500	600	127	73	60
15	124	145	800	661	1,480	363	524	1,050	470	136	72	58
16	420	140	930	609	1,080	342	584	1,000	408	179	70	56
17	1,900	133	810	570	1,150	319	812	1,120	460	153	69	60
18	990	127	750	514	875	300	1,620	1,150	905	169	127	78
19	810	142	720	460	900	294	1,150	950	676	207	748	176
20	470	265	700	427	925	290	852	900	556	294	432	161
21	422	247	640	413	880	269	708	1,080	518	216	294	139
22	490	308	615	455	815	253	676	1,050	438	182	234	127
23	408	580	661	1,120	750	243	592	1,000	408	161	201	384
24	319	2,000	980	1,080	556	234	506	1,020	394	146	174	959
25	274	1,500	849	833	606	222	460	852	408	131	156	748
26	235	1,100	865	795	740	222	487	628	371	121	139	530
27	214	940	743	833	932	240	599	563	334	114	125	389
28	195	970	1,260	1,090	1,580	256	812	563	304	125	114	319
29	176	1,050	1,220	1,700	1,020	250	852	577	304	136	106	266
30	157	940	881	2,900	-------	237	1,070	676	319	121	103	280
31	147	-------	694	3,680	-------	228	-------	740	-------	108	98	-------

NOTE.—No gage-height record Oct. 16–19, Nov. 2–5, 23–30, Dec. 1–7, 15–21, Jan. 10–12, 29–31; Feb. 1–8, 17–23, May 2–4, 10–24, and June 8–14; discharge estimated by comparison with records of Middle and South forks.

Monthly discharge of North Fork of Snoqualmie River near North Bend, Wash., for the year ending September 30, 1924

[Drainage area, 105 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,900	70	298	2.84	3.27	18,300
November	2,000	127	466	4.44	4.95	27,700
December	2,300	615	901	8.58	9.89	55,400
January	3,680	413	949	9.04	10.42	58,400
February	7,170	556	1,540	14.7	15.85	88,600
March	836	222	363	3.46	3.99	22,300
April	1,620	228	631	6.01	6.70	37,500
May	2,620	563	1,010	9.62	11.09	62,100
June	905	304	561	5.34	5.96	33,400
July	323	108	176	1.68	1.94	10,800
August	748	69	148	1.41	1.63	9,100
September	959	56	193	1.84	2.05	11,500
The year	7,170	56	600	5.71	77.74	435,000

SOUTH FORK OF SNOQUALMIE RIVER AT NORTH BEND, WASH.

LOCATION.—In SE. ¼ sec. 9, T. 23 N., R. 8 E., at Cooper ranch, half a mile south of North Bend, King County, and 3½ miles by river above mouth.

DRAINAGE AREA.—84 square miles (measured on topographic maps).

RECORDS AVAILABLE.—July 21, 1907, to February 29, 1908, and June 26, 1908, to September 30, 1924.

GAGE.—Friez water-stage recorder on left bank at Cooper ranch; installed October 2, 1916; inspected by employees of Puget Sound Power & Light Co.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 150 feet below gage.

CHANNEL AND CONTROL.—Bed composed of gravel; shifting at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 10.56 feet at noon February 12 (discharge, 6,460 second-feet); minimum discharge, 80 second-feet September 13–16.

1907–1924: Maximum stage recorded "Water-over gage" November 3, 4, 19, 23, and 29, 1909 (gage height and discharge not determined); minimum stage recorded, 0.70 foot October 10 and 11, 1908 (discharge, 68 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water December 7. Rating curve used prior to change, fairly well defined below 1,800 second-feet; that used after shift, fairly well defined between 400 second-feet and 1,800 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records fair.

COOPERATION.—Complete record furnished by Puget Sound Power & Light Co.

Discharge measurements of South Fork of Snoqualmie River at North Bend, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Jan. 29	Beery, Hatcher, and Butler	3.56	785
June 5	Hatcher and Butler	3.00	516

Daily discharge, in second-feet, of South Fork of Snoqualmie River at North Bend Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	88	158	450	535	2,120	898	336	695	650	234	118	90
2	88	322	416	500	1,400	830	375	762	650	232	115	88
3	84	256	433	465	1,100	785	405	740	610	226	113	87
4	93	209	450	430	1,030	762	372	672	571	215	113	86
5	93	188	486	395	1,560	718	349	630	531	201	111	86
6	93	168	1,770	388	1,400	695	369	570	491	190	109	86
7	104	158	1,660	378	1,120	672	444	530	452	177	106	86
8	104	149	965	388	920	650	478	590	412	169	105	87
9	98	140	740	388	808	630	478	808	415	161	105	88
10	98	140	630	1,500	740	610	530	988	428	158	104	87
11	93	140	610	1,250	1,320	590	570	1,200	385	150	102	84
12	93	132	590	830	5,040	590	550	1,450	418	143	102	82
13	88	124	530	650	2,400	570	570	1,450	421	141	100	80
14	88	124	530	570	1,560	590	550	1,120	375	139	98	80
15	98	124	630	530	1,300	570	495	942	362	143	97	80
16	216	117	718	495	1,120	550	495	920	336	145	97	80
17	779	110	630	495	1,120	530	550	920	346	141	96	82
18	720	110	610	461	1,080	512	942	965	398	169	108	91
19	384	124	550	425	988	495	830	785	369	193	148	130
20	308	168	495	405	942	495	672	718	336	232	141	124
21	294	168	461	392	942	478	590	830	336	177	121	109
22	294	168	428	405	920	444	550	852	330	154	111	101
23	256	383	444	590	852	428	512	808	305	141	105	200
24	220	1,470	590	695	830	408	478	762	293	135	102	400
25	188	986	570	590	830	388	444	695	293	132	100	275
26	168	806	512	530	830	375	444	610	275	130	97	200
27	158	598	495	512	875	385	478	530	257	128	95	158
28	149	678	875	570	1,060	382	550	480	240	128	93	139
29	140	762	1,030	718	988	375	610	500	234	128	93	126
30	132	560	718	965	-------	362	718	575	237	123	92	126
31	132	-------	570	1,930	-------	343	-------	620	-------	121	92	-------

NOTE.—Water-stage recorder not operating Jan. 1–4, May 27–31, June 3–7, and Sept. 23–26; discharge estimated by comparison with records of North and Middle forks.

Monthly discharge of South Fork of Snoqualmie River at North Bend, Wash., for the year ending September 30, 1924

[Drainage area, 84 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	779	84	192	2.29	2.64	11,800
November	1,470	110	325	3.87	4.32	19,300
December	1,770	416	664	7.90	9.11	40,800
January	1,930	378	625	7.44	8.58	38,400
February	5,040	740	1,280	15.2	16.39	73,600
March	898	343	552	6.57	7.57	33,900
April	942	336	524	6.24	6.96	31,200
May	1,450	480	797	9.49	10.94	49,000
June	650	234	392	4.67	5.21	23,300
July	234	121	163	1.94	2.24	10,000
August	148	92	106	1.26	1.45	6,520
September	400	80	121	1.44	1.61	7,200
The year	5,040	80	476	5.67	77.02	345,000

65904—26—WSP 592——5

STILAGUAMISH RIVER BASIN

DEER CREEK AT OSO, WASH.

LOCATION.—In sec. 5, T. 32 N., R. 7 W., 1¼ miles above Oso and junction with North Fork of Stilaguamish River, Snohomish County.

DRAINAGE AREA.—84 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 11, 1917, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank about 250 feet below mouth of 3-mile canyon; inspected by F. L. Bloxham. Datum lowered 0.50 foot July 24, 1920.

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

CHANNEL AND CONTROL.—Bed composed of boulders and gravel overlying bedrock. Banks high. One channel at all stages. Gage height of zero flow, November 5, 1923, −0.56 foot ± 0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water mark in well, 10.4 feet at 11 p. m. February 11 (discharge, 8,490 second-feet); minimum stage, 0.46 foot September 17 (discharge, 35 second-feet).

1918–1924: Maximum stage from high-water mark in well 11.7 feet December 12, 1921 (discharge, 10,400 second-feet); minimum stage, 1.08 feet September 29 and 30, 1919, and 0.40 foot on September 17, 1923 (discharge, 27 second-feet).

ICE.—Stage-discharge relation affected by ice, during severe winters; flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed October 17; not affected by ice. Rating curve used prior to change fairly well defined; that used after October 17, well defined between 100 second-feet and 2,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined by inspection from gage-height graph or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records good.

COOPERATION.—Gage-height record furnished by the Interurban Land Co.

Discharge measurements of Deer Creek at Oso, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 24	1.45	144	Jan. 25	2.26	330	Sept. 25	2.46	381
25	1.28	116	June 20	1.70	188	26	1.84	222
Nov. 5	1.24	107						

Daily discharge, in second-feet, of Deer Creek at Oso, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	52	73	319		2,430	605	175	406	208	78	43	43
2	51	624	314		1,310		385	474	199	74	43	42
3	48	199	1,030		878		339	385	193	71	46	41
4	47	138	1,540	200	2,610		232	324	165	69	51	40
5	46	112	925		3,340	370	345	330	141	64	46	40
6	176	99			1,190		457	292	181	66	43	40
7	122	87		605	988		585	292	162	63	40	39
8	80	78		565	672	243	454	364	132	59	39	40
9	66	75		480	527	262	341	509	134	57	38	43
10	58	69	1,200	2,160	514	252	394	565	141	55	38	40
11	51	67		720	6,420	232	441	672	147	53	38	38
12	48	69		457	4,230	210	527	770	148	52	37	38
13	46	71		361	1,220	210	457	648	145	50	36	37
14	47	86		305	932	310	361	474	126	57	38	36
15	464	75		285	795	270	308	376	112	73	38	35
16	1,020	68		260	565	216	388	370	99	86	38	35
17	1,020	64		257	720	187	730	413	571	65	43	35
18	453	60		227	585	169	2,220	394	571	59	767	61
19	252	159	800	191	491	165	618	295	243	94	278	92
20	185	167		191	491	158	419	295	189	98	152	52
21	148	160		204	626	147	332	352	154	64	104	59
22	292	262		356	527	134	298	344	132	57	79	680
23	208	1,970		731	457	124	255	298	116	53	68	1,770
24	145	3,800	626	457	419	122	219	300	106	50	61	1,010
25	120	2,420	648	335	510	111	206	272	104	48	57	390
26	105	1,290	491	406	648	112	234	195	98	47	53	230
27	93	648	457	491	1,590	129	327	175	90	47	51	167
28	86	822	546	1,130	1,460	177	394	181	85	51	49	132
29	78	605	457	1,470	744	152	400	183	80	51	46	111
30	76	441	316	2,040	------	138	542	189	80	47	45	393
31	74	------	223	4,950	------	136	------	204	------	45	44	------

NOTE.—Water-stage recorder not operating satisfactorily Dec. 6–23 and Jan. 1–6; intake clogged Mar. 2–7. Discharge Dec. 6–23 and Jan. 1–6 estimated by comparison with records of near-by streams; Mar. 2–6 from recorded graph after making corrections assumed applicable owing to clogged intake. Braced figures show mean discharge for periods indicated.

Monthly discharge of Deer Creek at Oso, Wash., for the year ending September 30, 1924

[Drainage area, 84 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,020	46	186	2.21	2.55	11,400
November	3,800	60	495	5.89	6.57	29,500
December	----------	223	835	9.94	11.46	51,300
January	4,950	----------	672	8.00	9.22	41,300
February	6,420	419	1,310	15.6	16.82	75,400
March	605	111	232	2.76	3.18	14,300
April	2,220	175	446	5.31	5.92	26,500
May	770	175	366	4.36	5.03	22,500
June	571	80	168	2.00	2.23	10,000
July	98	45	61.4	.731	.84	3,780
August	767	36	82.2	.979	1.13	5,050
September	1,770	35	194	2.31	2.58	11,500
The year	6,420	35	417	4.96	67.53	303,000

SKAGIT RIVER BASIN

SKAGIT RIVER BELOW RUBY CREEK, NEAR MARBLEMOUNT, WASH.

LOCATION.—In Whatcom County, three-fourths of a mile below Ruby Creek, 5 miles above Reflector Bar, and 23 miles northeast of Marblemount, Skagit County.

DRAINAGE AREA.—978 square miles. Area in United States, 588 square miles, measured on Washington National Forest map, edition of 1922; area in British Columbia, 390 square miles.[3]

RECORDS AVAILABLE.—June 1, 1919, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank three-fourths of a mile below Ruby Creek, installed June 9, 1919; inspected by F. E. Davis.

DISCHARGE MEASUREMENTS.—Made from cable 40 feet below gage.

CHANNEL AND CONTROL.—Control at head of rapids about 125 feet below gage; composed of large, angular boulders and perhaps some bedrock; permanent. Banks high and wooded; not subject to overflow. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 12.2 feet at 7.45 a. m. February 12 (discharge, 26,200 second-feet); minimum stage from recorder, 3.38 feet at 2.45 p. m. November 15 (discharge, 599 second-feet).

1919–1924: Maximum stage recorded, 16.1 feet at 7 p. m. December 12, 1921 (discharge from extension of rating curve, 45,700 second-feet); minimum stage, 3.30 feet at 10 p. m. November 11, 1919 (discharge, 555 second-feet).

ICE.—Stage-discharge relation slightly affected by ice during severe winters. Flow estimated from observer's notes and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 31 to January 5. Rating curve well defined between 600 and 20,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days when there was considerable variation in stage, by averaging results obtained by applying to rating table mean gage heights for shorter intervals. Records excellent.

Discharge measurements of Skagit River below Ruby Creek, near Marblemount, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 1	R. B. Kilgore	3.59	744	Aug. 15	F. E. Davis	4.68	1,730
2	do	3.80	895	Sept. 20	D. J. F. Calkins	3.71	808
June 25	G. L. Parker	6.53	4,500	20	do	3.70	810
July 18	F. E. Davis	5.16	2,100				

[3] White, A. V., Water powers of British Columbia, p. 483, Conservation Commission of Canada.

Daily discharge, in second-feet, of Skagit River below Ruby Creek, near Marblemount, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	942	737	863		7,230	2,820	1,160	4,960	8,900	5,800	2,020	1,130
2	974	842	856		5,480	2,600	1,160	6,020	10,200	6,250	1,960	1,240
3	1,010	807	842	900	4,280	2,390	1,160	6,480	10,600	6,020	1,910	1,340
4	1,050	772	966		3,630	2,260	1,160	6,020	9,550	5,580	1,860	1,480
5	1,060	765	1,110		4,180	2,140	1,160	5,160	8,030	5,160	1,740	1,580
6	1,120	730	1,380	918	3,900	2,080	1,160	4,660	6,720	4,370	1,690	1,380
7	1,090	712	1,480	886	3,540	2,020	1,430	4,370	5,800	3,460	1,740	1,340
8	990	694	1,340	870	3,130	1,910	1,910	4,660	5,800	3,130	1,860	1,430
9	942	682	1,200	856	2,820	1,860	1,960	6,020	6,020	3,210	1,910	1,160
10	886	658	1,180	950	2,530	1,800	2,080	8,600	6,480	3,210	1,910	1,010
11	863	640	1,580	910	6,050	1,740	2,140	11,400	6,250	2,970	1,910	990
12	849	634	1,640	878	21,200	1,690	2,200	15,300	6,250	3,050	1,860	1,070
13	842	622	1,480	863	12,600	1,640	2,260	18,200	6,250	3,130	1,800	1,140
14	814	610	1,380	842	8,310	1,640	2,260	19,700	6,250	3,210	1,800	1,160
15	894	604	1,640	828	6,480	1,580	2,140	18,700	6,720	2,970	1,690	1,140
16	998	604	2,140	807	5,260	1,530	2,020	17,200	6,480	2,530	1,690	1,090
17	1,020	610	2,140	807	4,560	1,480	1,960	16,200	6,020	2,320	1,580	998
18	974	604	2,320	800	3,990	1,480	1,960	16,200	5,260	2,260	1,740	870
19	926	622	2,260	779	3,540	1,430	1,860	15,300	4,860	2,260	1,690	849
20	1,050	646	2,020	765	3,210	1,430	1,740	14,800	4,560	2,260	1,530	800
21	1,240	622	1,860	765	2,970	1,380	1,690	14,000	4,370	2,200	1,430	807
22	1,340	622	1,690	765	2,740	1,340	1,640	13,500	4,280	2,140	1,380	1,720
23	1,110	718	1,580	772	2,530	1,290	1,640	12,600	4,180	2,140	1,430	2,820
24	1,020	1,030	1,530	772	2,390	1,290	1,580	11,800	4,180	2,390	1,480	1,910
25	966	1,030	1,480	758	2,260	1,240	1,530	10,600	4,560	2,670	1,530	1,480
26	918	990	1,380	751	2,260	1,240	1,640	8,310	4,760	2,820	1,580	1,240
27	870	942	1,340	751	2,390	1,200	1,910	7,230	4,560	2,820	1,690	1,170
28	842	982	1,290	793	3,130	1,200	2,460	6,250	4,370	2,670	1,580	1,180
29	807	982	1,290	942	2,970	1,170	3,290	6,020	4,660	2,260	1,340	1,170
30	772	942	1,130	1,580	-------	1,150	4,280	6,250	5,260	2,200	1,160	1,690
31	751	-------	870	4,570	-------	1,160	-------	6,970	-------	2,140	1,110	-------

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

Monthly discharge of Skagit River below Ruby Creek, near Marblemount, Wash., for the year ending September 30, 1924

[Drainage area, 978 square miles.]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,340	751	965	0.987	1.14	59,300
November	1,030	604	748	.765	.85	44,500
December	2,320	842	1,460	1.49	1.72	89,800
January	4,570	751	983	1.01	1.16	60,400
February	21,200	2,260	4,810	4.92	5.31	277,000
March	2,820	1,150	1,650	1.69	1.95	101,000
April	4,280	1,160	1,880	1.92	2.14	112,000
May	19,700	4,370	10,400	10.6	12.22	640,000
June	10,600	4,180	6,070	6.21	6.93	361,000
July	6,250	2,140	3,210	3.28	3.78	197,000
August	2,020	1,110	1,660	1.70	1.96	102,000
September	2,820	800	1,280	1.31	1.46	76,200
The year	21,200	604	2,930	3.00	40 62	2,120,000

SKAGIT RIVER NEAR MARBLEMOUNT, WASH.

LOCATION.—In SE. ¼ sec. 21, T. 37 N., R. 12 E., at city of Seattle power camp, Whatcom County, one-fourth of a mile above Newhalem Creek, 6½ miles below Stetattle Creek, and 16 miles above Marblemount.

DRAINAGE AREA.—1,160 square miles. Area in United States 770 square miles, measured on Washington National Forest maps; area in Canada, 390 square miles.[4]

RECORDS AVAILABLE.—December 21, 1908, to May 23, 1914; October 1, 1920, to September 30, 1924.

GAGE.—Stevens water-stage recorder installed June 5, 1923, on right bank about 300 feet below suspension footbridge and trail to Newhalem Creek power plant; inspected by F. E. Davis. Present gage datum 400 feet, above mean sea level; United States Geological Survey datum.

DISCHARGE MEASUREMENTS.—Made from suspension bridge or from measuring cable at gage.

CHANNEL AND CONTROL.—Right bank high, not subject to overflow; left bank gently sloping and wooded, is overflowed at extremely high stage. Channel straight for several hundred feet above and for long distance below gage. Control is gravel and boulder riffle; shifts at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 90.85 feet at 7.15 a. m. February 12 (discharge, 31,400 second-feet); minimum stage, from recorder, 80.18 feet from 1 to 10.30 p. m. November 18 (discharge, 802 second-feet).

1908–1914; 1920–1924: Maximum stage recorded, 94.2 feet at 8 p. m. December 12, 1921 (discharge, 60,000 second-feet); minimum stage recorded, 80.2 feet on March 7, 12, 13, 15–17, and 19, 1922 (discharge, 740 second-feet).

ICE.—Stage-discharge relation seriously affected by ice during severe winters; flow estimated from observer's notes and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice January 1–5. Rating curve, revised slightly for use after February 12, 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 determined from recorder graph by inspection or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Records excellent.

Discharge measurements of Skagit River near Marblemount, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 30	R. B. Kilgore	80.49	925	Aug. 19	F. E. Davis	82.43	2,710
31	do	80.46	920	Sept. 18	D. J. F. Calkins	81.02	1,280
June 24	G. L. Parker	84.15	5,570	21	do	80.63	1,050
27	do	84.39	5,970				

[4] White, A. V., Water powers of British Columbia, p. 483, Conservation Commission of Canada.

Daily discharge, in second-feet, of Skagit River near Marblemount, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,510	980	1,240		10,500	3,580	1,320	6,260	10,800	8,540	3,350	1,880
2	1,640	1,330	1,200		7,520	3,280	1,400	7,570	12,400	9,330	3,140	2,190
3	1,780	1,080	1,200	1,180	5,690	3,000	1,360	8,040	12,700	9,060	3,070	2,480
4	1,870	1,010	1,510		4,930	2,800	1,320	7,340	11,700	8,290	2,930	2,860
5	1,870	980	1,780		6,090	2,670	1,320	6,260	9,900	7,570	2,800	3,070
6	1,970	950	2,380	1,240	5,300	2,540	1,360	5,630	8,290	6,260	2,800	2,540
7	1,690	925	2,460	1,240	4,750	2,420	2,040	5,230	7,120	5,030	3,000	2,600
8	1,460	900	2,070	1,240	4,070	2,300	2,540	5,630	7,120	4,470	3,280	2,800
9	1,380	875	1,820		3,680	2,240	2,600	7,340	7,570	4,840	3,650	1,880
10	1,330	875	1,780		3,320	2,190	2,670	10,500	8,040	4,840	3,580	1,520
11	1,280	850	2,590		8,720	2,080	2,670	13,700	8,040	4,470	3,500	1,560
12	1,240	850	2,580	1,200	26,700	2,030	2,800	17,600	7,800	4,840	3,350	1,840
13	1,160	830	2,220		15,800	1,980	2,860	21,200	7,570	5,030	3,350	2,060
14	1,160	850	2,070		10,500	1,980	2,800	22,200	7,570	5,030	3,350	2,080
15	1,460	850	2,720		8,040	1,930	2,600	20,700	8,540	4,470	3,000	2,030
16	1,510	830	3,750	1,080	6,680	1,880	2,480	19,300	8,040	3,650	3,000	1,930
17	1,560	810	3,460	1,080	5,840	1,830	2,360	18,400	7,570	3,420	2,740	1,600
18	1,420	810	3,680	1,080	5,030	1,780	2,540	18,800	6,680	3,210	3,280	1,280
19	1,330	875	3,390	1,010	4,470	1,740	2,300	18,000	6,050	3,280	3,000	1,180
20	1,640	900	2,900	1,010	4,050	1,690	2,140	17,600	5,630	3,280	2,670	1,100
21	1,970	850	2,540	1,010	3,730	1,640	2,080	16,800	5,630	3,280	2,300	1,100
22	2,070	875	2,170	1,040	3,420	1,600	2,030	16,400	5,630	3,210	2,360	2,750
23	1,600	1,040	2,170	1,120	3,140	1,560	1,980	15,600	5,430	3,280	2,480	4,660
24	1,380	1,820	2,070	1,080	2,930	1,520	1,880	14,800	5,630	3,970	2,740	2,740
25	1,240	1,780	1,970	1,040	2,860	1,520	1,880	13,000	6,260	4,650	2,930	1,980
26	1,160	1,730	1,870	1,040	2,800	1,480	1,930	10,500	6,470	5,030	3,070	1,640
27	1,080	1,690	1,780	1,080	3,140	1,480	2,360	8,800	6,260	5,030	3,420	1,520
28	1,040	1,640	1,740	1,200	4,300	1,480	3,140	7,800	6,050	4,470	2,930	1,600
29	980	1,510	1,690	1,570	3,890	1,440	4,130	7,340	6,680	3,730	2,190	1,600
30	950	1,420	1,460	2,820	-------	1,400	5,430	7,570	7,800	3,650	1,780	2,720
31	925	-------	1,330	8,250	-------	1,360	-------	8,540	-------	3,580	1,740	-------

NOTE.—Water-stage recorder not operating Nov. 26, 27, Dec. 21, and Jan. 9–15; discharge estimated by interpolation Nov. 26, 27, and Dec. 21; and for Jan. 9–15 by comparison with records of Skagit River below Ruby Creek and Thunder Creek near Marblemount. Braced figures show mean discharge for periods indicated.

Monthly discharge of Skagit River near Marblemount, Wash., for the year ending September 30, 1924

[Drainage area, 1,160 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	2,070	925	1,440	1.24	1.43	88,500
November	1,820	810	1,090	.940	1.05	64,900
December	3,750	1,200	2,180	1.88	2.17	134,000
January	8,250	1,010	1,440	1.24	1.43	88,500
February	26,700	2,800	6,270	5.41	5.84	361,000
March	3,580	1,360	2,010	1.73	1.99	124,000
April	5,430	1,320	2,340	2.02	2.25	139,000
May	22,200	5,230	12,400	10.7	12.34	762,000
June	12,700	5,430	7,700	6.64	7.41	458,000
July	9,330	3,210	4,930	4.25	4.90	303,000
August	3,650	1,740	2,930	2.53	2.92	180,000
September	4,660	1,100	2,090	1.80	2.01	124,000
The year	26,700	810	3,900	3.36	45.74	2,830,000

THUNDER CREEK NEAR MARBLEMOUNT, WASH.

LOCATION.—In Whatcom County, a quarter of a mile above junction with Skagit River, 3½ miles from Reflector Bar ranger station and 20 miles northeast of Marblemount, Skagit County.

DRAINAGE AREA.—111 square miles (measured on Washington National Forest map, edition of 1922).

RECORDS AVAILABLE.—February 15, 1919, to September 30, 1924.

GAGE.—Stevens water-stage recorder on left bank a quarter of a mile above mouth; inspected by F. E. Davis.

DISCHARGE MEASUREMENTS.—Made from cable half a mile above gage or by wading.

CHANNEL AND CONTROL.—Control at high stage is at head of falls about 200 feet below gage; at low stage, it is bed of stream between gage and falls; composed of shifting gravel and boulders. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 11.1 feet at 7 a. m. February 12 (discharge, 5,050 second-feet); minimum stage, 3.36 feet at 6 p. m. November 22 (discharge, 113 second-feet).

1919–1924: Maximum stage, 15.5 feet, about 4.30 p. m. December 12, 1921 (discharge, 9,720 second-feet); minimum stage, 2.88 feet, from March 14 to 17, 1922 (discharge, 71 second-feet). Discharge may have been less in January and February, 1922, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice during severe winters. Flow estimated from study of observer's notes, weather records, and results at near-by gaging stations.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed October 1–5, February 12, and May 10 to September 16; affected by ice December 31 to January 6. Rating curves fairly well defined up to 2,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for days of considerable variation in stage, by averaging results obtained by applying mean gage heights for shorter intervals. Shifting-control method used October 1–5 and May 10 to September 16. Records good.

Discharge measurements of Thunder Creek near Marblemount, Wash., during the the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 3	R. B. Kilgore	3.70	168	Sept. 19	D. J. F. Calkins	3.86	285
June 26	G. L. Parker	5.94	1,000	19	do	3.84	275
30	F. E. Davis	7.12	1,720				

Daily discharge, in second-feet, of Thunder Creek near Marblemount, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	498	154	172		1,190	393	161	668	1,380	1,980	980	670
2	600	247	168		750	372	168	805	1,560	2,190	906	883
3	673	170	164		562	348	163	830	1,560	2,190	858	980
4	692	163	222	140	512	325	155	712	1,320	1,980	812	1,230
5	654	155	233		634	309	154	625	1,080	1,740	835	1,260
6	634	150	331		545	300	154	563	881	1,260	882	980
7	448	145	322	157	496	286	245	523	695	980	1,000	1,080
8	381	142	262	152	432	278	298	584	717	955	1,170	1,080
9	362	137	235	148	378	273	289	830	881	1,170	1,350	580
10	387	136	224	195	346	260	309	1,170	1,030	1,200	1,290	482
11	368	134	314	172	1,150	250	309	1,560	1,030	1,080	1,260	563
12	356	131	295	161	3,930	240	315	1,980	980	1,230	1,200	752
13	331	130	262	152	2,050	235	318	2,260	930	1,350	1,230	860
14	381	139	245	148	1,290	235	312	2,120	955	1,380	1,200	838
15	432	134	368	145	955	228	292	1,910	1,140	1,080	1,060	816
16	328	128	528	142	780	217	280	1,770	1,030	788	1,030	753
17	287	122	480	139	668	212	273	1,740	1,030	744	906	500
18	250	120	480	134	584	208	292	1,770	832	702	1,170	362
19	247	132	432	131	523	206	260	1,700	763	767	955	290
20	365	131	368	128	478	199	247	1,630	697	745	814	252
21	480	120	322	126	446	192	238	1,630	741	788	707	245
22	464	116	292	132	414	186	233	1,630	741	767	792	610
23	308	139	280	131	379	182	228	1,530	719	882	882	790
24	250	282	262	125	358	180	217	1,530	881	1,230	1,000	375
25	224	245	250	124	341	176	215	1,260	1,030	1,530	1,110	288
26	206	203	228	124	331	172	231	980	1,060	1,600	1,230	243
27	188	184	217	124	354	172	275	760	980	1,560	1,380	245
28	172	252	212	134	485	172	351	671	980	1,290	1,060	313
29	159	215	201	163	424	168	478	629	1,230	1,060	709	337
30	152	190	172	274	-------	164	604	738	1,600	1,140	542	782
31	147	-------	140	949	-------	163	-------	980	-------	1,080	560	-------

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

Monthly discharge of Thunder Creek near Marblemount, Wash., for the year ending September 30, 1924

[Drainage area, 111 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	692	147	369	3.32	3.83	22,700
November	282	116	162	1.46	1.63	9,640
December	528	140	280	2.52	2.90	17,200
January	949	124	173	1.56	1.80	10,600
February	3,930	331	751	6.77	7.30	43,200
March	393	163	236	2.13	2.46	14,500
April	604	154	269	2.42	2.70	16,000
May	2,260	523	1,230	11.1	12.80	75,600
June	1,600	695	1,020	9.19	10.25	60,700
July	2,190	702	1,240	11.2	12.91	76,200
August	1,380	542	996	8.97	10.34	61,200
September	1,260	243	646	5.82	6.49	38,400
The year	3,930	116	614	5.53	75.41	446,000

65904—26—WSP 592——6

SAUK RIVER AT DARRINGTON, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 32 N., R. 9 E., at suspension footbridge half a mile southeast of Darrington, Snohomish County, 2½ miles below Clear Creek, and 23 miles above mouth of river.

DRAINAGE AREA.—293 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 15, 1914, to September 30, 1924.

GAGE.—Vertical and inclined staff on right bank at suspension footbridge; installed April 14, 1922; read by Paul Schmidt.

DISCHARGE MEASUREMENTS.—Made by wading or from the suspension footbridge.

CHANNEL AND CONTROL.—Bed composed of gravel and large boulders. Right bank at gage high and not subject to overflow; left bank flat and subject to overflow at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.5 feet February 12 (discharge, 19,000 second-feet); minimum stage recorded, 1.35 feet November 19 (discharge, 432 second-feet).

1914–1924: Maximum stage, 15.0 feet at 9 a. m. December 29, 1917, and 4 p. m. December 12, 1921, determined by levels to high-water mark (discharge, 36,000 second-feet); minimum stage recorded, 1.15 feet on March 26, 1922 (discharge, 315 second-feet).

ICE.—Stage-discharge relation only slightly affected by ice during severe winters.

DIVERSIONS.—An average diversion of possibly 10 second-feet is made from a point about one-fourth mile above gage for the purpose of driving shingle bolts to mill pond at Darrington.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water February 12; affected by ice January 1–4. Rating curves well defined between 600 and 10,000 second-feet. Gages read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except for periods represented by flat estimates of discharge.

Discharge measurements of Sauk River at Darrington, Wash., during the year ending September 30, 1924

[Made by R. B. Kilgore]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 25	2.11	858	June 20	3.27	1,760
Nov. 6	1.95	741	Sept. 26	2.37	904
Jan. 26	2.26	998			

Daily discharge, in second-feet, of Sauk River at Darrington, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	505	720	1,630	700	7,320	1,820	690	2,220	3,320	2,820	860	
2	555	990	1,430		4,720	1,580	745	2,510	3,500	3,150	800	
3	610	910	2,330		4,150	1,360	800	2,510	3,680	2,820	745	
4	638	840	3,790		3,610	1,260	860	2,080	3,320	2,510	690	
5	665	780	5,940	810	5,110	1,260	920	1,820	2,980	2,080	690	
6	692	750	4,720	840	3,970	1,160	920	1,700	2,820	1,820	690	700
7	720	720	3,790	910	2,930	1,070	1,070	1,700	2,360	1,580	745	
8	638	692	3,090	990	2,330	1,070	1,360	1,950	2,080	1,360	800	
9	582	638	1,850	1,070	2,080	1,070	1,260	2,510	2,220	1,360	800	
10	505	582	2,470	1,160	1,850	1,160	1,160	3,500	2,360	1,260	920	
11	505	530	2,200	1,250	16,100	1,260	1,070	5,700	2,510	1,260		
12	555	530	1,960	1,340	19,000	1,260	1,160	7,560	2,510	1,260		
13	582	530	2,470	1,430	7,080	1,360	1,260	6,610	2,360	1,260		
14	638	505	3,090	1,340	5,270	1,160	1,260	5,480	2,220	1,260		
15	1,250	505	3,970	1,250	3,680	920	1,070	5,060	2,510	1,260		
16	3,430	480	3,430	1,160	3,500	800	1,070	4,640	2,510	1,160	1,000	500
17	2,330	455	3,610	1,030	3,320	800	1,360	4,640	2,660	1,070		
18	1,740	455	3,610	910	2,820	800	2,360	5,060	2,220	990		
19	1,530	432	3,260	840	2,220	745	1,820	4,640	1,950	1,070		
20	1,430	455	2,930	780	2,080	745	1,160	4,440	1,700	1,160		
21	1,250	780	2,470	780	2,080	800	1,070	4,240	1,820	1,070		
22	1,160	1,430	2,080	750	1,820	800	1,070	4,050	1,950	1,000		
23	990	2,620	2,330	780	1,580	745	1,070	3,860	1,950	1,170		1,600
24	910	5,110	2,200	840	1,470	745	920	3,500	1,950	1,300		
25	840	5,940	1,960	910	1,470	690	990	3,320	1,950	1,450		
26	750	4,340	2,080	990	2,220	690	1,070	2,660	2,220	1,500	700	920
27	692	3,790	1,850	1,340	3,320	690	1,160	2,510	2,220	1,400		
28	638	2,930	1,630	1,850	2,820	662	1,470	2,220	2,220	1,070		900
29	610	2,470	1,430	2,470	2,080	662	1,580	2,080	2,510	990		
30	582	2,080	1,160	3,790	-------	690	1,820	2,510	2,660	920		
31	555	-------	990	15,200	-------	662	-------	3,150	-------	920		

NOTE.—Discharge Jan. 1–4 estimated by comparison with records of near-by streams because of ice effect. Gage heights July 22–27 questionable; owing to observer's death gage not read Aug. 11–31, Sept. 1–25, and 27–30. Discharge estimated by comparison with records of near-by streams. Braced figures show mean discharge for periods indicated.

Monthly discharge of Sauk River at Darrington, Wash., for the year ending September 30, 1924

[Drainage area, 293 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,430	505	938	3.20	3.69	57,700
November	5,940	432	1,470	5.02	5.60	87,500
December	5,940	990	2,640	9.01	10.39	162,000
January	15,200	----------	1,600	5.46	6.30	98,400
February	19,000	1,470	4,210	14.4	15.53	242,000
March	1,820	662	984	3.36	3.87	60,500
April	2,360	690	1,190	4.06	4.53	70,800
May	7,560	1,700	3,560	12.2	14.07	219,000
June	3,680	1,700	2,440	8.33	9.29	145,000
July	3,150	920	1,460	4.98	5.74	89,800
August	----------	----------	821	2.80	3.23	50,500
September	----------	----------	817	2.79	3.11	48,600
The year	19,000	432	1,830	6.25	85.35	1,330,000

BAKER RIVER BELOW ANDERSON CREEK, NEAR CONCRETE, WASH.

LOCATION.—In SE. ¼ sec. 30, T. 37 N., R. 9 E., Whatcom County, 350 feet below Anderson Creek, a quarter of a mile above Baker River ranger station, and 11 miles above Concrete.

DRAINAGE AREA.—184 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 10, 1910, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder referred to inside staff gage, on left bank; installed September 24, 1915; inspected by Charles Bagnell.

DISCHARGE MEASUREMENTS.—Made from cable 300 feet above gage.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel over bedrock; not likely to shift except during extremely high water. Right bank high and rocky; left bank fairly high, wooded, subject to overflow at about 11-foot stage.

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water mark in well, 11.9 feet sometime late January 31 or early February 1, when water-stage recorder was not operating (discharge, 28,500 second-feet); minimum stage, 2.00 feet for few hours November 1 and 17 (discharge, 450 second-feet). Stage probably very slightly lower November 18 when because of torn record paper exact stage can not be determined.

1910–1924: Maximum stage recorded, 13.7 feet at 12.30 p. m. December 29, 1917 (discharge, 36,800 second-feet); minimum stage recorded, 1.21 feet on December 15–16, 1919 (discharge, 219 second-feet).

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water January 31. Rating curves fairly well defined below 10,000 second-feet. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection or, for a few days when range of stage was considerable, by averaging results obtained by applying mean gage heights for shorter intervals. Records good.

Discharge measurements of Baker River below Anderson Creek, near Concrete, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 28	R. B. Kilgore	2.28	568	Sept. 23	D. J. F. Calkins	6.52	5,460
June 18	do	4.08	2,110	24	do	5.51	3,570
19	do	4.02	2,040				

Daily discharge, in second-feet, of Baker River below Anderson Creek, near Concrete, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	865	565	1,120	698		2,220	888	2,120	4,440	3,650	1,440	1,040
2	958	1,160	1,010	680		1,840	982	2,380	4,840	3,730	1,360	1,160
3	1,010	865	1,080	664		1,620	1,120	2,270	4,640	3,570	1,320	1,280
4	1,010	758	1,480	652		1,440	1,080	1,980	3,980	3,330	1,360	1,400
5	972	728	1,520		3,200	1,320	1,440	1,700	3,250	2,880	1,360	1,570
6	1,520	669	2,010			1,320	1,440	1,520	2,490	2,270	1,360	1,480
7	1,080	615		900		1,240	1,440	1,480	2,020	1,750	1,400	1,400
8	972	580				1,200	1,660	1,700	2,120	1,620	1,520	1,400
9	872	535	1,300			1,160	1,660	2,520	2,620	1,750	1,700	1,160
10	782	509				1,120	1,660	3,820	3,100	1,800	1,750	952
11	770	482	2,060	1,240	6,330	1,080	1,660	4,940	3,330	1,700	1,750	930
12	752	485	1,680	1,080	15,500	1,080	1,620	6,520	2,740	1,800	1,750	990
13	704	478	1,360	972	6,320	1,040	1,570	6,940	2,550	1,880	1,750	1,080
14	770	620	1,480	865	3,650	1,080	1,570	5,620	2,490	1,930	1,660	1,160
15	1,240	521	2,520	806	2,950	1,040	1,520	4,540	2,810	1,980	1,520	1,160
16	1,520	478	3,000	752	2,270	1,000	1,480	4,340	2,550	1,620	1,480	1,160
17	1,560	460	2,930	734	2,020	982	1,440	4,640	2,550	1,480	1,400	1,000
18	1,360	680	3,370	686	1,840	968	1,570	4,840	2,270	1,400	2,270	923
19	1,240	900	2,490	636	1,660	960	1,360	3,980	2,020	1,440	1,980	1,000
20	1,560	740	1,860	610	1,570	938	1,240	4,070	1,880	1,520	1,660	930
21	1,730	686	1,520	630	1,700	916	1,120	4,540	1,840	1,440	1,480	923
22	1,520	716	1,440	764	1,570	895	1,040	4,440	1,840	1,440	1,400	2,920
23	1,120	1,180	1,480	935	1,440	867	975	3,980	1,880	1,570	1,360	5,450
24	907	2,430	1,440	865	1,360	854	909	4,070	2,170	1,840	1,360	3,210
25	794	2,320	1,360	788	1,570	840	874	3,570	2,430	2,120	1,400	1,820
26	728	1,860	1,240	865	1,840	840	909	2,430	2,550	2,220	1,440	1,360
27	647	1,640	1,120	965	2,840	881	1,120	1,980	2,270	2,070	1,570	1,150
28	575	1,910	1,080	1,240	4,500	945	1,480	2,020	2,120	1,840	1,480	1,070
29	530	1,640	995	1,820	3,020	982	1,750	2,220	2,620	1,570	1,320	1,070
30	489	1,360	852	3,520	-------	952	2,120	2,680	3,250	1,480	1,160	2,300
31	471	-------	746	16,700	-------	923	-------	3,410	-------	1,480	1,040	-------

NOTE.—Recorder not operating satisfactorily Dec. 7–10, Jan. 5–10, and Jan. 31 to Feb. 10; discharge Jan. 31 determined from partial graph and high-water marks in well. Discharge for other periods of faulty record estimated by comparison with records of near-by streams. Braced figures show mean discharge for periods indicated.

Monthly discharge of Baker River below Anderson Creek near Concrete, Wash., for the year ending September 30, 1924

[Drainage area, 184 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,730	471	1,000	5.43	6.26	61,500
November	2,430	460	952	5.17	5.77	56,600
December	3,370	746	1,590	8.64	9.96	97,800
January	16,700	610	1,470	7.99	9.21	90,400
February	15,500	1,360	3,310	18.0	19.41	190,000
March	2,220	840	1,110	6.03	6.95	68,200
April	2,120	874	1,360	7.39	8.24	80,900
May	6,940	1,480	3,460	18.8	21.67	213,000
June	4,840	1,840	2,720	14.8	16.51	162,000
July	3,730	1,400	2,010	10.9	12.57	124,000
August	2,270	1,040	1,510	8.21	9.46	92,800
September	5,450	923	1,480	8.04	8.97	88,100
The year	16,700	460	1,830	9.95	134.98	1,330,000

UPPER COLUMBIA RIVER BASIN

MAIN STREAM

COLUMBIA RIVER AT TRAIL, B. C.

LOCATION.—At highway bridge at Trail, 15 miles above international boundary and mouth of Clark Fork and 18 miles below mouth of Kootenai River.

DRAINAGE AREA.—34,000 square miles (measured by Dominion Water Power Branch).

RECORDS AVAILABLE.—April 18, 1913, to September 30, 1924.

GAGE.—Chain gage installed on bridge in June, 1913; read by C. A. Broderick.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel straight for a quarter of a mile above and below gage. Riffle control below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum mean daily stage recorded during year, 31.1 feet May 26 (discharge, 199,000 second-feet); minimum mean daily stage recorded, 7.75 feet January 17, 24, 26 (discharge, 13,000 second-feet).

1913–1924: Maximum stage recorded, 41.6 feet June 14–15, 1913 (discharge, 312,000 second-feet); minimum stage recorded, 7.40 feet March 28, 1917 (discharge, 9,600 second-feet).

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

DIVERSION.—A small amount of water is diverted above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Gage read twice daily to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Complete record furnished by Dominion Water Power Branch, Department of the Interior, Canada.

Discharge measurements of Columbia River at Trail, B. C., during the year ending September 30, 1924

[Made by G. K. Beeston]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Jan. 16	7.85	13,100	June 6	28.65	183,000
Feb. 29	9.15	19,200	Aug. 6	22.00	105,000

Daily discharge, in second-feet, of Columbia River at Trail, B. C., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	50,900	29,500	19,300	15,800	14,000	18,600	16,000	27,100	176,000	133,000	111,000	93,500
2	49,200	28,700	19,200	15,600	14,100	18,500	16,000	29,500	175,000	134,000	112,000	92,400
3	47,400	28,200	19,100	15,400	14,300	18,400	16,200	31,600	174,000	141,000	113,000	91,400
4	46,400	27,700	18,900	15,300	14,400	18,200	16,300	35,200	174,000	148,000	114,000	90,300
5	45,100	27,100	18,800	15,100	14,600	18,200	16,400	37,600	175,000	156,000	113,000	89,000
6	44,200	26,600	18,700	14,900	15,000	18,100	16,500	39,600	174,000	162,000	112,000	87,800
7	43,400	26,100	18,600	14,700	15,200	18,000	16,600	42,100	172,000	165,000	110,000	86,600
8	42,700	25,600	18,300	14,600	15,500	18,000	16,700	44,900	170,000	168,000	108,000	85,400
9	42,100	25,100	18,200	14,400	15,700	18,000	17,000	48,100	168,000	165,000	105,000	84,100
10	41,500	24,800	18,100	14,200	16,000	18,000	17,200	52,300	166,000	162,000	102,000	82,800
11	40,900	24,300	17,900	14,000	16,300	18,000	17,400	57,900	164,000	158,000	101,000	81,400
12	40,400	23,900	17,800	13,800	16,500	18,100	17,700	65,600	163,000	152,000	100,000	80,100
13	39,600	23,600	17,800	13,600	16,800	18,200	17,900	73,200	161,000	146,000	99,600	78,800
14	39,200	23,200	17,700	13,400	17,000	18,200	18,200	82,300	160,000	142,000	98,000	77,500
15	38,800	22,900	17,700	13,400	17,300	18,200	18,400	99,300	159,000	140,000	98,900	76,300
16	38,300	22,500	17,600	13,200	17,600	18,000	18,700	108,000	159,000	138,000	100,000	75,000
17	37,800	22,000	17,500	13,000	18,000	18,000	19,100	124,000	158,000	136,000	100,000	73,900
18	37,500	21,500	17,500	13,100	18,200	18,000	19,600	140,000	156,000	133,000	101,000	72,700
19	37,000	21,000	17,500	13,300	18,500	17,800	20,000	158,000	155,000	130,000	102,000	71,600
20	36,600	20,700	17,400	13,400	18,600	17,700	20,300	171,000	153,000	126,000	102,000	70,400
21	36,100	20,500	17,300	13,300	18,500	17,600	20,600	181,000	152,000	123,000	102,000	68,000
22	35,800	20,300	17,200	13,200	18,400	17,400	21,000	189,000	150,000	120,000	102,000	65,900
23	35,200	20,200	17,100	13,100	18,200	17,300	21,400	192,000	149,000	116,000	102,000	64,000
24	34,600	20,200	17,000	13,000	18,400	17,200	22,000	196,000	147,000	111,000	99,400	61,900
25	34,000	20,100	16,900	13,100	18,300	17,100	22,600	198,000	144,000	108,000	98,800	60,200
26	33,400	20,100	16,800	13,000	18,400	16,800	23,000	199,000	140,000	105,000	98,200	57,900
27	32,800	20,000	16,700	13,100	18,400	16,600	23,500	198,000	137,000	104,000	97,500	55,800
28	32,200	19,800	16,700	13,200	18,600	16,500	24,000	195,000	134,000	104,000	98,600	54,100
29	31,600	19,200	16,600	13,400	18,600	16,400	24,500	190,000	130,000	106,000	97,300	52,300
30	31,100	19,400	16,300	13,500	-------	16,200	25,300	185,000	132,000	108,000	95,900	50,900
31	30,400	-------	16,100	13,800	-------	16,100	-------	181,000	-------	110,000	94,700	-------

Monthly discharge of Columbia River at Trail, B. C., for the year ending September 30, 1924

[Drainage area, 34,000 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	50,900	30,400	38,900	1.15	1.33	2,390,000
November	29,500	19,200	23,200	.68	.76	1,380,000
December	19,300	16,100	17,700	.52	.60	1,090,000
January	15,800	13,000	13,900	.41	.47	855,000
February	18,600	14,000	16,900	.50	.54	972,000
March	18,600	16,100	17,700	.52	.60	1,090,000
April	25,300	16,000	19,300	.57	.64	1,150,000
May	199,000	27,100	115,000	3.38	3.90	7,070,000
June	176,000	130,000	158,000	4.65	5.19	9,400,000
July	168,000	104,000	134,000	3.94	4.54	8,240,000
August	114,000	94,700	103,000	3.03	3.49	6,330,000
September	93,500	50,900	74,400	2.19	2.44	4,430,000
The year	199,000	13,000	61,000	1.80	24.50	44,400,000

COLUMBIA RIVER AT KETTLE FALLS, WASH.

LOCATION.—In SW. ¼ sec. 23, T. 36 N., R. 37 E., 150 feet above ferry at Kettle Falls, Stevens County, 1½ miles above mouth of Colville River, and 4½ miles below mouth of Kettle River.

DRAINAGE AREA.—64,500 square miles. (Areas in United States measured on maps issued by United States Geological Survey, scale 1:500,000. Areas in British Columbia measured on Department of the Interior railway belt maps, scale 1:500,000; Department of Mines, West Kootenay sheet, scale 1:253,440; and Department of Lands map, scale 1:1,125,000).

RECORDS AVAILABLE.—April 1, 1916, to September 30, 1924. Monthly discharge, May, 1913, to March, 1916.

GAGE.—Since June 5, 1921, several sets of vertical and inclined staff gages on left bank at Kettle Falls ferry, set first at arbitrary datum and later to mean-sea level datum, read by Ed. Pletcher, W. H. Latta, C. T. Humphreys, and B. E. Crofoot. An auxiliary low-water gage installed at mean sea level datum on right or west bank January 25–26, 1924, was read in conjunction with gages on left bank or east side January 26 to April 30, 1924.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Left bank high, right bank is overflowed at extremely high stages. Two channels at extremely low stage. Channel straight for half a mile above and one mile below gage. Bed composed of small boulders and gravel. Control consists of river channel below gage and Rickey Rapids, which is about 3 miles downstream from gage; permanent except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1,186.9 feet May 25–26 (discharge, 287,000 second-feet). Minimum discharge, estimated at 18,600 second-feet on January 1 and 3; during period stage-discharge relation was affected by ice.

1913–1924: Maximum stage, 34.2 feet during night of June 14–15, 1913, as determined from a well-defined high-water mark referred to United States Weather Bureau gage at Marcus (discharge, 468,000 second-feet). Minimum discharge, 15,800 second-feet, result of current-meter measurement February 16, 1923, when stage-discharge relation was affected by ice. Minimum discharge prior to winter of 1921–22 not known because daily record of stage not available.

The United States Weather Bureau reports a maximum stage of 44.7 feet on the Marcus gage during the June (probably June 7) flood of 1894; discharge, 735,000 second-feet, estimated by extending rating curve.

ICE.—Stage-discharge relation affected by ice during severe winters; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Considerable water diverted for irrigation above gage but amount very small in proportion to flow past gage.

REGULATION.—None, except the effect of natural storage in Upper and Lower Arrow lakes, Kootenay, Flathead, Pend Oreille, Priest, and other smaller lakes.

ACCURACY.—Stage-discharge relation may have changed slightly February 1; affected by ice December 28–31 and January 1–9 and 20–26. Rating curves well defined below 500,000 second-feet. Beginning February 1, west side gage rated and used below 50,600 second-feet. Gage read to hundredths twice daily. Morning and afternoon readings made by different persons over part of year. Record of morning observations May 24 to July 31 lost by observer when fighting forest fire. Daily discharge ascertained by applying mean daily or daily gage height to rating table. Records excellent except during periods when stage-discharge relation was affected by ice.

Discharge measurements of Columbia River at Kettle Falls, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Dec. 4	J. L. Ford	65.38	25,800	May 15	Ford and Gatewood	79.06	153,000
Jan. 5	Ford and Becker	64.70	20,000	July 28	Ford and Keyser	76.80	123,000
12	J. S. Gatewood	63.92	19,800	Aug. 6	Gatewood and Keyser	76.92	124,000
25	Ford and Becker	[a]63.88	19,600	Sept. 30	Ford and Tucker	70.00	52,700
Mar. 27	Ford and Biddinger	[b]65.64	26,900				

[a] Stage-discharge relation affected by ice. [b] West side gage; all others east side gage.

Daily discharge, in second-feet, of Columbia River at Kettle Falls, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	57,000	35,500	26,400		21,400	31,700	26,100	50,600	258,000	175,000	124,000	101,000
2	54,800	34,300	25,900		22,400	31,700	26,600	54,300	253,000	175,000	125,000	98,800
3	54,000	33,700	25,900		23,200	31,700	26,600	60,400	249,000	180,000	125,000	96,500
4	52,500	33,100	25,900		23,200	31,700	26,100	66,000	249,000	185,000	125,000	93,200
5	51,100	32,600	25,900	{19,500	23,200	31,200	26,100	68,500	246,000	191,000	125,000	91,000
6	49,700	32,600	25,900		23,600	31,200	25,600	70,200	246,000	199,000	124,000	90,000
7	49,000	32,000	25,900		24,100	31,200	26,100	73,800	244,000	205,000	121,000	89,000
8	48,300	32,000	25,400		24,600	31,200	26,600	78,500	240,000	207,000	120,000	89,000
9	47,600	31,500	25,400		24,600	30,700	27,100	83,200	235,000	204,000	117,000	89,000
10	46,200	31,000	25,400	20,500	24,600	30,700	27,600	91,000	232,000	201,000	113,000	89,000
11	45,500	30,500	25,400	20,200	24,600	30,700	28,100	102,000	230,000	193,000	112,000	89,000
12	44,900	29,900	25,400	19,900	25,600	30,700	29,100	112,000	229,000	185,000	110,000	88,000
13	44,200	29,900	24,900	19,600	28,100	30,200	30,700	126,000	225,000	180,000	108,000	87,000
14	43,600	29,400	24,900	19,200	28,600	30,200	32,200	138,000	222,000	174,000	107,000	83,200
15	42,900	28,900	24,500	19,200	29,100	30,200	32,800	152,000	220,000	168,000	107,000	81,300
16	42,900	28,400	24,500	19,600	29,600	29,600	33,900	170,000	218,000	164,000	108,000	79,400
17	42,900	28,400	24,500	19,600	30,200	29,600	34,400	188,000	218,000	163,000	110,000	77,500
18	42,300	27,900	24,500	19,600	31,200	29,600	34,400	205,000	218,000	160,000	108,000	75,700
19	42,300	27,400	24,500	19,200	31,200	29,600	35,000	225,000	218,000	156,000	110,000	74,700
20	41,600	26,900	24,000		31,700	29,100	35,600	242,000	218,000	151,000	110,000	72,900
21	41,600	26,900	24,000		32,200	29,100	36,200	254,000	215,000	145,000	110,000	71,100
22	41,000	26,900	23,600		32,200	29,100	36,800	266,000	210,000	141,000	108,000	67,700
23	41,000	26,900	23,600	19,500	31,700	29,100	37,400	276,000	205,000	137,000	107,000	66,800
24	40,400	26,900	23,600		31,700	28,600	36,800	278,000	201,000	132,000	106,000	65,200
25	39,800	26,900	23,600		31,700	28,100	37,400	287,000	194,000	128,000	105,000	63,600
26	39,200	26,900	24,000		31,700	27,600	38,600	287,000	189,000	125,000	104,000	62,000
27	38,500	26,900	23,600	19,900	31,700	27,100	39,800	285,000	185,000	122,000	102,000	60,400
28	37,900	26,900		19,900	31,700	27,100	41,600	281,000	180,000	122,000	104,000	57,300
29	37,300	26,900	22,500	19,900	31,700	27,600	44,200	276,000	178,000	122,000	104,000	56,600
30	36,700	26,400		19,900	-------	27,100	47,000	268,000	177,000	124,000	104,000	54,300
31	36,100	-------		20,500	-------	26,600	-------	262,000	-------	125,000	104,000	-------

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

Monthly discharge of Columbia River at Kettle Falls, Wash., for the year ending September 30, 1924

[Drainage area, 64,500 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	57,600	36,100	44,300	0.687	0.79	2,720,000
November	35,500	26,400	29,500	.457	.51	1,760,000
December	26,400	----------	24,600	.381	.44	1,510,000
January	20,500	----------	19,600	.304	.35	1,210,000
February	32,200	21,400	28,000	.434	.47	1,610,000
March	31,700	26,600	29,700	.460	.53	1,830,000
April	47,000	25,600	32,900	.510	.57	1,960,000
May	287,000	50,600	173,000	2.68	3.09	10,600,000
June	258,000	177,000	220,000	3.41	3.80	13,100,000
July	207,000	122,000	163,000	2.53	2.92	10,000,000
August	125,000	102,000	112,000	1.74	2.01	6,890,000
September	101,000	54,300	78,700	1.22	1.36	4,680,000
The year	287,000	----------	79,800	1.24	16.84	57,900,000

COLUMBIA RIVER AT VERNITA, WASH.

LOCATION.—In sec. 11, T. 13 N., R. 24 E., at Richmond Ferry, half a mile north of Vernita and 6 miles below Priest Rapids, Benton County.

DRAINAGE AREA.—95,500 square miles. (Areas in the United States measured on topographic maps and on maps issued by the United States Geological Survey on scale 1:500,000. Areas in British Columbia measured on Department of the Interior Railway belt maps, scale 1:500,000; Department of Mines, West Kootenai sheet, scale 1:253,440; and Department of Lands map, scale 1:1,125,000.)

RECORDS AVAILABLE.—Flood heights only, at Wenatchee, 1894 to 1903; continuous gage-height record at Wenatchee, April 18, 1904, to December 31, 1916; at Beverly January 1–13, 1917; at Vernita January 14, 1917, to September 30, 1924. Gage-height record at Wenatchee published by U. S. Weather Bureau.

GAGE.—Since March 25, 1918, vertical staff gage in eight sections, on right bank at ferry; read by J. P. Richmond. Gage datum, 388.7 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from standard gaging car on ferry cable at Vernita, or, when ice conditions are severe, from railroad bridge at Beverly.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. High-water control is Coyote Rapids 6 or 7 miles below gage; low-water control riffle noticeable at low stages about three-fourths mile below gage; apparently permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 25.1 feet at 7.30 p. m. May 25 (discharge, 339,000 second-feet); minimum discharge estimated at 24,200 second-feet for January 2–4 while stage-discharge relation was affected by ice.

1913–1924: Maximum stage recorded, 45.7 feet at Wenatchee June 15 and 16, 1913 (discharge, 528,000 second-feet); minimum discharge, 23,900 second-feet (current-meter measurements) January 31, 1917, and December 14, 1919, when stage-discharge relation was affected by ice.

Maximum stage recorded at Wenatchee by United States Weather Bureau and Great Northern Railway Co., 58.0 feet June 7, 1894 (estimated discharge by extending rating curve, 710,000 second-feet). The Chief of Engineers, United States Army, [5] gives a crest elevation of the flood of 1894 and an elevation of zero on the Weather Bureau gage, from which it appears that the gage height was 59.8 feet (estimated discharge, by extending rating curve, 740,000 second-feet).

ICE.—Stage-discharge relation affected by ice except during mild winters. Flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSION.—Some water diverted for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 31 to January 28. Rating curve well defined below 300,000 second-feet. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent except for periods of ice effect.

Discharge measurements of Columbia River at Vernita, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 1	J. S. Gatewood	3.11	46,200	Mar. 16	R. B. Kilgore	3.54	47,400
2	do	3.00	45,200	June 11	do	21.60	265,000
Dec. 22	do	1.00	31,700	Sept. 24	J. S. Gatewood	7.10	74,900
Jan. 10	R. B. Kilgore	[a] 2.30	27,100				

[a] Stage-discharge relation affected by ice.

[5] Chief Eng. U. S. Army Rept., 1895, pt. V, p. 3542.

Daily discharge, in second-feet, of Columbia River at Vernita, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	68,800	44,500	34,500		32,700	49,800	39,300	66,300	311,000	191,000	130,000	109,000
2	67,200	43,800	33,300		39,300	50,500	39,300	70,600	302,000	190,000	131,000	108,000
3	65,400	43,200	33,900		41,200	49,100	36,900	76,600	298,000	190,000	131,000	106,000
4	64,600	42,600	33,900		40,000	50,500	36,900	82,900	292,000	190,000	131,000	105,000
5	62,900	41,200	33,900		40,000	49,800	36,900	89,200	288,000	191,000	131,000	103,000
6	60,500	41,200	33,900	25,500	38,700	48,400	36,900	96,800	284,000	196,000	131,000	99,700
7	59,700	40,600	33,900		38,700	48,400	36,300	98,700	282,000	200,000	131,000	98,700
8	58,100	40,600	35,100		40,000	47,800	37,500	103,000	278,000	208,000	130,000	96,800
9	56,500	40,000	35,700		40,000	47,800	38,700	106,000	272,000	213,000	128,000	94,900
10	56,500	40,000	35,100		41,200	47,100	40,000	111,000	270,000	214,000	126,000	94,900
11	55,700	39,300	35,700		41,900	47,100	40,600	119,000	267,000	213,000	123,000	94,900
12	55,000	38,700	36,300		43,200	47,100	43,800	131,000	261,000	208,000	120,000	94,900
13	54,200	38,100	35,100		53,400	46,400	45,200	147,000	257,000	202,000	118,000	94,000
14	53,400	37,500	33,900		54,200	45,200	46,400	171,000	255,000	196,000	116,000	94,000
15	52,000	37,500	33,300		51,200	46,400	47,800	188,000	250,000	188,000	115,000	92,000
16	51,600	36,900	32,700	26,000	52,000	47,800	49,800	205,000	246,000	184,000	115,000	90,200
17	51,200	36,900	32,200		52,000	47,100	51,200	221,000	243,000	179,000	113,000	87,400
18	51,200	36,300	32,200		52,000	45,800	52,000	238,000	243,000	175,000	114,000	85,600
19	50,500	36,300	32,700		52,700	46,400	53,400	257,000	241,000	172,000	115,000	83,800
20	49,100	35,100	32,700		53,400	45,800	53,400	276,000	238,000	168,000	114,000	82,000
21	49,100	34,500	32,200		53,400	45,200	53,400	298,000	236,000	164,000	115,000	81,100
22	49,100	34,500	31,600		52,700	44,500	53,400	313,000	236,000	158,000	116,000	80,200
23	49,100	34,500	31,600		53,400	43,200	54,200	323,000	229,000	154,000	115,000	77,500
24	49,100	35,100	31,600		53,400	43,200	55,000	332,000	226,000	150,000	115,000	75,700
25	48,400	34,500	31,000	27,000	52,000	43,200	55,700	337,000	221,000	147,000	114,000	74,800
26	47,800	34,500	30,500		51,200	43,200	56,500	337,000	214,000	140,000	112,000	73,100
27	47,100	33,900	30,500		51,200	41,900	55,700	337,000	208,000	136,000	109,000	71,400
28	47,100	34,500	31,000		51,200	40,600	56,500	337,000	203,000	133,000	107,000	68,800
29	46,400	34,500	31,000	27,200	50,500	40,000	59,700	332,000	199,000	131,000	107,000	67,200
30	45,200	34,500	31,000	27,200	-------	40,000	62,900	328,000	194,000	128,000	107,000	63,800
31	44,500	-------	30,500	27,800	-------	40,000	-------	319,000	-------	128,000	109,000	-------

NOTE.—Gage not read Oct. 16; discharge estimated by interpolation. Braced figures show mean discharge for periods indicated.

Monthly discharge of Columbia River at Vernita, Wash., for the year ending September 30, 1924

[Drainage area, 95,500 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	68,800	44,500	53,800	0.563	0.65	3,310,000
November	44,500	33,900	37,800	.396	.44	2,250,000
December	36,300	30,500	33,000	.346	.40	2,030,000
January	27,800	----------	26,200	.274	.32	1,610,000
February	54,200	32,700	47,100	.493	.53	2,710,000
March	50,500	40,000	45,800	.480	.55	2,820,000
April	62,900	36,300	47,500	.497	.55	2,830,000
May	337,000	66,300	208,000	2.18	2.51	12,800,000
June	311,000	194,000	251,000	2.63	2.93	14,900,000
July	214,000	128,000	175,000	1.83	2.11	10,800,000
August	131,000	107,000	119,000	1.25	1.44	7,320,000
September	109,000	63,800	88,300	.925	1.03	5,250,000
The year	337,000	----------	94,600	.991	13.46	68,600,000

KOOTENAI RIVER BASIN

KOOTENAI RIVER AT LIBBY, MONT.

LOCATION.—In sec. 3, T. 30 N., R. 31 W., at highway bridge opposite Great Northern Railway station at Libby, Lincoln County.

DRAINAGE AREA.—11,000 square miles.

RECORDS AVAILABLE.—October 13, 1910, to September 30, 1924.

GAGE.—Chain gage on left span of highway bridge.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel broken by two piers. Bed of stream composed of small rocks; probably permanent. Current fairly swift and uniformly distributed.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.48 feet at 4 p. m. May 17 (discharge, 43,300 second-feet); minimum stage, 1.99 feet March 25–27, 31, and April 5 (discharge, 2,510 second-feet).

1910–1924: Maximum stage, 19.17 feet June 21, 1916 (discharge, 130,000 second-feet); minimum stage, 1.4 feet February 7, 1914 (discharge, 1,480 second-feet).

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

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except when affected by iee. Rating curve well defined between 2,500 and 40,000 second-feet. Gage read to hundredths once daily except Sundays and holidays. Daily discharge ascertained by applying daily gage height to rating table and interpolating for days of missing gage heights. Records good.

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

Discharge measurements of Kootenai River at Libby, Mont., during the year ending September 30, 1924

[Made by W. A. Lamb]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
Mar. 7	2.30	3,310
Aug. 9	4.45	9,590

Daily discharge, in second-feet, of Kootenai River at Libby, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	4,660	3,660	3,140	-------	3,350	2,550	8,370	18,000	16,300	8,600	7,270
2	4,560	3,550	3,060	-------	3,280	2,590	9,800	17,500	16,300	8,510	7,010
3	4,450	3,530	2,980	-------	3,220	2,590	11,000	16,800	17,000	8,430	6,750
4	4,370	3,560	2,860	-------	3,180	2,550	11,400	21,900	18,200	8,330	6,370
5	4,300	3,600	3,060	-------	3,100	2,510	11,800	21,500	19,500	8,400	5,970
6	4,320	3,620	3,440	-------	3,040	2,720	12,600	19,100	18,800	9,390	5,960
7	4,300	3,620	3,400	-------	3,060	2,920	13,400	18,400	18,000	10,100	5,950
8	4,270	3,550	3,310	-------	2,980	3,220	13,000	18,900	16,500	10,200	5,940
9	4,350	3,440	3,260	-------	2,960	3,780	13,700	19,400	15,100	10,000	5,940
10	4,400	3,330	3,220	-------	2,940	4,140	14,300	19,300	12,600	9,830	6,060
11	4,320	3,260	3,120	-------	2,980	4,560	17,400	17,500	11,300	9,650	6,440
12	4,300	3,190	3,020	-------	2,980	4,610	20,500	17,100	11,200	9,390	6,370
13	4,320	3,120	3,020	-------	2,940	4,860	25,600	17,700	11,000	9,170	6,030
14	4,300	3,140	2,920	-------	2,900	5,110	26,200	18,900	10,900	9,030	5,680
15	4,270	3,180	2,820	-------	2,900	5,220	31,500	21,400	10,600	8,820	5,340
16	4,400	3,180	2,920	-------	2,840	5,050	37,800	23,800	10,600	8,790	5,280
17	4,370	3,160	3,020	-------	2,780	4,910	43,300	23,600	10,500	8,770	5,170
18	4,320	3,140	3,120	-------	2,740	4,640	43,200	22,600	9,760	8,740	5,110
19	4,240	3,120	-------	-------	2,700	4,640	43,000	21,900	9,400	8,680	5,080
20	4,200	3,160	-------	3,060	2,700	4,500	39,400	19,400	9,040	8,740	5,080
21	4,100	3,200	-------	3,550	2,660	4,370	34,700	18,700	8,680	8,820	5,050
22	4,000	3,220	-------	3,450	2,620	4,120	32,000	18,000	8,600	8,680	5,020
23	4,140	3,220	-------	3,350	2,580	4,370	30,400	17,300	8,330	8,630	5,020
24	4,220	3,240	-------	3,370	2,550	4,750	30,400	16,800	8,260	8,590	4,990
25	4,140	3,260	-------	3,380	2,510	4,800	31,000	16,400	8,160	8,540	4,970
26	4,100	3,270	-------	3,400	2,510	5,250	31,600	15,500	8,100	8,540	4,940
27	4,070	3,220	-------	3,220	2,510	5,520	29,100	15,600	8,050	8,330	4,730
28	4,010	3,220	-------	3,270	2,550	5,790	26,000	15,700	7,990	8,130	4,510
29	3,950	3,190	-------	3,310	2,550	6,340	22,600	15,800	8,160	8,060	4,300
30	3,850	3,160	-------	-------	2,530	7,040	20,500	15,900	8,500	7,800	4,240
31	3,780	-------	-------	-------	2,510	-------	18,400	-------	8,880	7,340	-------

NOTE.—Discharge interpolated for following days when gage was not read: Oct. 7, 14, 21, 28, Nov. 4, 11, 12, 18, 24, 25, 29, Dec. 2, 9, 16, Feb. 22, 24, 25, Mar. 2, 9, 16, 23, 30, Apr. 6, 13, 20, 27, May 4, 11, 18, 25, 30, June 1, 8, 15, 21, 22, 28, 29, July 4, 6, 11, 12, 19, 20, 26, 27, Aug. 2, 3, 9, 10, 16, 17, 23, 24, 30, 31, Sept. 1, 6, 7, 13, 14, 21, 24, 25, 27, 28. No gage-height record during period of ice effect Dec. 19 to Feb. 19; discharge not estimated.

Monthly discharge of Kootenai River at Libby, Mont., for the year ending September 30, 1924

[Drainage area, 11,000 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	4,660	3,780	4,240	0.385	0.44	261,000
November	3,660	3,120	3,310	.301	.34	197,000
December 1–18	3,440	2,820	3,090	.281	.19	110,000
February 20–29	3,550	3,060	3,340	.304	.11	66,200
March	3,350	2,510	2,830	.257	.30	174,000
April	7,040	2,510	4,330	.394	.44	258,000
May	43,300	8,370	24,300	2.21	2.55	1,490,000
June	23,800	15,500	18,700	1.70	1.90	1,110,000
July	19,500	7,990	11,800	1.07	1.23	726,000
August	10,200	7,340	8,810	.801	.92	542,000
September	7,270	4,240	5,550	.505	.56	330,000

GRAVES CREEK NEAR FORTINE, MONT.

LOCATION.—In SW. ¼ sec. 5, T. 35 N., R. 25 W., 6 miles northeast of Fortine, Lincoln County, and 12 miles southeast of Eureka.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 16, 1923, to June 30, 1924, when station was discontinued.

GAGE.—Overhanging weight and wire gage nailed to trees on right bank 1½ miles above ranger station; read by William Marston.

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

CHANNEL AND CONTROL.—Bed of stream at gage composed of boulders and cobblestones and probably forms a permanent control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.58 feet May 17–18 (discharge, 518 second-feet); minimum stage, 0.86 foot April 1–5 (discharge, 18 second-feet).

1923–24: Maximum stage recorded, 3.00 feet June 11, 1923 (discharge, 690 second-feet); minimum stage April 1–5, 1924.

ICE.—None during period of record.

DIVERSIONS.—None above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well-defined between 30 and 500 second-feet. Gage read to hundredths once daily; occasionally twice daily during fluctuating stages. Daily discharge ascertained by applying daily gage height or mean daily gage height to rating table. Records good.

COOPERATION.—Maintained in cooperation with Eureka Hydro-Electric Co.

The following discharge measurement was made by Heidel and Beebe:

October 11, 1923: Gage height, 1.02 feet; discharge, 36.3 second-feet.

Daily discharge, in second-feet, of Graves Creek near Fortine, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	Day	Oct.	Nov.	Dec.	Apr.	May	June
1	40	37	40	18	129	379	16	42	27	65	45	486	366
2	40	37	40	18	156	371	17	42	27	48	45	518	361
3	37	37	37	18	186	363	18	45	29	34	48	518	356
4	37	34	37	18	203	386	19	42	29	34	48	502	336
5	37	34	40	18	231	409	20	42	32	32	48	494	316
6	37	32	40	22	252	424	21	40	32	32	51	486	296
7	37	32	42	24	266	447	22	40	32	29	51	486	259
8	37	29	42	29	311	439	23	40	34	34	58	478	249
9	34	29	48	29	318	401	24	37	40	34	58	470	240
10	34	27	55	40	341	386	25	40	37	37	62	470	231
11	37	27	65	40	363	363	26	40	37	37	65	447	220
12	37	27	77	40	401	386	27	40	34	37	77	417	209
13	37	27	99	42	417	394	28	40	34	40	85	417	198
14	40	29	113	42	447	386	29	37	37	42	94	409	192
15	40	29	103	42	478	371	30	37	37	------	103	386	186
							31	37	------	------	------	379	------

NOTE.—No record Jan. 1 to Mar. 31.

Monthly discharge of Graves Creek near Fortine, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	45	34	38.8	2,390
November	40	27	32.2	1,920
December 1–29	113	29	48.7	2,800
April	103	18	45.9	2,730
May	518	129	383	23,600
June	447	186	331	19,700

CLARK FORK BASIN

CLARK FORK NEAR PLAINS, MONT.

LOCATION.—In lot 7, sec. 7, T. 19 N., R. 26 W., at Cooper's ferry, 3 miles above Plains, Sanders County, and 7 miles below mouth of Flathead River.

DRAINAGE AREA.—19,900 square miles.

RECORDS AVAILABLE.—October 28, 1910, to September 30, 1924.

GAGE.—Barrett & Lawrence water-stage recorder; inspected by A. L. Steiner.

DISCHARGE MEASUREMENTS.—Made from cable.

CHANNEL AND CONTROL.—River deep and current only moderately swift even at flood stages. Banks high and are not overflowed. Channel practically permanent. No well-defined control.

EXTREMES OF DISCHARGE.—Maximum stage during year, 14.0 feet at 8 p. m. May 20 (discharge, 80,300 second-feet); minimum stage, 3.55 feet at 11 p. m. Dec. 29 (discharge, 5,520 second-feet).

1910–1924: Maximum stage recorded, 17.9 feet June 5, 1913, and July 2, 1916 (discharge, 115,000 second-feet); minimum open water stage, 3.7 feet, several times during October and November, 1919 (discharge, 4,890 second-feet); lower flow probably occurred during ice periods.

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

DIVERSIONS.—Numerous diversions are made for irrigation from the headwaters of Clark Fork and tributaries to Flathead River.

REGULATIONS.—Flathead Lake furnishes natural regulation for part of flow.

ACCURACY.—Stage-discharge relation changed during period it was affected by ice. Two rating curves used during year, one applicable October 1 to December 30 fairly well defined below 100,000 second-feet; the other well defined between 15,000 and 40,000 second-feet and fairly well defined above and below, is applicable February 11 to September 30. Gage height obtained by inspection of graph of the Barrett & Lawrence recorder. Daily discharge ascertained by applying mean daily gage height to rating table except as stated in footnote to daily-discharge table. Records good except for period of ice effect for which they are fair.

Discharge measurements of Clark Fork near Plains, Mont., during the year ending September 30, 1924

[Made by W. A. Lamb]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
Apr. 8	4.28	7,210
June 27	9.58	37,000

Daily discharge, in second-feet, of Clark Fork near Plains, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	7,120	7,280	6,960			6,850	5,780	19,800	58,300	33,400	14,000	7,820
2	7,120	7,120	6,960			7,040	5,850	21,500	57,300	31,600	13,700	7,820
3	7,120	7,120	6,800			6,850	5,920	25,500	55,300	30,200	13,200	7,430
4	7,120	6,960	6,800			7,040	5,980	30,200	56,300	28,800	13,000	7,430
5	7,120	7,120	6,800			7,040	6,050	34,200	56,300	24,300	12,700	7,240
				5,600	6,000							
6	7,120	6,960	6,800			6,850	6,120	36,200	54,300	27,800	12,700	7,240
7	7,120	6,960	6,800			6,850	6,480	34,600	53,300	27,800	12,300	7,040
8	7,120	6,800	6,800			6,850	6,850	33,800	52,300	27,400	11,800	7,040
9	7,120	6,800	6,800			6,660	7,740	35,400	50,400	26,800	11,600	6,850
10	7,120	6,800	6,800			6,660	8,630	37,000	48,400	25,500	11,300	6,660
11	7,280	6,800	6,800		6,120	6,660	9,520	42,000	46,600	24,300	11,100	6,660
12	7,450	6,960	6,800		6,850	6,660	10,400	47,500	45,600	23,200	10,600	6,660
13	7,450	6,960	6,640		7,820	6,660	11,300	54,300	44,700	22,600	10,400	6,480
14	7,450	6,960	6,490		7,820	6,660	11,600	59,300	44,700	21,500	10,400	6,480
15	7,280	6,960	6,490		7,820	6,850	11,800	62,400	46,600	20,400	10,200	6,480
				5,800								
16	7,280	6,800	6,200		7,820	6,850	12,000	66,600	47,500	19,800	9,940	6,480
17	7,280	6,800	6,060		8,020	6,660	11,800	70,800	48,400	19,300	9,940	6,480
18	7,280	6,800	6,060		7,620	6,660	11,600	76,100	47,500	19,500	9,720	6,300
19	7,280	6,800	6,060		7,620	6,480	11,100	78,200	46,600	17,700	9,500	6,300
20	7,450	6,800	5,920		7,430	6,480	11,100	79,200	44,700	17,700	9,500	6,300
21	7,450	6,800	5,920		7,240	6,480	10,800	78,200	43,800	17,200	9,280	6,300
22	7,450	6,800	5,920		6,850	6,660	11,100	78,200	42,900	17,000	9,280	6,300
23	7,450	6,800	5,920		6,660	6,300	11,600	76,100	42,000	16,700	9,070	6,300
24	7,450	6,800	6,200		6,850	6,120	13,700	76,100	40,300	16,400	9,070	6,300
25	7,450	6,960	6,060		6,660	6,120	15,400	73,000	38,600	16,200	9,070	6,300
				6,000								
26	7,450	7,120	6,200		6,660	5,950	15,400	74,000	37,000	16,000	8,640	6,300
27	7,450	7,120	6,060		6,660	5,950	15,400	71,900	37,000	15,200	8,640	6,120
28	7,280	6,960	6,060		6,850	5,950	16,000	69,800	37,000	15,000	8,640	6,120
29	7,280	6,960	5,780		6,660	5,950	19,000	66,600	37,000	14,200	8,220	6,120
30	7,280	6,960	5,700		-------	5,780	19,000	63,500	36,200	14,000	7,820	5,950
31	7,280	-------	5,650		-------	5,780	-------	61,400	-------	13,700	7,820	-------

NOTE.—Stage-discharge relation affected by ice Dec. 30 to Feb. 10, discharge estimated. Braced figures show mean for periods indicated. Daily discharge interpolated Apr. 2–5, 7, and 9–12 on account of missing gage heights.

Monthly discharge of Clark Fork near Plains, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	7,450	7,120	7,290	448,000
November	7,280	6,800	6,930	412,000
December	6,960	5,650	6,360	391,000
January			5,810	357,000
February	8,020	6,000	6,760	389,000
March	7,040	5,780	6,530	402,000
April	19,000	5,780	10,800	643,000
May	79,200	19,800	55,900	3,440,000
June	58,300	36,200	46,600	2,770,000
July	33,400	13,700	21,300	1,310,000
August	14,000	7,820	10,400	640,000
September	7,820	5,950	6,640	395,000
The year	79,200	5,650	13,000	11,600,000

PEND OREILLE LAKE AT HOPE, IDAHO

LOCATION.—In lot 2, sec. 35, T. 57 N., R. 1 E. Boise meridian, at floating dock near Northern Pacific Railway station at Hope, Bonner County.

DRAINAGE AREA.—22,900 square miles. (Areas in United States measured on maps issued by United States Geological Survey, scale 1:500,000; area of Flathead River basin in British Columbia measured on Department of Lands map, scale 1:1,125,000.)

RECORDS AVAILABLE.—September 17, 1921, to September 30, 1924.

GAGE.—Vertical staff in three sections on piles at floating dock; read by Capt. E. E. Moore and Capt. R. E. Smith. Zero of gage at elevation 2,048.88 feet, when referred to bench mark at Hope described on page 94 of United States Geological Survey Bulletin 567. Zero of gage at elevation 2,045.67, United States Coast and Geodetic Survey datum.

EXTREMES OF STAGE.—Maximum stage recorded during year, 15.00 feet on May 28; minimum stage recorded, 1.46 feet on January 9.

1922–1924: Maximum stage recorded, 19.00 feet on June 14, 1922; minimum stage recorded on January 9, 1924.

Crest elevation during flood of June, 1894, was 2,079.29 feet as determined by William Ashley who referred the height of the water to the United States Geological Survey bench mark at Hope, Idaho. This crest elevation is equivalent to a gage height of 30.41 feet on gage at Hope and of 33.71 feet on gage formerly used at Sandpoint, when referred to bench mark described on page 94 of United States Geological Survey Bulletin 567.

ICE.—Ice forms in some places in lake but ice conditions not serious at this station.

DIVERSIONS.—Considerable water diverted from tributaries of Clark Fork for irrigation.

REGULATION.—None.

ACCURACY.—Gage read to hundredths once each day for which gage height is shown.

Daily gage height, in feet, of Pend Oreille Lake at Hope, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.10	1.88	1.90	1.80	1.66	2.88	2.24	4.45	------	9.55	------	2.56
2	2.08	------	------	1.82	------	------	------	4.65	14.30	9.40	4.55	2.48
3	2.08	1.90	1.90	1.80	------	2.84	2.20	5.00	14.05	9.20	------	2.44
4	2.06	------	1.88	1.78	1.90	2.80	------	------	------	9.00	4.25	2.40
5	2.06	1.88	------	1.70	2.04	2.76	2.18	------	13.65	8.85	4.15	2.38
6	2.04	1.88	------	------	2.10	2.74	------	6.35	------	------	4.10	2.34
7	------	1.86	------	1.60	2.18	2.70	2.14	6.65	13.30	8.45	4.00	------
8	------	1.84	------	1.50	------	2.70	2.14	7.05	------	8.20	------	------
9	------	1.84	------	1.46	2.28	------	2.14	7.30	12.90	8.10	3.80	------
10	1.98	1.84	------	------	------	2.70	2.20	7.70	12.70	7.95	------	2.24
11	1.98	------	------	1.50	2.34	2.68	2.34	------	------	7.70	3.65	2.18
12	1.96	1.80	1.92	1.50	------	2.62	------	8.45	12.30	7.55	3.55	2.14
13	1.96	1.78	1.90	------	2.50	2.62	------	9.05	12.10	------	3.50	2.12
14	------	1.78	1.88	1.50	2.60	2.60	------	9.55	11.85	7.20	3.40	------
15	------	1.78	1.84	1.52	------	------	2.90	10.05	------	7.00	3.35	2.08
16	------	1.76	------	1.52	2.86	------	2.96	10.85	11.60	6.80	3.30	2.04
17	------	1.74	1.80	------	------	2.54	------	11.50	------	6.55	------	------
18	2.00	------	1.80	1.54	------	------	------	------	------	------	3.16	------
19	2.00	1.74	1.78	1.52	3.00	2.50	3.20	12.65	11.25	6.30	3.14	------
20	1.98	------	1.78	------	3.02	2.50	------	13.25	11.15	------	------	------
21	------	1.72	1.78	1.50	3.06	2.46	3.30	13.70	11.10	------	3.04	------
22	------	1.72	1.78	1.52	3.06	2.40	------	13.95	------	6.10	3.00	1.92
23	2.00	------	------	1.52	3.00	------	------	14.40	10.85	6.00	2.94	------
24	1.96	------	1.74	1.52	------	2.36	3.45	14.65	10.70	5.80	------	------
25	1.96	------	------	1.50	2.96	2.34	3.50	------	10.60	5.60	2.86	------
26	1.96	1.90	1.72	1.50	2.90	------	3.60	14.95	10.40	5.50	2.80	1.88
27	1.96	------	1.70	------	2.90	2.36	------	------	10.30	------	2.76	1.86
28	------	1.92	1.72	1.50	------	2.36	3.85	15.00	10.05	5.30	------	------
29	1.94	------	1.78	------	2.90	2.34	4.05	14.95	------	5.10	------	1.84
30	1.90	1.92	------	1.54	------	------	4.25	14.90	9.70	4.90	2.66	------
31	1.88	------	1.78	------	------	2.28	------	14.70	------	4.70	------	------

CLARK FORK AT METALINE FALLS, WASH.

LOCATION.—In SE. ¼ sec. 21, T. 39 N., R. 43 E., three-eighths of a mile above Metaline Falls, opposite town of Metaline Falls, Pend Oreille County, and 11 miles south of international boundary.

DRAINAGE AREA.—25,100 square miles. (Areas in United States measured on maps issued by United States Geological Survey, scale 1 : 500,000; area of Flathead River basin in British Columbia measured on Department of Lands map, scale 1 : 1,125,000; area of Priest River basin in British Columbia measured on Nelson sheet, British Columbia map.)

RECORDS AVAILABLE.—November 4, 1908, to September 4, 1910 (gage heights only; data insufficient for determination of discharge); October 1, 1912, to September 30, 1924.

GAGE.—Vertical and inclined staff, in five sections, reading from 0 to 55 feet, on right bank, three-eighths of a mile above falls; installed December 10, 1916; read by Leland West and Willis Pugh.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths mile above falls. Flow of Sullivan Creek added to flow measured at cable.

CHANNEL AND CONTROL.—Banks high and not subject to overflow. Sensitive and practically permanent control formed by Metaline Falls, the drop over which is 20 feet in a distance of 1,200 feet. Elevation, water surface at medium low stage, 1,970 feet above sea level.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 27.3 feet May 29–30 (discharge, 81,000 second-feet); minimum stage recorded, −1.65 feet at 7.45 a. m. January 2 (discharge, 4,120 second-feet).

1912–1924: Maximum stage recorded, 41.2 feet June 16, 1913 (discharge, 139,000 second-feet); minimum stage recorded, −2.4 feet December 12, 1919 (discharge, 2,500 second-feet).

Maximum stage at Newport (900 square miles less drainage area), independently determined from three separate high-water marks left by the flood of June, 1894, 38.9 feet (discharge, 217,000 second-feet, estimated by extending rating curve).

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

DIVERSIONS.—Numerous diversions from upper tributaries for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve well defined above 8,000 second-feet; revised slightly for use after April 1. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Station maintained in cooperation with Dominion Water Power Branch.

Discharge measurements of Clark Fork at Metaline Falls, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 13	2.60	8,840	Aug. 1	9.17	21,000
May 26	27.05	79,900	Sept. 21	2.44	8,340

Daily discharge, in second-feet, of Clark Fork at Metaline Falls, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,160	8,600	8,460	6,500	8,740	13,700	11,300	18,700	79,200	46,900	21,000	11,200
2	9,160	8,460	8,600	4,120	9,300	13,700	11,300	19,600	78,700	45,900	20,400	11,200
3	9,020	8,460	8,600	5,320	9,440	13,900	10,800	20,400	76,400	45,300	19,800	10,800
4	9,020	8,460	8,460	5,320	9,440	13,700	10,500	21,900	74,200	43,600	19,600	10,800
5	9,020	8,460	8,460	5,800	9,600	13,300	10,500	23,700	73,300	42,700	18,900	10,500
6	8,740	8,460	8,460	6,100	9,600	13,000	10,500	25,700	72,000	41,400	18,500	10,300
7	8,740	8,460	8,460	6,700	9,760	13,000	10,600	27,800	70,600	40,500	18,100	10,000
8	8,740	8,460	8,460	6,820	10,100	13,000	10,500	29,700	69,700	39,300	17,700	10,000
9	8,740	8,460	8,460	6,820	10,200	13,000	10,800	31,400	68,800	38,400	17,400	9,850
10	8,600	8,320	8,600	6,820	10,400	13,000	10,800	33,600	67,600	37,300	17,000	9,550
11	8,600	8,180	8,740	6,940	10,600	12,600	11,200	35,400	66,300	36,500	16,400	9,550
12	8,460	8,180	8,740	6,940	10,900	12,600	11,300	37,300	64,600	35,700	16,000	9,400
13	8,460	8,180	8,740	6,700	11,200	12,400	11,900	39,600	63,400	34,600	15,600	9,250
14	8,460	8,180	8,740	6,700	11,900	12,200	12,200	43,000	62,100	33,600	15,200	9,250
15	8,460	8,180	8,740	6,700	12,600	12,400	12,800	46,300	60,400	32,800	15,000	9,100
16	8,460	8,040	8,600	6,600	13,000	12,200	13,100	49,600	59,200	31,600	14,800	9,100
17	8,460	8,040	8,460	6,820	13,300	12,200	13,300	53,000	58,300	30,900	14,400	8,950
18	8,320	8,040	8,460	6,300	13,500	12,200	13,500	56,700	57,100	29,900	14,000	8,650
19	8,600	7,900	8,460	6,400	13,700	11,900	14,000	60,800	57,100	29,000	13,700	8,500
20	8,740	7,900	8,320	6,700	14,100	11,900	14,400	64,600	56,200	28,300	13,500	8,500
21	8,600	7,900	8,320	6,700	14,100	12,100	14,800	68,400	55,400	27,800	13,300	8,360
22	8,740	7,900	8,320	6,700	14,100	12,200	15,000	71,500	54,600	26,600	13,100	8,360
23	8,740	7,900	8,180	6,700	14,100	11,900	14,800	73,800	53,800	25,900	13,000	8,360
24	8,740	8,180	8,040	6,700	14,100	11,700	14,800	76,400	53,400	25,500	12,800	8,220
25	8,740	8,180	8,180	6,820	13,900	11,500	15,600	77,800	53,000	25,000	12,600	7,940
26	8,740	8,320	8,180	6,820	13,700	11,200	16,000	79,600	51,900	24,600	12,200	8,220
27	8,740	8,460	8,040	6,700	13,700	11,000	16,400	80,100	50,700	23,900	12,100	8,080
28	8,740	8,460	8,180	6,940	13,700	11,200	16,600	80,500	49,600	23,500	11,700	8,080
29	8,600	8,460	8,040	6,940	13,700	11,200	17,200	81,000	48,600	22,600	11,300	8,080
30	8,600	8,460	7,900	6,940	-------	11,000	18,100	81,000	47,600	22,100	11,200	8,080
31	8,740	-------	7,660	7,660	-------	11,000	-------	80,100	-------	21,900	11,200	-------

Monthly discharge of Clark Fork at Metaline Falls, Wash., for the year ending September 30, 1924

[Drainage area, 25,100 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	9,160	8,320	8,700	0.347	0.40	535,000
November	8,600	7,900	8,250	.329	.37	491,000
December	8,740	7,660	8,390	.334	.39	516,000
January	7,660	4,120	6,540	.261	.30	402,000
February	14,100	8,740	11,900	.474	.51	684,000
March	13,900	11,000	12,300	.490	.56	756,000
April	18,100	10,500	13,200	.526	.59	786,000
May	81,000	18,700	51,300	2.04	2.35	3,150,000
June	79,200	47,600	61,800	2.46	2.74	3,680,000
July	46,900	21,900	32,700	1.30	1.50	2,010,000
August	21,000	11,200	15,200	.606	.70	935,000
September	11,200	7,940	9,210	.367	.41	548,000
The year	81,000	4,120	20,000	.797	10.82	14,500,000

ROCK CREEK NEAR QUIGLEY, MONT.

LOCATION.—In SW. ¼ sec. 36, T. 10 N., R. 17 W. (unsurveyed), at highway bridge one-fourth mile above mouth of Ranch Creek and 2½ miles south of Quigley, Granite County.

DRAINAGE AREA.—772 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 1, 1922, to September 30, 1924, at present site; September 22, 1910, to November 17, 1912, at a site below mouth of Ranch Creek.

GAGE.—Standard wire and weight on downstream side of highway bridge; read by Mrs. C. H. Hamm.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Bed composed of heavy boulders. Two channels at high stages. Control is bed of stream for several hundred feet below gage; probably permanent.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.45 feet at 4 p. m. May 17 (discharge, 2,700 second-feet). Minimum discharge from measurement of Dec. 13, 1923, 128 second-feet; ice present.

1922–1924: Maximum stage recorded, 6.32 feet June 5, 1922 (discharge, 6,260 second-feet). Minimum discharge from measurement of December 13, 1923, 128 second-feet; ice present.

ICE.—Stage-discharge relation seriously affected by ice. Gage not read a sufficient number of times for computation of daily discharge. Mean discharge for month based upon these readings and the discharge measurement for months of December, January, February, and March.

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent except for periods affected by ice. Rating curve well defined between 150 and 3,500 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except as stated in footnote to daily-discharge table. Records good except for December 1 to March 31, for which they are fair.

COOPERATION.—Maintained in cooperation with Rock Creek Power Co.

Discharge measurements of Rock Creek near Quigley, Mont., during the year ending September 30, 1924

[Made by W. A. Lamb]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 13	1.16	*128	Apr. 7	1.68	317	Sept. 30	1.18	160
Feb. 1	2.94	*196	Aug. 5	1.43	214			

* Ice present.

Daily discharge, in second-feet, of Rock Creek near Quigley, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	240	252	210	196	------		641	1,070	409	237	138
2	257	237	------	------	------		723	1,070	400	226	138
3	257	224	------	------	------	268	815	990	391	226	138
4	252	224	------	------	------		881	990	382	226	138
5	246	224	213	------	------		783	975	372	226	138
6	246	224	------	------	------	269	729	952	365	221	138
7	224	224	------	------	------	269	641	915	365	216	
8	229	224	------	------	------	254	729	915	365	216	
9	252	197	------	------	------	254	777	847	365	216	
10	246	197	------	------	------	246	809	815	365	215	
11	246	197	------	------	------	240	915	783	365	214	
12	252	197	------	------	------	224	1,120	753	365	212	
13	240	224	128	------	------	242	1,420	723	365	211	
14	235	224	------	197	252	260	1,930	723	365	209	
15	240	224	------	226	------	279	2,220	723	365	208	
16	252	224	------	------	------	299	2,540	759	331	206	
17	246	197	------	------	------	296	2,700	723	331	205	
18	240	197	------	------	------	284	2,680	723	331	205	148
19	235	197	------	------	------	269	2,670	723	331	200	
20	224	197	------	------	------	284	2,540	667	315	200	
21	213	197	------	------	------	296	2,380	615	315	200	
22	218	197	------	------	------	315	2,380	586	315	200	
23	237	197	------	------	------	348	2,220	586	315	200	
24	237	197	------	------	266	382	2,080	586	315	200	
25	224	197	200	------	----	393	2,000	566	315	195	
26	224	210	------	------	------	393	2,000	543	315	190	
27	224	210	------	------	------	418	1,800	520	299	182	
28	197	210	------	------	------	457	1,660	520	284	174	
29	197	210	------	249	------	477	1,420	437	269	170	
30	197	210	------	------	------	590	1,210	418	254	162	157
31	224	------	------	------	------	------	1,140	------	240	150	------

NOTE.—Braced figures show mean for period indicated. Gage not read and discharge interpolated Apr. 13–15, July 1–5, and Aug. 10–16.

Monthly discharge of Rock Creek near Quigley, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	257	197	234	14,400
November	252	197	211	12,600
December	----------	----------	[a]190	11,700
January	----------	----------	[a]170	10,500
February	----------	----------	[a]215	12,400
March	----------	----------	[a]250	15,400
April	590	224	313	18,600
May	2,700	641	1,570	96,500
June	1,070	418	741	44,100
July	409	240	338	20,800
August	237	150	204	12,500
September	157	138	146	8,690
The year	2,700	----------	383	278,000

[a] Mean monthly discharge computed from discharge measurements, observer's reading, and temperature records.

RANCH CREEK NEAR QUIGLEY, MONT.

LOCATION.—In NE. ¼ sec. 36, T. 10 N., R. 17 W. (unsurveyed), one-fourth of a mile above mouth and 2¼ miles south of Quigley, Granite County.

DRAINAGE AREA.—42.7 square miles (measured on topographic sheet).

RECORDS AVAILABLE.—May 2, 1922, to September 30, 1924.

GAGE.—Vertical staff with enamel face on right abutment of highway bridge; read by Mrs. C. H. Hamm.

DISCHARGE MEASUREMENTS.—Made from bridge or by wading.

CHANNEL AND CONTROL.—Bed composed of cobblestones. Control is riffle 20 feet below gage, subject to slight shifts. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.30 feet May 17 (discharge by indirect method, 164 second-feet); minimum discharge recorded, 10.7 second-feet (discharge measurement of February 1).

1922–1924: Maximum stage recorded, 1.50 feet May 19 and 20, 1922 (discharge, 238 second-feet), minimum discharge, 10.7 second-feet (from measurement of February 1, 1924; ice present).

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

DIVERSIONS.—None of importance.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent; affected by ice. Rating curve is well defined between 10 and 220 second-feet but is used only for indirect method after ice period begins. Daily discharge ascertained by applying daily gage height to rating table directly, or indirectly for days of gage readings.

COOPERATION.—Maintained in cooperation with the Rock Creek Power Co.

Discharge measurements of Ranch Creek near Quigley, Mont., during the year ending September 30, 1924

[Made by W. A. Lamb]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Dec. 13	1.08	[a]11.4	Apr. 7	0.67	23.9	Sept. 30	0.65	20.7
Feb. 1	.68	[a]10.7	Aug. 5	.68	27.4			

[a] Ice present.

Daily discharge, in second-feet, of Ranch Creek near Quigley, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	30	28	21	------	11	81		70	78	37	36	19
2	30	28	------	------	11	40		89	78	37	35	19
3	30	28	------	------	12			103	73	38	35	19
4	30	28	------	------	13		24	133	73	38	34	19
5	30	28	------	15	13			103	73	38	28	19
6	29	28	------	------	14			81	73	38	28	18
7	30	28	------	------	15		24	76	73	38	28	
8	30	28	18	------	15		26	76	73	38	28	
9	31	28	------	------	20		28	89	73	38	28	
10	31	28	------	------	24		35	98	68	38	28	
11	30	28	------	------	24		22	118	68	38	27	
12	30	28	------	15	24		22	124	65	38	27	
13	30	26	11	------	28		22	133	55	38	26	
14	30	28	------	------	28		26	133	53	38	26	
15	30	28	------	------	28		25	133	46	38	25	
16	30	28	------	------	31		26	148	46	38	25	
17	30	28	------	------	31	30	26	164	38	38	24	
18	30	28	------	------	30		26	151	38	38	24	20
19	30	26	------	------	30		26	148	38	38	24	
20	30	26	------	------	60		26	154	36	38	24	
21	30	26	------	------	60		30	142	32	38	24	
22	36	26	------	------	70		34	133	32	38	24	
23	36	26	------	------	70		36	127	32	38	24	
24	30	26	------	14	86		42	118	32	38	24	
25	30	26	------	------	86		46	118	36	38	24	
26	30	26	------	------	83		49	118	36	38	24	
27	30	22	------	------	112		49	118	32	38	24	
28	29	22	------	------	112		46	103	36	37	24	
29	30	21	------	------	109		49	103	37	37	24	
30	30	21	------	------	------		51	89	37	37	24	21
31	29	------	------	------	------		------	76	------	36	20	------

NOTE.—Braced figures show estimated mean discharge for periods indicated. No gage-height records for the periods nor for Feb. 2-7, 9, July 1-5, 27-31, and Aug. 10-16; discharge interpolated.

Monthly discharge of Ranch Creek near Quigley, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	36	29	30.4	1,870
November	28	21	26.5	1,580
December	------	------	[a] 16.0	984
January	------	------	[a] 12.0	738
February	112	11	43.1	2,480
March	81	30	32.0	1,970
April	51	22	31.2	1,860
May	164	70	115.0	7,070
June	78	32	52.0	3,090
July	38	36	37.8	2,320
August	36	20	26.5	1,630
September	21	18	19.8	1,180
The year	164	------	36.9	26,810

[a] Mean discharge for month estimated; no gage-height record during period of ice effect.

SKALKAHO CREEK NEAR HAMILTON, MONT.

LOCATION.—In SW. ¼ sec. 28, T. 5 N., R. 19 W., at farm bridge 1,000 feet south of ranch buildings on J. A. Brennan's ranch, 9 miles southeast of Hamilton, Ravalli County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 20, 1920, to September 30, 1924, when station was discontinued.

GAGE.—Vertical staff with enamel face on downstream end of left abutment of bridge; read by J. A. Brennan.

DISCHARGE MEASUREMENTS.—Made by wading near gage or from farm bridge half a mile below gage.

CHANNEL AND CONTROL.—Bed of stream composed of boulders and cobblestones for several hundred feet above and below gage. Control is same for all stages; seldom shifts. One channel at all stages. Banks high and not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.90 feet morning and afternoon readings May 25 (discharge, 462 second-feet); minimum stage, 1.30 feet March 26 to April 5 (discharge, 14 second-feet).

1920–1924: Maximum stage recorded, 3.80 feet June 14, 1922 (discharge, 1,110 second-feet); minimum stage, 1.30 feet March 26 to April 5, 1924 (discharge, 14 second-feet).

ICE.—Stage-discharge relation affected by ice along banks and on bottom of creek.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation not permanent affected by ice and slightly shifting control. Two rating curves used during year; first used only for shifting channel October 1–7; second used for open water during remainder of year. It is well defined between 30 and 400 second-feet. Gage read to half-tenths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table except as stated in footnote to daily discharge table. Records good.

Discharge measurements of Skalkaho Creek near Hamilton, Mont., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 8	C. S. Heidel	1.60	40.8	June 23	C. S. Heidel	2.08	128
May 23	do	2.70	368	Oct. 31	do	1.42	24.0
June 1	E. L. Grant	2.38	218				

Daily discharge, in second-feet, of Skalkaho Creek near Hamilton, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	36	30	26	-------	14	48	235	97	48	26
2	36	30	26	-------	14	73	259	97	48	26
3	36	30	26	-------	14	97	247	97	44	26
4	35	30	-------	-------	14	91	247	103	41	26
5	35	30	-------	-------	14	87	227	91	41	26
6	34	30	-------	-------	18	69	227	91	41	26
7	39	30	-------	-------	18	73	198	87	41	26
8	41	30	-------	-------	18	91	198	87	41	26
9	39	30	-------	-------	18	112	191	83	39	26
10	36	30	-------	-------	20	131	191	83	36	26
11	32	30	-------	-------	20	191	191	78	36	26
12	30	30	-------	-------	18	247	191	73	36	24
13	30	30	-------	-------	21	288	191	69	36	24
14	30	30	-------	-------	21	319	191	69	32	21
15	30	30	-------	-------	20	367	191	69	36	21
16	36	30	-------	-------	20	435	185	69	36	21
17	41	30	-------	-------	20	435	175	69	32	21
18	39	30	-------	-------	20	435	165	66	32	26
19	32	26	-------	-------	23	435	159	66	36	26
20	30	26	-------	-------	23	435	159	78	36	26
21	30	26	-------	-------	23	419	145	73	36	26
22	39	26	-------	-------	26	382	138	62	36	24
23	36	26	-------	-------	28	382	131	73	32	24
24	30	26	-------	-------	28	357	126	62	32	26
25	30	26	-------	-------	28	462	119	57	30	26
26	30	26	-------	14	28	382	119	57	30	26
27	30	26	-------	14	28	348	126	54	28	26
28	30	26	-------	14	30	310	112	54	26	26
29	30	26	-------	14	32	301	103	51	26	26
30	30	26	-------	14	32	259	103	51	26	26
31	30	26	-------	14	-------	235	-------	48	26	-------

NOTE.—Discharge Oct. 1–7 obtained by indirect method for shifting control. Discharge Oct. 30 to Nov. 4 estimated owing to ice effect. No record Dec. 4 to Mar. 25. No record June 22; discharge interpolated.

Monthly discharge of Skalkaho Creek near Hamilton, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	41	30	33.6	2,070
November	30	26	28.4	1,690
December 1–3	26	26	26.0	155
March 26–31	14	14	14.0	167
April	32	14	21.7	1,290
May	462	48	268	16,500
June	259	103	175	10,400
July	103	48	73.0	4,490
August	48	26	35.4	2,180
September	26	21	25.1	1,490

WILLOW CREEK NEAR CORVALLIS, MONT.

LOCATION.—In sec. 8, T. 6 N., R. 19 W., at Willey ranch, 6 miles southeast of Corvallis, Ravalli County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 30, 1920, to May 3, 1924, when station was discontinued.

GAGE.—Vertical staff with enamel face, on right bank 150 feet upstream from Willey ranch house; read by Mrs. Bray Willey.

DISCHARGE MEASUREMENTS.—Made at ford 50 feet below gage.

CHANNEL AND CONTROL.—Bed of stream composed of boulders and cobblestones, fairly permanent. Current evenly distributed. Banks high and not subject to overflow. One channel at all stages. Control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.64 foot October 21–23 (discharge, 7.1 second-feet); minimum stage recorded, 0.52 foot November 28 to December 1 and March 23–25 (discharge, 3.6 second-feet).

1920–1924: Maximum stage recorded, 2.20 feet June 15, 1922 (discharge, 130 second-feet); minimum stage recorded, 0.52 foot November 28 to December 1, 1923, and March 23–25, 1924 (discharge, 3.6 second-feet).

ICE.—Station not operated during period of ice effect.

DIVERSIONS.—One ditch diverts a small quantity of water above gage.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 7 and 80 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except as stated in footnote to daily discharge table. Records good.

The following discharge measurement was made by E. L. Grant:

May 30, 1924: Gage height, 1.04 feet; discharge, 28.5 second-feet.

Daily discharge, in second-feet, of Willow Creek near Corvallis, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	Day	Oct.	Nov.	Dec.	Mar.	Apr.	May
1	6.4	6.4	3.6	------	4.7	5.2	16	6.4	5.2	5.7	------	5.2	------
2	6.4	6.4	4.1	------	4.7	5.2	17	6.4	5.2	5.7	------	5.2	------
3	6.4	6.4	4.1	------	4.7	5.7	18	6.4	4.1	5.7	------	5.2	------
4	5.7	5.7	4.7	------	4.7	------	19	6.4	4.1	5.7	------	5.2	------
5	5.7	5.7	4.7	------	4.7	------	20	6.4	4.1	5.7	------	5.2	------
6	5.7	5.2	5.2	------	4.7	------	21	7.1	4.1	5.7	------	5.2	------
7	5.7	5.2	5.2	------	4.7	------	22	7.1	4.1	5.7	------	5.2	------
8	5.7	5.2	5.2	------	5.2	------	23	7.1	4.1	5.7	3.6	5.2	------
9	5.7	5.2	5.2	------	5.2	------	24	6.4	4.1	5.7	3.6	5.2	------
10	6.4	5.2	5.2	------	5.2	------	25	6.4	4.1	5.7	3.6	5.2	------
11	6.4	5.2	5.2	------	5.2	------	26	6.4	4.1	5.7	4.1	5.2	------
12	5.7	5.2	5.2	------	5.2	------	27	6.4	4.1	5.7	4.1	5.2	------
13	5.2	5.2	5.2	------	5.2	------	28	6.4	3.6	5.7	4.1	5.2	------
14	5.7	5.2	5.2	------	5.2	------	29	6.4	3.6	5.7	4.1	5.2	------
15	5.7	5.2	5.2	------	5.2	------	30	6.4	3.6	5.7	4.1	5.2	------
							31	6.4	------	5.7	4.7	------	------

NOTE.—No gage-height record Dec. 25, Jan. 1 to Mar. 22, Apr. 20, and 27. Discharge interpolated Dec 25, Apr. 20, and 27.

Monthly discharge of Willow Creek near Corvallis, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	7.1	5.2	6.23	383
November	6.4	3.6	4.83	287
December	5.7	3.6	5.30	326
March 23–31	4.7	3.6	4.00	71.4
April	5.2	4.7	5.08	302
May 1–3	5.7	5.2	5.37	32.0

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BURNT FORK CREEK NEAR STEVENSVILLE, MONT.

LOCATION.—In SW. ¼ sec. 11, T. 8 N., R. 19 W., at highway bridge at John Buck's ranch, 9 miles southeast of Stevensville, Ravalli County.

DRAINAGE AREA.—74 square miles (measured on topographic map).

RECORDS AVAILABLE.—May 9, 1920, to August 23, 1924, when station was discontinued.

GAGE.—Staff gage with enamel face on downstream end of left abutment of highway bridge; read by Oscar Smith.

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

CHANNEL AND CONTROL.—Stream bed composed of cobblestones and gravel; fairly smooth and not subject to shift. Banks high and are not overflowed. One channel at all stages; straight for 50 feet above and below gage. Control is gravel and cobblestone bar at point where stream forks about 100 feet below gage; fairly permanent. Stage-discharge relation may be affected by driftwood collecting at this point.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.90 feet May 18 (discharge, 268 second-feet); minimum stage recorded, 0.48 foot August 23 (discharge, 15 second-feet).

1920–1924: Maximum stage recorded, 2.64 feet June 10, 1922 (discharge, 620 second-feet); minimum stage recorded, 0.48 foot March 22–25, 1923, and August 23, 1924 (discharge, 15 second-feet).

ICE.—No records during ice period.

DIVERSIONS.—One or two small diversions above gage.

ACCURACY.—Stage-discharge relation permanent during year. Rating curve well defined between 13 and 350 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

COOPERATION.—Maintained in cooperation with the Bitter Root Valley Irrigation District.

Discharge measurements of Burnt Fork Creek near Stevensville, Mont., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 23	C. S. Heidel	1.64	182	June 23	C. S. Heidel	0.94	49.1
29	E. L. Grant	1.42	127	Oct. 30	do	.44	13.2

Daily discharge, in second-feet, of Burnt Fork Creek near Stevensville, Mont., for the year ending September 30, 1924

Day	May	June	July	Aug.	Day	May	June	July	Aug.
1		100	45	19	16	224	70	30	19
2		100	44	21	17	231	72	30	19
3		100	42	21	18	268	75	30	18
4		100	45	21	19	238	67	30	22
5		90	40	22	20	224	58	30	22
6		107	37	24	21	198	58	30	21
7		107	35	24	22	180	51	38	16
8		97	32	24	23	174	49	37	15
9		91	32	24	24	174	51	24	
10	132	94	30	22	25	168	53	24	
11	141	91	30	22	26	157	49	24	
12	152	85	30	21	27	146	60	22	
13	168	82	29	21	28	132	51	22	
14	198	85	27	21	29	123	47	21	
15	218	72	29	21	30	111	45	19	
					31	104		21	

NOTE.—No gage-height record Oct. 1 to May 9 and May 16. Discharge May 16 interpolated.

Monthly discharge of Burnt Fork Creek near Stevensville, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
May 10–31	268	104	175	7,630
June	107	45	75.2	4,470
July	45	19	30.9	1,900
August 1–23	24	15	20.9	954

FLATHEAD LAKE AT SOMERS, MONT.

LOCATION.—In NE. ¼ sec. 26, T. 27 N., R. 21 W., at steamboat dock at Somers, Flathead County.

RECORDS AVAILABLE.—April 25, 1922, to September 30, 1924; fragmentary.

GAGE.—Stevens water-stage recorder referenced to staff gage in well; inspected by G. E. Cottrell.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2,891.35 feet above sea level, at 7 a. m. May 25; minimum stage, 2,882.0 feet December 6–12.

1922–1924: Maximum stage recorded, 2,892.75 feet above sea level June 10, 1922; minimum stage, 2,882.0 feet December 6–12, 1923.

ACCURACY.—Records good.

Daily gage height, in feet, of Flathead Lake at Somers, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.
1	82.55	82.2	82.1		83.9	90.4	88.05	
2	82.5	82.2	82.1		84.1	90.25	88.0	
3	82.5	82.2	82.1		84.55	90.1		
4	82.5	82.2	82.1		85.05	89.95		
5	82.5	82.2	82.1		85.5	89.95		
6	82.4	82.2	82.0		85.9	89.85		
7	82.4	82.2	82.0		86.1	89.9		84.25
8	82.4	82.2	82.0		86.3	89.8		84.15
9	82.4	82.2	82.0		86.5	89.7		84.1
10	82.4	82.2	82.0	82.3	86.7	89.65		84.05
11	82.4	82.2	82.0	82.3		89.55		84.0
12	82.4	82.2	82.0	82.35		89.5		83.9
13	82.4	82.2		82.45		89.5		83.85
14	82.4	82.2		82.5		89.55		83.9
15	82.4	82.2		82.6		89.65		
16	82.4	82.2		82.7		89.75		
17	82.4	82.2		82.8		89.8		
18	82.4	82.2		82.85		89.85		
19	82.4	82.2		82.9		89.75		
20	82.4	82.2		82.95		89.7		
21	82.4	82.2		82.95		89.5		
22	82.3	82.2		83.0		89.4		
23	82.3	82.2		83.05		89.2		
24	82.3	82.2		83.1	91.2	89.05		
25	82.3	82.2		83.25	91.25	88.9		
26	82.3	82.2		83.3	91.25	88.75		
27	82.3	82.1		83.4	91.25	88.65		
28	82.3	82.1		83.5	91.2	88.45		
29	82.3	82.1		83.65	91.00	88.3		
30	82.3	82.1		83.8	90.85	88.15		
31	82.3				90.65			

NOTE.—Add 2,800.00 feet to reduce to sea level. No record Dec. 13 to Apr. 9, May 11–23, July 3 to Aug. 6, and Aug. 15 to Sept. 30, 1924.

FLATHEAD LAKE AT POLSON, MONT.

LOCATION.—In SE. ¼ sec. 4, T. 22 N., R. 20 W., at steamboat dock at south end of lake at Polson, Lake County.

RECORDS AVAILABLE.—August 23, 1908, to September 30, 1924; fragmentary.

GAGE.—Stevens water-stage recorder installed April 23, 1922, and referenced to staff gage in well.

EXTREMES OF STAGE.—Maximum stage recorded during year, 2,891.3 feet above mean sea level at 3 p. m. May 25; minimum stage, 2,881.50 feet at 11.30 a. m. November 24, 1923.

1908–1924: Maximum stage recorded, 2,895.7 feet above mean sea level July 1, 2, and 4, 1916; minimum stage, 2,881.5 feet February 16–22, 1913.

ACCURACY.—Records good.

Daily gage height, in feet, of Flathead Lake at Polson, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	Aug.	Sept.
1	82.5	82.2	82.1		84.0	90.3		83.35
2	82.5	82.2	82.05		84.15	90.1		83.3
3	82.5	82.1	82.05		84.4			83.2
4	82.5	82.1	82.05		84.8			83.25
5	82.4	82.2	81.95		85.25			83.25
6	82.4	82.2	81.85		85.6		84.2	83.2
7	82.4	82.15	81.95		85.9		84.15	83.2
8	82.4	82.15		82.2	86.1		84.4	83.1
9	82.4	82.15		82.15	86.3		84.1	83.05
10	82.4	82.15		82.15	86.5		84.05	83.0
11	82.4	82.15		82.2	86.8		84.0	83.0
12	82.3	82.1		82.25	87.2		83.9	83.0
13	82.3	82.1		82.35	87.6		83.9	83.0
14	82.3	82.1		82.4	88.1		83.8	83.0
15	82.2	82.15		82.55	88.7		83.8	82.95
16	82.1	82.1		82.6			83.75	82.9
17	82.2	82.1		82.7			83.7	82.9
18	82.3	82.1		82.75			83.7	82.9
19	82.3	82.05		82.85			83.85	82.85
20	82.3	82.05		82.9			83.85	82.65
21	82.3	82.05		82.9			83.75	82.7
22	82.25	82.0		82.95			83.6	82.7
23	82.4	82.0		83.05	91.1		83.55	82.7
24	82.35	81.9		83.2	91.2		83.5	82.65
25	82.3	82.05		83.25	91.1		83.5	82.65
26	82.3	82.1		83.35	91.2		83.5	82.6
27	82.3	82.05		83.45	91.15		83.5	82.6
28	82.3	82.05		83.6	91.05		83.45	82.55
29	82.3	82.05		83.7	91.0		83.3	82.55
30	82.25	82.15		83.85	90.8		83.4	82.5
31	82.2				90.5		83.4	

NOTE.—Add 2,800.00 feet to reduce to sea level. No record Dec. 8 to Apr. 6, May 16–22, and June 3 to Aug. 5.

FLATHEAD RIVER NEAR POLSON, MONT.

LOCATION.—In sec. 19, T. 22 N., R. 21 W., on highway bridge at Norrisvale, 5 miles below Newell tunnel, 15 miles northwest of Ronan, and 12 miles below Polson, Lake County.

DRAINAGE AREA.—7,010 square miles.

RECORDS AVAILABLE.—July 23, 1907, to September 30, 1924.

GAGE.—Chain gage on downstream side of bridge installed March 10, 1921; read by Mrs. Jennie Wigen.

DISCHARGE MEASUREMENTS.—Made from highway bridge at site of old ferry.

CHANNEL AND CONTROL.—Control not well defined but permanent. Current fairly swift. Banks high.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.09 feet at 8 a. m. May 26 (discharge, 47,000 second-feet); minimum stage, 1.20 feet December 25 (discharge, 2,420 second-feet).

1907–1924: Maximum stage recorded, 16.4 feet June 12, 1913 (discharge, 75,400 second-feet); minimum stage recorded, −0.1 foot December 9–14, 1919, and March 14, 1920 (discharge, 1,360 second-feet).

ICE.—Stage-discharge relation affected by ice December 12–14 and January 1–6.

DIVERSIONS.—Several small diversions from tributaries above Flathead Lake.

REGULATION.—Flathead Lake forms a natural regulation.

ACCURACY.—Stage-discharge relation permanent except when affected by ice. Rating curve well defined between 2,500 and 60,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table except as stated in footnote to daily discharge table. Records good.

Discharge measurements of Flathead River near Polson, Mont., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
June 23	E. L. Grant	9.41	30,900
Aug. 6	W. A. Lamb	4.89	8,800

Daily discharge, in second-feet, of Flathead River near Polson, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	3,740	3,110	2,720	2,490	2,660	2,870	3,190	8,770	42,700	28,200	10,400	5,340
2	3,700	3,080	2,720	2,520	2,710	3,200	3,320	9,090	42,100	27,500	10,300	5,300
3	3,480	3,030	2,720	2,550	2,710	3,200	3,320	10,200	41,400	26,600	10,200	5,150
4	3,230	3,000	2,700	2,580	2,700	3,080	3,440	12,000	40,200	25,600	9,440	4,970
5	3,230	3,000	2,700	2,610	2,700	3,030	3,440	15,700	39,600	24,600	9,380	4,970
6	3,230	3,000	2,700	2,640	2,710	3,030	3,440	16,500	39,000	23,700	9,030	4,970
7	3,620	2,980	2,690	2,670	2,710	2,870	3,440	17,000	38,400	22,700	8,860	4,970
8	3,620	2,960	2,690	2,880	2,670	2,760	3,320	17,500	38,300	22,100	8,770	4,950
9	3,230	2,940	2,700	2,880	2,660	3,090	3,190	18,000	37,800	21,600	8,690	4,880
10	3,230	2,940	2,700	2,820	2,710	3,200	3,190	21,100	43,700	21,200	8,050	4,790
11	3,110	2,940	2,700	2,770	2,750	3,330	3,190	22,700	43,300	20,500	8,160	4,660
12	3,000	2,910	2,800	2,700	2,760	3,330	3,080	23,500	36,500	20,500	7,790	4,610
13	2,920	2,910	2,900	2,670	2,870	3,330	3,080	26,000	37,000	18,800	7,790	4,610
14	2,780	2,900	3,000	2,670	2,920	3,460	3,080	28,200	37,700	18,000	7,770	4,450
15	2,780	2,890	3,100	2,630	2,980	3,470	3,080	30,600	38,300	17,400	7,740	4,450
16	2,680	2,890	2,880	2,580	3,080	3,890	3,080	31,700	37,100	16,700	7,470	4,450
17	2,490	2,870	2,820	2,560	3,200	3,200	3,080	35,900	37,100	16,500	7,300	4,450
18	2,580	2,830	2,670	2,520	3,460	3,080	3,080	39,000	37,000	16,300	7,250	4,450
19	2,890	2,810	2,670	2,520	3,200	2,980	3,190	41,500	37,000	15,700	7,080	4,440
20	2,890	2,790	2,670	2,570	3,180	2,980	3,720	43,400	37,000	15,200	7,060	4,400
21	2,890	2,780	2,670	2,570	2,980	2,980	3,880	45,000	36,700	14,700	7,030	4,400
22	2,890	2,780	2,670	2,570	2,980	2,980	4,180	46,000	36,000	14,500	6,870	4,360
23	2,890	2,780	2,570	2,570	3,080	2,980	4,500	46,700	35,300	13,600	6,600	4,360
24	2,890	2,830	2,570	2,590	2,980	2,980	4,660	46,800	34,700	13,200	6,560	4,360
25	3,230	2,870	2,420	2,650	2,980	2,980	5,280	46,000	34,000	13,000	6,490	4,290
26	3,230	2,870	2,460	2,670	2,980	2,980	5,800	47,000	32,500	12,600	6,380	3,980
27	3,230	2,790	2,460	2,670	2,980	2,980	6,230	46,300	31,100	12,200	6,380	3,540
28	3,230	2,780	2,460	2,670	2,980	2,980	6,670	46,300	30,400	11,500	6,160	3,410
29	3,110	2,740	2,460	2,670	2,980	3,090	7,870	45,400	29,300	11,100	5,990	3,350
30	3,110	2,730	2,460	2,670	-------	3,200	7,870	44,400	28,600	10,900	5,850	3,290
31	3,110	-------	2,460	2,670	-------	3,200	-------	43,200	-------	11,100	5,740	-------

NOTE.—Ice effect Dec. 12–14 and Jan. 1–6. No record July 3–5. Discharge interpolated for those periods.

Monthly discharge of Flathead River near Polson, Mont., for the year ending September 30, 1924

[Drainage area, 7,010 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	3,740	2,490	3,100	0.442	0.51	191,000
November	3,110	2,730	2,890	.412	.46	172,000
December	3,100	2,420	2,670	.381	.44	164,000
January	2,880	2,520	2,640	.377	.43	162,000
February	3,460	2,660	2,910	.415	.45	167,000
March	3,890	2,760	3,120	.445	.51	192,000
April	7,870	3,080	4,060	.579	.65	242,000
May	47,000	8,770	31,300	4.47	5.15	1,920,000
June	43,700	28,600	37,000	5.28	5.89	2,200,000
July	28,200	10,900	18,000	2.57	2.96	1,110,000
August	10,400	5,740	7,700	1.10	1.27	473,000
September	5,340	3,290	4,490	.641	.72	267,000
The year	47,000	2,420	10,000	1.43	19.44	7,260,000

SOUTH FORK OF FLATHEAD RIVER NEAR COLUMBIA FALLS, MONT.

LOCATION.—In NW. ¼ sec. 7, T. 30 N., R. 19 W., at highway bridge half a mile above mouth and 7 miles east of Columbia Falls, Flathead County.

DRAINAGE AREA.—1,640 square miles (measured on forest map).

RECORDS AVAILABLE.—September 20, 1910, to September 30, 1916, and April 13, 1923, to September 30, 1924.

GAGE.—Stevens water-stage recorder installed April 13, 1923, in gage shelter on downstream side of pier. Datum same as chain gage used 1910-1916.

DISCHARGE MEASUREMENTS.—Made from highway bridge.

CHANNEL AND CONTROL.—Channel composed of boulders and cobblestones, seldom shifts. No definite control. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 12.20 feet at 2.30 a. m. May 17 (discharge by indirect method, 25,800 second-feet); minimum stage, 2.08 feet at 10 p. m. October 6 (discharge, 340 second-feet).

1910–1916; 1923–1924: Maximum stage recorded, 16.6 feet June 19, 1916 (discharge estimated by extension of rating curve, 46,200 second-feet); minimum stage, 2.08 feet October 6, 1923 (discharge, 340 second-feet).

ICE.—No record during period of ice effect.

DIVERSIONS.—None.

REGULATIONS.—None.

ACCURACY.—Stage-discharge relation changed during high water in May. Rating curve used October 1 to May 22, well defined between 400 and 20,000 second-feet; curve applicable May 23 to September 30 well defined between 400 and 18,000 second-feet. Daily discharge ascertained by applying to rating table mean daily gage height obtained by inspecting recorder graph except as stated in footnote to daily-discharge table. Records good.

Discharge measurements of South Fork of Flathead River near Columbia Falls, Mont., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 12	C. S. Heidel	2.54	648	June 30	E. L. Grant	5.09	4,900
Apr. 9	W. A. Lamb	3.94	2,370	Aug. 7	W. A. Lamb	2.85	997
May 25	do	8.98	16,100				

Daily discharge, in second-feet, of South Fork of Flathead River near Columbia Falls, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	388	558	565	-------	544	7,650	8,640	4,480	1,240	460
2	383	558	558	-------	566	10,200	10,200	4,410	1,200	
3	366	558	558	-------	586	13,500	11,100	4,190	1,180	
4	361	558	558	-------	586	16,400	11,500	4,080	1,150	
5	350	558	551	-------	579	12,500	9,600	3,860	1,110	
6	345	558	572	760	586	10,500	8,460	3,750	1,070	
7	356	551	622	743	817	9,640	8,400	3,420	1,010	
8	478	551	-------	709	1,650	10,400	7,760	3,150	1,010	
9	779	551	-------	692	2,100	12,700	7,060	2,910	1,010	
10	718	551	-------	684	2,280	14,100	7,220	2,730	963	450
11	652	551	-------	684	2,480	17,000	8,460	2,560	952	
12	630	551	-------	675	2,760	19,100	10,500	2,420	910	
13	600	551	-------	668	3,290	19,100	11,500	2,280	880	
14	579	551	-------	675	3,510	19,100	12,300	2,190	860	
15	558	551	-------	660	3,290	20,300	12,600	2,100	880	
16	572	551	-------	622	2,960	23,400	11,800	1,990	900	
17	660	551	-------	600	2,710	24,400	10,700	1,920	890	
18	700	551	-------	615	2,510	22,400	9,270	1,850	870	460
19	668	558	-------	630	2,320	20,500	8,370	1,780	865	453
20	622	558	-------	630	2,290	19,000	7,700	1,750	865	453
21	600	551	-------	615	2,280	17,700	6,950	1,700	865	460
22	630	551	-------	593	2,900	17,400	6,560	1,720	865	460
23	734	551	-------	579	3,900	16,600	6,350	1,760	865	453
24	718	586	-------	586	4,500	15,200	5,990	1,670	860	453
25	675	660	-------	586	4,500	15,950	5,700	1,580	821	446
26	630	622	-------	586	4,750	15,100	5,400	1,520	812	432
27	593	565	-------	593	5,700	12,800	5,280	1,460	767	453
28	572	558	-------	579	5,790	11,100	5,080	1,420	668	446
29	565	608	-------	565	5,390	9,660	4,700	1,370	659	481
30	565	593	-------	558	5,900	8,610	4,680	1,320	642	481
31	558	-------	-------	551	-------	8,430	-------	1,270	518	-------

NOTE.—No gage-height record Dec. 8 to Mar. 5, Aug. 19–23, and Sept. 2–17. Discharge, May 1–22, determined by indirect method for shifting control; discharge, estimated Aug. 19–23 and Sept. 2–17, Braced figures show mean for period indicated.

Monthly discharge of South Fork of Flathead River near Columbia Falls, Mont., for the year ending September 30, 1924

[Drainage area, 1,640 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	779	345	568	0.346	0.40	34,900
November	660	551	564	.344	.38	33,600
December 1–7	622	551	569	.347	.09	7,900
March 6–31	760	551	632	.385	.37	32,600
April	5,900	544	2,800	1.71	1.91	167,000
May	24,400	7,650	15,200	9.27	10.69	935,000
June	12,600	4,680	8,330	5.08	5.67	496,000
July	4,480	1,270	2,410	1.47	1.70	148,000
August	1,240	518	908	.554	.64	55,800
September	481	432	453	.276	.31	27,000

SWAN RIVER NEAR BIG FORK, MONT.

LOCATION.—In NW. ¼ sec. 14, T. 26 N., R. 19 W., at outlet of Swan Lake, 7 miles southeast of Big Fork, Flathead County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—April 28, 1922, to September 30, 1924.

GAGE.—Vertical staff with enamel face fastened to pier on left bank, 1,000 feet below outlet of lake; read by Pat Murphy.

DISCHARGE MEASUREMENTS.—Made from highway bridge three-fourths of a mile below gage or from boat.

CHANNEL AND CONTROL.—Bed of stream composed of boulders and gravel. Banks subject to overflow at high stages. Control is rock ledge with some loose material about 300 feet below gage, slightly shifting.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 4.67 feet May 19 and 20 (discharge, 5,330 second-feet); minimum stage recorded, 0.36 foot January 5–6 (discharge, 280 second-feet).

1922–1924: Maximum stage recorded, 4.85 feet at 7 a. m. June 8, 1922 (discharge, 5,500 second-feet); minimum stage recorded, 0.33 foot February 25 to March 24, 1923 (discharge, 268 second-feet).

ICE.—Stage-discharge relation very slightly, if any, affected by ice; open channel rating assumed applicable for winter records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during high water in May. Rating curve used October 1 to May 20 well defined between 300 and 4,500 second-feet; curve used May 21 to September 30 well defined between 320 and 4,500 second-feet. Gage read to hundredths once daily, occasionally twice daily. Daily discharge ascertained by applying daily gage height or mean daily gage height to rating table. Records good.

Discharge measurements of Swan River near Big Fork, Mont., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
May 24	W. A. Lamb	4.22	4,350
June 29	E. L. Grant	2.18	1,740
Aug. 7	W. A. Lamb	.98	551

Daily discharge, in second-feet, of Swan River near Big Fork, Mont., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	388	369	419	331	314	474	419	1,660	2,590	1,600	608	443
2	388	369	451	296	322	462	430	1,860	2,480	1,560	608	424
3	378	369	430	296	331	440	440	2,150	2,480	1,540	596	424
4	378	388	419	288	340	440	451	2,540	2,540	1,520	549	424
5	378	369	419	280	350	440	451	2,910	2,700	1,490	549	404
6	369	369	419	280	359	440	496	3,010	2,780	1,450	549	404
7	340	369	430	288	369	440	532	2,860	2,890	1,430	549	404
8	388	369	440	288	388	440	607	2,700	2,810	1,390	538	404
9	419	369	440	296	388	440	717	2,610	2,720	1,350	527	404
10	430	359	430	305	388	440	868	2,720	2,540	1,270	516	395
11	419	369	430	314	388	440	966	2,780	2,300	1,210	516	386
12	430	359	388	314	388	440	1,100	3,190	2,170	1,150	505	386
13	419	359	388	314	414	440	1,270	3,600	2,100	1,090	495	386
14	409	350	388	314	440	440	1,440	3,970	2,050	1,090	495	386
15	388	340	378	305	468	440	1,560	4,220	2,150	955	495	378
16	409	340	350	305	496	440	1,580	4,430	2,350	917	495	369
17	419	340	378	305	496	440	1,520	4,730	2,430	879	495	360
18	409	340	378	305	508	440	1,440	5,210	2,460	842	495	369
19	409	340	378	305	520	440	1,360	5,330	2,460	824	495	369
20	409	350	350	305	520	440	1,290	5,330	2,410	788	495	378
21	409	350	350	296	508	440	1,290	5,190	2,300	788	527	395
22	409	350	350	296	508	440	1,310	5,040	2,070	788	527	395
23	409	350	331	296	496	430	1,350	4,870	1,980	824	538	378
24	419	350	331	296	485	419	1,440	4,560	1,890	842	527	378
25	409	378	331	296	485	419	1,500	4,260	1,850	806	505	378
26	409	398	331	296	485	419	1,500	4,190	1,780	754	505	378
27	388	451	359	296	485	419	1,520	4,190	1,740	738	495	378
28	378	451	369	296	496	419	1,540	3,860	1,740	690	484	360
29	369	474	378	296	474	409	1,580	3,540	1,670	676	453	360
30	369	419	359	296	-------	409	1,600	3,190	1,650	662	453	360
31	369	-------	331	305	-------	409	-------	2,810	-------	634	443	-------

Monthly discharge of Swan River near Big Fork, Mont., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	430	340	397	24,400
November	474	340	372	22,100
December	451	331	385	23,700
January	331	280	300	18,400
February	520	314	435	25,000
March	474	409	435	26,700
April	1,600	419	1,120	66,600
May	5,330	1,660	3,660	225,000
June	2,890	1,650	2,270	135,000
July	1,600	634	1,050	64,600
August	608	443	517	31,800
September	443	360	389	23,100
The year	5,330	280	946	686,000

PRIEST RIVER AT OUTLET OF PRIEST LAKE, NEAR COOLIN, IDAHO

LOCATION.—In SW. ¼ sec. 5, T. 59 N., R. 4 W., at southwest end of Priest Lake, 2 miles northwest of Coolin, Bonner County.

DRAINAGE AREA.—572 square miles.

RECORDS AVAILABLE.—June 18, 1911, to September 30, 1918; May 1, 1919, to September 30, 1924.

GAGE.—Stevens water-stage recorder on right bank 600 feet below outlet; installed November 24, 1914; inspected by F. S. Williamson.

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

CHANNEL AND CONTROL.—Bed rough. Banks high. Control boulder riffle. Many large boulders and angular rocks at control catch logs and cause backwater.

EXTREMES OF DISCHARGE.—Maximum stage during year, 4.64 feet at 8.45 a. m. on May 20 (discharge, 4,220 second-feet); minimum stage, 0.19 foot from 6 to 11 p. m. September 29 (discharge, 167 second-feet).

1911–1924: Maximum stage recorded, 6.83 feet at 1.30 p. m. May 30, 1917 (discharge, 7,290 second-feet); minimum stage, September 29, 1924.

ICE.—Forms on lake and occasionally in river just below outlet. Stage-discharge relation not affected by ice except possibly for short periods when ice, running out of lake, jams on rocks at control.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed slightly during spring high-water; affected by logs April 12 to May 10. Rating curves 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 determined from gage-height graph by inspection. Records excellent except for periods represented by flat estimates of discharge.

Discharge measurements of Priest River at outlet of Priest Lake, near Coolin, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 10	J. S. Gatewood	0.34	222	July 12	Gatewood and Thompson	1.28	612
10	do	.34	222	30	J. S. Gatewood	.87	413
Apr. 28	do	* 2.15	601	Sept. 20	do	.30	201
May 25	do	4.17	3,670				

* Stage-discharge relation affected by logs.

Daily discharge, in second-feet, of Priest River at outlet of Priest Lake, near Coolin, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	250	231	254	272	339	575	485		2,760	938	389	273
2	247	240	261	268	359	560	480		2,640	906	377	262
3	244	240	264	261	371	555	471		2,520	875	372	258
4	240	240	258	258	387	545	466		2,460	824	372	254
5	237	237	258	258	403	540	462		2,340	789	368	248
6	234	231	272	261	407	540	453	{2,200	2,280	735	360	248
7	237	228	275	254	415	535	444		2,220	722	356	244
8	234	228	275	254	423	525	438		2,170	703	356	240
9	234	231	272	254	427	520	466		2,120	678	343	240
10	228	234	275	261	427	520	471		2,120	660	339	237
11	225	234	268	272	448	520	495	3,080	2,060	636	331	227
12	222	231	268	275	466	515		3,200	1,990	618	327	224
13	222	228	261	272	495	510		3,400	1,910	602	315	218
14	225	228	264	268	510	505		3,530	1,840	585	319	215
15	219	225	264	264	530	505		3,660	1,760	542	327	215
16	225	228	261	264	540	515	550	3,940	1,690	537	323	206
17	225	225	264	268	555	520		3,940	1,620	522	315	200
18	228	225	268	264	560	520		4,080	1,540	508	323	197
19	222	222	272	264	565	535		4,220	1,470	503	323	200
20	219	219	275	264	565	545		4,220	1,390	494	323	197
21	219	219	279	264	570	545		4,220	1,320	484	327	194
22	228	216	279	272	570	540		4,080	1,280	484	327	191
23	234	228	279	287	570	535		3,940	1,230	466	323	185
24	231	240	279	287	570	520		3,660	1,140	457	319	182
25	234	237	283	287	555	510		3,660	1,130	453	315	179
26	231	247	283	283	555	500	650	3,530	1,090	448	315	179
27	234	250	283	279	555	500		3,530	1,050	444	307	176
28	231	258	295	279	575	495		3,400	1,030	423	299	173
29	231	258	307	287	580	490		3,200	1,010	419	292	170
30	228	261	299	295	------	495		3,010	978	414	288	173
31	228	------	264	319	------	490	------	2,880	------	402	280	------

NOTE.—Water-stage recorder not operating June 12–20; discharge interpolated. Braced figures show estimated mean discharge for periods indicated, when stage-discharge relation was affected by logging operations.

Monthly discharge of Priest River at outlet of Priest Lake, near Coolin, Idaho, for the year ending September 30, 1924

[Drainage area, 572 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	250	219	231	0.404	0.47	14,200
November	261	216	234	.409	.46	13,900
December	307	254	273	.477	.55	16,800
January	319	254	271	.474	.55	16,700
February	580	339	493	.862	.93	28,400
March	575	490	523	.914	1.05	32,200
April	------	438	553	.967	1.08	32,900
May	4,220	------	3,170	5.54	6.39	195,000
June	2,760	978	1,740	3.04	3.39	104,000
July	938	402	589	1.03	1.19	36,200
August	389	280	331	.579	.67	20,400
September	273	170	214	.374	.42	12,700
The year	4,220	170	720	1.26	17.15	523,000

SULLIVAN CREEK NEAR METALINE FALLS, WASH.

LOCATION.—In sec. 30, T. 39 N., R. 44 E., one-eighth of a mile below Outlet Creek, half a mile below Sullivan Lake, and 4 miles east of Metaline Falls, Pend Oreille County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 16, 1912, to December 31, 1924, when station was discontinued.

GAGE.—Inclined staff on left bank installed October 27, 1919; read by A. J. McDougall.

DISCHARGE MEASUREMENTS.—Made by wading or from cable 40 feet below gage.

CHANNEL AND CONTROL.—Stream bed of cobblestones and coarse gravel; shifting. Banks high and not subject to overflow. Gradient steep. Gage height of zero flow October 2, 1920, −0.3 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period October 1, 1923, to December 31, 1924, 2.30 feet on May 15 (discharge, 495 second-feet); minimum stage recorded, 0.50 foot August 27, 28, and September 14–17 (discharge, 15 second-feet).

1912–1924: Maximum stage recorded, 4.2 feet June 2, 1913 (discharge, 1,650 second-feet); minimum stage recorded, August 27, 28, and September 14–17, 1924.

ICE.—Stage-discharge relation affected by ice only during extremely severe winters.

DIVERSION.—Water is diverted from Sullivan Creek about a mile above station for storage in Sullivan Lake, but entire run-off of drainage basin passes gage.

REGULATION.—Storage in Sullivan Lake is used by Inland Portland Cement Co., to increase low-water flow.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curves fairly well defined. Gage read to hundredths once daily. Surge makes it difficult to read gage accurately. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Sullivan Creek near Metaline Falls, Wash., for the period October 1, 1923, to December 31, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 12	0.90	42.2	May 27	1.75	262	Aug. 2	1.04	62.8
13	.90	43.1	27	1.75	256	Sept. 22	.96	49.4

Daily discharge, in second-feet, of Sullivan Creek near Metaline Falls, Wash., for the period October 1, 1923, to December 31, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1923-24												
1	68	68	62	131	145	108	84	256	193	69	35	43
2	68	71	69	139	147	108	84	318	183	69	60	35
3	68	68	108	139	145	108	88	383	167	69	64	35
4	66	68	108	136	145	108	88	405	159	69	78	35
5	66	66	108	136	134	108	88	450	159	66	69	35
6	66	66	108	136	129	108	84	84	167	66	54	35
7	68	66	108	136	123	108	84	84	153	66	54	35
8	69	66	108	134	123	98	84	84	147	62	54	35
9	}	66	108	134	126	98	93	450	145	60	48	54
10	45	66	96	134	110	93	93	450	139	58	48	43
11	}	64	96	134	110	98	100	450	139	58	54	35
12	48	64	96	131	110	98	106	472	139	58	54	35
13	48	64	96	131	116	103	113	318	139	58	69	21
14	48	64	96	134	118	103	113	405	134	58	73	15
15	48	64	96	134	126	103	113	495	126	58	77	15
16	51	66	93	134	121	103	113	450	118	58	54	15
17	62	66	93	126	126	103	113	405	118	54	54	15
18	62	66	93	121	121	103	108	361	113	54	48	28
19	62	66	93	121	116	113	113	340	108	54	48	43
20	62	62	93	118	116	113	120	361	113	54	54	43
21	62	58	93	118	116	113	126	383	108	54	54	43
22	62	57	93	118	116	113	126	405	106	54	54	50
23	62	68	93	118	113	113	126	405	100	54	35	45
24	62	69	90	118	113	113	116	405	96	57	35	43
25	62	69	90	118	113	108	108	361	96	57	35	54
26	64	62	90	118	108	100	113	340	88	57	35	52
27	64	62	88	118	108	93	126	276	88	57	15	50
28	64	71	88	116	113	88	167	236	84	44	15	50
29	62	69	88	116	113	88	189	218	78	35	78	50
30	64	66	88	116	------	84	236	225	73	35	78	47
31	68	------	126	118	------	84	------	199	------	35	54	------

Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.	Day	Oct.	Nov.	Dec.
1924											
1	54	64	77	11	54	66	82	21	48	66	88
2	88	68	73	12	54	60	88	22	45	66	84
3	80	88	66	13	54	63	93	23	48	66	80
4	84	93	66	14	69	66	93	24	48	66	80
5	68	88	66	15	69	66	93	25	52	62	80
6	62	54	66	16	54	66	78	26	54	54	80
7	57	35	62	17	53	63	78	27	54	35	80
8	54	57	58	18	53	63	78	28	62	62	73
9	54	69	58	19	52	66	84	29	62	82	69
10	54	69	82	20	48	66	88	30	62	82	66
								31	62	------	66

NOTE.—Gage not read Dec. 25, 1923, Apr. 20, Sept. 3–4 and Dec. 25, 1924; discharge estimated by interpolation. Braced figures show estimated discharge for period indicated.

Monthly discharge of Sullivan Creek near Metaline Falls, Wash., for the period October 1, 1923, to December 31, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
1923–24				
October	69	----------	60.0	3,690
November	71	57	65.6	3,900
December	126	62	95.3	5,860
January	139	116	127	7,810
February	147	108	121	6,960
March	113	84	103	6,330
April	236	84	114	6,780
May	495	84	338	20,800
June	193	73	126	7,500
July	69	35	56.7	3,490
August	78	15	52.8	3,250
September	54	15	37.8	2,250
The year	495	15	108	78,600
1924				
October	88	45	58.5	3,600
November	93	35	65.7	3,910
December	93	58	76.6	4,710
The period	----------	----------	----------	12,200

COLVILLE RIVER BASIN

COLVILLE RIVER AT BLUE CREEK, WASH.

LOCATION.—In sec. 31, T. 33 N., R. 40 E., above small dam at sawmill just below mouth of Blue Creek, a quarter of a mile above Great Northern Railway crossing at Blue Creek, Stevens County.

DRAINAGE AREA.—not measured.

RECORDS AVAILABLE.—October 28, 1922, to September 30, 1924, when station was discontinued.

GAGE.—Vertical staff gage on left bank installed October 28, 1922; read by Howard Kjolseth.

DISCHARGE MEASUREMENTS.—Made from highway bridge, railway bridge below gage, or by wading.

CHANNEL AND CONTROL.—Banks moderately high; not subject to overflow. Stream bed is composed of soft mud. Control at low stage is small timber dam; overgrown bank and highway crossing are factors in high-water control.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.45 feet April 12–17 (discharge, 138 second-feet); minimum stage recorded, 0.09 foot at 7.30 p. m. August 13 (discharge, 5.3 second-feet). Both higher and lower discharges may have occurred during period records were not being kept.

1923–24: Maximum stage recorded, 4.5 feet April 8, 1923 (discharge, 468 second-feet); minimum stage recorded August 13, 1924.

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

DIVERSION.—A large percentage of summer flow diverted for irrigation above the station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed May 15–16; affected by trash on control April 1–25 and June 20–24. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records fair.

Discharge measurements of Colville River at Blue Creek, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 26	J. S. Gatewood	1.18	115	Aug. 5	J. S. Gatewood	0.51	16.3
May 12	do	1.02	73	8	Gatewood and Kjolseth	.34	11.7
July 11	Gatewood and Thompson	.53	16.7				

Daily discharge, in second-feet, of Colville River at Blue Creek, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	132	99	14	21	15	28	16	138	16	24	15	38	33
2	132	84	13	20	14	28	17	138	30	22	14	32	28
3	126	81	22	17	17	26	18	132	28	23	16	25	28
4	132	87	22	14	15	28	19	132	14	29	18	33	30
5	126	94	15	14	16	26	20	126	12	19	18	38	32
6	126	94	11	13	16	27	21	126	13	22	18	35	35
7	126	68	17	14	10	27	22	126	14	22	16	34	38
8	126	45	21	16	12	20	23	126	14	18	17	33	33
9	132	54	47	15	12	28	24	126	40	20	16	30	33
10	132	54	38	16	12	24	25	126	28	21	19	32	29
11	132	50	40	16	13	22	26	117	23	20	18	32	29
12	138	68	27	8.8	13	22	27	104	19	19	14	29	29
13	138	30	32	11	6.0	20	28	99	16	20	14	27	31
14	138	25	32	14	8.2	20	29	81	14	14	16	27	30
15	138	20	24	14	17	20	30	104	16	16	16	22	35
							31		15		18	28	

Monthly discharge of Colville River at Blue Creek, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	138	81	126	7,500
May	99	12	40.8	2,510
June	47	11	22.8	1,360
July	21	8.8	15.7	965
August	38	6.0	22.3	1,370
September	38	20	28.0	1,670
The period				15,400

COLVILLE RIVER AT MEYERS FALLS, WASH.

LOCATION.—In sec. 29, T. 36 N., R. 38 E., at Stevens County Light & Power Co.'s plant at foot of Meyers Falls, at town of Meyers Falls, Stevens County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—October 26, 1922, to September 30, 1924.

GAGE.—Vertical staff in two sections at confluence of power plant tailrace and river; read by plant attendants.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Right bank high; not subject to overflow; left bank may be overflowed at extremely high water. Channel straight for several hundred feet below gage. Control is of sand, gravel, and boulders which form pool at foot of falls; will shift at high stage. Gage height of zero flow, August 6, 1924, −0.30 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 2.73 feet at 1.50 p. m. February 8 (discharge, 422 second-feet); minimum stage recorded, 0.70 foot at 1.45 p. m. August 13, 6.18 a. m. August 14, and 1.25 p. m. September 3 (discharge, 17 second-feet).

1923–24: Maximum stage recorded, 3.9 feet April 20, 1923 (discharge, 916 second-feet); minimum stage recorded, in 1924.

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

DIVERSIONS.—Several small ditches divert water for irrigation above station.

REGULATION.—Small reservoir above the falls; effect probably slight.

ACCURACY.—Stage-discharge relation practically permanent. Rating curve fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good except for periods of ice effect.

Discharge measurements of Colville River at Meyers Falls, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 13	J. S. Gatewood	[a] 1.51	101	Aug. 5	J. S. Gatewood	0.85	26.7
Apr. 25	do	2.15	241	6	Ford and Logan	.84	26.5
May 14	do	1.96	192				

[a] Stage-discharge relation slightly affected by ice.

Daily discharge, in second-feet, of Colville River at Meyers Falls, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	86	113	142		238	292	225	238	88	41	20	37
2	78	113	120		280	307	214	250	83	41	23	38
3	82	113	116		322	307	214	238	70	37	23	17
4	81	116	123		322	277	214	250	70	39	25	38
5	83	116	123		338	277	214	238	68	36	25	31
6	82	114	142		354	250	214	238	91	31	25	36
7	83	114	142	60	370	264	214	225	81	32	25	35
8	86	114	171		404	250	225	225	79	32	27	33
9	86	114	161		404	250	238	225	83	31	25	40
10	92	109			370	250	238	214	83	29	20	33
11	92	113			354	250	238	202	91	24	20	36
12	86	114			37	238	250	202	100	26	20	37
13	83	113	120		387	250	250	202	90	29	18	36
14	83	109		103	387	250	277	192	88	25	18	38
15	91	113		103	404	238	264	181	88	24	23	35
16	88	113		103	370	238	264	181	86	19	21	35
17	78	111	132		354	238	264	142	86	24	42	36
18	106	113	132		354	225	264	132	70	22	43	37
19	106	102	132		338	238	250	132	72	22	48	43
20	104	113	132		307	238	238	123	68	29	55	43
21	100	113	132		292	225	250	111	75	29	55	46
22	109	118	123	90	277	225	238	108	73	31	53	46
23	120	120	132		264	225	238	120	61	29	49	48
24	123	142	132		250	225	238	96	65	28	51	46
25	123	152	132		250	214	238	113	65	28	48	48
26	113	161	123		238	214	238	123	47	29	45	51
27	109	161			238	214	238	106	57	26	43	41
28	111	152		123	264	225	238	97	51	25	40	47
29	109	142	100	161	292	225	238	100	53	24	37	48
30	111	142		152	-------	225	238	100	60	25	37	45
31	108	-------		180	-------	214	-------	81	-------	22	41	-------

NOTE.—Braced figures show estimated mean discharge for periods indicated when stage-discharge relation was affected by ice.

Monthly discharge of Colville River at Meyers Falls, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	123	78	96.5	5,930
November	161	102	122	7,260
December	171		125	7,690
January			86.9	5,340
February	404	238	324	18,600
March	307	214	244	15,000
April	277	214	239	14,200
May	250	81	167	10,300
June	100	47	74.7	4,440
July	41	19	28.7	1,760
August	55	18	33.7	2,070
September	51	17	39.3	2,340
The year	404	17	131	94,900

HALL CREEK BASIN

HALL CREEK AT INCHELIUM, WASH.

LOCATION.—In NE. ¼ sec. 6, T. 32 N., R. 37 E., half a mile above highway bridge, three-fourths of a mile above mouth, and three-fourths of a mile northwest of Inchelium, Ferry County.

DRAINAGE AREA.—163 square miles (measured on topographic map and maps of Colville Indian Reservation and Colville National Forest).

RECORDS AVAILABLE.—December 18, 1912, to September 30, 1924.

GAGE.—Stevens water-stage recorder on right bank half a mile above highway bridge since August 27, 1916; inspected by H. G. Parmeter.

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

CHANNEL AND CONTROL.—Bed of stream composed of gravel and boulders; seldom shifts. Channel straight above and below gage. Banks high. Gage height of zero flow August 7, 1924, 0.6 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 2.58 feet from 1 to 5 p. m. April 14 (discharge, 158 second-feet); minimum stage, 1.22 feet from 2 to 10 a. m. September 5 (discharge, 8.0 second-feet). Maximum discharge, and probably minimum discharge for the year, occurred during period records were not being kept.

1912–1924: Maximum stage recorded, 3.10 feet at 6.20 a. m. April 16, 1914 (discharge, 965 second-feet). Minimum discharge probably occurred on January 1, 1919, when stage-discharge relation was affected by ice; discharge estimated at 4 second-feet.

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

DIVERSIONS.—Water is diverted for use in Gwen mine power plant but is returned above gage.

REGULATION.—Effect of operation of power plant negligible.

ACCURACY.—Stage-discharge relation permanent. Rating curve fairly 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 determined by inspection from gage-height graph. Records good.

Discharge measurements of Hall Creek at Inchelium, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Apr. 24	2.38	116	Aug. 7	1.29	9.7
May 13	2.34	104	7	1.29	9.9

Daily discharge, in second-feet, of Hall Creek at Inchelium, Wash., for the year ending September 30, 1924

Day	Oct.	Nov	Apr.	May	June	July	Aug.	Sept.
1	18	20	55	136	56	18	9.2	9.2
2	17	20	56	140	54	17	9.8	9.0
3	16	20	58	147	52	15	11	8.8
4	16	20	58	147	46	15	11	8.5
5	15	20	58	147	45	14	11	8.2
6	16	20	63	142	46	14	10	8.2
7	21	20	79	136	50	14	9.5	8.5
8	22	19	97	131	45	14	9.2	8.2
9	20	19	110	127	46	14	9.0	9.2
10	18	18	122	122	43	13	8.8	10
11	18	17	127	118	42	13	8.5	9.8
12	18	18	140	110	41	13	8.2	9.2
13	18	20	145	108	39	12	8.2	9.0
14	17	20	156	105	38	12	8.5	8.8
15	17	20	149	101	36	11	9.0	8.8
16	20	20	140	97	35	11	9.8	8.5
17	24	20	133	94	33	12	11	8.5
18	22	20	127	91	32	12	11	8.8
19	21	20	120	86	34	14	12	9.5
20	20	19	116	83	33	14	12	10
21	20	19	112	79	31	13	12	10
22	24	19	114	77	30	13	11	10
23	26	20	116	75	28	12	11	9.8
24	23	24	114	72	27	12	10	9.5
25	22	27	112	75	26	11	10	10
26	21	23	114	73	24	11	9.8	10
27	20	22	116	69	23	11	9.0	10
28	20	21	122	67	22	10	8.8	10
29	20	21	127	64	21	9.8	8.5	10
30	20	20	131	61	20	9.5	8.8	11
31	20			59		9.2	9.2	

NOTE.—Water-stage recorder not operating Nov. 17-18; discharge estimated by interpolation.

Monthly discharge of Hall Creek at Inchelium, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	26	15	19.7	1,210
November	27	17	20.2	1,200
April	156	55	110	6,550
May	147	59	101	6,210
June	56	20	36.6	2,180
July	18	9.2	12.7	781
August	12	8.2	9.83	604
September	11	8.2	9.30	553

STRANGER CREEK BASIN

STRANGER CREEK AT METEOR, WASH.

LOCATION.—In sec. 21, T. 32 N., R. 36 E., at highway bridge at Meteor, Ferry County, 8 miles southwest of Inchelium.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—August 29, 1916, to September 30, 1924.

GAGE.—Vertical staff on right bank 15 feet downstream from bridge; read by Andrew Kilgore.

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

CHANNEL AND CONTROL.—Bed composed of gravel. One channel at all stages. Left bank subject to overflow at extremely high stages. Concrete control 6 feet downstream from gage. Gage height of zero flow, April 6 and September 25, 1923, at zero reading.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 0.64 foot at 5 p. m. April 27 (discharge, 14.1 second-feet). Discharge probably greater in February and early spring while records were not being kept. Stream dry August 13–18 and August 24 to September 30.

1916–1924: Maximum stage recorded, 2.0 feet from May 15–19, 1917, and April 20 to May 3, 1919 (discharge, 164 second-feet); probably no flow on December 12, 1919; creek frozen almost solid; no flow August 13–18 and August 24 to September 30, 1924.

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

DIVERSIONS.—None.

REGULATION.—None.

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.

Discharge measurements of Stranger Creek at Meteor, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Apr. 24	Gatewood and Inman	0.62	13.2
May 13	J. S. Gatewood	.60	12.0
Aug. 7	do	.09	.46

Daily discharge, in second-feet, of Stranger Creek at Meteor, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	11	13	8.1	2.3	0.7		16	11	11	5.3	2.3		
2	11	13	7.8	1.9	.7		17	12	11	5.3	2.3		
3	11	13	7.1	1.4	.7		18	12	11	5.3	2.3		
4	11	13	7.1	1.3	.6		19	12	11	5.6	2.6	0.3	
5	11	13	7.1	1.2	.5		20	12	11	5.3	2.5	.3	
6	11	13	7.1	1.1	.5		21	12	10	5.3	2.0	.3	
7	11	13	7.8	.9	.4		22	12	11	5.0	2.0	.2	
8	11	13	7.8	.6	.4		23	12	10	4.8	2.0	.2	
9	10	12	7.4	2.5	.4		24	13	9.9	4.3	1.7		
10	11	12	7.1	2.3	.3		25	13	9.2	4.0	1.4		
11	11	12	7.1	2.1	.3		26	13	9.2	3.8	1.4		
12	11	11	7.1	2.3	.2		27	14	8.8	3.4	.9		
13	11	11	7.1	2.5			28	13	8.4	3.0	.8		
14	11	11	7.1	2.5			29	13	8.4	2.6	.7		
15	11	11	6.8	2.3			30	13	8.4	2.5	.7		
							31		8.4		.7		

NOTE.—No flow Aug. 13–18 and Aug. 24 to Sept. 30.

Monthly discharge of Stranger Creek at Meteor, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April	14	10	11.7	696
May	13	8.4	11.0	676
June	8.1	2.5	5.84	348
July	2.6	.6	1.73	106
August	.7	.0	.23	14.1
September	.0	.0	.00	.0
The period				1,840

SPOKANE RIVER BASIN

COEUR D'ALENE RIVER NEAR CATALDO, IDAHO

LOCATION.—In sec. 26, T. 49 N., R. 1 E. Boise meridian, in Shoshone County, 1½ miles above Cataldo, Kootenai County, and 3 miles below junction of North and South forks.

DRAINAGE AREA.—1,220 square miles (measured by engineers of Washington Water Power Co. on map of Spokane River drainage basin compiled from best sources available).

RECORDS AVAILABLE.—April 25, 1911, to December 31, 1912; July 29, 1920, to September 30, 1924.

GAGE.—Inclined staff on right bank, 1½ miles above Cataldo; installed August 4, 1921; read by Lola Wilcox. Elevation of gage datum about 2,100 feet above sea level.

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

CHANNEL AND CONTROL.—Channel straight for 500 feet above and 1,500 feet below gage. Left bank high and wooded; not subject to overflow. Right bank subject to overflow at gage height about 50 feet. Low-water control is boulder and gravel riffle about 1,500 feet below gage; high-water control not determined; probably long stretch of river channel.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 47.2 feet on May 4 (discharge, 15,800 second-feet); minimum stage recorded, 37.1 feet September 16 and 17 (discharge, 260 second-feet).

1911–1912; 1920–1924; Maximum stage recorded, 49.0 feet on March 18, 1921 (discharge, 22,000 second-feet); minimum stage recorded, 37.0 feet August 27, 1923 (discharge, 215 second-feet). Discharge probably lower in December, 1922, when gage was not read.

ICE.—Stage-discharge relation seriously affected by ice during severe winters; flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually April 17 to May 1; affected by ice January 1–8 and 18–30. Rating curve used prior to change revised slightly at low water for use with this year's records. Both curves well defined below 10,000 second-feet. Gage read to half-tenths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used April 17 to May 1. Records good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Washington Water Power Co.

Discharge measurements of Coeur d'Alene River near Cataldo, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 19	Ford and Gatewood	37.99	670	Apr. 16	J. L. Ford	42.55	5,460
19	do	37.99	662	May 2	do	44.39	8,620
Dec. 21	J. L. Ford	37.92	595	7	Ford and Gatewood	42.60	5,420
Jan. 31	do	39.22	1,410	July 9	J. L. Ford	37.84	578
Feb 1	do	41.91	4,780	Aug. 13	Gatewood and Ford	37.28	344
11	do	41.05	3,270	Sept. 17	J. S. Gatewood	37.12	272
Mar. 13	do	40.09	2,120	17	J. L. Ford	37.12	261

Daily discharge, in second-feet, of Coeur d'Alene River near Cataldo, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	400	400	1,150		4,540	2,980	1,500	7,840	1,580	630	400	300
2	400	400	1,010		4,540	3,370	1,580	8,620	1,500	630	400	300
3	400	420	885		5,310	3,240	1,740	10,500	1,430	655	400	300
4	400	420	710		3,790	3,240	1,740	15,800	1,360	630	380	280
5	400	420	765	480	3,940	3,110	1,740	8,010	1,360	605	380	280
6	400	420	825		5,310	2,850	1,740	6,390	1,430	605	380	280
7	400	420	885		4,690	2,720	3,110	5,400	1,430	580	360	280
8	400	420	1,580		4,540	2,600	6,110	4,050	1,360	580	360	300
9	400	420	1,580	532	4,390	2,480	6,270	6,050	1,360	555	360	300
10	400	400	1,740	605	4,390	2,480	6,440	6,560	1,290	510	360	300
11	400	400	1,150	655	3,370	2,480	6,270	7,820	1,220	510	360	300
12	400	400	885	630	3,940	2,250	6,110	9,070	1,150	510	320	280
13	400	380	765	605	10,500	2,150	7,910	7,090	1,150	510	340	300
14	400	360	825	605	11,300	2,250	6,790	8,010	1,010	510	320	300
15	420	360	825	555	8,530	2,360	6,440	7,090	1,010	488	320	280
16	420	360	825	488	7,340	2,600	5,630	6,730	1,010	510	340	260
17	765	360	765	488	6,440	2,480	4,830	6,050	1,010	510	340	260
18	885	360	765		5,630	2,480	4,660	5,400	945	532	340	280
19	655	360	710		4,840	2,360	4,500	4,630	945	555	420	320
20	630	380	655		4,240	2,360	4,640	4,190	945	555	465	340
21	488	400	630		3,790	2,250	5,400	3,630	885	580	420	380
22	532	400	630		3,240	2,250	4,760	3,500	885	555	380	340
23	488	442	605		2,980	2,060	5,210	3,000	885	532	360	320
24	465	1,010	630	500	2,850	1,740	5,840	2,450	825	510	360	340
25	442	1,290	630		2,480	1,740	5,180	2,450	825	488	360	340
26	442	1,150	630		2,480	1,740	5,330	2,350	765	488	340	340
27	420	945	605		2,480	1,740	6,120	2,150	765	465	320	340
28	400	885	630		3,510	1,820	6,620	2,150	710	420	320	320
29	400	945	655		2,980	2,150	7,320	1,980	682	400	300	300
30	400	1,220	630		-------	1,660	8,250	1,900	630	400	300	300
31	400	-------	605	1,580	-------	1,500	-------	1,740	-------	420	300	-------

NOTE.—Discharge for Dec. 8 and May 8 determined after assuming that observer recorded stage 1.0 foot too low on those dates. Gage not read Sept. 2; discharge estimated by interpolation. Braced figures show estimated mean discharge for periods indicated when there was ice effect.

Monthly discharge of Coeur d'Alene River near Cataldo, Idaho, for the year ending September 30, 1924

[Drainage area, 1,220 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	885	400	460	0.377	0.43	28,300
November	1,290	360	552	.452	.50	32,800
December	1,740	605	845	.693	.80	52,000
January	1,580		551	.452	.52	33,900
February	11,300	2,480	4,770	3.91	4.22	274,000
March	3,370	1,500	2,370	1.94	2.24	146,000
April	8,250	1,500	4,990	4.09	4.56	297,000
May	15,800	1,740	5,570	4.57	5.27	342,000
June	1,580	630	1,080	.885	.99	64,300
July	655	400	530	.434	.50	32,600
August	465	300	358	.293	.34	22,000
September	380	260	305	.250	.28	18,100
The year	15,800	260	1,850	1.52	20.65	1,340,000

COEUR D'ALENE LAKE AT COEUR D'ALENE, IDAHO

LOCATION.—In SW. ¼ sec. 13, T. 50 N., R. 4 W., at Johnson's Wharf, 800 feet southeast of railroad station at Coeur d'Alene, Kootenai County.

DRAINAGE AREA.—3,750 square miles (measured by Washington Water Power Co. on map of Spokane River drainage basin compiled from all available sources).

RECORDS AVAILABLE.—February 11, 1905, to September 30, 1924; April 25, 1903, to February 11, 1905, at St. Joe Boom Co.'s gage at mouth of St. Joe River.

GAGE.—Stevens continuous water-stage recorder at wharf installed March 24, 1921; inspected by employees of Washington Water Power Co. Gage datum is 2,100 feet above mean sea level.

EXTREMES OF STAGE.—Maximum stage during year, 29.43 feet from 3 to 6 a. m. May 17; minimum stage, 22.92 feet at 5 a. m. January 29.

1903–1924: Maximum stage recorded, 36.00 feet at 6.15 p. m. January 3, 1918; minimum stage recorded, 19.9 feet on October 10–12, 1904, September 24–25, 1905, and October 14 to November 3, 1906.

The maximum stage known to early settlers, 37.6 feet as determined from high-water marks, occurred May 31, 1894.

DIVERSIONS.—None.

REGULATION.—Considerable storage is used by the Washington Water Power Co. Flow is regulated by Taintor gates and bear-trap dam at Post Falls.

ACCURACY.—Mean daily gage heights have been determined by inspection from gage-height graph. Records excellent.

Daily gage height, in feet, of Coeur d'Alene Lake at Coeur d'Alene, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	24.74	24.27	24.23	23.65	23.49	24.71	23.37	27.35	26.49	26.48	25.74	24.39
2	24.72	24.26	24.26	23.58	24.11	25.63	23.51	27.62	26.50	26.50	25.69	24.37
3	24.68	24.23	24.26	23.54	24.59	25.58	23.56	27.92	26.48	26.53	25.66	24.33
4	24.67	24.19	24.26	23.51	24.84	25.53	23.61	28.26	26.46	26.53	25.59	24.28
5	24.64	24.17	24.23	23.47	25.03	25.48	23.66	28.62	26.45	26.49	25.54	24.26
6	24.62	24.15	24.22	23.44	25.26	25.41	23.66	28.78	26.45	26.47	25.49	24.23
7	24.61	24.11	24.27	23.39	25.48	25.31	23.66	28.76	26.48	26.46	25.45	24.20
8	24.59	24.10	24.28	23.36	25.70	25.17	23.76	28.61	26.47	26.43	25.38	24.19
9	24.56	24.06	24.19	23.32	25.82	25.06	24.01	28.53	26.48	26.39	25.28	24.14
10	24.54	24.02	24.07	23.31	25.86	24.95	24.34	28.51	26.50	26.38	25.26	24.08
11	24.50	23.98	24.00	23.25	25.84	24.84	24.66	28.56	26.51	26.33	25.19	24.04
12	24.47	23.94	23.93	23.19	25.78	24.73	24.94	28.73	26.50	26.27	25.14	23.99
13	24.45	23.88	23.91	23.18	25.80	24.59	25.21	28.96	26.44	26.26	25.08	23.96
14	24.43	23.85	23.95	23.19	26.22	24.48	25.63	29.18	26.46	26.25	25.04	23.92
15	24.43	23.81	23.94	23.18	26.64	24.37	26.00	29.31	26.51	26.21	24.99	23.89
16	24.44	23.77	23.94	23.16	26.93	24.27	26.16	29.37	26.53	26.16	24.96	23.85
17	24.41	23.74	23.93	23.16	27.10	24.17	26.24	29.38	26.54	26.11	24.95	23.82
18	24.44	23.68	23.94	23.15	27.13	24.09	26.17	29.36	26.49	26.09	24.88	23.83
19	24.44	23.66	23.94	23.13	27.14	23.99	26.13	29.24	26.49	26.10	24.87	23.80
20	24.43	23.62	23.93	23.08	27.08	23.88	26.06	29.09	26.44	26.11	24.86	23.80
21	24.44	23.58	23.92	23.05	26.97	23.80	25.99	28.88	26.44	26.11	24.85	23.79
22	24.46	23.55	23.89	23.03	26.83	23.74	25.96	28.64	26.45	26.11	24.82	23.78
23	24.46	23.57	23.91	23.05	26.65	23.65	25.99	28.43	26.47	26.09	24.79	23.78
24	24.45	23.71	23.92	23.02	26.46	23.55	26.15	28.15	26.48	26.09	24.77	23.74
25	24.45	23.83	23.99	22.96	26.26	23.48	26.28	27.89	26.50	26.07	24.76	23.73
26	24.45	23.95	23.96	22.94	26.08	23.41	26.38	27.61	26.53	26.04	24.70	23.73
27	24.43	24.00	23.96	22.93	25.93	23.36	26.48	27.32	26.53	25.99	24.66	23.71
28	24.38	24.05	23.97	22.93	25.82	23.36	26.64	27.04	26.50	25.94	24.62	23.70
29	24.36	24.08	23.91	22.91	25.76	23.34	26.86	26.75	26.49	25.87	24.56	23.69
30	24.34	24.15	23.78	22.91	-------	23.29	27.12	26.47	26.50	25.83	24.49	23.70
31	24.31	-------	23.72	23.06	-------	23.27	-------	26.43	-------	25.78	24.41	-------

SPOKANE RIVER AT POST FALLS, IDAHO

LOCATION.—In sec. 4, T. 50 N., R. 5 W. Boise meridian, a quarter of a mile below power plant of Washington Water Power Co., three-fourths of a mile below intake of Spokane Valley Farms Co.'s canal, and 1 mile west of Post Falls, Kootenai County.

DRAINAGE AREA.—3,880 square miles (measured by engineers of Washington Water Power Co. on map of Spokane River drainage basin to scale of one-half inch to the mile, compiled from all sources available).

RECORDS AVAILABLE.—January 1, 1913, to September 30, 1924.

GAGE.—Stevens water-stage recorder on right bank since November 22, 1920; inspected by employees of Washington Water Power Co. Elevation of zero of gage, 2,000 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable 600 feet above gage.

CHANNEL AND CONTROL.—River bed composed of coarse gravel and boulders; shifts during floods. One channel at all stages. Control fairly permanent.

EXTREMES OF DISCHARGE.—Maximum stage during year, 72.52 feet at 8.15 a. m. on May 17 (discharge, 17,500 second-feet); minimum stage, 65.50 feet at 2.20 a. m. August 21 (discharge, 650 second-feet).

1913–1924: Maximum stage recorded, 79.20 feet at 7.30 a. m. May 18, 1917 (discharge, 39,800 second-feet); minimum stage recorded, 65.15 feet at 11 a. m. September 5, 1922 (discharge, 578 second-feet).

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

DIVERSION.—Spokane Valley Farms Co's. canal diverts above gage for irrigation. Mean diversion during 1924, 89 second-feet.

REGULATION.—Varying load on power plant causes fluctuation in stage. Storage in Coeur d'Alene Lake partly regulated by operation of gates in dam at Post Falls.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined; revised slightly for use after January 1. Operation of water-stage recorder satisfactory except as stated in footnote to table of daily discharge. Daily discharge January 12–27, and May 5–8, and 12–21 ascertained by applying to rating table mean daily gage height determined by inspection from gage-height graph, otherwise by use of discharge integrator. Records excellent.

COOPERATION.—Gage-height record and some discharge measurements furnished by Washington Water Power Co.

Discharge measurements of Spokane River at Post Falls, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 20	Gatewood and Ford	66.34	1,070	Apr. 30	Ford and Gatewood	71.21	11,900
Feb. 14	Ford and Becker	70.73	10,700	Aug. 9	do	66.64	1,380
27	J. L. Ford	70.52	9,880	Sept. 19	do	66.10	914

Daily discharge, in second-feet, of Spokane River at Post Falls, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,120	1,180		1,800	4,700	9,170	2,050	12,800	3,260	1,080	1,300	991
2	1,180	1,240	2,000	1,580	6,520	9,000	2,480	13,500	4,340	1,010	1,310	990
3	1,140	1,180		1,440	7,040	8,820	3,090	14,300	4,300	1,060	1,250	995
4	1,220	1,220	2,160	1,460	7,630	8,760	3,520	15,000	4,040	1,160	1,200	898
5	1,200	1,200	2,380	1,520	8,010	8,710	4,170	15,800	3,680	1,150	1,250	917
6	1,140	1,180	3,490	1,960	8,440	8,460	4,680	16,200	2,590	980	1,270	1,070
7	1,150	1,140	4,740	2,000	8,920	8,280	5,060	16,200	3,000	1,120	1,310	1,040
8	1,140	1,140	5,030	1,640	9,340	8,070	5,440	15,600	3,810	1,160	1,360	1,060
9	1,140	1,180	5,230	1,600	9,580	7,920	6,110	15,400	3,020	1,140	1,380	1,090
10	1,180	1,240	4,280	2,160	9,710	7,760	6,660	15,400	2,970	1,210	1,340	1,070
11	1,180	1,340	3,020	2,370	9,630	7,530	7,280	15,500	3,220	1,230	1,320	1,030
12	1,190	1,380	2,020	1,770	9,470	7,300	7,840	15,800	3,460	1,180	1,220	926
13	1,160	1,400	1,570	1,460	9,560	7,100	8,240	16,200	2,760	1,160	1,280	934
14	1,100	1,480	1,600	1,460	10,500	6,840	8,910	17,000	1,960	1,190	1,270	988
15	1,120	1,540	1,660	1,580	11,700	6,650	9,400	17,000	1,860	1,180	1,220	910
16	1,180	1,550	1,670	1,580	12,000	6,540	9,850	17,000	1,820	1,240	1,090	982
17	1,060	1,540	1,760	1,460	12,500	6,320	9,970	17,400	2,660	1,330	1,050	957
18	1,080	1,560	1,660	1,580	12,600	6,200	9,960	17,000	2,940	1,220	1,130	962
19	1,040	1,420	1,680	1,520	12,500	5,980	9,840	17,000	3,010	1,140	1,070	970
20	990	1,460	1,500	1,460	12,300	5,600	9,820	16,200	1,780	980	1,000	930
21	986	1,560	1,420	1,460	12,100	5,580	9,710	15,800	1,200	1,010	950	950
22	960	1,520	1,260	1,770	11,800	5,480	9,640	15,000	1,120	1,020	998	945
23	961		1,230	2,030	11,400	5,370	9,650	14,800	1,050	1,020	960	895
24	945		1,160	2,030	10,900	5,200	10,000	14,400	1,210	1,130	1,020	950
25	943		1,470	1,460	10,400	4,920	10,200	13,900	1,270	1,190	967	916
26	948	1,450	1,640	1,460	9,880	4,560	10,400	13,200	1,260	1,260	968	984
27	978		1,730	1,460	9,620	4,510	10,600	12,500	1,340	1,370	1,030	990
28	1,150		2,600	1,680	9,510	4,520	10,900	11,800	1,350	1,460	1,030	990
29	1,160		3,510	1,980	9,360	4,520	11,400	11,200	1,130	1,480	1,060	948
30	1,160		2,500	2,130	------	3,560	12,000	8,210	1,150	1,360	986	948
31	1,200	------	2,260	2,660	------	1,890	------	3,670	------	1,320	1,040	------

NOTE.—Water-stage recorder not operating Nov. 23 to Dec. 3 and May 1–4; discharge Nov. 23 to Dec. 3 estimated by comparison with flow at Spokane and from a study of inflow and storage of Coeur d'Alene Lake; discharge interpolated May 1–4.

Monthly discharge of Spokane River and Spokane Valley Farms Co.'s canal[a] at Post Falls, Idaho, for the year ending September 30, 1924

[Drainage area, 3,880 square miles]

Month	Discharge in second-feet						Run-off (combined)	
	River			Canal (mean)	Combined			
	Maximum	Minimum	Mean		Mean	Per square mile	Inches	Acre-feet
October	1,220	943	1,100	14	1,110			68,200
November		1,140	1,380		1,380			82,100
December	5,230	1,160	2,330		2,330			143,000
January	2,660	1,440	1,730		1,730			106,000
February	12,600	4,700	9,920		9,920			571,000
March	9,170	1,890	6,490		6,490			399,000
April	12,000	2,050	7,960	81	8,040			478,000
May	17,400	3,670	14,500	188	14,700			904,000
June	4,340	1,050	2,420	238	2,660			158,000
July	1,480	980	1,180	231	1,410			86,700
August	1,380	950	1,150	221	1,370			84,200
September	1,090	895	974	95	1,070			63,700
The year	17,400	895	4,240	89	4,330	1.12	15.24	3,140,000

[a] Formerly Spokane Valley Land & Water Co.'s canal.

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. The yearly figures represent the natural yield closely.

SPOKANE RIVER AT SPOKANE, WASH.

LOCATION.—In sec. 13, T. 25 N., R. 42 E., opposite Cochran Street, Spokane, Spokane County, a quarter of a mile above high railroad viaduct and 3 miles above Latah Creek.

DRAINAGE AREA.—4,350 square miles (measured by engineers of Washington Water Power Co. on maps of Spokane River drainage basin, scale half an inch to the mile, compiled from all available sources).

RECORDS AVAILABLE.—April 1, 1891, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank at Cochran Street 1 mile below Monroe Street bridge; used since July 1, 1921. Approximate elevation of gage datum 1,700 feet above sea level.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. One channel at all stages. Control is well-defined riffle one-fourth of a mile below gage; permanent. Gage height of zero flow estimated at 14.5 feet on October 7, 1922.

EXTREMES OF DISCHARGE.—Maximum stage during year, 23.6 feet on May 16–18 (discharge, 17,800 second-feet); minimum stage, 17.04 feet at 4.30 p. m. September 6 (discharge, 756 second-feet).

1891–1924: Maximum stage recorded, 12.42 feet, May 31, 1894 (discharge, 49,000 second-feet); minimum stage recorded, 16.70 feet at 8.30 a. m. October 21, 1922 (discharge, 500 second-feet).

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

DIVERSION.—Water is diverted above the station for irrigation by the Spokane Valley Farms Co.

REGULATION.—Flow partly regulated by storage in Coeur d'Alene Lake since July, 1906.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined. Operation of water-stage recorder satisfactory, except as noted in footnote to daily discharge table. Daily discharge ascertained by use of discharge integrator, or when discharge was above 8,600 second-feet 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 Washington Water Power Co.

Discharge measurements of Spokane River at Spokane, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 4	J. S. Gatewood	17.90	1,850	Apr. 3	J. L. Ford	18.92	3,430
Nov. 8	J. L. Ford	17.80	1,670	May 13	do	23.28	16,500
Feb. 13	Ford and Becker	21.30	9,790	June 24	do	17.72	1,590
25	J. L. Ford	21.71	10,900	Aug 4	Gatewood and Ford	17.67	1,480

Daily discharge, in second-feet, of Spokane River at Spokane, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,690	1,800	2,030	2,290	3,970	9,870	2,660	12,900	4,290	1,570	1,790	1,470
2	1,760	1,760	2,160	2,130	6,020	9,550	2,930	13,300	5,290	1,530	1,820	1,400
3	1,680	1,770	2,200	2,060	6,540	9,550	3,410	14,000	5,320	1,530	1,730	1,400
4	1,800	1,730	2,460	2,000	7,340	9,550	3,820	14,700	5,020	1,620	1,710	1,480
5	1,790	1,810	2,560	2,000	7,760	9,230	4,270	15,400	4,690	1,690	1,760	1,560
6	1,810	1,730	3,080	2,210	8,120	9,230	4,830	16,200	4,140	1,580	1,680	1,300
7	1,760	1,690	4,550	2,860	8,610	8,920	5,200	16,200	3,380	1,570	1,700	1,350
8	1,820	1,660	4,740	2,130	9,230	8,920	5,680	15,800	4,700	1,650	1,720	1,430
9	1,730	1,700	5,120	2,240	9,550	8,600	6,200	15,800	3,880	1,660	1,800	1,500
10	1,960	1,740	4,750	2,450	9,870	8,460	6,890	15,800	3,720	1,660	1,770	1,490
11	1,920	1,820	3,610	2,880	9,870	8,230	7,480	15,800	3,810	1,740	1,830	1,520
12	1,860	1,860	2,840	2,430	9,550	7,970	8,110	15,800	4,070	1,750	1,720	1,450
13	1,840	1,890	2,300	2,030	9,870	7,720	8,460	16,500	3,880	1,640	1,720	1,490
14	1,760	1,960	2,180	2,100	10,500	7,620	9,230	16,900	2,910	1,660	1,790	1,380
15	1,740	2,060	2,280	2,040	11,200	7,230	9,870	17,400	2,830	1,640	1,780	1,410
16	1,800	2,110	2,260	2,030	11,900	7,140	10,200	17,800	2,580	1,630	1,620	1,350
17	1,730	2,080	2,240	2,040	12,600	6,920	10,200	17,800	2,880	1,710	1,590	1,350
18	1,700	2,080	2,240	2,040	12,600	6,780	10,200	17,800	3,520	1,740	1,550	1,350
19	1,700	2,060	2,220	2,040	12,600	6,520	10,200	17,400	3,660	1,680	1,570	1,340
20	1,600	1,940	2,200	2,100	12,600	6,220	10,200	16,900	2,930	1,560	1,560	1,370
21	1,640	2,070	2,050	2,060	12,400	6,100	9,870	16,500	2,240	1,470	1,400	1,250
22	1,580	2,060	1,980	2,000	12,200	6,000	9,870	16,200	1,920	1,530	1,490	1,380
23	1,500	2,100	1,920	2,120	11,900	5,870	9,870	15,400	1,810	1,520	1,410	1,370
24	1,500	1,920	1,750	2,410	11,600	5,740	10,200	15,000	1,630	1,560	1,500	1,350
25	1,490	1,620	1,850	2,370	10,900	5,620	10,500	14,700	1,920	1,610	1,440	1,300
26	1,480	1,680	2,160	1,980	10,500	5,320	10,500	14,000	1,850	1,660	1,400	1,350
27	1,480	1,870	2,200	1,990	10,200	5,140	10,900	13,300	1,810	1,750	1,430	1,400
28	1,580	1,890	2,540	2,070	10,200	5,140	11,200	12,600	1,890	1,850	1,490	1,440
29	1,750	1,880	3,760	2,260	9,870	5,060	11,600	12,200	1,760	1,850	1,440	1,350
30	1,700	1,780	3,000	2,620	-------	4,730	12,200	10,600	1,560	1,830	1,500	1,300
31	1,760	-------	2,750	2,910	-------	2,710	-------	5,820	-------	1,830	1,400	-------

NOTE.—Gage-height record faulty Dec. 30 to Jan. 2 and Jan. 6–8; discharge Dec. 30–31 estimated from flow at Post Falls, Idaho; Jan. 1, 2, and 6–8 from partial graph and occasional staff gage readings.

Monthly discharge of Spokane River at Spokane, Wash., for the year ending September 30, 1924

[Drainage area, 4,350 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	1,960	1,480	1,710			105,000
November	2,110	1,620	1,870			111,000
December	5,120	1,750	2,710			167,000
January	2,910	1,980	2,200			136,000
February	12,600	3,970	10,000			575,000
March	9,870	2,710	7,150			440,000
April	12,200	2,660	8,220			489,000
May	17,800	5,820	15,000			922,000
June	5,320	1,560	3,200			190,000
July	1,850	1,470	1,650			101,000
August	1,830	1,400	1,620			99,600
September	1,560	1,250	1,400			83,300
The year	17,800	1,250	4,720	1.09	14.84	3,420,000

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. Yearly figures represent the natural discharge and run-off closely.

SPOKANE RIVER BELOW LITTLE FALLS, NEAR LONG LAKE, WASH.

LOCATION.—In NW. ¼ sec. 19, T. 27 N., R. 39 E., just above Chamokane Ferry, 1½ miles below Little Falls power plant of Washington Water Power Co., 4 miles below Chamokane Creek, and 5 miles below Long Lake, Lincoln County.

DRAINAGE AREA.—6,380 square miles (measured by engineers of Washington Water Power Co. on maps, compiled from best sources available).

RECORDS AVAILABLE.—November 5, 1912, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank; gage datum 1,200 feet above mean sea level.

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

CHANNEL AND CONTROL.—Bed composed of large boulders; shifting at high stages. Banks high. One channel at all stages. No noticeable riffle control below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 84.3 feet at noon and 5.30 p. m. May 12 (discharge, 20,300 second-feet); minimum stage, less than 73.4 feet from 3 to 4.30 p. m. September 1 and from 2.30 to 6.30 p. m. September 27 (discharge, less than 1,160 second-feet).

1912–1924: Maximum stage, 90.32 feet at 8.30 p. m. May 18, 1917 (discharge, 41,300 second-feet); minimum stage, September 1 and 27, 1924.

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

DIVERSIONS.—Water is diverted by the Spokane Valley Farms Co. for irrigation above the station.

REGULATION.—Flow affected considerably by power regulation at Little Falls and Long Lake and slightly by power regulation at Ninemile, Spokane, and Post Falls. Low-water flow is affected by regulation of storage in Coeur d'Alene Lake.

ACCURACY.—Stage-discharge relation changed at high water May 20. Rating curves well defined between 2,000 and 30,000 second-feet. Operation of water-stage recorder satisfactory. Daily discharge ascertained by use of discharge integrator or 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 Washington Water Power Co.

Discharge measurements of Spokane River below Little Falls, near Long Lake, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 23	Ford and Gatewood	76.04	2,920	Aug. 15	Gatewood and Ford	75.70	2,680
Dec. 7	Ford and Becker	78.50	6,070	Aug. 20	J. L. Ford	75.92	2,940

Daily discharge, in second-feet, of Spokane River below Little Falls, near Long Lake, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2,560	2,510	2,400	2,940	12,600	10,500	3,170	13,100	5,160	3,160	2,460	1,860
2	2,530	2,360	2,320	3,080	10,900	10,900	4,210	13,100	5,260	2,630	2,470	2,240
3	2,500	2,410	3,490	2,420	9,520	11,500	4,120	14,600	4,910	2,580	1,990	2,360
4	2,520	2,010	2,740	2,740	8,780	10,500	4,260	14,900	6,480	1,750	2,580	2,330
5	2,420	2,440	4,200	2,720	10,300	10,500	4,730	15,800	5,660	1,840	2,540	2,600
6	2,490	2,490	3,570	2,470	10,700	10,300	5,440	17,200	5,260	2,000	2,490	2,760
7	1,980	2,520	4,980	3,120	10,800	9,820	6,160	17,700	4,580	2,430	2,660	1,970
8	2,380	2,660	4,690	3,260	11,400	9,770	6,940	17,100	4,180	2,580	2,640	2,080
9	2,450	2,870	5,700	2,880	11,600	9,420	6,660	16,700	6,190	2,520	2,510	2,450
10	2,640	2,620	6,170	2,580	11,200	9,840	8,620	16,400	4,380	2,500	2,110	2,450
11	2,560	2,320	4,230	3,280	11,600	7,840	7,740	15,800	4,120	2,470	2,430	2,290
12	2,450	2,670	3,160	3,490	11,300	6,810	8,510	19,100	5,020	2,510	2,600	2,320
13	2,610	2,710	3,320	2,900	10,800	8,060	9,010	17,300	4,950	2,120	2,670	2,270
14	2,190	2,720	2,940	2,110	11,800	8,440	9,640	17,400	3,360	2,420	2,550	2,120
15	2,650	2,710	2,250	3,030	12,500	7,960	10,300	18,000	2,070	2,500	2,470	2,200
16	2,360	2,620	2,720	2,830	13,400	7,360	11,200	18,400	3,150	2,510	2,240	2,310
17	2,180	2,640	3,120	2,430	13,700	8,250	11,500	18,800	3,340	2,420	2,580	2,260
18	2,090	2,110	3,080	3,330	14,900	7,400	10,400	18,200	3,460	2,400	2,320	2,280
19	2,080	2,780	2,930	2,520	13,900	7,070	11,100	19,100	4,540	2,380	2,390	2,190
20	2,650	2,710	2,660	1,950	13,600	7,130	10,800	18,800	4,420	2,250	2,510	2,430
21	2,220	2,780	2,860	2,560	13,700	6,070	11,100	18,100	3,040	2,760	2,610	2,330
22	2,700	2,860	2,620	3,100	13,200	6,870	10,400	16,700	2,330	2,490	2,340	2,360
23	2,280	2,520	2,390	3,100	12,400	6,660	11,100	16,500	2,420	2,580	2,400	2,280
24	2,340	2,180	2,180	2,880	12,300	6,860	10,700	15,500	2,520	2,540	2,060	2,320
25	2,480	2,280	2,320	2,910	12,400	5,900	10,500	14,900	2,420	2,540	2,120	2,240
26	2,490	2,780	3,020	2,170	12,000	5,200	11,000	15,700	2,670	2,500	2,340	2,110
27	2,400	2,650	2,390	2,700	11,500	5,720	11,900	13,800	2,630	2,080	2,370	2,050
28	1,940	2,620	3,020	2,420	11,300	6,660	12,500	13,300	2,710	2,250	2,280	1,760
29	2,440	1,820	4,280	3,760	11,400	5,330	12,200	13,400	2,520	2,370	2,400	2,180
30	2,610	2,970	3,730	8,320	-------	5,820	12,600	11,900	3,030	2,440	2,380	2,520
31	2,460	-------	3,100	11,300	-------	5,040	-------	6,580	-------	2,460	2,080	-------

Monthly discharge of Spokane River below Little Falls, near Long Lake, Wash., for the year ending September 30, 1924

[Drainage area, 6,380 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	2,700	1,940	2,410	----------	----------	148,000
November	2,970	1,820	2,540	----------	----------	151,000
December	6,170	2,180	3,310	----------	----------	204,000
January	11,300	1,950	3,270	----------	----------	201,000
February	14,900	8,780	11,900	----------	----------	684,000
March	11,500	5,040	7,920	----------	----------	487,000
April	12,600	3,170	8,950	----------	----------	533,000
May	19,100	6,580	15,900	----------	----------	978,000
June	6,480	2,070	3,890	----------	----------	231,000
July	3,160	1,750	2,420	----------	----------	149,000
August	2,670	1,990	2,410	----------	----------	148,000
September	2,760	1,760	2,260	----------	----------	134,000
The year	19,100	1,750	5,580	0.875	11.91	4,050,000

NOTE.—Monthly discharge in second-feet per square mile and run-off in inches not computed owing to regulation. Yearly figures represent the natural discharge and run-off closely.

ST. JOE RIVER AT CALDER, IDAHO

LOCATION.—In sec. 3, T. 45 N., R. 2 E. Boise meridian, at ferry 150 feet southwest of Chicago, Milwaukee & St. Paul Railway station at Calder, Shoshone County, 5 miles below Marble Creek, and 11 miles east of St. Joe.

DRAINAGE AREA.—1,080 square miles (measured by engineers of Washington Water Power Co., on map of Spokane River drainage basin compiled from all sources available).

RECORDS AVAILABLE.—July 13, 1920, to September 30, 1924; April 14, 1911, to September 30, 1912, at station about 2½ miles farther downstream.

GAGE.—Stevens continuous water-stage recorder on right bank at ferry landing at Calder; installed December 22, 1920; inspected by C. P. Latham. Gage datum is approximately 2,100 feet above sea level.

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

CHANNEL AND CONTROL.—Right bank high, not subject to overflow; left bank subject to overflow at high stages. Control is shifting gravel riffle 800 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage during year, 86.45 feet at 7.30 a. m. May 13 (discharge, 13,100 second-feet); minimum stage recorded, 78.81 feet at 2 p. m. December 31 (discharge, 230 second-feet); minimum discharge probably occurred in January when stage-discharge relation was affected by ice.

1911–1912, 1920–1924: Maximum stage recorded, 87.8 feet at 7 a. m. May 18, 1922 (discharge, 17,600 second-feet); minimum stage recorded, 78.67 feet at 9.30 a. m. and from 11 a. m. to noon November 25, 1922 (discharge, 194 second-feet). Discharge probably less in December, 1922, when stage-discharge relation was affected by ice.

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

DIVERSIONS.—None.

REGULATION.—Flash dam at Marble Creek used to store water for flushing logs down river during low water. Water released at regular intervals during driving season. Operation of dam causes diurnal fluctuation at gage of about 1 foot. Duration of effect about 4 hours.

ACCURACY.—Stage-discharge relation changed at high water May 4 and gradually due to logs July 9 to August 11; affected by ice January 1 to February 3. Rating curves well defined. Operation of water-stage recorder fairly satisfactory except as stated in footnote to table of daily discharge. October 1 to July 10 daily discharge ascertained by use of discharge integrator; July 11 to September 30, by applying to rating table mean daily gage height determined from gage-height graph by inspection. Records good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Washington Water Power Co.

Discharge measurements of St. Joe River at Calder, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 18	Gatewood and Ford	79.98	695	May 5	Gatewood and Ford	84.91	8,840
Dec. 19	J. L. Ford	79.70	537	23	J. L. Ford	83.57	5,260
Jan. 5	J. S. Gatewood	[a] 80.54	438	June 6	do	81.89	2,440
16	J. L. Ford	[a] 79.97	455	July 8	do	80.02	771
Feb. 8	do	81.71	2,200	Aug. 12	Gatewood and Ford	79.55	413
Mar. 6	do	80.99	1,470	Sept. 16	J. L. Ford	79.33	352
Apr. 10	do	83.15	4,250	16	J. S. Gatewood	79.33	340

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of St. Joe River at Calder, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	351	360	779			1,430	957	8,910	2,690	1,090	480	360
2	370	461	667		3,000	1,440	1,100	10,200	2,740	1,090	500	375
3	346	470	655			1,690	1,370	11,300	2,650	1,060	480	390
4	326	411	652		1,570	1,700	1,300	11,300	2,550	1,040	480	375
5	411	392	616		1,790	1,600	1,430	8,890	2,370	978	460	360
				400								
6	390	376	818		2,100	1,570	1,570	6,840	2,300	950	460	390
7	419	358	1,280		1,960	1,470	2,960	6,130	2,330	960	460	375
8	521	353	941		2,160	1,400	4,320	6,920	2,220	896	442	390
9	493	350	760		1,930	1,440	4,690	8,020	2,150	819	442	460
10	438	348	668		1,580	1,420	4,460	9,160	2,000	834	442	375
11	445	316	573		1,410	1,320	4,680	10,500	1,960	760	442	375
12	427	330	720		1,490	1,270	4,600	11,900	1,930	760	442	390
13	413	396	622		3,790	1,250	5,060	12,500	1,870	760	425	375
14	409	410			4,740	1,280	5,100	11,600	1,840	760	425	390
15	394	464			3,820	1,260	4,230	10,700	1,750	700	520	360
				500								
16	550	395	581		3,210	1,140	3,590	10,600	1,680	700	500	360
17	978	356			2,760	1,140	3,150	9,970	1,680	670	480	360
18	755	311			2,440	1,170	2,930	9,190	1,720	700	480	360
19	605	318	540		2,240	1,160	2,800	8,550	1,660	760	500	480
20	498	496	525		1,990	1,120	2,820	7,380	1,590	760	565	460
21	470	510	430		1,820	1,090	3,100	6,620	1,480	700	480	425
22	506	429	358		1,660	1,060		5,980	1,410	700	442	408
23	508	548	473		1,490	996	4,500	5,400	1,360	730	408	390
24	477	1,640	534		1,360	1,040		4,990	1,340	640	408	408
25	430	1,420	526		1,360	1,040	5,400	4,670	1,310	590	408	408
				700								
26	408	938	490		1,360	1,080	6,010	4,150	1,310	565	375	480
27	444	754	465		1,350	1,120	6,860	3,740	1,360	565	390	460
28	384	698	471		1,450	1,120	7,510	3,360	1,300	520	390	408
29	381	912	504		1,420	1,070	8,440	3,100	1,200	520	375	390
30	323	996	361		-------	982	9,170	2,860	1,080	520	390	375
31	400	-------	254		-------	943	-------	2,760	-------	500	360	-------

NOTE.—Water-stage recorder not operating satisfactorily Dec. 14–18 and Apr. 22–24; discharge Dec. 14–18 estimated by interpolation; Apr. 22–24 by comparison with flow of Coeur d'Alene River near Cataldo, Idaho. Discharge estimated Jan. 1 to Feb. 3 owing to ice effect. Braced figures show mean discharge for periods indicated.

Monthly discharge of St. Joe River at Calder, Idaho, for the year ending September 30, 1924

[Drainage area, 1,080 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	978	323	460	0.426	0.49	28,300
November	1,640	311	551	.510	.57	32,800
December	1,280	254	600	.556	.64	36,900
January	----------	----------	539	.499	.58	33,100
February	----------	1,350	2,180	2.02	2.18	125,000
March	1,700	943	1,250	1.16	1.34	76,900
April	9,170	957	4,100	3.80	4.24	244,000
May	12,500	2,760	7,680	7.11	8.20	472,000
June	2,740	1,080	1,830	1.69	1.89	109,000
July	1,090	500	761	.705	.81	46,800
August	565	360	447	.414	.48	27,500
September	480	360	397	.368	.41	23,600
The year	12,500	----------	1,730	1.60	21.83	1,260,000

ST. MARIES RIVER AT LOTUS, IDAHO

LOCATION.—In sec. 20, T. 45 N., R. 2 W. Boise meridian, 1,000 feet below Lotus station on Elk River branch of Chicago, Milwaukee & St. Paul Railway and 9 miles above St. Maries and mouth of river, Benewah County.

DRAINAGE AREA.—420 square miles (measured by engineers of Washington Water Power Co. on map of Spokane River drainage basin compiled from all available sources).

RECORDS AVAILABLE.—July 9, 1911, to October 31, 1912, and July 15, 1920, to September 30, 1924.

GAGE.—Since October 1, 1922, vertical and inclined staff on left bank; read by Mrs. Naoma Carter.

DISCHARGE MEASUREMENTS.—Made by wading or from suspension footbridge at railway station.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders. Channel straight for 200 feet below gage. Left bank high, not subject to overflow at gage. Right bank subject to overflow at high stages. Riffle control 150 feet below gage; shifting at high stages.

EXTREMES OF DISCHARGE.—Maximum mean daily discharge, estimated at 2,400 second-feet on February 2, when ice and log jam, backing water over gage, broke. Minimum stage recorded, 2.65 feet on September 5–7 (discharge, 36 second-feet).

1911–12, 1920–1924: Maximum stage recorded, 66.5 feet at 6 a. m. March 18, 1921 (discharge, 8,660 second-feet); minimum discharge probably occurred during winter 1922–23, when stage-discharge relation was affected by ice and logs; certainly less than 30 second-feet.

ICE.—Stage-discharge relation seriously affected by ice. Flow estimated from discharge measurements, observer's notes, and weather records.

ACCURACY.—Stage-discharge relation changed gradually April 19 to May 1 and May 7–17; affected by ice and logs December 11 to February 3, and by logs May 7–17. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used April 19 to May 1 and May 7–17. Records poor for periods covered by flat estimates of discharge. Otherwise good.

COOPERATION.—Gage-height record and some discharge measurements furnished by Washington Water Power Co.

Discharge measurements of St. Maries River at Lotus, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 17	Gatewood and Ford	3.10	141	May 6	J. S. Gatewood	[b] 4.41	838
17	do	3.11	146	June 5	J. L. Ford	3.12	166
Dec. 20	J. L. Ford	[a] 3.67	150	July 7	do	2.82	65.2
Jan. 4	J. S. Gatewood	[a] 4.31	129	Aug. 11	Gatewood and Ford	2.69	39.8
15	J. L. Ford	[a] 4.13	144	Sept. 15	J. S. Gatewood	2.68	40.4
Feb. 6	do	5.03	1,710	15	J. L. Ford	2.68	39.0
Apr. 9	do	4.24	845				

[a] Stage-discharge relation affected by ice.
[b] Stage-discharge relation affected by logs on control.

Daily discharge, in second-feet, of St. Maries River at Lotus, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	53	58	210			1,020	275	880	187	83	47	37
2	53	77	203		1,800	1,020	326	970	183	78	47	37
3	53	77	210			970	383	1,120	179	76	47	37
4	51	77	203		1,120	970	365	1,240	179	70	47	37
5	53	69	176		1,480	880	348	1,070	166	68	47	36
				130								
6	53	66	144		1,750	750	354	835	162	68	47	36
7	64	64	1,120		1,750	710	458		187	65	46	36
8	69	66	458		1,620	672	925		200	65	44	41
9	64	66	285		1,550	598	835		183	65	42	49
10	69	66	210		1,120	560	880		183	63	42	58
11	66	66			835	458	970		175	60	41	42
12	64	124			750	458	1,360	850	175	58	41	41
13	64	98			750	425	1,480		158	56	39	41
14	61	56			1,180	458	1,360		142	56	39	39
15	64	58	180		1,680	490	1,180		131	53	42	39
				130								
16	69	69			1,550	419	925		127	51	53	39
17	144	64			1,240	395	835		138	53	53	38
18	120	64			1,180	360	750	522	142	60	51	41
19	95	53			1,120	348	790	522	142	93	65	60
20	77	104			835	332	672	428	135	99	93	135
21	80	117			750	305	672	392	127	102	86	89
22	80	107			710	290	750	364	131	86	65	78
23	75	127			672	275	835	342	138	83	55	76
24	72	490			672	285	710	311	123	70	49	58
25	69	458			672	243	672	277	106	63	46	68
26	69	210	120	180	710	265	635	263	102	60	46	81
27	69	180			750	252	672	253	96	56	44	81
28	69	188			1,070	285	790	249	93	55	41	60
29	66	210			1,020	338	790	235	93	51	38	56
30	51	218				260	925	218	86	49	37	53
31	51					265		204		47	37	

NOTE.—Braced figures show mean discharge for periods indicated. See paragraph on "Accuracy."

Monthly discharge of St. Maries River at Lotus, Idaho, for the year ending September 30, 1924

[Drainage area, 420 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October	144	51	69.6	0.166	0.19	4,280
November	490	53	125	.298	.33	7,440
December	1,120		204	.486	.56	12,500
January			148	.352	.41	9,100
February		672	1,170	2.79	3.01	67,300
March	1,020	243	495	1.18	1.36	30,400
April	1,480	275	764	1.82	2.03	45,500
May		204	647	1.54	1.78	39,800
June	200	86	146	.348	.39	8,690
July	102	47	66.5	.158	.18	4,090
August	93	37	48.9	.116	.13	3,010
September	135	36	54.0	.129	.14	3,210
The year		36	324	.771	10.51	235,000

HAYDEN LAKE AT HAYDEN LAKE, IDAHO

LOCATION.—In sec. 18, T. 51 N., R. 3 W. Boise meridian, at Avondale and Hayden Lake pumping plants, a quarter of a mile north of Hayden Lake depot of Spokane & Eastern Railway & Power Co., Kootenai County.

DRAINAGE AREA.—Not measured.

RECORDS AVAILABLE.—May 19, 1920, to September 30, 1924.

GAGE.—Vertical staff in three sections; read by Sigurd Berven. Sections 0 to −3.3 feet, and 0 to +3.3 feet bolted to boulders in lake bed; high-water section fastened to rock crib foundation of boathouse about 300 feet north of substation of Spokane & Eastern Railway & Power Co. Zero of gage at elevation 2,233.13 feet United States Geological Survey datum, when referred to bench mark at Hudlow's ranch, described in United States Geological Survey Bulletin 567, on page 80.

EXTREMES OF STAGE.—Maximum stage recorded during year, 4.30 feet May 8–10; minimum stage recorded, −1.25 feet September 30.

1920–1924: Maximum stage recorded, 10.06 feet April 30 to May 18, 1921; minimum stage recorded, September 30, 1924.

ICE.—No ice during period of record.

DIVERSION.—Water pumped from lake for irrigation and domestic purposes.

REGULATION.—None.

ACCURACY.—Gage read to hundredths once daily.

Daily gage height, in feet, of Hayden Lake at Hayden Lake, Idaho, for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1.80	1.24	1.00	0.80	0.87	3.22	3.61	4.19	3.58	2.36	0.96	−0.53
2	1.78	1.22	.98	.79	.97	3.28	3.61	4.22	3.54	2.32	.91	−.57
3	1.76	1.20	.97	.78	1.06	3.34	3.62	4.24	3.49	2.26	.84	−.61
4	1.74	1.17	.97	.76	1.14	3.34	3.62	4.26	3.44	2.22	.78	−.64
5	1.72	1.15	.96	.75	1.22	3.38	3.62	4.28	3.40	2.17	.71	−.68
6	1.70	1.12	.95	.75	1.30	3.41	3.62	4.29	3.36	2.12	.64	−.72
7	1.68	1.10	.95	.74	1.38	3.45	3.62	4.29	3.37	2.06	.57	−.74
8	1.66	1.07	.94	.74	1.46	3.48	3.64	4.30	3.34	2.00	.50	−.76
9	1.63	1.05	.93	.74	1.56	3.50	3.67	4.30	3.30	1.95	.44	−.78
10	1.61	1.03	.92	.73	1.65	3.51	3.71	4.30	3.26	1.90	.38	−.80
11	1.59	1.01	.92	.73	1.75	3.52	3.75	4.29	3.22	1.84	.32	−.82
12	1.57	1.00	.91	.73	1.90	3.54	3.78	4.29	3.19	1.79	.28	−.83
13	1.55	.99	.91	.72	2.04	3.55	3.81	4.28	3.16	1.74	.22	−.84
14	1.51	.97	.90	.72	2.21	3.56	3.84	4.26	3.12	1.69	.18	−.86
15	1.49	.96	.90	.71	2.35	3.57	3.87	4.24	3.09	1.65	.15	−.89
16	1.48	.94	.89	.71	2.50	3.55	3.90	4.21	3.06	1.60	.12	−.92
17	1.46	.92	.89	.70	2.58	3.55	3.93	4.19	3.02	1.56	.10	−.95
18	1.44	.90	.88	.68	2.65	3.56	3.95	4.16	2.98	1.52	.09	−.98
19	1.42	.89	.88	.67	2.71	3.56	3.97	4.13	2.93	1.49	.08	−1.00
20	1.40	.88	.88	.67	2.77	3.57	4.01	4.10	2.88	1.46	.04	−1.02
21	1.41	.87	.87	.66	2.81	3.58	4.02	4.06	2.84	1.43	.00	−1.05
22	1.39	.87	.87	.65	2.85	3.58	4.04	4.02	2.79	1.40	−.04	−1.08
23	1.37	.89	.87	.65	2.90	3.58	4.06	3.96	2.74	1.37	−.09	−1.11
24	1.36	.93	.86	.64	2.97	3.59	4.08	3.90	2.68	1.35	−.14	−1.14
25	1.35	.97	.86	.64	3.00	3.59	4.10	3.86	2.64	1.32	−.19	−1.16
26	1.34	.99	.85	.63	3.03	3.60	4.13	3.82	2.60	1.29	−.24	−1.18
27	1.33	1.00	.85	.62	3.07	3.60	4.12	3.78	2.56	1.23	−.29	−1.20
28	1.31	1.00	.84	.62	3.10	3.60	4.13	3.74	2.48	1.19	−.34	−1.21
29	1.30	1.01	.84	.67	3.15	3.61	4.14	3.70	2.44	1.13	−.40	−1.23
30	1.28	1.02	.83	.73	-------	3.62	4.16	3.66	2.40	1.07	−.46	−1.25
31	1.26	-------	.83	.79	-------	3.62	-------	3.62	-------	1.02	−.50	-------

SPOKANE VALLEY FARMS CO.'S CANAL[6] AT POST FALLS, IDAHO

LOCATION.—In NE. ¼ sec. 4, T. 50 N., R. 5 W. Boise meridian, on right bank of Spokane River, 1,200 feet below canal head gates and half a mile west of Post Falls, Kootenai County.

RECORDS AVAILABLE.—May 20, 1911, to September 30, 1917; September 6, 1919, to September 30, 1924.

GAGE.—Vertical staff on left side of flume; installed April 21, 1915, read by Emil Johnson.

DISCHARGE MEASUREMENTS.—Made from cross ties on top of flume or from footbridge across flume one-fourth of a mile below gage.

CHANNEL AND CONTROL.—Flume and canal section below gage; shifts at all stages owing to effect of gravel bar at end of flume and plant growth, and possibly to regulation of head gates of diversion ditches below gage. Gage height of zero flow May 23, 1923, −0.1 foot.

EXTREMES OF DISCHARGE.—Maximum discharge during year, 246 second-feet on July 15. Canal dry or practically so October 28 to March 31, and September 20–30.

1911–1917; 1919–1924: Maximum discharge occurred on July 15, 1924. No water in canal during periods in 1911, 1912, 1916, 1917, 1919, 1920, 1921, 1922, 1923, and 1924.

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

ACCURACY.—Stage-discharge relation changed during period of no flow and gradually July 1 to August 13. Rating curves fairly well defined. Gage read to hundredths once daily which is considered adequate for determination of mean daily gage height since two submerged orifices and wasteway above canal head gates are instrumental in causing gage height in canal to remain constant even though the stage of the river is subject to considerable daily fluctuation. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used July 1 to August 13. Records good.

COOPERATION.—Gage-height record furnished by Spokane Valley Farms Co. and some discharge measurements furnished by Washington Water Power Co.

Canal diverts water from right bank of Spokane River in SE. ¼ sec. 3, T. 50 N., R. 5 W. Boise meridian. Water used for irrigation.

Discharge measurements of Spokane Valley Farms Co.'s canal at Post Falls, Idaho, during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 22	Gatewood and Ford	0.93	14.6	July 11	J. L. Ford	4.43	213
Apr. 30	do	2.64	114	15	J. S. Gatewood	4.60	241
June 3	J. L. Ford	4.10	226	Aug. 14	Gatewood and Ford	4.63	228
27	do	4.16	234	Sept. 19	do	.46	4.0

[6] Formerly Spokane Valley Land & Water Co.'s canal.

Daily discharge, in second-feet, of Spokane Valley Farms Co.'s canal at Post Falls, Idaho, for the year ending September 30, 1924

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1	20.5	48	120	238	238	230	181
2	20.5	48	120	238	230	230	181
3	16.6	48	120	230	230	230	181
4	16.6	48	120	238	222	230	181
5	16.6	48	127	238	222	230	181
6	16.6	53	127	238	222	230	181
7	16.6	53	127	238	222	230	181
8	16.6	59	127	238	222	230	181
9	16.6	59	134	238	214	230	181
10	15.9	71	134	238	222	230	174
11	15.9	77	134	238	214	230	174
12	15.9	86	134	238	222	230	174
13	15.9	86	142	238	222	230	174
14	15.9	86	142	238	222	226	167
15	15.9	86	222	238	246	226	167
16	15.9	86	230	238	238	226	167
17	15.9	86	238	238	238	226	4
18	15.9	86	238	238	238	226	4
19	15.9	86	238	238	238	226	4
20	15.9	86	238	238	238	226	------
21	15.3	92	238	238	238	210	------
22	15.3	92	238	238	238	210	------
23	15.3	99	238	238	238	210	------
24	15.3	99	238	238	238	210	------
25	15.3	99	238	238	238	210	------
26	15.3	113	238	238	238	210	------
27	15.3	113	238	238	238	210	------
28	------	113	238	238	238	210	------
29	------	120	238	238	238	203	------
30	------	113	238	238	238	203	------
31	------	------	238	------	230	203	------

NOTE.—Gates closed Sept. 16; discharge Sept. 17 and 18 is leakage estimated from current-meter measurement made Sept. 19. No flow Oct. 28 to Mar. 31, and Sept. 20–30.

Monthly discharge of Spokane Valley Farms Co.'s canal at Post Falls, Idaho, for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October 1–27	20.5	15.3	16.3	873
April	120	48	81.3	4,840
May	238	120	188	11,600
June	238	230	238	14,200
July	246	214	231	14,200
August	230	203	221	13,600
September 1–19	181	4	149	5,620

NOTE.—See footnote to daily discharge table.

NESPELEM RIVER BASIN

NESPELEM RIVER AT NESPELEM, WASH.

LOCATION.—In SE. ¼ sec. 24, T. 31 N., R. 30 E., half a mile above Nespelem, Okanogan County, 5 miles above Little Nespelem River, and 6 miles above mouth.

DRAINAGE AREA.—122 square miles (measured on map of Colville Indian Reservation, edition of 1911).

RECORDS AVAILABLE.—May 1, 1911, to September 30, 1924.

GAGE.—Vertical staff on left bank at gaging bridge; installed October 19, 1916; read by J. L. Davis.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Concrete control. Moss grows on concrete control during summer. Right bank flat; subject to overflow at gage height 4.0 feet; left bank high; not subject to overflow. Gage height of zero flow, 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during period April 1 to September 30, 1.44 feet April 15 (discharge, 66 second-feet); minimum stage recorded, 0.71 foot July 11, 12, 27, 30, 31, Aug. 1, 2, and 9–15 (discharge, 3.1 second-feet).

1911–1924: Maximum stage recorded, 4.9 feet April 5, 1919, determined from leveling to high-water mark (discharge, 483 second-feet); minimum stage recorded in 1924.

ICE.—Records discontinued during winter.

DIVERSIONS.—Nespelem canal diverts water for irrigation from a point above gage. See records for Nespelem canal.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; slightly affected by aquatic growth April 1–18 and July 1 to August 23. Rating curve well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Nespelem River at Nespelem, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 2	0.72	4.6	Apr. 21	1.39	59.2	Aug. 24	0.72	3.7
Apr. 19	1.39	60.1	May 9	1.28	46.0	24	.72	3.9
20	1.39	58.0	10	1.27	45.5			

Daily discharge, in second-feet, of Nespelem River at Nespelem, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	51	50	13	4.5	3.1	3.8	16	60	30	7.6	3.4	3.4	4.5
2	49	50	12	4.5	3.1	3.8	17	60	29	7.3	3.8	3.4	4.5
3	48	50	11	4.1	3.4	3.8	18	60	27	7.0	3.4	3.4	4.5
4	49	50	11	3.8	3.4	3.8	19	58	26	6.5	4.1	3.8	4.8
5	48	50	10	3.8	3.4	3.8	20	58	25	6.5	3.8	3.8	4.8
6	48	49	12	3.8	3.4	3.8	21	58	24	6.5	3.8	3.8	4.5
7	49	48	13	3.8	3.4	3.8	22	58	22	6.2	3.8	3.4	4.5
8	50	46	13	3.4	3.4	4.1	23	57	21	5.8	3.4	3.4	4.5
9	52	45	11	3.4	3.1	4.1	24	57	21	5.8	3.4	3.8	4.5
10	53	44	11	3.4	3.1	4.1	25	53	21	5.8	3.4	3.4	4.5
11	57	42	10	3.1	3.1	4.1	26	53	20	5.8	3.4	3.4	4.5
12	58	40	9.8	3.1	3.1	4.1	27	52	19	5.5	3.1	3.4	4.5
13	60	34	9.2	3.8	3.1	4.5	28	49	17	5.5	3.4	3.4	4.5
14	60	32	8.7	3.4	3.1	4.1	29	50	16	5.5	3.4	3.4	4.5
15	66	32	8.2	3.4	3.1	4.5	30	50	16	5.1	3.1	3.8	4.5
							31	------	15	------	3.1	3.8	------

NOTE.—Gage not read June 17, Aug. 31, and Sept. 17; discharge interpolated.

Combined monthly discharge of Nespelem River and Nespelem canal at Nespelem, Wash., for the period April 1 to September 30, 1924

Month	Discharge in second-feet					Combined run-off in acre-feet
	Maximum (combined)	Minimum (combined)	Mean		Combined (mean)	
			River	Canal		
April	68.7	48.0	54.4	2.83	57.2	3,400
May	56.7	27.7	32.6	9.69	42.3	2,600
June	25.7	12.9	8.51	9.90	18.4	1,090
July	10.3	7.3	3.58	5.09	8.67	533
August	8.3	7.1	3.39	4.13	7.52	462
September	10.5	7.7	4.28	4.16	8.44	502
The period						8,590

NESPELEM CANAL AT NESPELEM, WASH.

LOCATION.—In sec. 24, T. 31 N., R. 30 E., three-fourths of a mile below canal intake and three-fourths of a mile northwest of Nespelem post office, Okanogan County.

RECORDS AVAILABLE.—April 1, 1921, to September 30, 1924.

GAGE.—Vertical staff on right side of canal; read by Claude Marble.

DISCHARGE MEASUREMENTS.—Made by wading near gage.

CHANNEL AND CONTROL.—Canal section, modified during growing season by plant growth. Gage height of zero flow, 0.40 foot ±0.05 foot, April 20, 1924.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.8 feet May 29 to June 1 (discharge, 12.7 second-feet). No flow through canal December 2 to April 3.

1921–1924: Maximum stage recorded, May 29 to June 1, 1924. No flow through canal during winter.

ACCURACY.—Stage-discharge relation changed during period of nonuse of canal and gradually June 1 to August 24. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used June 1 to August 24. Records good.

Canal diverts water from right bank of Nespelem River about on line between sections 24 and 13, T. 31 N., R. 30 E.

Discharge measurements of Nespelem Canal at Nespelem, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 2	1.21	4.60	Apr. 20	0.91	2.86	May 9	1.31	6.79
2	1.22	4.69	20	.91	2.79	10	1.31	6.72
						Aug. 24	1.01	4.10

Daily discharge, in second-feet, of Nespelem Canal at Nespelem, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1	4.5	5.8	2.8		6.7	12.7	5.8	4.3	6.0
2	4.6	5.8			6.7	12.0	5.8	4.3	5.0
3	4.5	5.8			6.7	12.0	5.7	4.2	5.0
4	4.5	5.8		2.7	6.7	12.0	5.7	4.1	4.0
5	4.5	2.8		2.7	6.7	12.0	5.6	4.1	4.0
6	4.5	2.8		2.1	6.7	12.0	5.5	4.1	4.0
7	4.5	2.8		2.7	6.7	12.0	5.5	4.1	3.9
8	4.5	2.8		2.7	6.7	12.0	5.5	4.1	3.9
9	4.5	2.8		2.7	6.7	10.8	5.5	4.0	3.9
10	4.5	2.8		2.7	6.7	10.8	5.5	4.0	3.8
11	4.5	2.8		2.7	6.7	10.8	5.5	4.1	3.8
12	4.5	2.8		2.7	6.7	10.8	5.5	4.1	3.8
13	4.5	2.8		2.7	10.8	10.8	5.5	4.1	3.8
14	4.7	2.8		2.7	11.4	10.8	5.3	4.1	3.9
15	4.7	2.8		2.7	11.4	10.8	5.3	4.1	3.8
16	4.7	2.8		2.7	11.4	8.9	5.3	4.1	3.8
17	4.7	2.8		2.7	11.4	8.9	5.3	4.1	3.8
18	4.7	2.8		2.8	11.4	8.9	5.3	4.3	3.9
19	4.7	2.8		2.8	11.4	8.9	5.2	4.5	4.0
20	4.7	2.8		2.8	11.4	8.9	5.1	4.4	4.0
21	4.7	2.8		2.9	11.4	8.9	5.1	4.2	4.0
22	5.8	2.8		2.9	11.4	8.9	5.1	4.2	4.0
23	5.8	2.8		2.7	11.4	7.8	4.2	4.2	4.0
24	5.8	2.8		2.7	11.4	7.8	4.2	4.1	6.0
25	5.8	2.8		2.7	11.4	7.8	4.2	4.0	5.0
26	5.8	2.8		2.7	11.4	7.8	4.1	4.0	4.0
27	5.8	2.8		2.7	11.4	7.8	4.2	4.0	4.0
28	5.8	2.8		6.7	11.4	7.8	4.3	4.0	4.0
29	5.8	2.8		6.7	12.7	7.8	4.3	4.0	3.8
30	5.8	2.8		6.7	12.7	7.8	4.3	4.0	3.8
31	5.8				12.7		4.3	4.0	

NOTE.—No flow Dec. 2 to Apr. 3.

Monthly discharge of Nespelem Canal at Nespelem, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	5.8	4.5	4.97	306
November	5.8	2.8	3.20	190
April 4-30	6.7	2.7	3.15	169
May	12.7	6.7	9.69	596
June	12.7	7.8	9.90	589
July	5.8	4.1	5.09	313
August	4.5	4.0	4.13	254
September	6.0	3.8	4.16	248

OKANOGAN RIVER BASIN

OKANOGAN RIVER AT OKANOGAN, WASH.

LOCATION.—In sec. 16, T. 33 N., R. 26 E., at Okanogan, Okanogan County, a quarter of a mile above Salmon Creek.

DRAINAGE AREA.—7,740 square miles (measured on topographic maps, and maps of Okanogan National Forest, Colville Indian Reservation, and Canadian Railway belt).

RECORDS AVAILABLE.—May 10, 1911, to September 30, 1924.

GAGE.—Chain gage on highway bridge; installed June 10, 1920; read by W. A. Steiner and B. F. Haas.

DISCHARGE MEASUREMENTS.—Made from boat at gage; from highway bridge; by wading at Omak, 4 miles upstream; from ice cover; or by wading below gage.

CHANNEL AND CONTROL.—Bed composed of boulders and cobblestones; likely to shift at extremely high water. Banks fairly high. One channel at all stages. Gage height of zero flow estimated October 4, 1918, −2.4 feet.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.9 feet May 20 (discharge, 17,800 second-feet); minimum discharge, 412 second-feet September 5, 9, 11–16, and 18–24.

1911–1924: Maximum stage recorded, 12.21 feet June 20, 1916 (discharge, 22,200 second-feet); minimum stage recorded, 0.96 foot February 13, 1923 (discharge, 385 second-feet); flow may have been less in December, 1922 when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice except during mild winters; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Numerous ditches divert water for irrigation above station.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice December 30 to January 29. Rating curve well defined. Gage read to hundredths once daily except as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Okanogan River at Okanogan, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
May 19	10.82	17,700
31	6.52	7,320
Aug. 28	1.38	521

Daily discharge, in second-feet, of Okanogan River at Okanogan, Wash., for the ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	1,100	1,140	1,100		2,030	1,510	1,140	2,740	7,320	2,740	865	450
2	1,100	1,140	1,100		1,610	1,510	1,050	3,420	7,520	2,740	798	435
3	1,140	1,140	1,100		1,460	1,510	1,100	4,160	7,920	2,610	798	435
4	1,100	1,180	1,050		1,320	1,510	1,100	4,480	8,130	2,610	798	435
5	1,110	1,230	1,010		1,320	1,410	1,050	4,800	7,720	2,610	765	412
6	1,120	1,230	1,100	750	1,410	1,410	1,070	5,130	7,120	2,380	735	435
7	1,130	1,230	1,140		1,410	1,410	1,080	4,800	6,360	2,140	705	435
8	1,140	1,230	1,140		1,510	1,410	1,100	4,650	6,000	2,030	735	435
9	1,100	1,230	1,100		1,320	1,410	1,100	4,800	5,640	1,980	705	412
10	1,140	1,140	1,050		1,320	1,410	1,410	5,470	5,820	1,920	705	435
11	1,230	1,140	1,010		1,320	1,320	1,510	7,340	5,820	1,810	705	412
12	1,230	1,140	1,010		1,410	1,320	1,510	9,210	6,930	1,710	675	412
13	1,230	1,140	1,050		1,810	1,410	1,560	11,000	5,130	1,610	675	412
14	1,160	1,140	1,050		1,510	1,320	1,610	12,700	5,300	1,510	645	412
15	1,100	1,140	1,050		2,370	1,320	1,710	14,800	5,470	1,410	530	412
16	1,140	1,140	1,050	800	2,370	1,320	1,710	15,600	5,640	1,320	530	412
17	1,140	1,140	1,050		2,200	1,320	1,710	17,000	5,820	1,410	530	435
18	1,140	1,140	1,050		2,030	1,320	1,610	17,200	5,300	1,320	530	412
19	1,140	1,140	1,050		1,920	1,320	1,610	17,500	4,800	1,230	530	412
20	1,140	1,140	1,100		1,810	1,320	1,610	17,800	5,130	1,230	558	412
21	1,180	1,140	1,050		1,810	1,320	1,610	17,500	4,160	1,230	530	412
22	1,230	1,140	1,050		1,760	1,230	1,580	16,700	4,010	1,140	585	412
23	1,230	1,140	1,030		1,710	1,230	1,540	15,400	3,860	1,140	675	412
24	1,230	1,140	1,010		1,660	1,230	1,510	14,600	3,710	1,050	616	412
25	1,320	1,140	1,030	950	1,610	1,230	1,510	13,400	3,560	1,050	558	435
26	1,320	1,140	1,050		1,510	1,230	1,510	12,200	3,420	1,050	530	480
27	1,230	1,140	1,010		1,510	1,140	1,460	10,300	3,280	992	530	705
28	1,230	1,140	1,010		1,510	1,140	1,410	8,990	3,280	935	530	645
29	1,230	1,140	1,050		1,510	1,230	1,610	7,920	3,080	935	480	585
30	1,230	1,140	900	1,230	-------	1,180	2,030	7,520	2,870	900	480	585
31	1,230	-------	765	1,320	-------	1,140	------	7,120	-------	900	465	-------

NOTE.—Gage not read Oct. 1, 5–7, 14, 21, 28, Nov. 4, 11, 12, 18, 25, 26, 29, Dec. 2, 9, 16, 23, 25, Feb. 3, 10, 17, 22, 24, Mar. 2, 9, 16, 23, 30, Apr. 6, 7, 13, 20, 22, 23, 25, 27, May 4, 11, 13, 18, 25, 30, June 1, 8, 15, 22, 29, July 4, 6, 9, 13, 20, 27, Aug. 3, 10, 17, 24, 31, and Sept. 1, 7, 14, 21, and 28; discharge interpolated. Braced figures show estimated mean discharge for periods indicated. Ice effect Dec. 30 to Jan. 29.

Monthly discharge of Okanogan River at Okanogan, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	1,320	1,100	1,180	72,600
November	1,230	1,140	1,160	69,000
December	1,140	765	1,040	64,000
January	1,320	----------	858	52,800
February	2,370	1,320	1,660	95,500
March	1,510	1,140	1,330	81,800
April	2,030	1,050	1,440	85,700
May	17,800	2,740	10,200	627,000
June	8,130	2,870	5,340	318,000
July	2,740	900	1,600	98,400
August	865	465	629	38,700
September	705	412	452	26,900
The year	17,800	412	2,240	1,630,000

SIMILKAMEEN RIVER NEAR OROVILLE, WASH.

LOCATION.—In SE. ¼ sec. 13, T. 40 N., R. 26 E., at Okanogan Valley Power Co.'s plant, 4 miles above Oroville, Okanogan County, and 5 miles above mouth; below all tributaries.

DRAINAGE AREA.—3,450 square miles (measured on topographic and Canadian railway-belt maps).

RECORDS AVAILABLE.—May 14, 1911, to September 30, 1924.

GAGE.—Since March 4, 1924, vertical staff on right bank about 40 feet above tailrace of power plant; read by employees of Washington Water Power Co. Previous gages as follows: Prior to January 31, 1921, a vertical staff in seven sections on left bank just above present site and at different datum. January 31, 1921, to March 3, 1924, a vertical staff on concrete foundation wall of power house, in tailrace, and at different datum. Present gage is set to sea-level datum.

DISCHARGE MEASUREMENTS.—Made by wading or from highway bridge at Oroville, 4 miles below gage.

CHANNEL AND CONTROL.—Narrow canyon at gage and control; fairly permanent. Banks high, not subject to overflow. Control for low and medium stages is riffle formed by bedrock and boulders; high-water control not well defined.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 979.3 feet at 6 a. m. May 17 (discharge, 18,300 second-feet); minimum stage recorded, 2.3 feet on January 1–4 (discharge, 123 second-feet).

1911–1924: Maximum stage recorded, 18.5 feet on June 5, 1922 (discharge, 21,400 second-feet); river dry at 4 p. m. December 5, 1920, while filling pond behind dam.

ICE.—Stage-discharge relation seriously affected by ice; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Some water is diverted for irrigation from tributaries above the station. The principal diversion is made from the river above the gage by the West Okanogan Irrigation District.[7]

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually January 18–31 and with change of gages March 4; not affected by ice. Rating curves well defined above 300 second-feet. Gage read to tenths twice daily, occasionally to hundredths. Daily discharge ascertained by applying mean daily gage height to rating table. Shifting-control method used January 18–31. Records excellent April to July; fair January and February; otherwise good.

COOPERATION.—Gage-height record and some discharge measurements furnished by the Washington Water Power Co.

Discharge measurements of Similkameen River near Oroville, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Mar. 21	J. L. Ford	66.39	600	July 9	Gatewood and Thompson.	67.80	1,530
May 20	J. S. Gatewood	78.60	17,200				
27	J. L. Ford	73.70	8,280	25	J. L. Ford	66.70	778
June 1	J. S. Gatewood	72.40	6,440	Aug. 26	J. S. Gatewood	65.74	334

[7] See records of West Okanogan Irrigation District Canal, p. 135.

Daily discharge, in second-feet, of Similkameen River near Oroville, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	427	525	427	123		842	551	3,090	6,110	2,460	576	266
2	475	525	427	123		810	551	3,800	6,950	2,380	505	266
3	475	525	427	123	530	778	551	4,840	7,230	2,380	484	266
4	475	525	427	123		905	551	5580	6,950	2,380	484	241
5	475	525	427	280		808	576	4,960	6,380	2,200	494	230
6	475	525	427	427		808	601	4,360	5,970	2,040	505	230
7	475	475	525	427		744	551	4,240	5,320	1,860	505	230
8	525	475	500	427	595	684	551	4,360	5,080	1,700	484	230
9	525	475	475	427		744	970	4,840	5,200	1,540	444	241
10	575	475	475	427		713	970	6,670	4,960	1,380	528	230
11	575	475	451	427	575	744	1,100	8,480	4,960	1,310	463	230
12	525	427	451	427	602	684	1,240	10,400	4,720	1,240	354	230
13	525	427	451	427	1,290	684	1,240	12,300	4,840	1,240	293	230
14	525	427	451	427	1,680	684	1,310	14,800	4,840	1,100	528	241
15	525	475	427	427	1,600	684	1,310	16,400	4,840	1,100	371	254
16	525	475	427	427	1,440	684	1,310	17,900	4,960	1,100	354	241
17	525	475	427	427	1,440	684	1,240	18,100	4,840	1,100	354	241
18	525	451	427		1,150	628	1,240	17,700	4,360	1,100	338	230
19	525	427	451		1,150	628	1,170	16,200	3,910	970	354	230
20	525	427	427		1,150	628	1,170	16,600	3,690	970	388	230
21	550	427	427	385	1,010	601	1,170	15,400	3,480	840	371	219
22	525	427	427		875	601	1,100	14,300	3,480	905	388	219
23	525	427	427		810	601	1,100	13,900	3,280	840	371	266
24	575	427	427		810	576	1,100	12,800	3,090	840	388	280
25	575	475	427		810	576	1,100	12,100	2,910	808	338	628
26	575	427	427		810	576	1,100	10,100	2,910	713	338	463
27	525	427	427		810	576	1,100	8,480	2,910	684	308	406
28	525	427	427	405	810	601	1,240	7,230	2,820	684	266	388
29	525	427	427		810	628	1,780	6,390	2,550	684	280	371
30	525	427	427		-------	576	2,380	6,110	2,550	655	280	354
31	525	-------	132		-------	551	-------	5,840	-------	628	266	-------

Monthly discharge of Similkameen River and West Okanogan Irrigation District Canal near Oroville, Wash., for the year ending September 30, 1924

[Drainage area, 3,450 square miles]

Month	Discharge in second-feet						Run-off (combined)	
	Maximum (combined)	Minimum (combined)	Mean		Combined		Inches	Acre-feet
			River	Canal	Mean	Per square mile		
October	575	427	521	-------	521	0.151	0.17	32,000
November	525	427	462	-------	462	.134	.15	27,500
December	525	132	430	-------	430	.125	.14	26,400
January	-------	123	369	-------	369	.107	.12	22,700
February	1,680	-------	871	-------	871	.252	.27	50,100
March	905	551	678	-------	678	.197	.23	41,700
April	2,480	551	1,060	51.4	1,110	.322	.36	66,000
May	18,300	3,200	9,940	141	10,100	2.93	3.38	621,000
June	7,380	2,730	4,540	164	4,700	1.36	1.52	280,000
July	2,640	783	1,280	141	1,420	.412	.48	87,300
August	731	415	400	147	547	.159	.18	33,600
September	724	349	279	133	412	.119	.13	24,500
The year	18,300	123	1,740	-------	1,810	.525	7.13	1,310,000

65904—26—WSP 592——10

SINLAHEKIN CREEK ABOVE BLUE LAKE, NEAR LOOMIS, WASH.

LOCATION.—In NE. ¼ sec. 20, T. 37 N., R. 25 E., 1,800 feet above Blue Lake diversion dam, 1 mile northwest of Blue Lake, 3½ miles above Sarsapkin Creek, and 9½ miles southwest of Loomis, Okanogan County.

DRAINAGE AREA.—41.7 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17 to September 30, 1924. June 13, 1903, to March 30, 1905, at site 3 miles above Loomis; June 1 to October 31, 1920, at Blue Lake half a mile below; May 1, 1921, to September 30, 1923, at Twin Bridges, 4 miles below.

GAGE.—Stevens continuous water-stage recorder on right bank; installed April 17, 1924; inspected by employees of Whitestone Irrigation District.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed of stream composed of boulders; gradient steep. Right bank high; left bank subject to overflow at extremely high water. High-water control large boulders; permanent. Low-water control gravel and small boulders; will shift at high stages.

EXTREMES OF DISCHARGE.—Maximum stage during period April 17 to September 30, 1.31 feet at 10 p. m. May 12 (discharge, 34 second-feet); minimum stage recorded, 0.42 foot for short periods July 31 and August 1 (discharge, 1.9 second-feet); flow may have been lower in August and September when water-stage recorder was not operating.

1920–1924: Maximum stage recorded, 2.6 feet on Twin Bridges gage on May 18, 1922 (discharge, 363 second-feet); minimum stage recorded, 1.50 feet August 16, 1920 (discharge, 0.7 second-foot); may have been lower August 17, 1920, when gage was not read.

ICE.—Station discontinued during winter.

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent. Rating curve well defined below 30 second-feet. Operation of water-stage recorder fairly 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 good.

Discharge measurements of Sinlahekin Creek above Blue Lake, near Loomis, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 17	J. S. Gatewood	0.72	6.05	June 2	J. S. Gatewood	0.80	8.69
30	R. B. Kilgore	.95	15.7	July 8	Gatewood and Thompson	.54	2.64
May 17	J. S. Gatewood	1.10	21.8				
23	Gatewood and Holbert	.95	14.3	Aug. 27	J. S. Gatewood	.48	2.30

Daily discharge, in second-feet, of Sinlahekin Creek above Blue Lake, near Loomis, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1		18	9.0	3.5	2.0	2.3	16		26	7.0	2.5		2.3
2		20	8.0	3.3	2.2	2.3	17	6.0	24	6.5	2.7		
3		22	7.5	3.0	2.8	2.3	18	6.0	22	6.5	3.6		
4		18	7.5	2.9	3.6	2.3	19	6.0	20	6.3	3.0		
5		16	7.5	2.8	2.6	2.3	20	5.5	18	6.0	2.9	3	
6		15	9.0	2.7	2.4	2.3	21	6.5	17	5.8	2.8		
7		14	10	2.7	2.3	2.3	22	6.5	16	5.5	2.6		
8		15	10	2.7	2.2	2.6	23	7.0	15	5.2	2.6	2.5	
9		18	11	2.7	2.2	2.9	24	5.5	14	5.0	2.4	2.5	2.5
10		22	12	2.6	2.2	2.5	25	6.0	13	4.7	2.4	2.3	
11		24	10	2.6	2.2	2.4	26	7.5	12	4.5	2.3	2.3	
12		28	9.0	2.6	2.1	2.3	27	9.5	11	4.2	2.2	2.3	
13		28	8.5	2.5	3	2.3	28	11	11	4.0	2.2	2.3	
14		26	8.0	2.5	3	2.3	29	13	10	3.8	2.1	2.2	
15		26	7.5	2.5	3	2.3	30	16	10	3.5	2.1	2.3	
							31		9.5		2.0	2.3	

NOTE.—Water-stage recorder not operating June 19–26, Aug. 13–22, and Sept. 17–30; discharge June 19–26 interpolated; flat estimates of discharge are results of comparisons with records of Toats Coulee Creek near Loomis and show mean discharge for periods indicated.

Monthly discharge of Sinlahekin Creek above Blue Lake, near Loomis, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 17–30	16	5.5	8.00	222
May	28	9.5	18.0	1,110
June	12	3.5	7.10	422
July	3.6	2.0	2.65	163
August			2.57	158
September			2.43	145
The period				2,220

TOATS COULEE CREEK NEAR LOOMIS, WASH.

LOCATION.—In SE. ¼ sec. 33, T. 39 N., R. 25 E., just below Deer Creek, 1,200 feet above intake of Whitestone Irrigation District flume, and 3 miles northwest of Loomis, Okanogan County.

DRAINAGE AREA.—132 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 1, 1920, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank at head of falls, installed June 3, 1920; inspected by Harold Eastman.

DISCHARGE MEASUREMENTS.—Made from footbridge just above irrigation flume intake or by wading.

CHANNEL AND CONTROL.—Bed composed of large bouldérs and gravel. One channel at all stages. Banks high and wooded. Control at head of 20-foot falls several feet below gage; same for all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 3.15 feet at 2 a. m. May 16 (discharge, 274 second-feet); minimum stage, 0.90 foot from 8 to 11 p. m. September 7 (discharge, 2.5 second-feet); flow may have been lower during winter when recorder was not operating.

1920–1924: Maximum stage recorded, 4.8 feet at 8 p. m. June 3, 1922 (discharge, 925 second-feet); minimum stage recorded on September 7, 1924.

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

DIVERSIONS.—None.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually May 19 to June 20 not affected by ice while recorder was in operation. Rating curve used directly and as standard form for shifting control fairly 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 determined from recorder graph by inspection. Shifting-control method used May 19 to June 20. Records fair.

Discharge measurements of Toats Coulee Creek near Loomis, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Apr. 13	J. S. Gatewood	1.74	15.0	May 22	J. S. Gatewood	2.65	116
13	do	1.78	15.8	June 2	do	2.27	49.6
29	R. B. Kilgore	2.16	36.7	July 8	do	1.63	12.5
May 1	do	2.28	47.3	Aug. 27	do	1.16	4.7
18	J. S. Gatewood	2.86	159	27	do	1.16	5.5
18	do	2.84	150				

Daily discharge, in second-feet, of Toats Coulee Creek near Loomis, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Apr.	May	June	July	Aug.	Sept.
1	10	10	6		56	52	18	6	4
2	9	10	8		68	50	17	7	3
3	9	9	8		83	47	16	10	3
4	9	9	9		65	43	15	9	3
5	11	7	8		48	41	14	8	3
6	13	9	8		46	43	13	6	3
7	27	9	8		41	47	12	6	3
8	24	8	7		50	61	12	5	3
9	19	8			67	64	12	5	5
10	16	8			104	87	11	5	6
11	15	9			136	72	10	4	5
12	14	9			176	64	9	4	4
13	13	10		19	216	59	9	4	4
14	13	10		18	221	54	8	4	4
15	12	10		14	221	52	8	5	3
16	14	9		15	212	47	8	6	3
17	13	11		14	184	43	11	9	3
18	12	9		14	173	44	12	9	3
19	12	11		12	152	40	11	13	4
20	12	10		13	129	38	11	11	4
21	14	9		13	123	33	10	9	5
22	18	9		14	120	34	9	7	5
23	16	11		14	108	32	9	7	5
24	14	11		12	100	30	8	6	5
25	12	11		12	98	30	8	6	5
26	13	11		14	82	27	7	5	5
27	10	10		20	72	26	7	5	5
28	9	10		29	68	24	6	4	5
29	7	8		37	62	22	6	4	5
30	9	8		50	59	19	6	4	5
31	10				53		6	4	

NOTE.—Water-stage recorder not operating Nov. 10–13; discharge interpolated. No record Dec. 9 to Apr. 12.

Monthly discharge of Tatts Coulee Creek near Loomis, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	27	7	13.2	812
November	11	7	9.4	559
December 1-8	9	6	7.8	124
April 13-30	50	12	18.6	664
May	221	41	109.	6,700
June	87	19	44.2	2,630
July	18	6	10.3	633
August	13	4	6.4	394
September	6	3	4.1	244

WEST OKANOGAN VALLEY IRRIGATION DISTRICT CANAL NEAR OROVILLE, WASH.

LOCATION.—In sec. 20, T. 40 N., R. 27 E., at under crossing of road to power plant, 1½ miles northwest of Oroville, Okanogan County.

RECORDS AVAILABLE.—Irrigation seasons 1922 to 1924.

GAGE.—Since April 7, 1924, float and staff gage on left side of flume; read by John Truax. Previous gage was vertical staff on right wall of flume, 1,500 feet below at different datum.

DISCHARGE MEASUREMENTS.—Made from plank over flume.

CHANNEL AND CONTROL.—Control is long section of metal-lined flume and earth canal. Stage-discharge relation may be affected somewhat by operation of lateral gates considerable distance below gage and by plant growth in earth section.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.1 feet June 27 to July 1 (discharge, 182 second-feet). Canal dry April 25, and during nonirrigating seasons.

1922-1924: Maximum stage recorded from June 27 to July 1, 1924. Canal dry June 15, 1923, April 25, 1924, and during nonirrigating seasons.

ICE.—Canal dry during winter.

ACCURACY.—Stage-discharge relation changed gradually May 28 to August 26. Rating curves fairly well defined. Gage read to hundredths twice daily except for the periods April 7 to 15, and June 29 to July 5 when gage was read once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Gage-height record furnished by West Okanogan Valley Irrigation District.

Canal diverts water from left bank of Similkameen River in sec. 7, T. 40 N., R. 26 E. Water is used for irrigation.

Discharge measurements of West Okanogan Valley Irrigation District Canal near Oroville, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 2	R. B. Kilgore	2.24	118	July 9	Gatewood and Thompson	0.99	46.8
21	J. S. Gatewood	2.66	151				
27	J. L. Ford	2.66	152	25	J. L. Ford	2.82	156
June 1	J. S. Gatewood	2.74	150	Aug. 26	J. S. Gatewood	2.90	149

Daily discharge, in second-feet, of West Okanogan Valley Irrigation District Canal near Oroville, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	------	115	146	182	155	149	16	48	146	164	137	155	142
2	------	122	146	173	155	149	17	50	155	164	146	155	142
3	------	129	155	173	155	149	18	56	146	164	146	146	142
4	------	122	155	173	155	149	19	66	146	164	155	146	142
5	------	129	155	173	146	149	20	60	146	164	155	155	136
6	------	129	155	164	146	142	21	68	155	164	155	48	136
7	16	137	155	164	146	142	22	68	146	164	155	146	130
8	36	137	155	164	146	149	23	53	146	173	155	146	118
9	40	137	155	48	146	142	24	36	146	164	155	146	106
10	40	146	155	79	155	149	25	0	146	173	155	146	96
11	40	103	164	79	155	149	26	40	155	173	155	146	101
12	40	146	164	79	155	142	27	79	155	182	155	149	106
13	40	146	164	76	146	142	28	85	146	182	155	149	106
14	38	146	164	76	146	142	29	91	146	182	155	149	101
15	40	146	164	115	155	142	30	103	146	182	155	149	101
							31	------	146	------	155	149	------

Monthly discharge of West Okanogan Valley Irrigation District Canal near Oroville, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 7–30	103	0	51.4	2,450
May	155	103	141	8,670
June	182	146	164	9,760
July	182	48	141	8,670
August	155	48	147	9,040
September	149	96	133	7,910
The period	------	------	------	46,500

METHOW RIVER BASIN

METHOW RIVER AT TWISP, WASH.

LOCATION.—In sec. 17, T. 33 N., R. 22 E., at highway bridge at Twisp, Okanogan County, a quarter of a mile below mouth of Twisp River.

DRAINAGE AREA.—1,330 square miles (measured on topographic and Forest Service maps).

RECORDS AVAILABLE.—June 1, 1919, to September 30, 1924.

GAGE.—Chain gage on upstream side of highway bridge; installed June 14, 1920; read by F. E. Tuttle, E. K. Christie, and H. A. Mykrantz.

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

CHANNEL AND CONTROL.—One channel at all stages; straight for long distance above and below gage. Bed composed of boulders and gravel. Control is a riffle of large boulders about 300 feet below gage; may shift during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.21 feet May 16 (discharge, 10,800 second-feet); minimum stage recorded, 1.58 feet at 7.30 a. m. September 17 (discharge, 173 second-feet). Flow may have been less during period January 1–10, when stage-discharge relation was affected by ice.

1919–1924: Maximum stage recorded, 10.4 feet at 9 a. m. on June 5, 1921 (discharge, 13,400 second-feet); minimum discharge estimated at 144 second-feet December 13–15, 1919, when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation seriously affected by ice during severe winters; flow estimated from discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Numerous diversions above station for irrigation.

REGULATION.—None.

ACCURACY.—Stage-discharge relation permanent; affected by ice January 1–10. Rating curve well defined below 7,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records excellent.

COOPERATION.—Gage-height record furnished by Methow Okanogan Irrigation District.

Discharge measurements of Methow River at Twisp, Wash., during the year ending September 30, 1924

[Made by J. S. Gatewood]

Date	Gage height	Discharge
	Feet	*Sec.-ft.*
June 4	5.28	3,310
Aug. 28	1.72	205
Sept. 26	1.70	204

Daily discharge, in second-feet, of Methow River at Twisp, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	275	314	256		221	256	335	1,800	3,050	1,310	314	204
2	275	314	275		238	256	335	2,120	3,680	1,400	335	191
3	275	335	275		230	256	356	2,900	3,840	1,500	335	178
4	294	335	294		221	256	356	2,700	3,360	1,500	314	178
5	275	335	275		221	256	356	2,490	2,900	1,400	314	178
6	294	314	275	190	221	256	378	2,240	2,620	1,220	294	178
7	356	314	275		221	256	401	2,010	2,360	1,140	294	178
8	335	314	275		221	256	550	2,120	2,360	850	294	178
9	335	314	275		191	266	655	2,490	2,490	815	275	191
10	335	314	275		214	275	780	3,360	2,620	748	275	191
11	314	314	275	256	238	275	850	4,820	2,490	685	275	204
12	314	314	256	256	238	294	920	6,440	2,240	655	256	204
13	314	314	275	247	256	294	955	8,840	2,360	636	256	204
14	314	314	275	238	256	314	990	9,680	2,360	617	238	204
15	314	314	275	256	256	335	920	6,630	2,360	598	256	204
16	314	294	284	256	238	335	920	10,800	2,360	579	256	191
17	335	294	294	238	247	335	885	8,840	2,240	560	275	178
18	335	294	275	256	256	335	850	8,630	2,010	540	275	178
19	335	294	256	275	256	356	780	8,420	1,900	521	294	191
20	335	294	238	256	238	356	780	7,610	1,700	502	275	191
21	335	275	256	238	238	356	780	6,250	1,600	483	275	191
22	335	294	275	238	238	335	748	6,060	1,600	464	275	191
23	335	294	256	238	238	346	748	6,060	1,500	445	256	204
24	335	314	238	238	238	356	715	5,510	1,400	426	238	191
25	335	314	238	238	238	335	715	4,990	1,400	426	238	204
26	335	314	238	238	256	356	715	4,480	1,400	450	238	204
27	335	294	256	238	256	356	800	3,680	1,310	426	238	191
28	335	294	275	238	256	356	885	3,200	1,310	401	221	191
29	335	294	256	238	256	356	1,140	2,900	1,220	378	204	204
30	314	294	230	221	-------	356	1,500	2,760	1,220	378	204	204
31	314	-------	204	238	-------	356	-------	2,620	-------	356	204	-------

NOTE.—Gage not read Oct. 21, 28, Nov. 11, 25, Dec. 9, 16, 23, 30, Jan. 13, 20, 26, 27, Feb. 3, 10, 17, 24, Mar. 2, 9, 16, 23, 30, Apr. 6, 13, 20, 27, May 4, and July 13-23; discharge interpolated. Braced figures show estimated mean discharge for period indicated when there was ice effect.

Monthly discharge of Methow River at Twisp, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	356	275	320	19,700
November	335	275	307	18,300
December	294	204	264	16,200
January	275	----	227	14,000
February	256	191	238	13,700
March	356	256	312	19,200
April	1,500	335	737	43,900
May	10,800	1,800	4,950	304,000
June	3,840	1,220	2,180	130,000
July	1,500	356	723	44,500
August	335	204	267	16,400
September	204	178	192	11,400
The year	10,800	----	897	651,000

CHELAN RIVER BASIN

LAKE CHELAN AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at Forest Service boat landing at Chelan, Chelan County, a quarter of a mile above highway bridge at outlet.

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

RECORDS AVAILABLE.—September 1 to October 15, 1897; January 1, 1898, to December 31, 1899; January 1 to June 30, 1905; December 5, 1910, to September 30, 1924.

GAGE.—Vertical staff on pile at landing; installed December 5, 1910; datum, 1,076.15 feet above sea level; read by C. A. Bennett. Gage used from 1897 to 1899 was at Lakeside, about 1 mile west of Chelan; datum 1,070.18 feet above sea level. In 1905 gage was on a bent of upper bridge at Chelan; elevation not determined.

EXTREMES OF STAGE.—Maximum stage recorded during year, 6.18 feet on May 23 and 24; minimum stage recorded, 1.36 feet on April 7.

1898–99; 1911–1924: Maximum stage recorded, 8.2 feet on June 8, 1921; minimum stage recorded, 6.60 feet (elevation, 1,076.78 feet) January 27–28 and December 2–3, 1898.

REGULATION.—The lake level is controlled at low water by operation of flashboard dam at outlet in the interest of navigation.

ACCURACY.—Gage read to hundredths once on days for which gage heights are recorded.

COOPERATION.—Gage-height record furnished by Chelan Electric Co.

Daily gage height, in feet, of Lake Chelan at Chelan, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	2.98	2.85	2.65	2.80	2.85	3.66	1.59	1.88		4.59	4.02	
2					2.86		1.48		5.00	4.67	4.00	
3		2.82						2.13	5.13	4.69		
4							1.47		5.08	4.71		
5				2.67			1.43	2.39	5.05	4.70		
6	2.95							2.49	4.88	4.80		3.29
7							1.36	2.50	4.80	4.75		
8			2.85			3.67	1.44	2.51		4.65		
9	2.93				3.05		1.48	2.58		4.62	3.87	
10		2.60					1.55	2.76	4.50	4.60		
11							1.60		4.40	4.50		
12				2.75			1.65	3.38	4.35	4.42		
13	2.87							3.89		4.42		3.16
14						3.45	1.75	4.35	4.15	4.42		
15			2.75		3.44	3.10	1.74	4.88		4.42		
16					3.46		1.75	5.29	4.10	4.25	3.80	
17		2.57				2.96	1.69	5.52	4.05	4.20		
18						2.77	1.75		4.05	4.08		
19				2.65		2.68	1.70	5.92	4.04	4.07		
20	2.88					2.55		6.00	4.05	3.99		2.95
21						2.43	1.73	6.07	4.04	3.91		
22			2.71			2.35	1.73	6.15		3.82		
23					3.60		1.73	6.18	4.05	3.82	3.58	
24		2.75				2.14	1.64	6.18	4.07	3.84		
25						2.08	1.60		4.10	3.88		
26				2.60		1.96	1.60	6.00	4.20	3.92		
27	2.82					1.84		5.80	4.23			2.72
28						1.82	1.63	5.54		4.00		
29			2.88		3.55	1.80	1.68	5.33				
30		2.52					1.81	5.15		3.94	3.43	2.66
31			2.80			1.65		5.07		4.01		

CHELAN RIVER AT CHELAN, WASH.

LOCATION.—In sec. 13, T. 27 N., R. 22 E., at lower bridge at Chelan, Chelan County, 800 feet below flashboard dam at outlet of Chelan Lake and 4 miles northwest of Chelan Falls.

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

RECORDS AVAILABLE.—November 1, 1903, to September 30, 1924.

GAGE.—Vertical staff on fourth bent of left approach to lower bridge; read by C. A. Bennett.

DISCHARGE MEASUREMENTS.—Made from upper bridge 1,000 feet above gage, from boat, or by wading.

CHANNEL AND CONTROL.—Bed composed of boulders and gravel; shifting at extremely high water. Channel curved above gage, but practically straight below. Banks high; not subject to overflow.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 10.4 feet May 22–24 (discharge, 8,060 second-feet); minimum stage recorded, 4.0 feet January 20–23, 27, and 28 (discharge, 360 second-feet).

1903–1924: Maximum stage recorded, 12.3 feet June 8, 1921 (discharge, 11,600 second-feet). Practically no flow for at least part of day on January 30, 1917, when outlet to lake was blocked solidly with ice so that no water could flow over dam.

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

DIVERSION.—Several irrigation ditches divert from tributaries a very small proportion of the run-off.

REGULATION.—Flashboard dam 800 feet above gage controls lake level at low water in interest of navigation. Monthly summaries of flow have been corrected for storage.

ACCURACY.—Stage-discharge relation practically premanent. Rating curve well defined between 700 and 10,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good October to February; otherwise excellent.

COOPERATION.—Gage-height record furnished by Chelan Electric Co.

Discharge measurements of Chelan River at Chelan, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*
Oct. 1	D. J. F. Calkins	5.18	785
Jnne 3	J. S. Gatewood	9.39	6,360
Aug. 29	....do	5.95	1,320

Daily discharge, in second-feet, of Chelan River at Chelan, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	800	535	410	410	385	800	1,460	1,780	6,090	2,900	1,780	1,190
2	800	535	410	410	410	850	1,360	1,890	6,090	3,040	1,670	1,190
3	800	535	410	410	410	850	1,270	2,010	6,260	3,190	1,560	1,190
4	700	535	410	385	410	850	1,190	2,130	6,260	3,810	1,560	1,190
5	700	535	410	385	410	850	1,270	2,250	6,260	3,810	1,560	1,190
6	700	535	440	385	410	970	1,190	2,370	5,920	3,970	1,460	1,190
7	700	535	440	385	410	850	1,190	2,370	5,750	3,650	1,460	1,190
8	655	500	410	410	440	850	1,270	2,500	5,580	3,340	1,460	1,190
9	655	500	410	385	410	910	1,270	2,500	7,160	3,190	1,460	1,190
10	700	500	410	410	410	910	1,360	2,760	5,250	3,040	1,460	1,110
11	655	492	410	385	440	1,040	1,360	3,040	5,250	3,040	1,460	1,110
12	655	485	385	385	535	1,190	1,560	3,650	5,090	2,760	1,460	1,110
13	655	478	410	385	575	2,630	1,560	4,290	4,930	2,760	1,460	1,110
14	655	470	410	385	615	3,190	1,560	5,090	4,770	2,760	1,460	1,110
15	655	470	410	385	615	3,040	1,560	5,920	4,770	2,760	1,460	1,040
16	615	470	410	385	615	2,760	1,560	6,620	4,610	2,630	1,460	1,040
17	615	470	410	385	655	2,630	1,560	6,980	4,610	2,630	1,460	1,040
18	615	470	410	385	700	2,760	1,670	7,160	4,290	2,630	1,460	1,040
19	615	470	410	385	800	2,630	1,560	7,340	3,810	2,500	1,360	1,040
20	615	470	410	360	750	2,500	1,560	7,700	3,040	2,370	1,460	970
21	615	470	410	360	800	2,370	1,560	7,880	2,370	2,250	1,360	970
22	615	470	410	360	750	2,250	1,560	8,060	2,010	1,670	1,360	970
23	615	440	385	360	700	2,130	1,560	8,060	1,780	1,560	1,360	910
24	615	470	385	385	750	2,010	1,460	8,060	1,890	1,560	1,360	910
25	615	440	385	385	800	2,010	1,460	7,880	1,890	1,560	1,360	910
26	615	410	410	385	850	1,780	1,460	7,700	2,130	1,560	1,360	910
27	575	410	410	360	750	1,670	1,460	7,340	2,250	1,670	1,360	910
28	575	410	410	360	800	1,670	1,460	6,980	2,250	1,670	1,360	910
29	575	410	410	385	800	1,670	1,560	6,620	2,370	1,670	1,270	910
30	575	410	410	385	-------	1,560	1,670	6,260	2,370	1,560	1,270	850
31	575	-------	410	385	-------	1,460	-------	6,090	-------	1,670	1,190	-------

NOTE.—Gage not read Nov. 11–13 or May 18; discharge interpolated.

Monthly discharge of Chelan River at Chelan, Wash., for the year ending September 30, 1924

[Drainage area, 950 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Run-off (inches)	Run-off (acre-feet)		
	Maximum	Minimum	Mean	Mean	Per square mile		Observed	Stored	Without storage
October	800	575	649	590	0.621	0.72	39,900	−3,600	36,300
November	535	410	478	302	.318	.35	28,400	−10,400	18,000
December	440	385	409	553	.582	.67	25,100	+8,900	34,000
January	410	360	384	389	.409	.47	23,600	+300	23,900
February	850	385	600	994	1.05	1.13	34,500	+22,700	57,200
March	3,190	800	1,730	764	.804	.93	106,000	−59,000	47,000
April	1,670	1,190	1,450	1,540	1.62	1.81	86,300	+5,300	91,600
May	8,060	1,780	5,230	6,880	7.24	8.35	322,000	+101,000	423,000
June	7,160	1,780	4,240	3,900	4.11	4.59	252,000	−19,700	232,000
July	3,970	1,560	2,550	2,340	2.46	2.84	157,000	−13,100	144,000
August	1,780	1,190	1,440	1,130	1.19	1.37	88,500	−19,000	69,500
September	1,190	850	1,050	664	.699	.78	62,500	−23,000	39,500
The year	8,060	360	1,690	1,670	1.76	24.01	1,230,000	−9,600	1,220,000

ENTIAT RIVER BASIN

ENTIAT RIVER AT ENTIAT, WASH.

LOCATION.—In sec. 18, T. 25 N., R. 21 E., one-eighth of a mile below power plant of Wenatchee Valley Gas & Electric Co., three-fourths of a mile west of Entiat, Chelan County, and 1 mile above mouth.

DRAINAGE AREA.—419 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 5, 1910, to September 30, 1924.

GAGE.—Inclined staff on left bank one-eighth of a mile below power plant; read by L. G. Asher.

DISCHARGE MEASUREMENTS.—Made from private bridge 200 feet below power plant or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifting. One channel at all stages. Left bank high; not subject to overflow. Right bank slopes gradually. Gage height of zero flow, September 24, 1922, —0.5 foot ±0.1 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded, 4.2 feet May 15 and 16 (discharge, 3,460 second-feet); minimum discharge occurred during period stage-discharge relation was affected by ice; not determined.

1910–1924: Maximum stage recorded, 5.0 feet June 17, 1916 (discharge, 5,150 second-feet); minimum discharge recorded, 32 second-feet, current-meter measurement made January 30, 1923, when stage-discharge relation was affected by ice; flow probably less during the same and other periods when stage-discharge relation was affected by ice.

ICE.—Stage-discharge relation affected by ice; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Several diversions above station for irrigation. Entiat Irrigation Co.'s high line canal (capacity, about 20 second-feet) carries water past station.

REGULATION.—Flow slightly affected by changes in load at power plant.

ACCURACY.—Stage-discharge relation changed May 17; affected by ice December 22–24, 26–31, and January 1–29. Rating curve used prior to change well defined below 2,000 second-feet and extended above; that used from May 17 on, fairly well defined below 2,000 second-feet and extended above. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good except during periods when stage-discharge relation was affected by ice.

COOPERATION.—Gage-height records furnished by Washington Coast Utilities Co.

Discharge measurements of Entiat River at Entiat, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Jan. 4	R. B. Kilgore	[a] 1.89	102	July 7	J. S. Gatewood	1.60	349
May 30	J. S. Gatewood	2.71	1,100	Aug. 30	do	.81	92
June 5	do	2.78	1,190	Sept. 27	do	.86	100

[a] Stage-discharge relation affected by ice.

Daily discharge, in second-feet, of Entiat River at Entiat, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	113	113	93		155	197	190	458	1,100	516	155	88
2	113	113	108		155	193	190	583	1,300	516	150	86
3	113	120	108		150	187	190	808	1,420	579	144	82
4	113	118	118		155	187	174	984	1,360	579	139	78
5	118	113	113		139	187	167	1,030	1,190	458	139	82
6	139	113	133	90	128	187	161	850	1,100	431	133	82
7	139	108	108		128	187	161	808	930	355	133	84
8	144	106	95		123	187	167	808	854	332	128	90
9	128	106	99		118	187	193	893	818	310	128	95
10	118	104	108		113	190	237	1,030	781	289	133	86
11	113	104	118		118	190	289	1,410	781	268	139	78
12	113	99	123		222	190	310	2,290	781	260	133	82
13	116	104	118		431	187	310	2,950	711	252	133	82
14	113	104	108		310	187	332	3,120	711	229	133	82
15	108	104	108		289	190	355	3,460	678	222	133	84
16	128	99	108	100	268	193	332	3,460	644	229	211	84
17	155	99	133		260	193	310	3,170	644	229	193	84
18	150	104	128		229	193	310	3,170	644	222	187	82
19	144	104	108		215	193	310	3,000	612	222	174	84
20	133	106	64		207	190	310	2,830	612	215	167	84
21	133	104	104		200	193	310	2,830	579	200	133	84
22	139	104			200	187	310	2,320	548	187	133	84
23	133	106	100		193	187	289	2,320	548	180	113	86
24	128	133			193	187	289	2,320	548	167	110	95
25	128	128	99	120	193	193	268	2,160	516	161	108	104
26	123	128			193	193	289	1,850	516	161	108	99
27	118	118			193	193	310	1,780	458	167	110	99
28	118	113			193	190	332	1,630	404	167	106	99
29	113	113	80		193	187	355	1,100	431	161	90	99
30	113	108		128	-------	187	380	1,100	458	161	88	95
31	108	-------		123	-------	190	-------	1,100	-------	155	88	-------

NOTE.—Low flow Dec. 20, due to ice above gage. Braced figures show estimated mean discharge for periods indicated when there was ice effect.

Monthly discharge of Entiat River at Entiat, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	155	108	125	7,690
November	133	99	110	6,550
December	133	----------	103	6,330
January	----------	----------	104	6,400
February	431	113	195	11,200
March	197	187	190	11,700
April	380	161	271	16,100
May	3,460	458	1,860	114,000
June	1,420	404	756	45,000
July	579	155	277	17,000
August	211	88	135	8,300
September	104	78	87.4	5,200
The year	3,460	----------	352	255,000

WENATCHEE RIVER BASIN

WENATCHEE RIVER NEAR LEAVENWORTH, WASH.

LOCATION.—In SW. ¼ sec. 12, T. 26 N., R. 17 E., 1,500 feet below highway bridge at Plain, half a mile below Beaver Creek, and 14 miles north of Leavenworth, Chelan County.

DRAINAGE AREA.—591 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 27, 1910, to September 30, 1924.

GAGE.—Since September 6, 1913, vertical and inclined staff gage on left bank, 1,500 feet below highway bridge; read by P. H. Hertzog.

DISCHARGE MEASUREMENTS.—Made from cable three-eighths of a mile above gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and small boulders. Control likely to shift during extremely high water. One channel at all stages. Banks high and not subject to overflow. Gage height of zero flow, September 27, 1918, 1.2 feet ±0.2 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 8.9 feet at 6 p. m. May 15 (discharge, 13,000 second-feet); minimum discharge probably occurred in October while stage-discharge relation was affected by logs.

1910–1924: Maximum stage recorded, 11.8 feet December 13, 1921 (discharge, 20,800 second-feet); minimum discharge recorded, 316 second-feet September 29 and 30, 1915, and October 11 and 12, 1915.

ICE.—Stage-discharge relation affected by ice during severe winters; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSION.—The Wenatchee Park Land & Irrigation Co. diverts a maximum of about 12 second-feet from Chiwawa River during irrigation season.

REGULATION.—None.

ACCURACY.—Stage-discharge relation practically permanent for periods of unobstructed control February 12 to March 24, and May 15 to June 19; otherwise seriously affected by logs. Rating curve used directly February 12 to March 24, and May 15 to June 19, and as standard form for other periods during year fairly well defined between 500 second-feet and 10,000 second-feet. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Shifting-control method used March 25 to May 14 and June 20 to July 31. Records good except for periods represented by flat estimates of discharge.

Discharge measurements of Wenatchee River near Leavenworth, Wash., during the the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 2	D. J. F. Calkins	[a] 3.80	412	June 6	J. S. Gatewood	5.94	5,260
26	do	[a] 3.90	545	July 7	Gatewood and Thompson	[a] 4.55	2,300
Jan. 5	R. B. Kilgore	[b] 3.64	505	Aug. 30	J. S. Gatewood	[a] 3.90	584
Apr. 11	J. S. Gatewood	[a] 4.88	2,660	Sept. 28	do	[a] 3.54	442
May 3	R. B. Kilgore	[a] 6.28	4,540				

[a] Stage-discharge relation affected by logs. [b] Stage-discharge relation affected by logs and ice.

Daily discharge, in second-feet, of Wenatchee River near Leavenworth, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1						1,960	1,580	3,120	5,390	3,440		
2						1,960	1,520	3,800	6,290	3,800		
3						1,830	1,460	4,560	6,780	3,800	1,050	
4						1,830	1,460	4,360	6,290	3,800		
5						1,830	1,400	3,620	5,830	3,120		
	415	470	940	545	2,070							590
6						1,830	1,520	3,280	5,170	2,510		
7						1,700	1,700	3,120	4,160	2,230		
8						1,700	1,960	3,120	4,160	1,960	835	
9						1,700	1,960	3,980	4,160	1,960		
10						1,830	1,960	5,830	4,160	1,960		
11					2,090	1,830	2,810	7,530	4,160	1,830		
12					8,850	1,960	2,810	8,850	4,160	1,830		
13					10,500	2,090	2,660	11,100	4,160	1,830	795	
14					6,290	2,230	2,660	12,200	4,160	1,830		
15					5,390	2,230	2,370	13,000	4,160	1,700		
	530	485	1,020	870								485
16					4,160	2,230	2,090	12,500	3,800	1,700		
17					3,280	2,090	1,960	11,900	3,800	1,640		
18					2,960	2,090	1,960	11,100	3,620	1,580	655	
19					2,660	2,090	1,830	10,500	3,370	1,580		
20					2,370	2,090	1,830	9,940	3,120	1,520		
21					2,230	2,090	1,700	9,390	2,960	1,460		
22					2,230	2,090	1,700	9,120	3,120	1,340		
23					1,960	2,090	1,640	9,120	2,810	1,220	585	
24					1,960	2,090	1,520	8,580	2,810	1,120		
25					1,960	1,960	1,640	8,050	2,810	1,010		
26	485	985	775	655	1,830	1,960	1,580	6,290	2,810	1,220		445
27					1,960	1,830	1,700	4,760	2,660	1,340		
28					1,960	1,830	1,960	4,560	2,510	1,340		
29					1,960	1,700	2,230	4,560	2,510	1,400	640	
30					-------	1,640	2,660	4,560	2,510	1,340		
31					-------	1,580	-------	4,760	-------	1,280		

NOTE.—Braced figures show mean discharge for periods indicated; estimated from results of eight discharge measurements, observer's notes, weather records, and results at gaging stations on near-by streams.

Monthly discharge of Wenatchee River near Leavenworth, Wash., for the year ending September 30, 1924

[Drainage area, 591 square miles]

Month	Discharge in second-feet				Run-off	
	Maximum	Minimum	Mean	Per square mile	Inches	Acre-feet
October			477	0.807	0.93	29,300
November			647	1.09	1.22	38,500
December			907	1.53	1.76	55,800
January			689	1.17	1.35	42,400
February	10,500		3,010	5.09	5.49	173,000
March	2,230	1,580	1,930	3.27	3.77	119,000
April	2,810	1,400	1,930	3.27	3.65	115,000
May	13,000	3,120	7,130	12.1	13.95	438,000
June	6,780	2,510	3,950	6.68	7.45	235,000
July	3,800	1,010	1,930	3.27	3.77	119,000
August			756	1.28	1.48	46,500
September			507	.858	.96	30,200
The year	13,000		1,990	3.37	45.78	1,440,000

YAKIMA RIVER BASIN

KEECHELUS LAKE NEAR MARTIN, WASH.

LOCATION.—At outlet of lake, 1¼ miles northeast of Meadow Creek railroad station, 3½ miles northwest of Martin, Kittitas County, and 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—January 12, 1906, to September 30, 1924.

GAGE.—Vertical and inclined staff attached to pier of bridge to gate house; set to sea-level datum; read by L. M. Ralph.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 2,517.80 feet at 5.10 p. m. May 24 (storage, 159,820 acre-feet); minimum stage recorded, 2,429.61 feet at 5.40 p. m. September 30 (storage, 5,770 acre-feet).

1906–1924: Maximum stage recorded May 24, 1924; minimum stage recorded, 2,429.26 feet from 5.25 p. m. October 5 to 7 a. m. October 6, 1922 (storage, 5,330 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 152,000 acre-feet; elevation of gate sill, 2,425 feet, and of spillway crest, 2,515 feet. Record of storage or release each month used to determine discharge without storage at gaging station below dam.

ACCURACY.—Staff gage read to hundredths twice daily. Records excellent.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Daily contents, in acre-feet, of Keechelus Lake near Martin, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	9,230	15,980	30,560	49,100	65,300	97,150	106,150	123,500	159,360	155,170	113,320	33,260
2	9,170	16,410	31,070	49,230	66,800	97,630	106,430	124,850	159,470	154,690	111,480	30,480
3	9,120	16,740	31,790	49,740	67,850	98,010	106,640	126,180	159,490	154,260	109,450	27,660
4	9,080	17,000	32,490	49,970	68,690	98,370	106,800	127,430	159,470	154,080	107,380	25,000
5	9,030	17,240	33,050	50,360	69,810	98,700	107,160	128,490	159,340	153,700	105,340	22,760
6	8,980	17,480	34,340	50,520	70,950	99,100	107,440	129,350	159,260	153,040	103,400	20,520
7	8,940	17,680	36,770	50,700	71,860	99,460	107,800	130,100	159,110	152,140	101,140	18,850
8	8,930	17,900	37,980	51,000	72,490	99,770	108,350	131,030	158,900	151,050	98,010	17,090
9	8,990	18,110	38,770	51,340	73,240	100,070	108,810	132,400	158,820	149,600	94,660	15,570
10	9,060	18,290	39,360	52,550	73,640	100,320	109,390	134,280	158,570	147,820	91,520	14,070
11	9,150	18,460	39,970	54,200	74,950	100,580	110,160	136,860	158,310	145,930	88,620	12,740
12	9,210	18,590	40,490	55,030	80,630	100,890	110,900	140,050	158,210	144,300	85,980	11,680
13	9,270	18,720	40,820	55,780	85,270	101,220	111,700	143,440	158,180	142,680	83,310	10,660
14	9,340	18,860	41,360	56,240	87,240	101,590	112,340	146,110	157,980	141,120	80,600	9,790
15	9,480	19,020	41,800	56,780	88,640	101,930	112,930	148,170	157,980	139,350	77,800	9,030
16	9,910	19,180	42,320	57,090	89,510	102,240	113,540	150,100	157,900	137,820	75,070	8,430
17	11,110	19,320	42,790	57,580	90,400	102,510	114,210	152,030	157,770	136,190	72,320	7,930
18	12,020	19,460	43,250	58,060	91,110	102,780	115,260	153,980	157,770	134,830	69,820	7,570
19	12,550	19,580	43,670	58,270	91,730	103,050	116,080	155,680	157,740	133,570	67,390	7,330
20	12,960	19,780	44,030	58,550	92,240	103,360	116,720	156,980	157,520	132,180	65,090	6,970
21	13,400	19,960	44,270	58,870	92,800	103,670	117,290	158,360	157,260	130,980	62,800	6,690
22	13,810	20,100	44,660	59,190	93,290	103,880	117,820	159,310	157,180	129,400	60,490	6,440
23	14,160	20,440	45,000	59,550	93,740	104,040	118,310	159,720	157,080	127,960	57,860	6,220
24	14,420	22,160	45,450	59,960	94,170	104,230	118,710	159,800	156,880	126,430	55,380	6,120
25	14,680	24,210	46,030	60,260	94,560	104,460	119,160	159,720	156,750	124,960	52,800	6,130
26	14,940	25,370	46,460	60,580	94,980	104,670	119,560	159,390	156,520	123,280	50,280	6,080
27	15,130	26,320	46,900	60,960	95,400	104,920	119,470	159,210	156,240	121,730	47,670	6,020
28	15,320	27,520	47,580	61,270	95,990	105,300	120,210	159,080	156,010	120,030	45,070	5,930
29	15,500	29,060	48,320	61,650	96,670	105,590	121,040	159,060	155,780	118,380	42,250	5,830
30	15,620	29,920	48,750	62,170	------	105,820	122,210	159,080	155,600	116,690	39,310	5,780
31	15,770	------	49,010	63,500	------	105,960	------	159,210	------	115,110	36,280	------

YAKIMA RIVER NEAR MARTIN, WASH.

LOCATION.—Below dam at outlet of Keechelus Lake, 1½ miles east of Meadow Creek railroad station, 3½ miles northwest of Martin, Kittitas County, and 9½ miles northwest of Easton.

DRAINAGE AREA.—55 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 18 to November 14, 1903; January 28, 1904, to September 30, 1924.

GAGE.—Inclined staff gage in paved section on left side of outlet works; installed December 2, 1916; read by L. M. Ralph.

DISCHARGE MEASUREMENTS.—Made from cable 700 feet below dam or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel; shifts at high stages. Logs and brush sometimes lodge on riffle control below gage and affect stage-discharge relation.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 9.02 feet at 9 a. m. August 31 (discharge, 1,730 second-feet). Minimum stage recorded, 1.93 feet from May 3 to May 14 (discharge, 9.9 second-feet).

1904-1924: Maximum discharge, 7,370 second-feet at 10.45 a. m. March 25, 1915, when temporary crib dam was washed out (gage destroyed; discharge computed from hourly gage readings of lake surface and estimated natural inflow to lake); practically no flow when gates in Keechelus reservoir dam are closed.

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

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Keechelus reservoir. Monthly discharge without storage determined from records of stage at reservoir.

ACCURACY.—Stage-discharge relation changed owing to sloughing off of channel banks January 28. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Yakima River near Martin, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 8	Mead and Crawford	1.87	13.0	Aug. 14	T. C. Mead	8.49	1,450
May 27	R. O. Crawford	2.03	12.9	19	do	8.10	1,270
July 4	T. C. Mead	5.11	367	Sept. 19	Mead and Crawford	4.40	238
25	do	6.80	830				

Daily discharge, in second-feet, of Yakima River near Martin, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	77	12	26	24	32	32	34	10	558	368	927	1,610
2	77	13	20	24	35	32	34	10	610	358	995	1,550
3	77	13	21	24	37	32	34	10	623	295	1,070	1,400
4	77	13	21	24	38	32	33	10	610	255	1,070	1,310
5	77	13	21	24	39	32	32	10	547	321	995	1,220
6	77	13	21	24	41	32	32	10	511	439	995	1,100
7	77	13	22	24	43	32	32	10	440	591	1,440	1,030
8	43	13	22	24	44	32	32	10	353	735	1,660	927
9	19	13	23	24	45	32	32	10	439	861	1,660	861
10	18	13	23	25	45	32	32	10	497	961	1,660	766
11	18	13	23	25	48	32	32	10	413	927	1,460	705
12	18	13	23	25	53	32	32	10	385	861	1,400	647
13	18	15	23	25	42	32	32	10	378	861	1,450	577
14	18	17	23	25	31	32	32	10	328	861	1,450	513
15	18	17	23	25	31	32	32	11	328	861	1,500	443
16	18	17	23	25	31	32	32	11	316	829	1,450	388
17	15	17	23	25	31	33	32	11	295	829	1,400	321
18	14	17	23	26	31	33	32	11	295	766	1,350	279
19	14	17	23	26	31	33	32	12	298	766	1,310	239
20	14	17	23	26	31	33	32	12	287	735	1,260	209
21	14	17	23	26	31	33	32	155	287	705	1,260	187
22	14	17	23	26	31	33	32	533	287	781	1,350	166
23	13	18	23	26	31	33	32	740	287	797	1,400	154
24	13	18	23	26	31	34	32	781	287	797	1,400	148
25	13	19	23	27	32	34	32	741	287	829	1,400	141
26	13	19	23	27	32	34	166	571	287	861	1,450	134
27	13	19	23	27	32	34	153	486	287	894	1,450	126
28	13	19	23	25	32	34	12	428	287	894	1,500	117
29	13	19	23	26	32	34	10	416	287	894	1,610	113
30	12	19	23	27	-------	34	10	428	321	894	1,660	109
31	12	-------	23	30	-------	34	-------	486	-------	894	1,720	-------

Monthly discharge of Yakima River near Martin, Wash., for the year ending September 30, 1924

[Drainage area, 55 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Run-off			
							Acre-feet		
	Maximum	Minimum	Mean	Mean	Per square mile	Inches	Observed	Stored	Without storage
October	77	12	29.9	136	2.47	2.85	1,840	+6,500	8,340
November	19	12	15.8	254	4.62	5.16	938	+14,200	15,100
December	23	20	22.5	333	6.05	6.98	1,380	+19,100	20,500
January	27	24	25.4	262	4.76	5.49	1,560	+14,500	16,100
February	53	31	34.8	614	11.2	12.08	2,070	+33,200	35,300
March	34	32	32.7	184	3.35	3.86	2,010	+9,290	11,300
April	166	10	38.6	311	5.65	6.30	2,300	+16,200	18,500
May	781	10	193	794	14.4	16.60	11,800	+37,000	48,800
June	623	287	380	319	5.80	6.47	22,600	−3,610	19,000
July	961	255	733	73.2	1.33	1.53	45,000	−40,500	4,500
August	1,720	927	1,380	96.0	1.75	2.02	84,700	−78,800	5,900
September	1,610	109	583	70.6	1.28	1.43	34,700	−30,500	4,200
The year	1,720	10	290	286	5.20	70.77	211,000	−3,420	208,000

YAKIMA RIVER AT CLE ELUM, WASH.

LOCATION.—In sec. 27, T. 20 N., R. 15 E., at highway bridge at Cle Elum, Kittitas County, just above Roslyn Creek, 3 miles below mouth of Cle Elum River, and 6½ miles above Teanaway Creek.

DRAINAGE AREA.—500 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 24, 1906, to September 30, 1924.

GAGE.—Due to reconstruction of highway bridge and recording gage equipment, several temporary staff gages at various locations on the left bank have been read since June 28, 1923. Gages read by J. F. Huffman.

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

CHANNEL AND CONTROL.—Bed composed of gravel and cobblestones. One channel at all stages. Control at low water formed by broad riffle about 1,200 feet below gage; riffle drowned out at high water. Control shifts during floods.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year from water-stage recorder, 6.99 feet at 6.55 a. m. February 13 (discharge, 8,570 second-feet); minimum stage recorded, 0.83 foot from 7.30 a. m. November 17 to 7.15 a. m. November 19 (discharge, 144 second-feet).

1906–1924: Maximum stage from high-water marks, 12.5 feet November 14, 1906 (discharge, about 25,600 second-feet); minimum stage recorded on November 17–19, 1923.

ICE.—Stage-discharge relation seriously affected by ice during severe winters; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—None.

REGULATION.—Flow partly regulated by storage and release of water at Keechelus, Kachess, and Cle Elum reservoirs. Monthly discharge without storage determined from records of stage at reservoirs.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Complete record furnished by United States Bureau of Reclamation.

Discharge measurements of Yakima River at Cle Elum, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 2	R. O. Crawford	1.61	477	Aug. 1	T. C. Mead	4.18	2,900
May 5	do	4.26	2,950	13	do	4.28	3,020
28	do	4.14	2,850	Sept. 17	do	2.68	1,240
July 8	T. C. Mead	4.38	3,150				

Daily discharge, in second-feet, of Yakima River at Cle Elum, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	610	365	532	772	1,500	1,410	752	2,840	2,840	3,060	2,910	2,500
2	460	375	472	688	1,240	1,320	765	3,210	3,210	3,290	2,910	2,560
3	438	380	449	646	1,070	1,280	793	3,530	3,450	3,290	2,980	2,260
4	380	400	449	652	895	1,240	779	3,530	3,450	3,210	3,130	2,080
5	385	395	490	616	1,920	1,160	888	3,060	3,210	3,210	3,060	2,030
6	360	375	865	574	1,920	1,200	982	2,770	2,910	3,130	2,910	2,030
7	302	365	1,500	604	1,810	1,160	1,200	2,440	2,500	3,130	2,910	2,030
8	274	360	1,500	580	1,650	1,110	1,280	2,500	2,200	3,210	3,060	2,080
9	270	355	1,280	586	1,500	1,070	1,410	2,910	2,080	3,290	2,980	2,030
10	263	346	1,110	1,070	1,410	1,030	1,810	3,870	2,560	3,370	2,910	1,920
11	270	346	1,110	1,650	1,500	1,030	2,140	5,400	2,700	3,370	2,910	1,810
12	256	332	1,070	1,410	3,870	1,030	2,260	6,690	2,630	3,210	2,980	1,700
13	246	228	990	1,280	8,350	1,070	2,440	7,630	2,440	3,210	3,060	1,600
14	238	214	958	1,160	5,820	1,110	2,380	7,630	2,260	3,210	3,060	1,500
15	242	193	894	1,070	4,310	1,200	2,140	7,150	2,140	3,210	3,060	1,410
16	235	153	850	982	3,290	1,160	1,920	6,690	2,140	3,210	3,060	1,320
17	538	144	800	974	2,700	1,160	1,860	6,030	2,260	3,130	3,130	1,240
18	508	144	793	926	2,320	1,110	1,920	5,610	2,320	3,060	3,060	1,200
19	460	147	779	807	2,080	1,070	1,920	5,400	2,440	2,980	2,980	1,160
20	427	153	739	758	1,860	1,070	1,700	5,200	2,560	3,130	2,500	1,070
21	410	156	713	694	1,700	1,030	1,600	4,900	2,700	2,980	2,380	982
22	410	159	652	700	1,600	990	1,920	4,900	2,770	2,910	2,380	934
23	416	186	664	752	1,500	942	1,750	5,000	2,630	2,980	2,500	895
24	427	355	726	758	1,410	910	1,650	4,800	2,500	2,980	2,500	880
25	432	628	746	726	1,370	865	1,550	4,600	2,630	2,980	2,500	835
26	410	592	739	713	1,320	835	1,500	3,870	2,770	2,980	2,500	765
27	405	556	713	700	1,320	850	1,920	3,370	2,770	2,910	2,440	739
28	395	550	902	688	1,410	835	1,860	2,840	2,770	3,060	2,380	793
29	395	652	926	739	1,410	850	1,860	2,560	2,980	2,910	2,440	752
30	380	616	865	821	-------	821	2,440	2,500	2,840	2,910	2,440	739
31	365	-------	772	926	-------	786	-------	2,560	-------	2,980	2,440	-------

NOTE.—Gage destroyed by drift Dec. 14; no reading Dec. 15-16. Discharge determined by comparing previous and later flow with sum of discharges of the three lake reservoirs.

Monthly discharge of Yakima River at Cle Elum, Wash., for the year ending September 30, 1924

[Drainage area, 500 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Inches	Run-off		
							Acre-feet		
	Maximum	Minimum	Mean	Mean	Per square mile		Observed	Stored	Without storage
October	610	235	374	576	1.15	1.33	23,000	+12,400	35,400
November	652	144	341	946	1.89	2.11	20,300	+36,000	56,000
December	1,500	449	840	1,530	3.06	3.53	51,700	+42,400	94,100
January	1,650	574	839	1,300	2.60	3.00	51,600	+28,600	80,200
February	8,350	895	2,210	3,360	6.72	7.25	127,000	+65,600	193,000
March	1,410	786	1,050	1,400	2.80	3.23	64,900	+21,000	85,900
April	2,440	752	1,650	2,270	4.54	5.06	97,900	+37,100	135,000
May	7,630	2,440	4,390	5,770	11.5	13.26	270,000	+84,800	355,000
June	3,450	2,080	2,660	2,240	4.48	5.00	158,000	−25,200	133,000
July	3,370	2,910	3,110	894	1.79	2.06	191,000	−136,000	55,000
August	3,130	2,380	2,790	439	.878	1.01	171,000	−144,000	27,000
September	2,560	739	1,460	338	.676	.75	86,900	−66,800	20,100
The year	8,350	144	1,810	1,750	3.50	47.59	1,310,000	−44,100	1,270,000

KACHESS LAKE NEAR EASTON, WASH.

LOCATION.—In sec. 24, T. 21 N., R. 13 E. (unsurveyed), at lake outlet, 2½ miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—63 square miles (measured on topographic maps).

RECORDS AVAILABLE.—September 30, 1905, to September 30, 1924.

GAGE.—Stevens water-stage recorder installed in gate tower November 25, 1915, for use when gates are closed, and staff gage in three sections (datum mean sea level) as follows: Highest section installed October 6, 1914, is inclined and is anchored to rock paving on upstream face of storage dam between outlet conduit and east end of dam; middle section installed October 31, 1914, is inclined and anchored to rock paving on upstream face of back-fill dam at former outlet of lake; lowest section installed September 28, 1915, is set vertically in dredged channel about halfway between back-fill dam and open water in lake. Original gage, used until September 5, 1911, was a vertical staff on east side of lake at boat landing, 400 feet above temporary crib dam at outlet; zero at elevation 2,226.02 feet September 6, 1911, until installation of present sections, a vertical staff on face of gate tower at outlet through new storage dam. Gage read by Fred Diener.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 2,261.00 feet at 7 a. m. June 10 (storage, 234,460 acre-feet); minimum stage recorded, 2,202.99 feet at 5 p. m. September 30 (storage, 28,360 acre-feet).

1906–1924: Maximum stage recorded, 2,261.14 feet at 4 p. m. July 21, 1920 (storage, 235,090 acre-feet); minimum stage recorded, 2.197.73 feet September 26–27, 1915 (storage, 13,730 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 221,000 acre-feet. Elevation of gate sill 2,192.75 feet; and of spillway crest, 2,258.00 feet. Record of storage or release each month used for determining discharge without storage at gaging station below dam.

ACCURACY.—Water-stage recorder in gate tower, not used during year. Staff gage read to hundredths twice daily. Records excellent.

COOPERATION.—Complete record furnished by United States Bureau of Reclamation.

Daily content, in acre-feet, of Kachess Lake near Easton, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	70,120	74,620	85,050	102,740	117,560	148,620	160,940	180,390	227,990	204,370	109,360	61,480
2	69,920	74,880	85,600	102,990	118,800	149,090	161,270	181,850	229,200	201,640	106,510	60,370
3	69,740	75,220	86,270	103,200	119,750	149,600	161,630	183,280	230,180	198,450	103,490	59,460
4	69,630	75,510	86,990	103,380	120,670	150,110	161,910	184,550	231,130	195,310	100,450	58,810
5	69,480	75,740	87,690	103,630	121,850	150,540	162,150	185,600	232,030	192,270	97,260	57,980
6	69,400	75,970	88,910	103,910	122,660	150,890	162,480	186,620	233,240	189,120	94,370	56,930
7	69,540	76,170	91,110	104,160	123,580	151,320	163,000	187,420	233,420	185,940	91,560	55,570
8	69,680	76,370	92,120	104,440	124,140	151,720	163,450	188,310	233,870	182,780	89,720	53,930
9	69,770	76,540	92,740	105,440	124,770	152,110	164,010	189,590	234,280	179,840	88,010	52,290
10	69,860	76,800	93,150	107,110	125,360	152,540	164,740	191,460	234,320	176,710	86,500	50,510
11	69,970	76,860	93,530	107,860	126,660	152,980	165,480	194,020	233,690	173,600	84,960	48,870
12	70,030	76,980	93,950	108,390	131,020	153,410	166,290	196,810	233,240	170,510	83,400	47,300
13	70,120	77,150	94,370	108,750	135,010	153,840	167,030	199,740	233,240	167,310	81,790	45,800
14	70,230	77,260	94,820	109,110	136,990	154,240	167,850	202,500	233,470	164,260	80,120	44,500
15	70,370	77,440	95,310	109,500	138,400	154,640	168,540	204,670	233,650	161,110	78,470	42,900
16	70,860	77,550	95,760	109,890	139,470	155,110	169,280	206,720	233,600	157,980	76,690	41,660
17	71,520	77,700	96,180	110,500	140,510	155,510	169,930	208,810	233,330	154,870	75,200	40,370
18	72,100	77,840	96,490	110,970	141,310	155,940	170,960	210,770	232,520	151,720	73,620	39,140
19	72,560	78,010	96,840	111,370	141,920	156,340	171,820	212,620	231,530	148,660	72,150	38,010
20	72,760	78,160	97,160	111,690	142,460	156,820	172,360	214,280	229,780	145,360	71,150	37,000
21	72,960	78,360	97,510	112,020	143,310	157,180	173,020	216,040	227,760	141,960	70,320	35,850
22	73,190	78,590	97,860	112,310	143,930	157,580	173,560	217,630	225,710	139,130	69,430	34,820
23	73,390	78,760	98,240	112,700	144,470	157,980	174,180	219,220	223,710	136,260	68,650	34,000
24	73,590	79,400	98,660	113,070	144,930	158,300	174,640	220,680	221,880	133,430	67,820	33,140
25	73,790	80,400	99,220	113,390	145,590	158,540	175,180	221,930	219,890	130,230	67,080	32,300
26	73,990	81,670	99,750	113,680	146,140	158,820	175,670	222,910	217,590	127,250	66,390	31,510
27	74,130	82,420	100,210	113,970	146,680	159,180	176,260	223,800	215,340	124,180	65,730	30,760
28	74,280	83,170	100,980	114,330	147,500	159,500	177,000	224,550	212,970	121,150	64,900	29,980
29	74,390	83,870	101,510	114,880	148,080	159,860	178,090	225,310	209,980	118,110	64,050	29,220
30	74,420	84,530	102,000	115,490	-------	160,220	179,300	226,200	207,190	115,310	63,190	28,500
31	74,540	-------	102,420	116,330	-------	160,540	-------	227,140	-------	112,340	62,340	-------

KACHESS RIVER NEAR EASTON, WASH.

LOCATION.—In sec. 3, T. 20 N., R. 13 E., three-fourths of a mile below Kachess storage dam, one-fourth of a mile above mouth, and 2 miles northwest of Easton, Kittitas County.

DRAINAGE AREA.—64 square miles (measured on topographic maps).

RECORDS AVAILABLE.—November 20, 1903, to September 30, 1924.

GAGE.—Stevens water-stage recorder at highway bridge; installed August 15, 1916; inspected by Fred Diener.

DISCHARGE MEASUREMENTS.—Made from cable 20 feet below site of old gage or by wading.

CHANNEL AND CONTROL.—Bed composed of light gravel and sand; shifting frequently. One channel at all stages. Control formed by broad riffle 125 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 6.20 feet at noon June 30 (discharge, 1,720 second-feet). Practically no flow when gates in dam are closed.

1904–1924: Maximum discharge, 2,240 second-feet (computed from gate opening) August 27, 1920; practically no flow when gates in dam are closed.

ICE.—Stage-discharge relation affected by ice; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSION.—None.

REGULATION.—Flow controlled by storage and release of water in Kachess Lake reservoir. Monthly discharge, without storage, determined from records of stage of reservoir.

ACCURACY.—Stage-discharge relation changed August 6 and September 3; not affected by ice. Rating curves fairly well defined. Water-stage recorder inspected daily except when gates are closed. Daily discharge ascertained by applying mean daily gage height to rating table. When gates are closed leakage estimated from knowledge of governing conditions. Records good.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Kachess River near Easton, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
May 27	R. O. Crawford	2.21	440	Aug. 13	T. C. Mead	4.99	856
July 4	T. C. Mead	6.06	1,620	Sept. 18	Crawford and Mead	4.33	604
24	do	6.09	1,580				

Daily discharge, in second-feet, of Kachess River near Easton, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	130	1	1	2	2	3	3	4	4	1,650	1,570	665
2	113	1	1	2	2	3	3	4	4	1,650	1,550	598
3	113	1	1	2	2	3	3	4	4	1,640	1,590	479
4	74	1	1	2	2	3	3	4	4	1,640	1,610	507
5	42	1	1	2	2	3	3	4	4	1,650	1,550	569
6	36	1	1	2	2	3	3	4	4	1,640	1,510	713
7	1	1	1	2	2	3	3	4	4	1,650	1,220	832
8	1	1	1	2	2	3	3	4	4	1,670	967	905
9	1	1	1	2	2	3	3	4	168	1,630	956	910
10	1	1	1	2	2	3	3	4	658	1,650	945	889
11	1	1	1	2	2	3	3	4	683	1,650	900	847
12	1	1	1	2	2	3	3	4	473	1,640	868	811
13	1	1	1	2	2	3	3	4	289	1,650	873	775
14	1	1	1	2	2	3	3	4	137	1,650	890	749
15	1	1	1	2	2	3	3	4	197	1,640	895	718
16	1	1	1	2	2	3	3	4	385	1,650	890	693
17	1	1	1	2	2	3	3	4	587	1,630	884	663
18	1	1	1	2	2	3	3	4	728	1,640	879	634
19	1	1	1	2	2	3	3	4	942	1,660	669	596
20	1	1	1	2	2	3	3	4	1,370	1,680	442	564
21	1	1	1	2	2	3	3	4	1,320	1,650	438	533
22	1	1	1	2	2	3	3	4	1,300	1,630	454	507
23	1	1	1	2	2	3	3	4	1,180	1,630	462	503
24	1	1	1	2	2	3	3	4	1,180	1,650	467	450
25	1	1	1	2	2	3	3	4	1,330	1,650	483	423
26	1	1	1	2	2	3	3	4	1,370	1,600	488	396
27	1	1	1	2	2	3	3	4	1,400	1,590	488	411
28	1	1	1	2	2	3	3	4	1,530	1,590	496	438
29	1	1	1	2	2	3	3	4	1,610	1,570	518	408
30	1	1	1	2	-------	3	3	4	1,630	1,560	539	382
31	1	-------	1	2	-------	3	-------	4	-------	1,600	548	-------

Monthly discharge of Kachess River near Easton, Wash., for the year ending September 30, 1924

[Drainage area, 64 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Run-off			
						Inches	Acre-feet		
	Maximum	Minimum	Mean	Mean	Per square mile		Observed	Stored	Without storage
October	130	1	17.2	85.4	1.33	1.53	1,060	+4,190	5,250
November	1	1	1.0	168	2.62	2.92	59.5	+9,990	10,000
December	1	1	1.0	293	4.58	5.28	61.5	+17,900	18,000
January	[2]	2	2.0	228	3.56	4.10	123	+13,900	14,000
February	2	2	2.0	555	8.67	9.35	115	+31,800	31,900
March	3	3	3.0	207	3.23	3.72	185	+12,500	12,700
April	3	3	3.0	319	4.98	5.56	179	+18,800	19,000
May	4	4	4.0	781	12.2	14.07	246	+47,800	48,000
June	1,630	4	683	346	5.41	6.04	40,600	−20,000	20,600
July	1,680	1,560	1,630	84.6	1.32	1.52	100,000	−94,800	5,200
August	1,610	438	872	58.5	.914	1.05	53,600	−50,000	3,600
September	910	382	619	50.4	.788	.88	36,800	−33,800	3,000
The year	1,680	1	322	263	4.11	56.02	233,000	−41,700	191,000

CLE ELUM LAKE NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., at outlet of lake, 4 miles northwest of Roslyn, Kittitas County, and 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—May 4, 1906, to September 30, 1924.

GAGE.—Stevens water-stage recorder; installed November 8, 1916; inspected by C. M. Keyes and W. W. Wasson. Zero of gage at elevation of gate sills, 2,122.75 feet above sea level.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 15.65 feet at 8.45 a. m. February 13 (storage, 34,420 acre-feet); minimum stage recorded, 2.90 feet at 6.30 a. m. October 15 (storage, 6,040 acre-feet).

1907–1924: Maximum stage recorded, 19.10 feet at 6 p. m. December, 30, 1917 (storage, 43,180 acre-feet); minimum stage estimated at 1.15 feet August 31, 1906 (storage, 2,380 acre-feet).

STORAGE.—Reservoir capacity at crest of spillway (gage height, 11.3 feet) 24,100 acre-feet. Storage or release each month used in determining discharge without storage for gaging station below dam.

ACCURACY.—Water-stage recorder referred to staff gage twice daily. Gage read to hundredths. Records excellent.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Daily contents, in acre-feet, of Cle Elum Lake near Roslyn, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	6,330	7,970	20,970	25,140	26,380	26,100	25,140	27,910	27,750	25,880	24,670	9,830
2	6,290	7,970	21,930	25,060	27,120	26,010	25,170	28,310	28,050	26,100	24,580	9,450
3	6,250	8,080	22,730	25,060	27,120	25,970	25,210	28,620	28,410	26,310	24,600	9,070
4	6,210	8,120	23,360	25,030	26,890	25,880	25,190	28,500	28,340	26,400	24,740	8,840
5	6,180	8,140	24,260	24,940	26,780	25,760	25,030	28,050	28,080	26,360	24,690	8,560
6	6,180	8,120	25,420	24,940	26,640	25,740	24,740	27,680	27,680	26,170	24,580	8,460
7	6,180	8,080	26,340	24,900	26,520	25,740	24,580	27,380	25,150	25,990	24,560	8,350
8	6,210	7,990	26,380	24,870	26,340	25,690	24,990	27,520	26,910	25,710	24,350	8,270
9	6,210	7,930	26,200	24,830	26,150	25,690	25,830	27,870	26,780	25,530	24,220	8,140
10	6,270	7,760	25,970	25,460	26,010	25,690	26,560	29,000	26,780	25,440	24,240	7,990
11	6,310	7,700	25,780	25,850	26,200	25,620	26,890	30,500	26,870	25,370	24,080	7,910
12	6,250	7,610	25,710	25,970	30,670	25,600	27,120	31,800	26,800	25,280	23,430	7,720
13	6,250	7,680	25,620	25,880	33,830	25,600	27,330	32,480	26,820	25,260	22,780	7,530
14	6,230	7,800	25,580	25,760	31,150	25,670	27,220	32,530	26,750	25,260	22,070	7,400
15	6,080	7,970	25,490	25,550	29,710	25,740	26,980	32,100	26,640	25,240	21,230	7,300
16	6,330	8,270	25,460	25,510	28,550	25,740	26,780	31,780	26,590	25,190	20,420	7,150
17	7,090	8,420	25,460	25,510	27,890	25,740	26,590	31,170	26,500	25,080	19,590	7,210
18	7,700	8,730	25,460	25,460	27,400	25,710	26,540	30,810	26,430	25,030	18,740	7,170
19	8,020	8,960	25,420	25,280	25,050	25,690	26,450	30,740	26,240	24,990	17,760	7,170
20	8,100	9,200	25,330	25,260	26,750	25,670	26,340	30,600	26,080	24,990	16,880	7,020
21	8,270	9,510	25,280	25,140	26,590	25,650	26,010	30,380	26,040	24,960	15,870	6,900
22	8,460	9,900	25,240	25,100	26,430	25,550	25,490	30,120	25,990	24,990	14,770	6,860
23	8,610	10,340	25,190	25,170	26,220	25,510	25,030	29,920	25,990	24,990	13,660	6,770
24	8,750	11,150	25,210	25,120	26,170	25,490	24,760	29,660	25,970	24,940	12,460	6,770
25	8,800	12,810	24,690	25,060	26,080	25,400	24,600	29,210	25,970	24,850	11,190	6,880
26	8,820	14,490	25,280	25,060	25,990	25,400	24,580	28,620	25,990	24,850	10,570	7,050
27	8,800	15,760	25,370	25,060	25,940	25,400	24,690	28,050	25,970	24,850	10,430	7,210
28	8,710	17,090	25,370	25,060	25,970	25,370	25,300	27,560	25,900	24,850	10,280	7,300
29	8,480	18,500	25,580	25,140	26,080	25,420	26,560	27,310	25,810	24,850	10,190	7,320
30	8,290	19,920	25,440	25,190	-------	25,330	27,360	27,220	25,810	24,830	10,090	7,490
31	8,100	-------	25,300	25,510	-------	25,260	-------	27,400	-------	24,780	10,040	-------

CLE ELUM RIVER NEAR ROSLYN, WASH.

LOCATION.—In sec. 10, T. 20 N., R. 14 E., below temporary crib dam at outlet of Cle Elum Lake, 4 miles northwest of Roslyn, Kittitas County, and 7½ miles northwest of Cle Elum.

DRAINAGE AREA.—202 square miles (measured on topographic maps).

RECORDS AVAILABLE.—October 10, 1903, to September 30, 1924.

GAGE.—Stevens water-stage recorder on left bank 800 feet below temporary crib dam; installed October 14, 1913; inspected by C. M. Keyes and W. W. Wasson.

DISCHARGE MEASUREMENTS.—Made from cable about 350 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of coarse gravel and boulders; shifting at high water. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 8.75 feet at 5 a. m. February 13 (discharge, 6,780 second-feet); minimum stage, 0.67 foot at 3 p. m. November 22 (discharge, 45 second-feet).

1904–1924: Maximum stage recorded, 14.05 feet at 2 p. m. November 15, 1906 (discharge, 18,700 second-feet); minimum stage recorded, zero at 6 p. m. September 28, 1914 (practically no flow).

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

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Cle Elum Lake reservoir. Monthly discharge without storage determined from records of stage at reservoir.

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

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Cle Elum River near Roslyn, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 10	Crawford and Mead	1.71	253	July 23	T. C. Mead	2.16	396
May 5	R. O. Crawford	4.70	1,990	Aug. 12	do	2.62	581
28	do	4.26	1,660	Sept. 19	Crawford and Mead	1.40	164
July 7	T. C. Mead	2.96	752				

Daily discharge, in second-feet, of Cle Elum River near Roslyn, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	153	267	70	338	877	686	374	1,760	1,760	820	305	326
2	151	262	75	326	1,260	661	378	2,050	2,010	877	302	302
3	155	253	78	320	1,220	636	385	2,270	2,180	997	302	282
4	153	262	84	308	1,120	603	437	2,220	2,180	997	302	267
5	147	259	125	299	1,060	570	511	1,960	2,010	936	299	245
6	133	265	388	290	997	565	584	1,720	1,760	848	288	242
7	133	256	712	282	936	556	607	1,530	1,500	765	329	235
8	133	253	820	279	820	538	570	1,570	1,320	661	280	232
9	143	251	712	302	765	524	712	1,920	1,260	579	265	224
10	164	248	636	477	686	520	997	2,610	1,260	524	273	219
11	172	242	570	612	765	503	1,190	3,740	1,260	516	410	209
12	168	192	556	636	3,660	486	1,320	4,880	1,260	486	612	197
13	157	108	511	588	6,280	490	1,390	5,440	1,260	477	607	195
14	164	114	481	534	3,980	520	1,390	5,440	1,220	473	588	193
15	168	73	465	486	2,660	529	1,260	5,020	1,160	457	612	190
16	188	48	457	457	2,010	529	1,090	4,750	1,120	437	612	174
17	219	48	449	465	1,610	524	997	4,230	1,090	422	612	170
18	256	48	437	457	1,320	511	1,030	3,980	1,060	399	636	170
19	273	49	426	399	1,120	520	997	3,860	936	392	612	172
20	282	48	407	361	997	529	877	3,620	877	399	612	172
21	290	49	388	345	936	520	907	3,500	820	392	612	170
22	296	47	371	338	820	494	1,090	3,270	848	382	612	168
23	302	49	368	345	765	477	997	3,060	848	374	612	170
24	308	48	374	338	738	453	877	2,960	820	371	612	155
25	308	50	422	332	686	433	848	2,760	820	364	607	145
26	308	53	407	326	661	418	820	2,270	848	361	556	112
27	302	62	407	323	636	422	848	1,840	820	348	507	112
28	296	63	486	326	661	414	887	1,610	765	338	465	114
29	305	64	511	361	686	414	1,060	1,460	765	335	429	118
30	290	69	445	368	-------	407	1,530	1,460	765	335	382	127
31	276	-------	399	465	-------	392	-------	1,530	-------	329	348	-------

Monthly discharge of Cle Elum River near Roslyn, Wash., for the year ending September 30, 1924

[Drainage area, 202 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Run-off			
						Inches	Acre-feet		
	Maximum	Minimum	Mean	Mean	Per square mile		Observed	Stored	Without storage
October	308	133	219	247	1.22	1.41	13,500	+1,750	15,200
November	267	47	137	334	1.65	1.84	8,130	+11,800	19,900
December	820	70	421	509	2.52	2.90	25,900	+5,380	31,300
January	636	279	390	394	1.95	2.25	24,000	+210	24,200
February	6,280	636	1,400	1,420	7.03	7.58	80,800	+570	81,400
March	686	392	511	498	2.47	2.85	31,400	−820	30,600
April	1,530	374	899	934	4.62	5.16	53,500	+2,100	55,600
May	5,440	1,460	2,910	2,910	14.4	16.60	179,000	+40	179,000
June	2,180	765	1,220	1,190	5.89	6.57	72,600	−1,590	71,000
July	997	329	529	512	2.53	2.92	32,500	−1,030	31,500
August	636	265	471	233	1.15	1.33	29,000	−14,700	14,300
September	326	112	194	150	.743	.83	11,500	−2,550	8,950
The year	6,280	47	774	775	3.84	52.24	562,000	+1,160	563,000

NACHES RIVER BELOW TIETON RIVER NEAR NACHES, WASH.

LOCATION.—In sec. 35, T. 15 N., R. 16 E., 600 feet below Tieton River, 500 feet above intake of Wapatox Canal, and 5 miles northwest of Naches, Yakima County.

DRAINAGE AREA.—942 square miles (revised; measured on topographic maps and Pl. 1, Water-Supply Paper 369).

RECORDS AVAILABLE.—August 4 to October 28, 1905; March 16, 1909, to October 31, 1912; May 10 to September 30, 1915; April 13, 1916, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on left bank; installed December 7, 1916; inspected by C. O. Gatewood and R. D. Powell.

DISCHARGE MEASUREMENTS.—Made from cable at gage.

CHANNEL AND CONTROL.—Bed of stream composed of small boulders and gravel; shifts at extremely high water. One channel except at extremely high stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 7.35 feet at 9 p. m. February 12 (discharge, 7,840 second-feet); minimum stage, 1.10 feet, from 7 a. m. September 23 until noon September 24 (discharge, 57 second-feet).

1905; 1909–1924: Maximum stage recorded, 8.9 feet at 8 a. m. November 24, 1909 (discharge, 18,800 second-feet); minimum stage recorded September 23–24, 1924.

ICE.—Stage-discharge relation seriously affected by ice during severe winters. Flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Selah Valley and Tieton canals. Diversion through canals added to mean monthly flow to determine the flow past the gage.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake and at Clear Creek reservoir. See record for Bumping Lake and table of monthly discharge for Bumping River near Nile, Wash., and of Tieton River at headworks of Tieton Canal near Naches, Wash.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Possibly slightly affected during periods of low stage by backwater from Taintor gates at intake of Wapatox Canal. Rating curve well defined. Water-stage recorder inspected daily. Daily discharge ascertained by applying mean daily gage height to rating table. Records excellent.

COOPERATION.—Maintained by United States Bureau of Reclamation in cooperation with Pacific Power & Light Co. United States Bureau of Reclamation furnished records for publication.

Discharge measurements of Naches River below Tieton River, near Naches, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 16	Mead and Crawford	2.01	357	July 8	R. O. Crawford	2.21	460
Apr. 18	R. O. Crawford	3.70	1,660	23	do	2.24	448
25	do	3.76	1,690	Sept. 12	F. A. Jenne	1.58	183
May 24	do	5.52	4,010	22	do	1.20	78.1

Daily discharge, in second-feet, of Naches River below Tieton River, near Naches, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	355	485	621	532	3,280	1,800	1,020	1,970	2,080	640	433	312
2	355	490	627	729	2,840	1,750	895	2,260	2,260	694	428	299
3	375	490	621	1,020	2,380	1,650	822	2,440	2,320	778	433	294
4	380	461	687	1,060	2,200	1,650	895	2,200	2,260	674	417	286
5	370	450	687	1,020	2,260	1,600	985	1,970	2,080	595	401	269
6	375	433	1,260	1,060	2,200	1,650	1,100	1,800	1,920	563	417	294
7	380	417	1,650	1,020	2,080	1,650	1,340	1,800	1,650	433	401	273
8	444	401	1,380	1,140	1,920	1,600	1,650	2,020	1,460	417	395	303
9	461	385	1,260	1,220	1,800	1,550	1,800	2,700	1,340	532	395	273
10	461	370	1,140	1,140	1,650	1,500	1,860	3,280	1,180	569	401	222
11	450	365	1,020	1,060	1,810	1,500	1,970	4,490	1,180	595	401	197
12	444	355	985	970	5,760	1,460	2,020	6,130	1,340	532	406	165
13	444	345	955	919	6,800	1,500	2,200	6,800	1,750	557	412	171
14	502	340	925	895	5,280	1,550	1,970	6,570	1,460	551	412	177
15	444	345	918	836	4,120	1,500	1,860	6,130	1,420	563	417	211
16	764	345	910	793	3,520	1,500	1,750	6,130	1,300	526	433	222
17	985	340	851	764	3,130	1,460	1,650	6,130	1,140	502	390	237
18	822	331	836	814	2,840	1,420	1,550	5,700	1,060	514	375	273
19	608	331	800	640	2,570	1,420	1,460	5,280	948	514	380	294
20	569	331	743	634	2,080	1,460	1,420	4,980	918	569	385	207
21	576	331	771	757	1,970	1,380	1,650	4,680	925	514	365	174
22	576	331	757	757	1,860	1,340	1,860	4,490	948	479	360	78
23	569	385	764	729	1,860	1,300	1,860	4,120	873	473	345	57
24	563	910	814	660	1,860	1,300	1,650	3,860	822	450	345	72
25	532	910	814	627	1,800	1,260	1,550	3,600	807	444	335	85
26	520	771	757	627	1,800	1,220	1,550	2,910	822	461	335	82
27	508	687	771	621	1,750	1,220	1,650	2,260	764	485	294	187
28	502	701	822	608	1,920	1,140	1,860	2,140	708	473	269	162
29	490	778	866	634	1,860	1,060	1,860	1,970	681	473	277	150
30	467	701	851	778	-------	1,060	1,920	1,650	634	433	281	225
31	450	-------	793	1,610	-------	1,020	-------	1,800	-------	417	317	-------

Combined monthly discharge of Naches River below Tieton River, Tieton Canal, and Selah Valley Canal, near Naches, Wash., for the year ending September 30, 1924

Month	Discharge of river (second-feet)			Run-off (acre-feet)				Combined discharge (second-feet)
					Diversions			
	Maximum	Minimum	Mean	River (observed	Selah Valley canal	Tieton canal	Combined	
October	985	355	508	31,200	855	1,470	33,500	545
November	910	331	477	28,400	----	832	29,200	491
December	1,650	621	892	54,800	----	458	55,300	899
January	1,610	532	860	52,900	----	----	52,900	860
February	6,800	1,650	2,660	153,000	----	----	153,000	2,660
March	1,800	1,020	1,430	88,200	1,640	454	90,300	1,470
April	2,200	822	1,590	94,400	5,620	7,740	108,000	1,820
May	6,800	1,650	3,690	227,000	7,780	19,500	254,000	4,130
June	2,320	634	1,300	77,400	7,550	19,200	104,000	1,750
July	778	417	530	32,600	7,350	19,800	59,800	973
August	433	269	376	23,100	7,870	19,600	50,600	823
September	312	57	208	12,400	6,000	9,750	28,200	474
The year	6,800	57	1,210	875,000	44,700	98,800	1,020,000	1,400

NOTE.—Because of regulation on headwaters of Tieton River for which records are not available, estimated monthly natural discharge for this station has not been computed, as in the past.

BUMPING LAKE NEAR NILE, WASH.

LOCATION—At storage dam in outlet, 12 miles above American River and 19 miles west of Nile, Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 27 to November 22, 1909; November 3, 1910, to September 30, 1924.

GAGE.—Stages below elevation 3,399 feet obtained by measuring from reference point to surface of water since January 6, 1923. November 4, 1922, to January 5, 1923, inclined staff 100 feet above gate tower used below elevation 3,399 feet; previous gage a vertical staff on gate tower installed November 3, 1910, used for all stages until November 3, 1922, and for stages above elevation 3,399 feet since November 3, 1922. Datum mean sea level. Gages read by J. H. Nelson.

EXTREMES OF STORAGE.—Maximum stage recorded during year, 3,430.22 feet at 6.30 a. m. June 12 (storage, 39,380 acre-feet); minimum stage recorded, 3,393.33 feet from 5.05 p. m. September 19 to 5.45 p. m. September 23 (storage, 2,760 acre-feet).

1911–1924: Maximum stage recorded, 3,430.40 feet from 7.30 a. m. July 11 to 5.30 p. m. July 12, 1921 (storage, 39,630 acre-feet); minimum stage recorded, 3,391.00 feet February 12–15, 1916 (storage, 1,260 acre-feet).

STORAGE.—Capacity of reservoir at crest of spillway, 33,700 acre-feet. Elevation of gate sill, 3,389 feet, and of spillway crest, 3,426 feet. Storage or release each month used for determining discharge without storage for gaging station below dam.

ACCURACY.—Gage read to hundredths twice daily. Records excellent.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Daily contents, in acre-feet, of Bumping Lake near Nile, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8,740	8,730	14,050	14,530	13,110	23,560	13,880	15,510	38,600	39,040	25,110	7,270
2	8,440	8,880	14,140	14,280	14,370	23,320	13,910	16,450	38,700	39,040	24,520	6,740
3	8,190	9,080	14,170	14,020	14,950	23,090	14,090	17,390	38,770	39,040	23,900	6,320
4	7,930	9,240	14,170	13,690	14,440	22,860	13,890	18,350	38,770	39,040	23,300	5,880
5	7,670	9,360	14,200	13,360	15,770	22,590	13,440	19,210	38,700	39,030	22,730	5,460
6	7,410	9,410	14,490	13,000	16,100	22,300	12,920	20,030	38,630	38,970	22,120	4,970
7	7,220	9,500	14,800	12,580	16,450	21,980	12,490	20,690	38,580	38,890	21,520	4,490
8	7,000	9,620	14,950	12,230	16,560	21,640	12,200	21,520	38,510	38,640	20,900	4,170
9	6,760	9,710	14,990	11,870	16,580	21,330	12,050	22,620	38,560	38,190	20,310	3,790
10	6,530	9,840	14,920	11,590	16,600	20,920	12,290	24,000	39,010	37,680	19,680	3,440
11	6,350	9,950	14,820	11,640	16,880	20,560	12,620	25,860	39,200	37,170	19,060	3,200
12	6,140	10,010	14,820	11,680	18,160	20,220	12,970	28,160	39,320	36,600	18,440	3,070
13	6,000	10,080	14,820	11,730	21,550	19,900	13,430	30,730	39,200	36,050	17,840	2,980
14	6,020	10,200	14,820	11,730	23,180	19,570	13,850	33,320	39,180	35,460	17,270	2,890
15	6,120	10,360	14,820	11,730	24,160	19,250	14,240	35,750	39,160	34,820	16,650	2,830
16	6,180	10,520	14,790	11,730	24,680	18,950	14,610	37,780	39,150	34,260	16,010	2,800
17	6,570	10,590	14,770	11,710	25,050	18,640	14,990	38,360	39,150	33,710	15,440	2,780
18	6,890	10,670	14,810	11,680	25,260	18,330	15,460	38,360	39,160	33,160	14,930	2,780
19	7,070	10,750	14,820	11,640	25,350	18,010	15,880	38,360	39,180	32,600	14,370	2,760
20	7,250	10,880	14,820	11,630	25,340	17,660	15,940	38,360	39,180	32,020	13,820	2,760
21	7,430	11,000	14,820	11,600	25,270	17,310	15,740	38,360	39,180	31,480	13,230	2,760
22	7,630	11,140	14,820	11,570	25,140	16,960	15,400	38,340	39,180	30,920	12,680	2,760
23	7,770	11,410	14,820	11,520	24,980	16,590	15,030	38,260	39,180	30,300	12,140	2,760
24	7,890	11,940	14,900	11,470	24,800	16,220	14,680	38,200	39,180	29,730	11,600	2,780
25	7,960	12,490	14,900	11,430	24,610	15,910	14,320	38,150	39,160	29,120	11,030	2,790
26	8,040	12,820	14,850	11,430	24,370	15,570	14,010	38,010	39,140	28,510	10,420	2,800
27	8,140	13,180	14,820	11,430	24,190	15,240	13,760	37,900	39,110	27,960	9,910	2,790
28	8,260	13,440	14,820	11,430	24,000	14,950	13,640	37,770	39,070	27,400	9,430	2,780
29	8,370	13,720	14,820	11,470	23,760	14,670	14,120	37,750	39,040	26,830	8,970	2,780
30	8,490	13,960	14,790	11,680	-------	14,430	14,710	38,140	39,040	26,240	8,440	2,800
31	8,590	-------	14,750	12,340	-------	14,150	-------	38,450	-------	25,710	7,860	-------

BUMPING RIVER NEAR NILE, WASH.

LOCATION.—A quarter of a mile below spillway of Bumping Lake Dam, half a mile below outlet conduit through storage dam, 11½ miles above American River, and 19 miles west of Nile, Yakima County.

DRAINAGE AREA.—68 square miles (measured on topographic maps).

RECORDS AVAILABLE.—June 13 to July 31, 1906; April 27, 1909, to September 30, 1924.

GAGE.—Stevens water-stage recorder installed June 17, 1913; inspected daily by J. H. Nelson.

DISCHARGE MEASUREMENTS.—Made from cable about 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and of large angular rocks; shifts at extremely high water. Riffle control 60 feet below gage. Gage height of zero flow about 0.4 foot.

EXTREMES OF DISCHARGE.—Maximum stage during year, 4.33 feet at 3.20 a. m. May 18 (discharge, 1,190 second-feet); minimum stage, 0.98 foot from 8 a. m. November 12 to 9 a. m. November 13 (discharge, 4.8 second-feet).

1906; 1909–1924: Maximum stage recorded, 9.33 feet at 5 p. m. December 29, 1917 (discharge, 5,180 second-feet); practically no flow when gates in outlet conduit are closed.

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

DIVERSIONS.—None.

REGULATION.—Flow partly controlled by storage and release of water at Bumping Lake Reservoir. Monthly discharge without storage determined from records of stage at reservoir

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve fairly well defined. Water-stage recorder inspected daily. Daily discharge ascertained by applying mean daily gage height to rating table or, for a few days when range in stage was considerable, by averaging results obtained by applying mean gage height for shorter intervals. Records good except for extreme low water.

COOPERATION.—Complete records furnished by United States Bureau of Reclamation.

Discharge measurements of Bumping River near Nile, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 5	Mead and Crawford	1.06	5.3	Sept. 11	F. A. Jenne	2.18	99.5
May 21	T. C. Mead	4.12	997	Sept. 30	do	1.84	48.9
Aug. 13	F. A. Jenne	3.06	373				

Daily discharge, in second-feet, of Bumping River near Nile, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	206	13	52	212	268	379	222	19	513	170	396	345
2	200	13	58	250	272	374	28	21	585	155	392	332
3	198	13	82	301	282	374	82	23	620	153	392	328
4	195	12	85	301	282	370	282	24	602	146	392	320
5	192	7	87	297	290	370	340	25	534	142	392	305
6	189	6	190	305	290	365	379	24	477	116	401	258
7	183	6	286	305	320	365	312	23	405	165	392	237
8	178	6	316	301	328	365	275	23	365	305	392	228
9	176	6	312	261	328	361	140	24	184	345	392	189
10	163	5	248	172	328	357	15	26	170	387	396	151
11	160	5	160	124	336	353	16	31	286	396	387	118
12	160	5	160	124	392	353	16	41	512	392	392	97
13	99	5	160	122	401	353	18	50	462	396	387	83
14	7	5	160	122	414	349	18	56	405	401	396	74
15	29	5	160	122	414	349	16	64	387	405	396	68
16	61	5	142	120	410	349	16	646	320	387	379	61
17	47	5	118	120	410	345	16	1,130	278	392	370	57
18	14	5	118	120	405	345	16	1,130	272	387	370	55
19	14	5	118	120	396	340	16	1,060	268	392	374	52
20	14	5	116	120	396	336	172	1,060	258	387	374	51
21	13	5	116	120	396	332	336	1,020	254	387	365	50
22	13	5	116	120	392	332	396	1,020	247	387	370	49
23	13	18	116	120	392	328	405	934	231	392	365	50
24	13	24	116	105	392	320	401	890	218	392	361	56
25	13	23	116	77	392	316	396	786	247	392	357	61
26	13	23	116	77	383	312	401	644	215	392	340	60
27	13	23	116	77	383	312	401	545	200	396	324	58
28	12	20	116	77	383	309	237	487	181	396	316	57
29	12	19	116	77	379	301	18	342	168	392	316	56
30	12	33	116	80	-------	297	18	231	170	392	345	57
31	12	-------	160	144	-------	293	-------	405	-------	392	361	-------

Monthly discharge of Bumping River near Nile, Wash., for the year ending September 30, 1924

[Drainage area, 68 square miles]

Month	Observed discharge (second-feet)			Discharge without storage (second-feet)		Run-off			
						Inches	Acre-feet		
	Maximum	Minimum	Mean	Mean	Per square mile		Observed	Stored	Without storage
October	206	7	84.6	78.1	1.15	1.33	5,200	−400	4,800
November	33	5	11.0	101	1.49	1.66	654	+5,370	6,020
December	316	52	143	156	2.29	2.64	8,820	+790	9,610
January	305	77	161	122	1.79	2.06	9,900	−2,410	7,490
February	414	268	360	558	8.21	8.86	20,700	+11,400	32,100
March	379	293	342	185	2.72	3.14	21,000	−9,610	11,400
April	405	15	180	190	2.79	3.11	10,700	+560	11,300
May	1,130	19	413	799	11.8	13.60	25,400	+23,700	49,100
June	620	168	334	345	5.07	5.66	19,900	+590	20,500
July	405	116	333	117	1.72	1.98	20,500	−13,300	7,200
August	401	316	374	84.6	1.24	1.43	23,000	−17,800	5,200
September	345	50	132	47.1	.693	.77	7,860	−5,060	2,800
The year	1,130	5	239	231	3.40	46.24	174,000	−6,170	168,000

TIETON RIVER AT HEADWORKS OF TIETON CANAL, NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below intake of Tieton Canal, 15 miles above mouth, and 16 miles southwest of Naches, Yakima County.

DRAINAGE AREA.—240 square miles (measured on topographic maps).

RECORDS AVAILABLE.—April 17 to September 17, 1906 (fragmentary gage-height record); July 5, 1907, to September 30, 1924.

GAGE.—Stevens continuous water-stage recorder on right bank about 1,000 feet below intake of Tieton Canal; inspected by Willis Taylor.

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

CHANNEL AND CONTROL.—Bed composed of gravel and boulders; shifts slightly at high water; gradient steep. One channel at all stages.

EXTREMES OF DISCHARGE.—Maximum stage during year, 5.22 feet at 6 p. m. February 12 (discharge, 2,000 second-feet); minimum stage, 1.29 feet at 5.20 p. m. August 2 (no flow).

1907–1924: Maximum stage recorded, 8.15 feet at 1.20 a. m. December 13, 1921 (discharge, 6,150 second-feet); minimum stage, on August 2, 1924.

ICE.—Stage-discharge relation affected by ice during severe winters.

DIVERSIONS.—Tieton Canal has diverted water above gage since 1910. Diversions through canal added to mean monthly flow to determine natural monthly discharge.

REGULATION.—Flow slightly regulated by storage and release of water at Clear Creek Reservoir about 15 miles above gage. Purpose of regulation to obviate diurnal fluctuations during irrigation seasons, and during September, 1924, to facilitate work in connection with construction of Rimrock Dam.

ACCURACY.—Stage-discharge relation practically permanent; not affected by ice. Rating curve well defined. Operation of water-stage recorder satisfactory except as noted in footnote to table of daily discharge. Daily discharge ascertained by applying mean daily gage height to rating table. Records good.

COOPERATION.—Complete record furnished by United States Bureau of Reclamation.

Discharge measurements of Tieton River at headworks of Tieton Canal, near Naches, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Nov. 15	Crawford and Mead	2.78	187	July 23	R. O. Crawford	1.80	14.6
Mar. 6	R. O. Crawford	3.48	486	Aug. 25	F. A. Jenne	1.80	15.2
May 12	do	4.67	1,400	26	do	1.49	1.91
July 14	do	2.35	70.4				

Daily discharge, in second-feet, of Tieton River at headworks of Tieton Canal, near Naches, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	139	267	204	214	1,170	493	300	172	550	214	18	2
2	150	275	225	244	918	488	309	229	604	284	13	4
3	156	263	221	300	809	482	296	259	604	244	16	12
4	165	255	280	322	761	455	284	221	562	201	7	19
5	165	248	284	334	809	455	263	190	493	165	19	43
6	168	232	466	504	753	482	267	296	444	123	16	79
7	178	221	493	809	717	482	326	361	366	83	17	72
8	214	204	399	710	668	477	380	510	334	60	12	114
9	236	194	380	394	610	466	384	801	317	58	25	76
10	244	184	357	556	562	461	394	817	343	74	30	72
11	236	181	348	366	623	450	394	1,080	255	48	24	70
12	236	175	334	267	1,620	450	399	1,460	343	48	36	78
13	248	175	322	271	1,670	455	424	1,670	533	59	40	100
14	248	181	313	334	1,460	461	380	1,670	444	59	32	131
15	255	181	304	292	1,310	450	429	1,670	429	49	30	162
16	366	181	300	280	1,170	444	499	1,670	371	13	22	181
17	439	175	304	280	1,080	439	471	1,460	284	28	7	190
18	384	175	309	259	1,040	429	471	1,410	236	22	21	267
19	304	178	300	248	859	424	444	1,310	162	30	19	236
20	271	184	284	218	544	429	434	1,260	184	48	11	102
21	288	187	280	214	450	419	439	1,170	232	22	9	58
22	304	187	280	221	419	394	461	1,220	232	12	4	13
23	284	221	267	225	499	394	371	1,120	184	10	16	9
24	292	424	360	232	522	389	280	1,000	165	8	19	10
25	275	334	300	225	527	380	229	970	197	25	26	12
26	263	300	296	221	510	371	218	662	204	53	12	23
27	263	275	296	221	510	366	225	409	165	70	9	162
28	251	267	322	221	539	334	259	493	134	46	9	44
29	248	275	334	232	504	309	280	444	128	22	4	131
30	251	240	309	300	-------	309	178	439	156	10	7	181
31	251	-------	259	769	-------	304	-------	450	-------	22	2	-------

NOTE.—Water-stage recorder not operating Jan. 1–18; discharge determined from two staff gage readings daily.

Combined monthly discharge of Tieton River and canal at headworks of Tieton Canal, near Naches, Wash., for the year ending September 30, 1924

Month	Discharge (second-feet)					Combined run-off (acre-feet)
	Maximum (combined)	Minimum (combined)	Mean			
			River	Canal	Combined	
October	439	218	251	24	275	16,900
November	481	175	228	14	242	14,400
December	493	259	312	7	319	19,600
January	809	214	332	------	332	20,400
February	1,670	419	815	------	815	46,900
March	493	359	424	7	431	26,500
April	632	355	350	130	480	28,600
May	1,990	482	868	317	1,180	72,600
June	926	450	322	322	644	38,300
July	606	331	71.3	322	393	24,200
August	364	303	17.2	319	336	20,700
September	443	9	88.4	164	252	15,000
The year	1,990	9	338	------	474	344,000

NOTE.—Low flow recorded in September caused by storage above Rimrock dam on account of which records are not available for computing discharge in second-feet per square mile and run-off in inches as in the past.

TIETON CANAL NEAR NACHES, WASH.

LOCATION.—In sec. 30, T. 14 N., R. 15 E. (unsurveyed), below canal intake and 16 miles southwest of Naches, Yakima County.

RECORDS AVAILABLE.—Irrigation seasons 1910 to September 30, 1924.

GAGE.—Float gage installed in a stilling well about 500 feet below canal intake; read by W. H. Taylor.

DISCHARGE MEASUREMENTS.—Made from a gaging bridge 30 feet below gage or by wading.

CHANNEL AND CONTROL.—Earth section merging into concrete-lined section 1,000 feet below gage.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 5.44 feet August 16–19 (discharge, 328 second-feet). No flow October 9 to November 23, December 4 to March 27, April 16–22, and September 19–30.

1910–1924: Maximum stage recorded, 5.53 feet for few hours September 9, 1921 (discharge, 344 second-feet); no flow when head gates are closed.

ACCURACY.—Stage-discharge relation changed during winter. Rating curves fairly well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table.

COOPERATION.—Complete record furnished by United States Bureau of Reclamation.

Canal diverts water from right bank of Tieton River in sec. 30, T. 14 N., R. 15 E; water is used for irrigation.

Discharge measurements of Tieton Canal near Naches, Wash., during the year ending September 30, 1924

[Made by R. B. Van Horn]

Date	Gage height	Discharge	Date	Gage height	Discharge	Date	Gage height	Discharge
	Feet	*Sec.-ft.*		*Feet*	*Sec.-ft.*		*Feet*	*Sec.-ft.*
Oct. 1	2.66	124	May 28	5.32	323	Aug. 1	5.36	309
Apr. 9	2.62	123	June 20	5.37	321	29	5.04	290
May 3	5.18	311	July 11	5.35	320	Sept. 15	4.44	246

Daily discharge, in second-feet, of Tieton Canal near Naches, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	122		77		55	310	322	322	322	308
2	123		77		55	309	322	322	323	300
3	114		77		78	310	322	323	323	299
4	106				78	312	322	322	323	301
5	106				104	314	322	323	323	299
6	106				104	317	322	322	323	303
7	40				114	317	322	322	323	302
8	22				124	316	322	322	323	302
9					136	317	322	322	323	295
10					172	317	322	323	323	282
11					190	317	322	322	323	266
12					199	317	322	323	323	256
13					208	317	322	322	324	253
14					224	316	322	323	325	254
15					60	317	323	322	326	252
16						317	322	323	328	253
17						317	322	322	328	253
18						317	322	322	328	139
19						317	322	322	328	
20						317	322	323	323	
21						317	322	322	314	
22						317	323	322	306	
23					98	317	322	322	307	
24		57			207	317	322	323	310	
25		57			242	317	322	322	311	
26		57			266	321	322	322	313	
27		57			280	320	322	322	311	
28		57		64	292	320	322	322	311	
29		57		55	298	323	322	312	304	
30		77		55	304	322	322	323	301	
31				55		322		323	301	

NOTE.—Canal dry during periods for which discharge is not shown.

Monthly discharge of Tieton Canal near Naches, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October 1–8	123	22	92.4	1,470
November 24–30	77	57	59.9	832
December 1–3	77	77	77.0	458
March 28–31	64	55	57.2	454
April	304	0	130	7,740
May	323	309	317	19,500
June	323	322	322	19,200
July	323	312	322	19,800
August	328	301	319	19,600
September 1–18	308	139	273	9,750

NOTE.—See footnote to daily-discharge table.

NORTH FORK OF AHTANUM CREEK NEAR TAMPICO, WASH.

LOCATION.—In NW¼ sec. 2, T. 12 N., R. 15 E., at Prior ranch, 100 feet below Nasty Creek and 3½ miles northwest of Tampico, Yakima County.

DRAINAGE AREA.—69 square miles (measured on topographic maps).

RECORDS AVAILABLE.—August 26, 1907, to September 30, 1924, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank, about 300 feet southeast of ranch house; installed April 6, 1919; inspected by R. S. Skillin and F. E. Moxley.

DISCHARGE MEASUREMENTS.—Made from gaging bridge 40 feet below gage or by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and boulders. Banks high; not subject to overflow. Concrete control 50 feet below gage installed in November, 1915. Gage height of zero flow at time of construction of control, 1.45 feet..

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 3.42 feet at 11 p. m. May 13 (discharge, 321 second-feet). Discharge was probably greater during period station was not in operation. Minimum stage recorded, 1.69 feet from 8 to 10 p. m. September 22 (discharge, 11 second-feet); actual minimum probably occurred in the winter while station was not in operation.

1907–1924: Maximum stage recorded, 4.60 feet at 9 a. m. June 18, 1916 (discharge, 728 second-feet); minimum stage recorded, 1.55 feet from 5 to 9 p. m. November 8, 1920 (discharge, 6.8 second-feet).

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

DIVERSIONS.—Station is above all diversions.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed during period records were discontinued. Rating curves fairly well defined. Operation of water-stage recorder satisfactory except as stated in footnote to daily discharge table. Daily discharge ascertained by applying to rating table mean daily gage height determined from recorder graph by inspection. Records good.

Discharge measurements of North Fork of Ahtanum Creek near Tampico, Wash. during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 17	D. J. F. Calkins	1.98	32.5	June 24	F. E. Moxley	2.05	37.8
17	do	1.97	30.6	July 5	R. S. Skilling	1.93	28.9
Apr. 21	Skillin and Moxley	2.34	76.6	15	do	1.88	25.2
24	R. B. Kilgore	2.37	81.5	21	do	1.85	23.2
May 29	F. E. Moxley	2.48	94.5	28	do	1.81	21.3
June 3	R. S. Skillin	2.43	89.6	Aug. 11	do	1.76	16.2
9	F. E. Moxley	2.24	61.9	26	do	1.74	15.8
17	R. S. Skillin	2.17	52.4	Sept. 18	F. E. Moxley	1.72	12.6

Daily discharge, in second-feet, of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending September 30, 1924

Day	Oct.	Apr.	May	June	July	Aug.	Sept.
1	16		121	92	30	18	13
2	16		136	90	29	18	13
3	17		142	87	28	18	13
4	20		132	81	28	18	12
5	18		121	77	28	18	12
6	19		115	76	28	17	13
7	18		117	71	27	17	13
8	18		132	66	26	17	16
9	17		151	63	25	16	15
10	17		177	63	25	16	14
11	17		220	59	25	16	14
12	17		254	74	25	16	14
13	17		283	64	24	15	14
14			286	60	24	15	13
15			274	56	24	16	13
16			260	52	25	18	13
17			230	51	24	17	13
18			220	50	23	18	13
19			209	48	22	18	13
20			198	45	22	17	14
21		78	187	43	21	17	13
22		89	175	42	21	16	12
23		86	164	40	20	16	13
24		81	153	39	20	15	16
25		78	142	38	20	15	16
26		80	131	37	19	14	15
27		87	119	35	19	14	14
28		98	108	33	19	13	14
29		107	97	32	19	13	14
30		115	94	32	18	13	14
31			92		18	13	

NOTE.—Water-stage recorder not operating May 19–28; discharge interpolated. No record Oct. 14 to Apr. 20.

Monthly discharge of North Fork of Ahtanum Creek near Tampico, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October 1–13	20	16	17.5	451
April 21–30	115	78	89.9	1,780
May	286	92	169	10,400
June	92	32	56.5	3,360
July	30	18	23.4	1,440
August	18	13	16.1	990
September	16	12	13.6	809

NOTE.—No record Oct. 14 to Apr. 20.

SOUTH FORK OF AHTANUM CREEK AT CONRAD RANCH, NEAR TAMPICO, WASH.

LOCATION.—In W. ½ sec. 23, T. 12 N., R. 15 E., at Conrad ranch, 2½ miles above mouth of North Fork and 2¾ miles southwest of Tampico, Yakima County.

DRAINAGE AREA.—26 square miles (measured on topographic maps, and Pl. I, Water-Supply Paper 369).

RECORDS AVAILABLE.—March 15, 1915, to September 30, 1924, when station was discontinued.

GAGE.—Vertical staff on left bank about 75 feet from ranch house; read by Mrs. P. C. Dickson. Gage datum raised 1.00 foot on August 9, 1918.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Bed composed of gravel and sand. Banks high and wooded. Concrete control 7 feet downstream from gage. Gage height of zero flow, April 24, 1924, 0.17 foot.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.13 feet at 7.30 p. m. May 13 (discharge, 61 second-feet); minimum stage recorded, 0.40 foot at 5 p. m. September 17 and 6 p. m. September 18 (discharge, 3.7 second-feet). Maximum and minimum stages for the year probably occurred during winter when observations were discontinued.

1915–1924: Maximum stage recorded, 3.1 feet June 19, 1916 (discharge, 216 second-feet); minimum stage recorded on September 17 and 18, 1924.

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

DIVERSIONS.—Small ditch diverting above gage supplies water to Conrad's hop fields.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually April 21–23. Rating curve well defined. Gage read to hundredths twice daily. Daily discharge ascertained by applying mean daily gage height to rating table. Shifting-control method used April 21–23. Records good.

Discharge measurements of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 18	D. J. F. Calkins	0.56	8.88	July 5	R. S. Skillin	0.55	9.08
18	do	.56	8.88	15	do	.51	7.08
Apr. 21	Moxley and Skillin	.75	18.0	21	do	.50	6.88
24	R. B. Kilgore	.77	21.4	28	do	.48	6.16
May 29	F. E. Moxley	.80	24.0	Aug. 4	do	.46	5.56
June 3	R. S. Skillin	.74	19.2	11	do	.44	4.99
9	F. E. Moxley	.68	15.8	26	do	.45	4.87
17	R. S. Skillin	.65	13.9	Sept. 18	F. E. Moxley	.42	4.30
24	F. E. Moxley	.60	9.98				

Daily discharge, in second-feet, of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending September 30, 1924

Day	Apr.	May	June	July	Aug.	Sept.	Day	Apr.	May	June	July	Aug.	Sept.
1	------	33	21	9.0	5.1	4.8	16	------	57	14	6.6	5.4	4.2
2	------	37	20	9.0	4.8	4.5	17	------	52	14	6.6	5.4	3.9
3	------	40	19	9.0	5.1	4.8	18	------	52	13	6.6	5.4	3.9
4	------	37	18	9.0	5.4	4.8	19	------	47	13	6.6	5.4	4.2
5	------	37	16	9.0	4.8	4.5	20	------	44	13	6.6	5.4	4.2
6	------	33	16	8.2	5.1	4.8	21	19	40	12	6.6	5.4	4.2
7	------	37	16	7.8	5.4	4.2	22	21	38	11	7.0	5.4	4.5
8	------	37	16	8.2	4.8	4.5	23	22	34	11	6.6	5.4	4.8
9	------	42	16	7.4	4.8	4.2	24	21	33	11	6.3	5.4	4.8
10	------	48	15	7.4	5.1	4.2	25	21	31	11	6.3	4.8	4.8
11	------	49	15	7.4	4.8	4.5	26	22	29	10	6.0	4.8	4.8
12	------	56	15	6.6	4.8	4.2	27	24	28	11	5.7	4.8	4.8
13	------	60	15	6.6	5.1	4.2	28	26	26	11	6.0	4.8	4.8
14	------	58	14	7.0	4.8	4.2	29	28	25	11	5.4	4.8	4.8
15	------	58	14	7.0	5.1	4.2	30	31	24	10	5.4	4.2	4.5
							31	------	24	------	5.1	4.8	------

NOTE.—No record Oct. 1 to Apr. 20.

Monthly discharge of South Fork of Ahtanum Creek at Conrad ranch, near Tampico, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
April 21-30	31	19	23.5	466
May	60	24	40.2	2,470
June	21	10	14.1	839
July	9.0	5.1	7.03	432
August	5.4	4.2	5.05	311
September	4.8	3.9	4.46	265
The period				4,780

NOTE.—No record Oct. 1 to Apr. 20.

TOPPENISH CREEK NEAR FORT SIMCOE, WASH.

LOCATION.—In sec. 35, T. 10 N., R. 16 E., 30 feet above dam and headworks of Toppenish feeder canal, 3 miles south of Fort Simcoe, Yakima County, and 5½ miles southeast of White Swan.

DRAINAGE AREA.—124 square miles (measured on Pl. I, Water-Supply Paper 369).

RECORDS AVAILABLE.—February 27, 1909, to September 30, 1924, when station was discontinued.

GAGE.—Inclined staff on left bank just above headworks of Toppenish feeder canal; installed by United States Office of Indian Affairs in 1922; used since October 1, 1922; read by A. B. Morrison.

DISCHARGE MEASUREMENTS.—Made by wading.

CHANNEL AND CONTROL.—Control is concrete dam and headworks to Toppenish feeder canal. Channel is straight for some distance above and below gage. Banks moderately high; not subject to overflow. Zero of gage approximately at elevation of crest of dam.

EXTREMES OF DISCHARGE.—Maximum stage recorded during year, 1.45 feet February 13 (discharge, 340 second-feet); minimum stage recorded, 0.04 foot on September 18 (discharge, 2.4 second-feet). Discharge may have been lower on some day September 15–17 or 19–24 when gage was not read.

1909–1924: Maximum discharge recorded, 1,650 second-feet at noon May 4, 1916; minimum discharge occurred in September, 1924.

ICE.—Stage-discharge relation affected by ice during severe winters.

DIVERSIONS.—Toppenish feeder canal was in operation throughout the year. Mean daily diversion ranged from 1.5 to 22 second-feet. In addition to new acreage, this canal fulfills irrigation requirements formerly taken care of by Nicol and Abe Lincoln ditches which have been abandoned. Diversion through canal added to flow at creek gaging station to determine natural monthly flow past gage. Diversions of spring run-off into reservoir on Simcoe Creek for use in irrigating Indian lands is proposed.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed at high water February 13; not affected by ice. Rating curves fairly well defined. Gage read to hundredths once daily. Daily discharge ascertained by applying daily gage height to rating table. Records good.

Discharge measurements of Toppenish Creek near Fort Simcoe, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 19	Calkins and Skillin	0.20	16.0	Apr. 22	R. B. Kilgore	0.58	78.3
19	do	.20	16.1	Aug. 7	R. S. Skillin	.10	5.8
Apr. 22	R. B. Kilgore	.59	84.3				

Daily discharge, in second-feet, of Toppenish Creek near Fort Simcoe, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	8.5	13	16	33	300	101	54	69	8.0	6.0	5.5	5.5
2	8.5	14	15	36	320	94	54	67	4.8	6.0	5.5	5.5
3	8.5	14	15	34	228	90	54	63	5.5	4.8	5.5	5.5
4	9.5	14	15	33	234	88	52	61	6.0	4.8	6.0	5.5
5	9.5	14	15	30	234	86	44	56	4.8	4.8	6.0	4.8
6	10	14	280	30	217	86	45	49	8.0	5.5	5.5	4.8
7	10	14	115	30	195	84	54	45	9.5	5.5	6.0	5.5
8	10	14	72	30	186	80	67	44	10	5.5	5.5	6.0
9	10	14	57	30	165	80	74	44	5.5	5.5	5.5	7.0
10	10	14	48	33	147	76	86	44	5.5	5.5	4.8	7.0
11	10	14	45	36	136	76	99	42	4.8	5.5	4.8	8.0
12	10	14	42	34	228	74	105	40	13	5.5	4.8	7.0
13	10	14	39	33	340	74	116	34	14	5.5	4.8	6.2
14	10	14	38	33	300	74	105	30	9.5	5.5	4.8	5.5
15	12	14	38	33	245	74	101	24	16	5.5	4.8	
16	19	14	38	32	209	71	86	24	12	6.0	7.0	4.9
17	33	14	36	30	176	69	84	24	12	6.0	8.0	
18	23	13	36	30	158	67	78	18	12	7.0	9.5	2.4
19	17	13	36	29	144	65	74	17	10	6.0	8.0	
20	16	13	33	29	130	65	76	16	10	5.5	7.0	
21	14	13	33	27	125	63	78	16	9.5	5.5	6.0	5
22	14	13	33	27	116	61	80	15	9.5	5.5	6.0	
23	13	14	32	29	109	61	76	14	8.0	5.5	6.0	
24	13	33	33	27	101	59	74	12	8.0	5.5	5.5	
25	13	27	36	27	97	59	69	12	8.0	5.5	5.5	7.0
26	13	23	34	27	99	58	65	10	9.5	5.5	5.5	7.8
27	13	20	33	27	94	56	63	10	9.5	5.5	5.5	8.7
28	13	19	33	29	101	56	65	9.5	9.5	5.5	5.5	9.5
29	13	17	39	33	103	56	67	8.0	8.0	6.0	5.5	10
30	13	17	33	52	-------	54	69	7.0	6.0	5.5	5.5	10
31	13	-------	29	228	-------	54	-------	8.0	-------	5.5	5.5	-------

NOTE.—Gage not read Sept. 13, 15-17, 19-24, 26, and 27; discharge interpolated or estimated from general information. Braced figures show mean discharge for periods indicated.

Monthly discharge of Toppenish Creek and Toppenish feeder canal near Fort Simcoe, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet					Run-off in acre-feet (combined)
	Maximum (combined)	Minimum (combined)	Mean			
			Creek	Canal	Combined	
October	42	18	12.9	9.35	22.2	1,360
November	42	22	15.7	9.27	25.0	1,490
December	282	24	45.1	3.85	49.0	3,010
January	231	30	37.8	3.01	40.8	2,510
February	343	97	181	3.13	184	10,600
March	104	57	71.3	3.10	74.4	4,570
April	130	55	73.8	14.2	88.0	5,240
May	88	28	30.1	20.6	50.7	3,120
June	31	14	8.88	13.4	22.3	1,330
July	14	10	5.58	6.29	11.9	732
August	14	9.1	5.85	4.56	10.4	640
September	16		6.04	5.30	11.3	672
The year	343		40.5	8.01	48.6	35,300

NOTE.—Canal discharge determined from complete gage-height record and fairly well defined rating curve.

SATUS CREEK BELOW DRY CREEK, NEAR TOPPENISH, WASH.

LOCATION.—In sec. 24, T. 9 N., R. 19 E., at dam site 1 mile below mouth of Dry Creek and 9 miles southwest of Toppenish, Yakima County.

DRAINAGE AREA.—427 square miles (measured on topographic maps and map of Yakima Indian Reservation).

RECORDS AVAILABLE.—June 22, 1913, to September 30, 1924, when station was discontinued.

GAGE.—Stevens continuous water-stage recorder on left bank; inspected by R. S. Skillin and F. E. Moxley.

DISCHARGE MEASUREMENTS.—Made from cable or by wading.

CHANNEL AND CONTROL.—Bed composed of small boulders and gravel; shifting.

EXTREMES OF DISCHARGE.—Maximum stage during year from high-water mark in well, 5.7 feet, probably occurred some time February 1–13 while water-stage recorder was not operating (discharge from extension of rating curve, 1,430 second-feet). Minimum stage, 1.19 feet from 10 p. m. September 4 to 10 a. m. September 5 (discharge, 1.9 second-feet).

1913–1924: Maximum stage, 9.15 feet December 22, 1915, from high-water mark in well (discharge from extension of rating curve, 3,870 second-feet); minimum stage, September 4–5, 1924.

ICE.—Stage-discharge relation affected by ice; flow estimated from gage-height record, discharge measurements, observer's notes, and weather records.

DIVERSIONS.—Entire flow of Satus Creek above Lazy Creek is diverted for irrigation during July and August; records for low water summer months show run-off of Lazy and Dry creeks and seepage return from upper Satus Creek.

REGULATION.—None.

ACCURACY.—Stage-discharge relation changed gradually October 1–20; during high water some time December 1–13 and February 1–13 and gradually again September 16–30. Rating curves used December 14 to September 15 well defined over range of use; curve used as standard form for other portions of year, well defined below 750 second-feet. Operation of water-stage recorder unsatisfactory through several long periods as indicated in footnote to table of daily discharge. Daily discharge ascertained by applying to rating table the mean daily gage height determined from recorder graph by inspection. Shifting-control method used October 1–20 and September 16–30. Records good except for periods represented by flat estimates of discharge, for which they are poor.

Discharge measurements of Satus Creek below Dry Creek, near Toppenish, Wash., during the year ending September 30, 1924

Date	Made by—	Gage height	Discharge	Date	Made by—	Gage height	Discharge
		Feet	*Sec.-ft.*			*Feet*	*Sec.-ft.*
Oct. 20	D. J. F. Calkins	1.67	22.7	Apr. 23	R. B. Kilgore	1.85	63.6
20	do	1.67	22.2	June 12	R. S. Skillin	1.53	19.6
Dec. 14	R. S. Skillin	1.93	69.8	July 21	F. E. Moxley	1.39	8.53
Mar. 4	do	2.22	129	Aug. 12	R. S. Skillin	1.34	6.43

Daily discharge, in second-feet, of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending September 30, 1924

Day	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
1	16			72		144	64	65	24			2.8
2	16			72		140	62	67	23			2.3
3	15			72		136	65	68	22			2.3
4	17			72		127	67	67	21			2.3
5	16			72		125	67	64	20			2.0
6	17			72		121	65	62	19		7.0	2.3
7	17		70	72	550	119	67	62	22			2.5
8	17			72		116	68	64	23			3.3
9	16			72		114	68	62	23			4.3
10	16			72		106	68	62	21	11		5.0
11	16			72		102	68	62	20			5.5
12	17			72		96	70	62	19		6.5	6.0
13	16			73		93	72	62			6.5	7.0
14	16		67	73		87	73	62			6.5	7.5
15	16	30	68	73	285	82	70	57			7.5	8.0
16	17		70	75	263	78	68	50			8.5	8.5
17	22		72	75	258	75	67	47			10.0	8.0
18	25		73	75	239	72	65	44			10.0	9.0
19	22		75	77	215	67	64	41			11.0	10
20	22		77	77	197	67	64	40			11.0	11
21	20		82	77	184	68	64	39	16	8.5	10.0	11
22			82	77	169	65	64	35		7.0	8.5	11
23			84	75	160	64	62	32		7.0	8.0	10
24			85	75	151	60	60	30		6.5	7.0	9.0
25			78	75	146	59	60	30		6.0	6.5	10
26	18		77	75	146	59	59	30		5.5	5.5	9.0
27			77	73	144	60	60	30		5.0	5.0	8.0
28			77	73	155	59	62	30		4.6	4.3	7.0
29			73	73	160	60	65	30			3.8	5.5
30			73	72	-------	62	67	27		5.0	3.6	4.3
31		-------	73	200	-------	62	-------	26	-------		3.3	-------

NOTE.—Owing partly to vandalism water-stage recorder not operating satisfactorily Oct. 22 to Dec. 13, Feb. 1–14, June 13 to July 20, and July 29 to Aug. 11; discharge estimated by comparison with combined flow of Toppenish Creek and Toppenish feeder canal. Braced figures show estimated mean discharge for periods indicated.

Monthly discharge of Satus Creek below Dry Creek, near Toppenish, Wash., for the year ending September 30, 1924

Month	Discharge in second-feet			Run-off in acre-feet
	Maximum	Minimum	Mean	
October	----------	15	17.8	1,090
November	----------	----------	30.0	1,790
December	----------	----------	73.3	4,510
January	----------	72	77.6	4,770
February	----------	144	365	21,000
March	144	59	88.5	5,440
April	73	59	65.5	3,900
May	68	26	48.7	2,990
June	24	----------	18.2	1,080
July	----------	----------	9.20	566
August	11	3.3	7.10	437
September	11	2.0	6.48	386
The year	----------	2.0	66.0	48,000

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 drainage basins in Washington during the year ending September 30, 1924

Chehalis River basin

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Sept. 13	Chehalis River [a]	Grays Harbor [a]	Rock gorge 1 mile west of Pe Ell, Wash.	1.00	17.3
23	East Fork of Satsop River. [b]	Satsop River	SE. ¼ sec. 29, T. 19 N., R. 6 W., Willamette meridian.		89.3
23	Little Satsop River [b]	East Fork of Satsop River.	Near center of south line of sec. 30, T. 19 N., R. 6 W. Willamette meridian.		170
24	Turnow Branch of Satsop River. [b]	do	SE. ¼ sec. 36, T. 19 N., R. 7 W. Willamette meridian.		1,020
Aug. 14	Wynoochee River	Chehalis River	Below Oxbow, at head of canyon, near Montesano, Wash.	1.02	85.2
Sept. 25	do. [b]	do	Highway crossing in sec. 5, T. 18 N., R. 8 W. Willamette meridian.		1,830

Quillayute River basin

Sept. 18	Soleduck River [b]	Quillayute River	1.3 miles above North Fork, near Fairholm, Wash.		47.0
Oct. 5	do	do	Former gaging station, near Fairholm, Wash.	.19	80.0
Feb. 2	do	do	do	3.66	1,790
July 19	do	do	do	.53	114
Sept. 14	do	do	do	.08	48.2
18	North Fork of Soleduck River. [b]	Soleduck River	Highway bridge at mouth, near Fairholm, Wash.		20.9

Morse Creek basin

Sept. 16	Morse Creek [b]	Juan de Fuca Strait	Olympic Highway crossing near Port Angeles, Wash.		19.4

Quilcene River basin

Sept. 15	Quilcene River [b]	Hood Canal	¼ mile above highway bridge, near Quilcene, Wash.		38.3
16	do	do	Highway bridge near Quilcene, Wash.		32.4

Duckabush River basin

Sept. 14	Duckabush River [b]	Hood Canal	Sec. 17, T. 25 N., R. 2 W. Willamette meridian.		51.3
17	do	do	0.6 mile above Olympic Highway bridge, at Duckabush, Wash.		48.2

[a] Furnished by J. D. Ross, superintendent of light, city of Seattle.
[b] Furnished by Department of Conservation and Development, State of Washington.

Miscellaneous discharge measurements in drainage basins in Washington during the year ending September 30, 1924—Continued

Hamma Hamma River basin

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Sept. 14	Hamma Hamma River.[b]	Hood Canal	⅛ mile below Olympic Highway bridge, near Eldon, Wash.		32.2
17	do	do	1,000 feet above Olympic Highway bridge, near Eldon, Wash.		28.0

Skokomish River basin

Sept. 13	South Fork of Skokomish River.[b]	Skokomish River	Sec. 12, T. 21 N., R. 5 W. Willamette meridian.		37.7

Puyallup River basin

Sept. 17	Coal Creek [c]	Stuck River	SE. ¼ SW. ¼ sec. 28, T. 21 N., R. 5 E. Willamette meridian.		19.0

Duwamish River basin

Sept. 17	Taft Park Creek [c]	Newaukum Creek	300 feet above confluence with Newaukum Creek, 2 miles northwest of Enumclaw, Wash.		3.2

Lake Washington basin

Aug. 13	Rock Creek [c]	Cedar River	Sec. 26, T. 22 N., R. 6 E. Willamette meridian; 1½ miles northwest of Ravensdale, Wash.		11.6

Snohomish River basin

Sept. 22	North Fork of Skykomish River.	Skykomish River	Former gaging station at Index, Wash.	3.76	169
July 28	Everett water-supply conduit.	Right side of Sultan River in sec. 32, T. 28 N., R. 8 E.	Upper end of first tunnel above gate tender's house, near Sultan, Wash.		17.8
29	do	do	Gage at lower end of first tunnel above gate tender's house.	2.47	18.3
29	do	do	do	1.19	15.6
30	do	do	do	2.32	18.0
30	do	do	do	2.18	17.8
31	do	do	do	1.68	16.4

Skagit River basin

Nov. 4	Skagit River	Skagit Bay	Former gaging station at Reflector Bar, near Marblemount, Wash.	1.98	935
Sept. 16	do	do	Three-fourths mile below The Dalles, about 2 miles below Concrete, Wash.	2.52	5,740
Oct. 26	do	do	Former gaging station near Sedro Woolley, Wash.	3.91	5,310

[a] Furnished by J. D. Ross, superintendent of light, city of Seattle.
[b] Furnished by Department of Conservation and Development, State of Washington.
[c] Furnished by W. J. Roberts; result, mean of two measurements.

Miscellaneous discharge measurements in drainage basins in Washington during the year ending September 30, 1924—Continued

Kootenai River basin

Date	Stream	Tributary to or diverting from—	Locality	Gage height	Discharge
				Feet	*Sec.-ft.*
Oct. 5	Moyie River	Kootenai River	Former gaging station at Snyder, Idaho.	2.96	* 90.7
6	do	do	do	2.96	87.0

Clark Fork basin

Oct. 8	Priest River	Clark Fork	Former gaging station at Priest River, Idaho.	2.76	360
9	do	do	do	2.74	351

Spokane River basin

Aug. 18	Little Spokane River [d]	Spokane River	Former gaging station near mouth.		360
Sept. 12	do [d]	do	do		361

Methow River basin

June 4	Methow Valley Irrigation District Canal.	Left side of Methow River.	Opposite confluence of Methow and Twisp rivers.	5.40	51.9
Aug. 28	do	do	do	5.40	51.7
Sept. 26	do	do	do	5.43	50.2
June 4	do	Right side of Twisp River.	Twisp, Wash., 3 miles below head works.	2.06	33.9
Aug. 29	do	do	do	1.75	27.7
Sept. 26	do	do	do	1.59	22.1
June 4	Risley ditch	do	Methow Valley Creamery building, Twisp, Wash.	4.32	9.2
Aug. 29	do	do	do	4.20	7.2
Sept. 26	do	do	do	3.85	2.9

Entiat River basin

May 30	Entiat Irrigation Co.'s canal.	Entiat River	Opposite power canal intake about 3 miles above Entiat, Wash.		18.2
30	Small ditch above Entiat Irrigation Co.'s canal.	do	do		1.6

Yakima River basin

Oct. 19	Toppenish feeder canal	Toppenish Creek	Gaging station at diversion, near Fort Simcoe, Wash.	2.14	9.6
Apr. 22	do	do	do	2.63	19.0
Aug. 7	do	do	do	1.80	4.7
7	do	do	do	1.80	4.4
Oct. 19	Simcoe Creek	do	Former gaging station, near Fort Simcoe, Wash.	.16	.1
19	Simcoe Creek flume	Simcoe Creek	Former gaging station near diversion headworks, near Fort Simcoe, Wash.	.37	.7
8	Reservation drain	Yakima River	Former gaging station 2 miles above mouth at Alfalfa, Wash.	2.11	415
21	do	do	do		* 342
22	do	do	do	2.86	f 327
26	do	do	do	3.09	g 362
Dec. 8	do	do	do	2.56	265
12	do	do	do	2.24	217

[d] Furnished by Washington Water Power Co.
* Includes 14.9 second-feet being diverted through new canal, taking out at site of former gage at Alfalfa.
f Includes 17.8 second-feet being diverted through new canal.
g Drain carrying flow of Toppenish Creek.

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