Water-Supply and Irrigation Paper No. 75 Series P, Hydrographic Progress Reports, 19

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
CHARLES D. WALCOTT, DIRECTOR

REPORT

OF

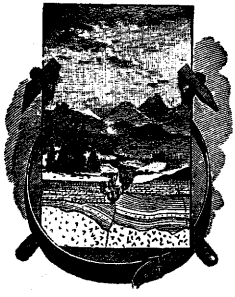
PROGRESS OF STREAM MEASUREMENTS

FOR

THE CALENDAR YEAR 1901

BY

F. H. NEWELL



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DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
DIVISION OF HYDROGRAPHY,
Washington, D. C., June 30, 1902.

SIR: I have the honor to transmit herewith a manuscript for a paper descriptive of the results of hydrographic surveys made during the calendar year 1901. This paper may be considered as being the third and last part of the Annual Report of the Division of Hydrography for 1901, Parts I and II having been printed as Water-Supply Papers Nos. 65 and 66, giving the gage heights and measurements at various river stations maintained during 1901. This form of publication has resulted from the limitations formerly imposed by law and through the operation of recent changes which have been made. At the time that Paper No. 65 was put in type it was proposed to print the manuscript herewith presented as Part IV of the Twenty-third Annual Report. By act of May, 1902, the report of the Director was limited to one volume, and the restriction of Water-Supply Papers to 100 pages was removed. As a result, the material which otherwise would have appeared as one of the volumes of the Director's report is now presented for publication in the Water-Supply and Irrigation series.

This paper presents briefly the results of computations of river flow, the data for them having been presented in Water-Supply Papers Nos. 65 and 66. This separation of the original observations of gage height and river measurement was brought about by the fact that since 1895 it has been found desirable to print as soon as possible after the conclusion of each calendar year the tables of gage heights and related facts, reserving for the annual report of the Director the conclusions resulting from computations and the diagrams of discharge, together with maps and other illustrations. This plan is carried out for 1901, with the exception of the modification noted in the first paragraph. It is proposed, however, in the future to combine and publish together the original observations and results for each locality.

Very respectfully,

F. H. NEWELL,
Hydrographer in Charge.

HON. CHARLES D. WALCOTT,
Director United States Geological Survey.

PROGRESS REPORT OF STREAM MEASUREMENTS FOR THE CALENDAR YEAR 1901.

By F. H. NEWELL.

GENERAL STATEMENT.

The determinations of the water supply of various parts of the United States have been continued during the year 1901 by the Division of Hydrography in a manner similar to that of previous years, slight modifications and improvements having been introduced in methods and operations. The work consists in measuring the streams and estimating the water supply, both above and under ground. To give full facts concerning the water supply it is necessary not merely to ascertain the quantity, but also in many cases the quality, and especially the possibilities of water storage or conservation. Water can not be considered as a resource unless it can be had when needed, and therefore the determination of the practicability of holding the floods until time of drought underlies any statement of water supply. In a similar way when considering underground waters it is not enough to know that there is water beneath the surface, but the facts must be ascertained as to the depth to the water, the rate of movement, if any, and the possibility of bringing the water to the surface at reasonable cost.

The principal operation of the hydrographic surveys, as at present conducted, is that of measuring the waters flowing upon the surface, obtaining their fluctuations in quantity, and sometimes in quality, from month to month and from year to year. The points at which the principal systematic measurements were made during the year 1901 are shown in figs. 1 and 2 by the heavy dots upon the branching lines of river systems.

HISTORICAL REVIEW.

Under the operation of various resolutions of Congress and appropriation acts, systematic hydrographic measurements have been carried on by the Geological Survey since 1888, papers Nos. 65, 66, and 75, taken together, constituting what may be termed the annual report

for the fourteenth year of the water supply and irrigation survey. The hydrographic data obtained during these years are scattered through a number of publications. In order to facilitate reference to these,

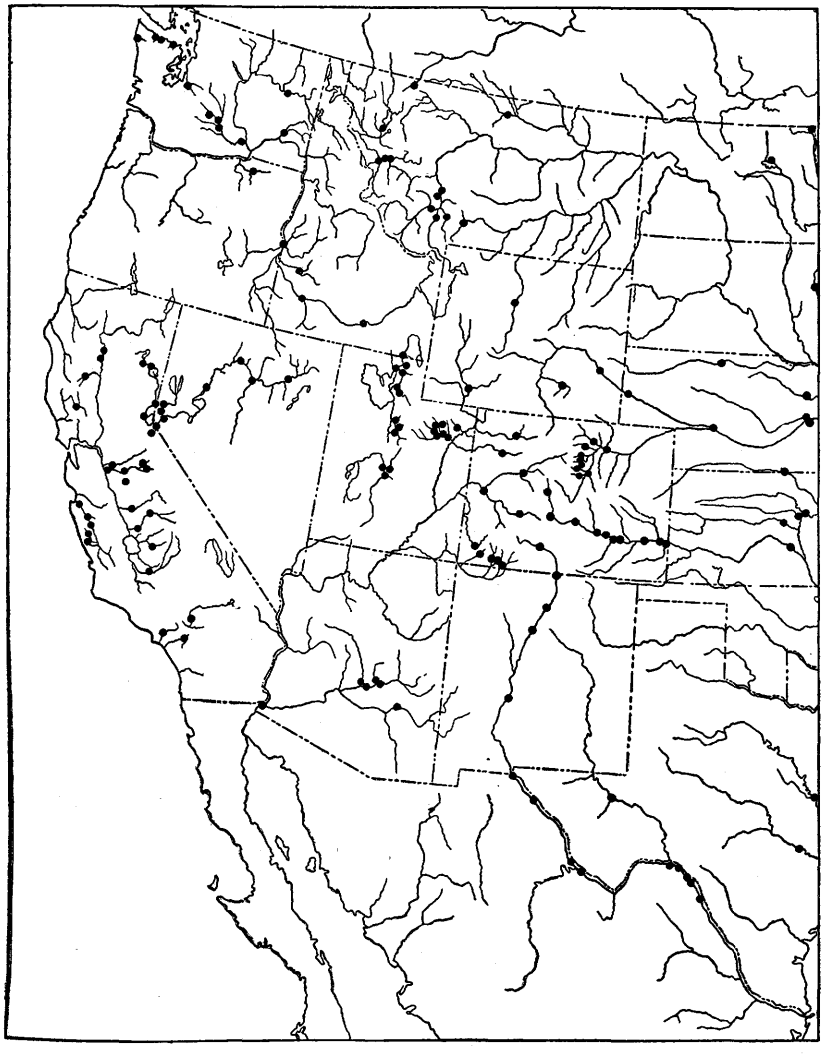


FIG. 1.—Location of river stations in western half of the United States in 1901.

the following brief review is given of the progress of the investigation, showing in chronologic order the development of the work:

1888, first year.—The Irrigation Survey was organized in accordance with the provisions of the act of October 2, 1888. The results of the first year's work are given in the Tenth Annual Report of the Geological Survey, Part II, Irrigation. This volume is devoted mainly to the details of organization and of the plans adopted and partly executed.

1889, second year.—The results of the operations outlined in the report just named are given in the Eleventh Annual Report, Part II, Irrigation. This contains a discussion of the hydrography and of the

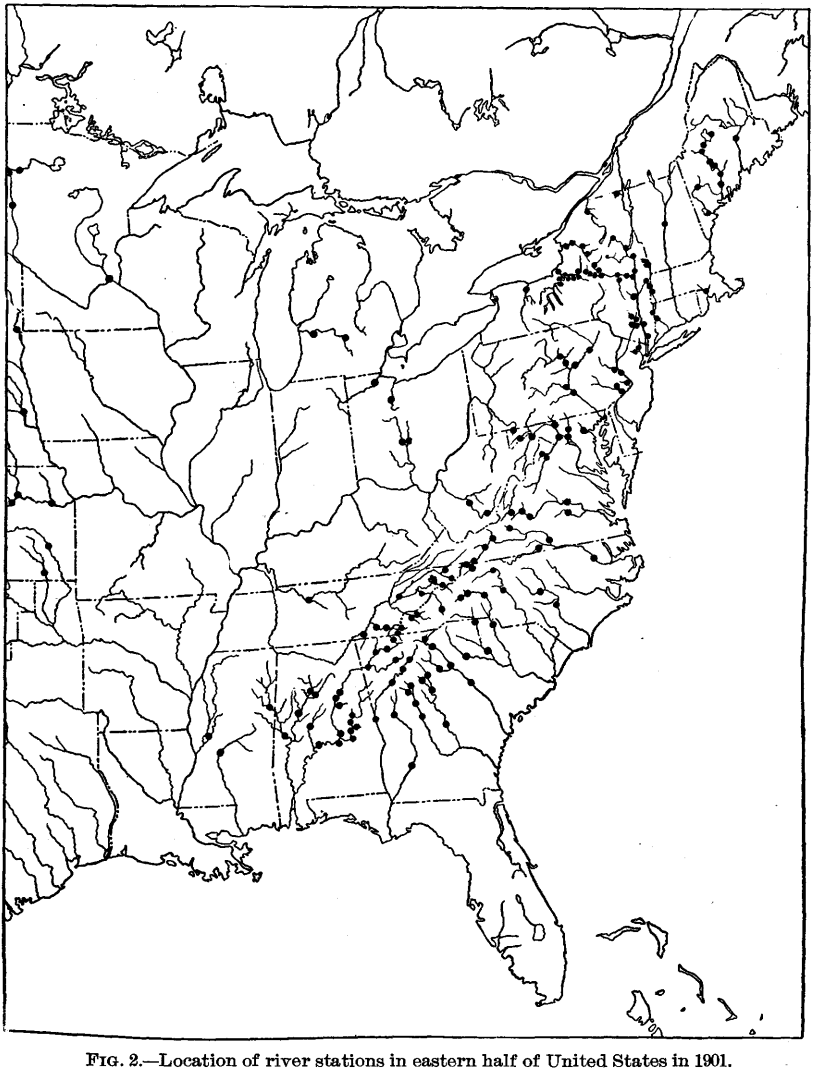


FIG. 2.—Location of river stations in eastern half of United States in 1901.

engineering surveys for canals and reservoirs, the statement of the Director of the Geological Survey to the House Committee on Irrigation, a report upon the topographic surveys relating to reclamation work, and a list of irrigation literature.

1890, third year.—The results of operations are given in the Twelfth Annual Report, Part II, Irrigation. This contains a statement of the location and survey of reservoir sites, by A. H. Thompson; a paper

on the hydrography of the arid region, by F. H. Newell, and a discussion of irrigation in India, by Herbert M. Wilson.

1891, fourth year.—The discussion of results obtained is continued in the Thirteenth Annual Report, Part III, Irrigation. This consists of a paper upon water supply for irrigation, by F. H. Newell; two papers by Herbert M. Wilson, the first upon American irrigation engineering and the second upon the engineering results of the Irrigation Survey, and a report by A. H. Thompson upon the location and survey of reservoir sites during the fiscal year.

1892, fifth year.—The Fourteenth Annual Report, Part II, contains a paper entitled "The results of stream measurements," by F. H. Newell. With this are two others bearing upon hydrography, the first, entitled "Potable waters of eastern United States," by W J McGee; the second, "Natural mineral waters of the United States," by A. C. Peale.

1893, sixth year.—The results of field work during this year are shown in Bulletin No. 131.

1894, seventh year.—The operations of this year are also shown in Bulletin No. 131. The Sixteenth Annual Report, Part II, contains a paper entitled "The public lands and their water supply," by F. H. Newell. This gives in condensed form the results of hydrographic work in preceding years. There is also in the same volume a report on the "Water resources of a portion of the great plains," by Robert Hay.

1895, eighth year.—Bulletin No. 140, entitled Report of Progress of the Division of Hydrography, gives the results of field work during the greater part of this year. The Seventeenth Annual Report contains a paper by G. K. Gilbert on the "Underground waters of the Arkansas Valley in eastern Colorado;" one by Frank Leverett on the "Water resources of Illinois," and another, by N. H. Darton, on "Artesian waters of a portion of the Dakotas."

1896, ninth year.—For this year was begun the method of double publication, the gage heights being published in Water-Supply Paper No. 11, and the results of computations, the illustrations, etc., being given in the Eighteenth Annual Report, Part IV.

1897, tenth year.—The gage heights are given in Water-Supply and Irrigation Papers Nos. 15 and 16 and the detailed descriptions in the Nineteenth Annual Report, Part IV.

1898, eleventh year.—The operations at river stations are given in Water-Supply Papers Nos. 27 and 28, while the results are shown in the Twentieth Annual Report, Part IV.

1899, twelfth year.—The operations at river stations are contained in Water-Supply Papers Nos. 35 to 39, inclusive, and the discussion of results in the Twenty-first Annual Report, Part IV.

1900, thirteenth year.—The operations at river stations are given in Water-Supply Papers Nos. 47 to 52, inclusive, while the final tables

and illustrations are shown in the Twenty-second Annual Report, Part IV.

1901, fourteenth year.—The operations at river stations are given in Water-Supply Papers Nos. 65 and 66, while the conclusions, with illustrations, are shown in Water-Supply Paper No. 75 instead of Part IV of the Twenty-third Annual Report, this latter report being confined to one volume.

The hydrographic surveys have been from necessity confined to the United States proper, but urgent appeals have been received for similar work in southern Alaska, the Hawaiian Islands, and other outlying possessions. The rivers of southern Alaska have considerable value as sources of water power and will probably be utilized in the future in connection with mining operations and the reduction of ores. The vast extent of Alaska and the public lands, some of which have great value from their mineral resources, are little realized, and it is only when the area of Alaska is compared with that of the States of the Union that comprehension can be had of the extent of land surface and area over which mineral and water resources are distributed.

ACKNOWLEDGMENTS.

Most of the measurements presented in Papers 65, 66, and in this paper have been obtained through local hydrographers, a comparatively small portion of the work having been conducted directly from the office of the Geological Survey at Washington. Acknowledgment is due to each of these persons, and thanks are extended to other persons and to corporations who have assisted the local hydrographers or have cooperated in any way, either by furnishing records of the height of water or by assisting in transportation. The following list, arranged alphabetically by States, gives the names of the resident hydrographers:

California: J. B. Lippincott, civil engineer, Los Angeles.

Colorado: A. L. Fellows, civil engineer, Denver.

Georgia and Alabama: Prof. B. M. Hall, civil engineer, Atlanta; Prof. W. S. Yeates, State geologist, Atlanta; and Prof. Eugene A. Smith, State geologist, Tuscaloosa.

Idaho: N. S. Dils, civil engineer, Caldwell.

Kansas: W. G. Russell, Russell.

Maryland: Prof. W. B. Clark, State geologist, Baltimore.

Montana: Prof. Samuel Fortier and J. S. Baker, Bozeman.

Nebraska: Prof. O. V. P. Stout, State University, Lincoln, assisted by Adna Dobson and Glenn E. Smith.

Nevada: L. H. Taylor, civil engineer, Carson City.

New Mexico: P. E. Harroun, civil engineer, Albuquerque.

North and South Carolina: Prof. J. A. Holmes, State geologist, Chapel Hill, N. C., assisted by E. W. Myers.

Texas: Prof. Thomas U. Taylor, State University.

Utah: Prof. George L. Swendsen, Logan.

Virginia and West Virginia: Prof. D. C. Humphreys, Washington and Lee University, Lexington, Va.

Washington: Sydney Arnold, civil engineer, North Yakima.

Wyoming: A. J. Parshall, civil engineer, Cheyenne.

In Colorado the State engineering department (Mr. A. J. McCune in charge) has cooperated, and valuable assistance has been rendered by the Denver and Rio Grande, the Union Pacific, the Colorado and Southern, the Rio Grande Southern, the Atchison, Topeka and Santa Fe, and the Burlington and Missouri River railroads. Special thanks are also due to the officers and employees of The Great Plains Water Company, one of whose engineers, Mr. C. W. Beach, has made many measurements on the Arkansas; to the Amity Land and Canal Company and its chief engineer, Mr. Thomas Berry; to the Buffalo Canal Company; to Mr. C. L. Harrison, chief engineer of the Denver Union Water Company; to Messrs. S. M. Matlock, T. J. Burrows, J. M. Wolaver, L. H. Dickson, Thomas Kneale, W. E. Obert, and other water commissioners in various parts of the State, and to many others who have furnished valuable information.

In California assistance in transportation has been rendered by Mr. William Hood, chief engineer of the Southern Pacific Company, who has also procured the assistance of bridge watchmen in observing the height of water in the rivers. Mr. Walter James, chief engineer of the Kern County Land Company, has supplied records of Kern River, and Mr. A. K. Warren, assistant engineer, has also furnished information. Mr. H. F. Parkinson, superintendent of canals taking water from San Gabriel River above Azusa, has furnished records of that stream; Mr. T. F. Keefe, secretary of the Fontana Development Company, has furnished records of Lytle Creek; and Mr. K. Sanborn, engineer of the Riverside Water Company, rendered valuable assistance in making low-water measurements. Mr. W. G. Nevin, general manager of the Southern California Railroad, has furnished transportation over the Santa Fe lines in California. The Los Angeles City Water Company has maintained gagings of Los Angeles River, which, through the courtesy of Mr. William Mulholland, city engineer, have been furnished to the Survey without charge. Mr. H. N. Savage, chief engineer, of the San Diego Land and Town Company, has contributed information concerning Sweetwater River.

In Georgia, Alabama, Florida, Tennessee, and Mississippi Prof. B. M. Hall and Mr. Max Hall, resident hydrographers, have been assisted in their work by the following persons and corporations: Prof. W. S. Yeates, State geologist of Georgia, has paid the observers at Madison, Tallulah Falls, Juliette, Almon, and Blueridge, and for a portion of the year the observers at Carters, Canton, and Woodbury. Dr. Eugene A. Smith, State geologist of Alabama, has paid the observers at Riverside, Cordova, Milstead, Susanna, Sturdivant, Dadeville, Alex-

ander, and Nottingham. The city of Augusta maintains the station at Augusta, Ga. The officials of the United States Weather Bureau have shown a great interest in the work and have rendered valuable assistance, particularly Messrs. J. B. Marbury, D. Fisher, F. P. Chaffee, L. M. Pindell, W. M. Dudley, and T. S. Collins. They have maintained stations at Calhoun Falls, S. C.; at Carlton, Dublin, Albany, West Point, and Oakdale, in Georgia; at Montgomery and Selma, in Alabama, and at Chattanooga and Knoxville, in Tennessee; and for a part of the year stations at Woodbury, Canton, Resaca, and Rome, in Georgia, and at Charleston, Tenn. Acknowledgments are also due to Messrs. R. C. McCalla, D. M. Andrews, and G. T. Nelles, United States assistant engineers, for cooperation in the work by sending records of stations at Tuscaloosa, Ala., and Lincoln, Ala., and furnishing valuable data concerning the Coosa, Cahaba, Warrior, Tennessee, and other rivers. Also to Prof. C. M. Strahan, of Georgia University; to Prof. C. S. Wilkins, of Alabama University; to Prof. W. M. Fulton, of Tennessee University; to Mr. H. S. Weems, of Carters, Ga.; and to Mr. W. M. Towers, of Rome, Ga. Transportation has been furnished through the kindness of Mr. J. S. B. Thompson, general agent of the Southern Railway; Mr. E. St. John, vice-president and general manager of the Seaboard Air Line; Mr. Thomas K. Scott, general manager of the Georgia Railroad; Mr. John M. Egan, president of the Central of Georgia Railway; Mr. James T. Wright, president and general manager of the Macon, Dublin and Savannah Railroad; Mr. John B. Newton, general manager of the Atlanta, Knoxville and Northern Railway; Mr. W. B. Denham, general superintendent of the Plant System; Mr. C. A. Wickersham, president and general manager of the Atlanta and West Point Railway and the Western Railway of Alabama; Mr. Hunter McDonald, chief engineer of the Nashville, Chattanooga and St. Louis Railway; Mr. Y. van den Berg, vice-president of the Louisville and Nashville Railroad, and Mr. J. T. Harahan, second vice-president of the Illinois Central Railroad.

Thanks are due to the Norfolk and Western Railway for an annual pass over all lines in Virginia and West Virginia, issued to Prof. D. C. Humphreys, and to the Chesapeake and Ohio Railway for a similar courtesy during the months of July, August, and September. Thanks are also due to Mr. Charles S. Churchill, of Roanoke, Va., for suggestions and assistance.

In Idaho the State engineer, Mr. D. W. Ross, has heartily cooperated. Transportation has also been furnished to Mr. N. S. Dils and others in the employ of the Survey, through the kindness of Mr. D. E. Burley, general passenger and ticket agent of the Oregon Short Line.

In connection with the work in Kansas the Survey is under obligations to the Missouri, Kansas and Texas Railway, the Union Pacific

Railway, and the Santa Fe Railroad for transportation furnished to Mr. W. G. Russell, resident hydrographer.

In Montana assistance has been rendered by the Great Northern Railroad, by the Bitterroot Stock Farm, of Hamilton; by Prof. M. J. Elrod, of Missoula University; by J. D. O'Donnell, of Billings, and by Mr. J. L. Rhead, superintendent of the Big Ditch at Laurel, Mont.

In Nebraska the resident hydrographer, Prof. O. V. P. Stout, has had the benefit of the continued cooperation of various public and private organizations. Special acknowledgments are due to the agricultural experiment station and the State board of irrigation for the service of hydrographers, to the State board of agriculture for the preparation and publication of valuable data, and to the following railway officials, without whose assistance the amount of work accomplished would have been greatly lessened: Mr. G. W. Holdredge, general manager of the Burlington lines west of Missouri River; Mr. George F. Bidwell, general manager of the Fremont, Elkhorn and Missouri Valley Railroad, and Mr. E. L. Lomax, general passenger agent of the Union Pacific Railroad; also to Prof. A. B. Crane, of the South Dakota Agricultural College, for measurements of Big Sioux River.

In Nevada officials of the Southern Pacific Railroad Company, of the Nevada-California-Oregon Railway Company, and of the Lake Tahoe Railway and Transportation Company have furnished transportation to Mr. L. H. Taylor, enabling him to greatly extend his field work.

In Wyoming transportation has been furnished to Mr. A. J. Parshall by Mr. E. Dickinson, general manager of the Union Pacific Railroad; by Mr. G. W. Holdredge, general manager of the Burlington and Missouri Railroad; by Mr. George F. Bidwell, general manager of the Fremont, Elkhorn and Missouri Valley Railroad, and by Mr. Frank Trumbull, general manager of the Colorado and Southern Railway, thus greatly increasing the amount of work accomplished.

In Washington the work has been facilitated by transportation furnished to Mr. Sydney Arnold by Mr. Thomas Cooper, general manager of the Northern Pacific Railway.

NORTHERN ATLANTIC COAST DRAINAGE.

Under this heading have been included data pertaining to the rivers entering the Atlantic Ocean from Maine to Virginia, inclusive, an arbitrary line being drawn between James River and Roanoke River, the latter stream being included in the southern Atlantic coast drainage.

In order to systematize the work of stream gaging in Maine, permanent gaging stations were established during the season of 1901 by the Geological Survey on a number of rivers in the State of Maine that are of peculiar interest on account of their water powers. Practically all of the data heretofore published on the Maine streams have been

furnished through the courtesy of local engineers and milling companies from their own records. As the data obtained at the newly established stations are as yet too incomplete to warrant computation of the discharge at these points, no results of measurements are given for 1901. As in preceding years, records of daily discharge have been kept by the Forest Paper Company at Yarmouthville, Me., on Cobbosseecontee River, at the reservoir dam, near Augusta; by the Rumford Falls Power Company, at Rumford Falls, on Androscoggin River, and by Mr. Hiram F. Mills, of Lowell, Mass., on Presumpscot River, at the outlet of Sebago Lake. The results of these measurements for 1901 are given in the following pages, where are also given results of observations made on Penobscot River at Sunk Haze Rips, near Costigan, Me., for the years 1899 and 1900. A full description of the Maine rivers and their drainage basins, together with tabulated statements of their flow, has been published in Water Supply Paper No. 69, entitled "Water Powers of the State of Maine," by H. A. Pressey.

Measurements of streams in New York State have been made as in previous years with the cooperation of the State engineer and surveyor, Edward A. Bond, and the deputy State engineer and surveyor, William Pierson Judson, under the immediate supervision of Robert E. Horton. The majority of these stations were primarily established in connection with a study for the water supply of the New York State canals and the Upper Hudson storage survey. The gage records for 1901 and tabulated results by months for the entire period of observation for each station have been published in Water-Supply Paper No. 65. During 1901 additional stations were established through cooperation of the department of water supply of New York, George W. Birdsall, chief engineer, for studying the possible sources of future municipal water supply for Greater New York. These stations are located as follows: Dover Plains, on Tenmile River; South Cairo, on Catskill Creek; Kingston, on Esopus Creek; New Paltz, on Wallkill River; Rosendale, on Rondout Creek; Glenham, on Fishkill Creek; and Gaylordsville, on Housatonic River. With the exception of the last-named station, which is in Connecticut, the stations are all within the State of New York. Descriptions of these stations, together with records of gage heights and results of measurements of the streams made in June, 1901, by H. A. Pressey and R. E. Horton, are published in Water-Supply Paper No. 65, pages 59–90.

Following is a complete list of the gaging stations maintained during the past season in the State of New York:

Raquette River at Hannawa Falls.
Black River at Watertown.
Black River at Felts Mills.
Beaver River at Tisses Bridge.
Indian River at Indian Lake Dam.
Schroon River at Warrensburg.
Moose River at Moose River.
Salmon River at Pulaski.
Oswego River at Fulton (High Dam, Minetto Station).
Seneca River at Baldwinsville.
Skaneateles Outlet at Willow Glen and Jordan.
Genesee River at Rochester.

Oneida River at Brewerton.
West Branch Fish Creek at McConnellsville.
Chittenango Creek at Bridgeport.
Chittenango Creek at Chittenango.
Oneida Creek at Kenwood.
Mohawk River at Ridge Mills.
West Canada Creek at Twin Rock Bridge.
Oriskany Creek at Woods road bridge.
Saquoit Creek at New York Mills.
Mohawk River at Utica.
West Canada Creek at Middleville.
Mohawk River at Little Falls.
East Canada Creek at Dolgeville.
Cayadutta Creek at Johnstown.
Hudson River at Fort Edward.
Schoharie Creek at Fort Hunter.
Schoharie Creek at Millpoint Aqueduct.
Schoharie Creek at Schoharie Falls.
Mohawk River at Schenectady.
Mohawk River at Rexford Flats.
Hudson River at Mechanicville.
Mohawk River at Dunsbach Ferry.
Normanskill Creek at French's Mill.
Kinderhook Creek at East Nassau and Wilson's dam.
Catskill Creek at South Cairo.
Esopus Creek at Kingston.
Rondout Creek at Rosendale.
Wallkill River at New Paltz.
Fishkill Creek at Glenham.
Rondout Creek at Honk Falls.
Croton River at old Croton dam.
Chenango River at Binghamton.
Susquehanna River at Binghamton.
Tenmile River at Dover Plains.
Richelieu River at Fort Montgomery.

NEW ENGLAND STREAMS.

Estimated monthly discharge of Penobscot River near Costigan, Me.

[Drainage area, 7,450 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1899.					
October	5,100	2,330	2,764	0.31	0.36
November	14,000	3,300	7,170	.96	1.07
December	11,500	4,800	9,014	1.21	1.40
1900.					
January	35,400	9,500	14,876	2.00	2.31
February	52,400	26,200	37,262	5.00	5.21
March	62,700	29,200	43,828	5.88	6.77
April	75,100	36,600	52,407	7.03	7.84
May	74,700	44,200	56,632	7.60	8.76
June	41,600	7,800	20,435	2.74	3.06
July	21,400	11,300	13,769	1.85	2.13
August	14,100	4,850	10,722	1.44	1.66
September 1–21			4,507	.60	.47

NOTE.—Daily discharge for 1899 and 1900 is given in Water-Supply Paper No. 65, pages 14 and 15.

EDWARD WARE'S MILL AT WINSLOW, ME., DURING SPRING FLOOD ON KENNEBEC RIVER.

Estimated monthly discharge of Cobbosseecontee River near Augusta, Me.

[Drainage area, 230 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	250	220	231	1.00	1.15
February	220	120	173	.75	.78
March	1,404	120	344	1.50	1.73
April	3,205	260	2,046	8.90	9.93
May	483	26	290	1.26	1.45
June	510	280	306	1.33	1.48
July	280	280	280	1.22	1.41
August	280	280	280	1.22	1.41
September	280	270	274	1.19	1.33
October	270	250	252	1.10	1.27
November	250	220	246	1.07	1.19
December	2,700	220	526	2.29	2.64
The year	3,205	26	437	1.90	25.77

NOTE.—Daily discharge for 1891 is given in Water-Supply Paper No. 65, page 20.

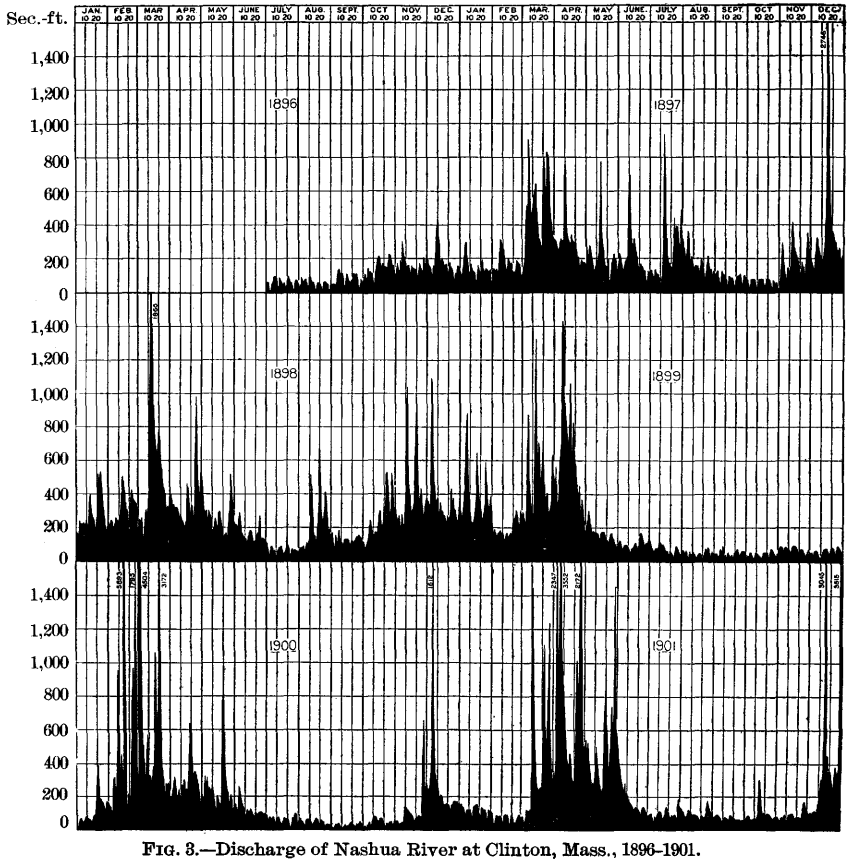


FIG. 3.—Discharge of Nashua River at Clinton, Mass., 1896-1901.

Estimated monthly discharge of Androscoggin River at Rumford Falls, Me.

[Drainage area, 2,320 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	2,082	1,692	1,895	0.82	0.95
February	2,496	1,563	1,832	.79	.82
March	4,445	1,873	2,463	1.06	1.22
April	32,653	2,887	14,891	6.42	7.16
May	16,808	6,711	10,714	4.62	5.32
June	7,424	2,787	4,420	1.91	2.13
July	3,833	1,612	2,671	1.15	1.33
August	5,035	1,925	2,788	1.20	1.38
September	1,955	1,343	1,590	.69	.77
October	5,137	1,547	2,224	.96	1.11
November	1,829	1,205	1,606	.69	.77
December	27,785	1,209	3,441	1.48	1.71
The year	32,653	1,205	4,211	1.82	24.67

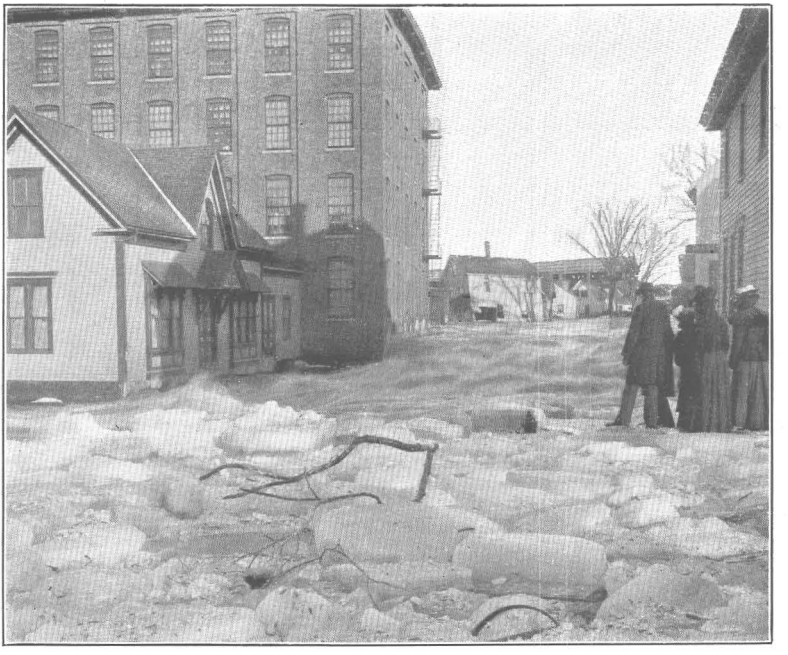
NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 21.

Estimated monthly discharge of Presumpscot River at outlet of Sebago Lake Maine.

[Drainage area, 470 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	673	367	619	1.32	1.52
February	673	517	649	1.38	1.44
March	833	333	623	1.33	1.53
April	673	0	466	.99	1.10
May	728	333	605	1.29	1.49
June	993	400	722	1.54	1.72
July	747	300	670	1.43	1.65
August	693	300	575	1.22	1.41
September	673	300	596	1.27	1.42
October	687	283	574	1.22	1.41
November	717	233	618	1.31	1.46
December	700	200	616	1.31	1.51
The year	993	0	611	1.30	17.66

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 22.



A. STREET SCENE IN MADISON, ME., DURING FRESHET ON KENNEBEC RIVER.

B. DESTRUCTION OF PROPERTY AT SKOWHEGAN, ME., BY FRESHET ON KENNEBEC RIVER.

Estimated monthly discharge of Connecticut River at Orford, N. H.

[Drainage area, 3,050 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
August 6–31			2,326	0.76	0.75
September	2,600	945	1,414	.46	.51
October	11,378	1,952	4,317	1.42	1.64
November	13,798	1,653	7,016	2.30	2.56
December	6,780	3,988	5,051	1.66	1.91
1901.					
January			[a]3,500	1.15	1.33
February			[a]3,300	1.08	1.12
March			[a]5,849	1.92	2.21
April	23,478	10,228	17,972	5.89	6.57
May	13,919	5,486	8,769	2.88	3.32
June	7,990	2,686	5,186	1.70	1.90
July	8,111	1,340	3,334	1.09	1.26
August	6,540	1,205	3,642	1.19	1.37
September	2,188	1,205	1,644	.54	.60
October	5,148	1,393	2,302	.75	.86
November	2,432	1,393	1,701	.56	.62
December			[a]6,594	2.16	2.49
The year			5,149	1.74	23.65

[a] Approximate; river frozen.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 29; rating table on page 318 of same paper.

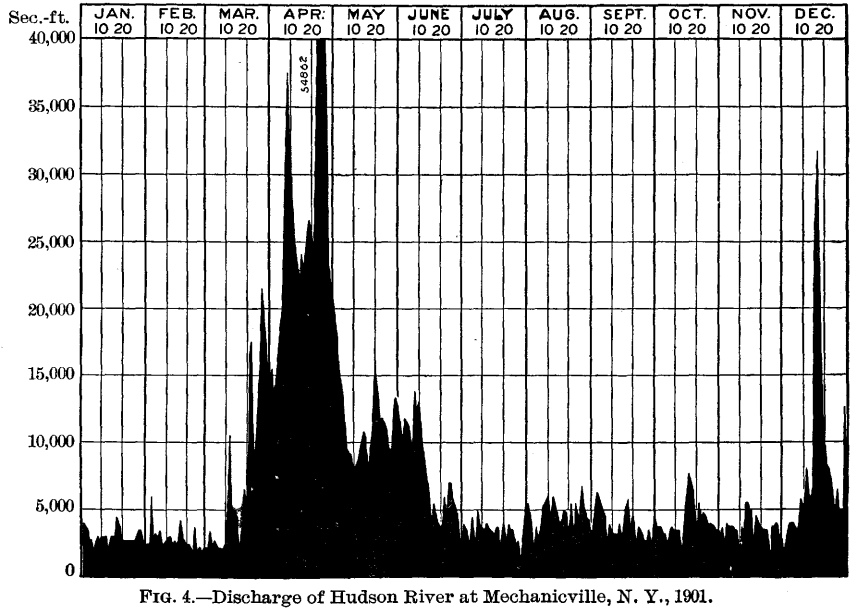


FIG. 4.—Discharge of Hudson River at Mechanicville, N. Y., 1901.

Estimated monthly discharge of Housatonic River at Gaylordsville, Conn.

[Drainage area, 1,020 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
October 23–31			358	0.35	0.12
November	550	240	909	.89	.99
December	3,890	810	1,544	1.51	1.74
1901.					
January	1,700	508	890	.87	1.00
February	682	324	489	.48	.50
March	16,845	458	4,269	4.19	4.84
April	12,285	2,600	6,280	6.16	6.87
May	6,525	2,600	4,432	4.34	5.01
June	4,845	745	2,067	2.03	2.26
July	885	508	674	.66	.76
August	6,285	458	1,458	1.43	1.65
September	1,700	745	1,088	1.07	1.19
October	6,045	745	1,639	1.61	1.86
November	2,035	562	1,108	1.09	1.22
December	12,525	745	3,872	3.80	4.39
The year	16,845	324	2,356	2.31	31.55

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 88; rating table on page 318 of same paper.

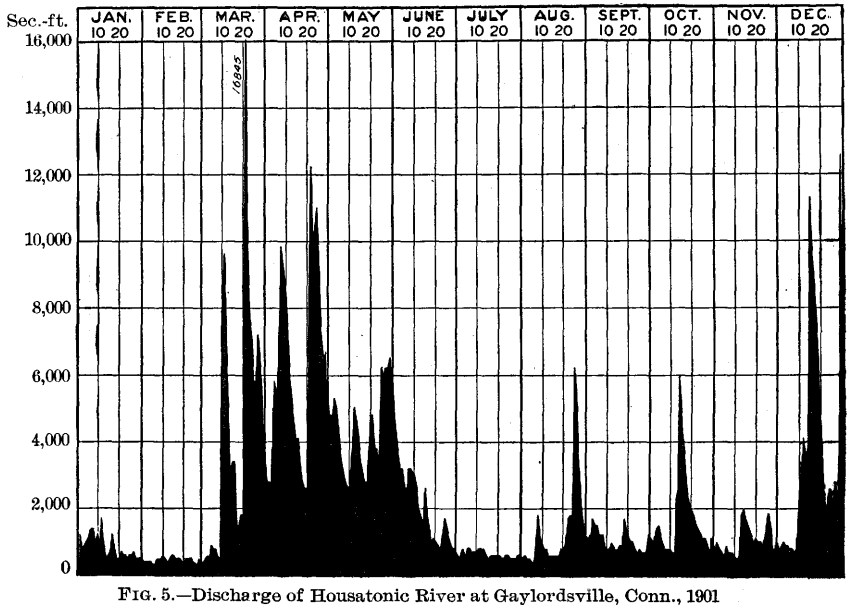
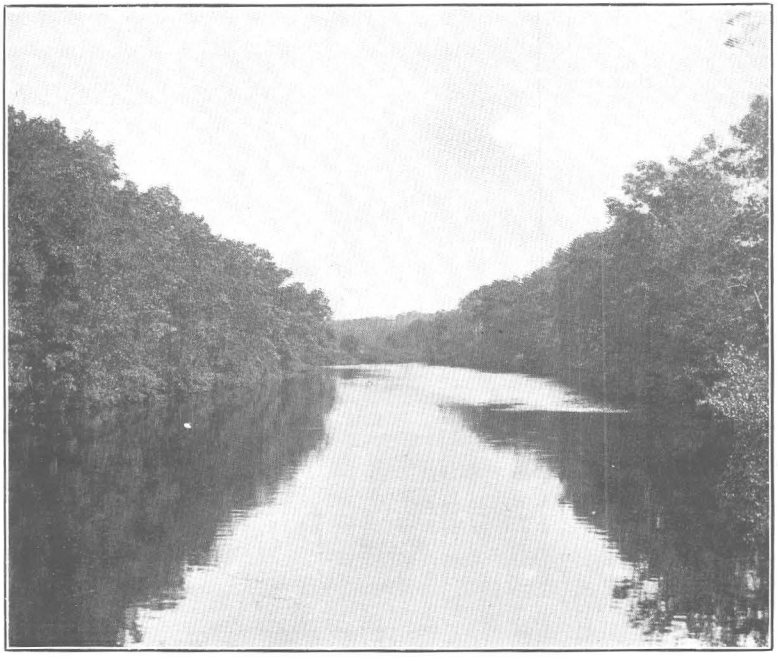
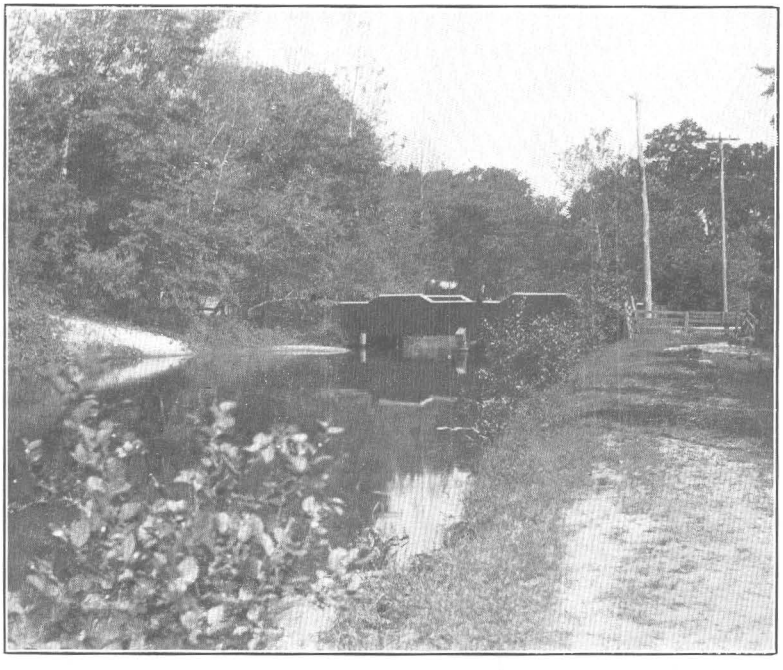


FIG. 5.—Discharge of Housatonic River at Gaylordsville, Conn., 1901



A. BLACKSTONE RIVER AT BERKELEY, R. I.



B. BLACKSTONE CANAL AT BERKELEY, R. I.

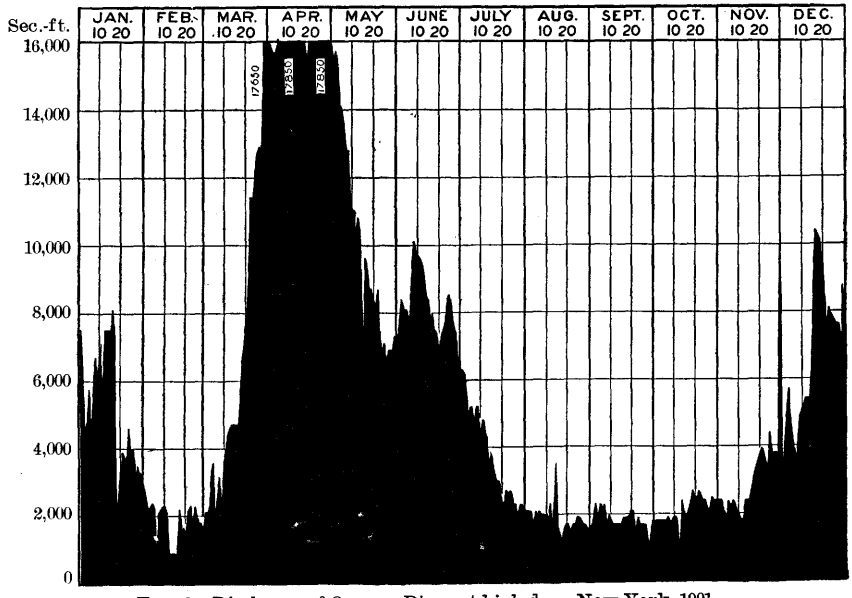


FIG. 6.—Discharge of Oswego River at high dam, New York, 1901.

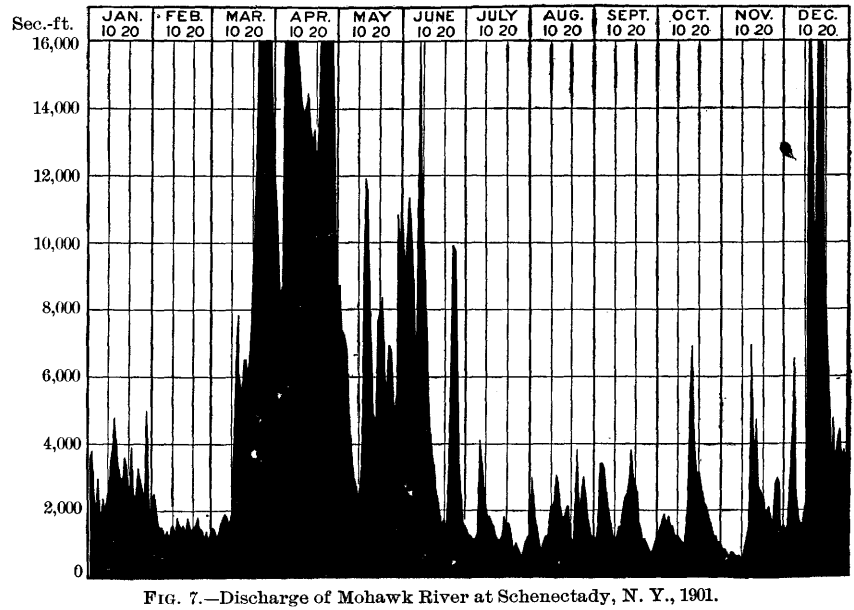


FIG. 7.—Discharge of Mohawk River at Schenectady, N. Y., 1901.

PASSAIC RIVER BASIN.

Gaging stations were established during 1901 on the Passaic River and on Pompton River, its principal tributary, at Two Bridges, N. J., by George B. Hollister, under whose direction systematic measurements are now being carried on. The two rivers drain areas of the

same extent, though different in character, the Pompton draining the high lands of northern New Jersey and part of New York State, while the Passaic flows through comparatively level lands. Following are the results of measurements for 1901:

Estimated monthly discharge of Passaic River at Two Bridges, N. J.

[Drainage area, 360 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
May [a]	2,000	623	1,105	3.07	3.54
June 1–22			779	2.16	1.76
July	1,007	137	448	1.24	1.43
August	3,858	363	1,409	3.91	4.51
September	1,650	271	632	1.76	1.96
October	959	225	472	1.31	1.51
November	719	181	321	.89	.99
December	4,445	225	1,015	2.82	3.26

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 211; rating table on page 318 of same paper.

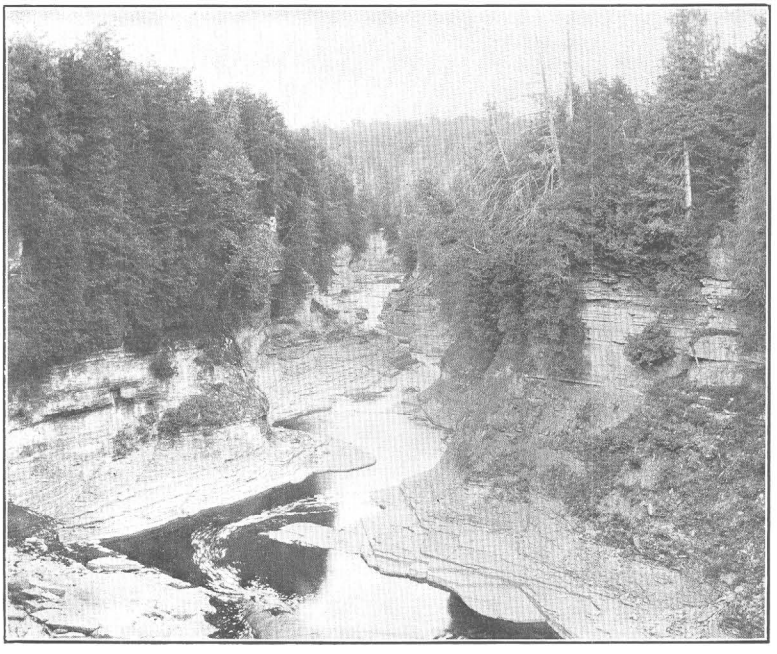
Estimated monthly discharge of Pompton River at Two Bridges, N. J

[Drainage area, 360 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
May [a]	2,751	893	1,529	4.25	4.90
June 1–22			1,015	2.82	2.30
July	1,254	195	541	1.50	1.73
August	5,342	255	1,834	5.09	5.86
September	2,240	221	848	2.35	2.62
October	1,181	221	533	1.48	1.71
November	1,001	195	322	.89	.99
December	6,328	300	1,441	4.00	4.61

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 212; rating table on page 318 of same paper.



A. TRENTON FALLS GORGE ON WEST CANADA CREEK, NEW YORK.

B. GAGING CATSKILL CREEK AT CAIRO, N. Y.

DELAWARE RIVER AND TRIBUTARIES NEAR PHILADELPHIA.

The gaging station on this river was established July 23, 1897, at Lambertville, N. J. Since its establishment continuous records have been kept of the flow of the river, which have been published in the annual reports, commencing with the Twentieth Annual Report, Part IV. The figures of discharge include in every instance the flow of the Delaware and Raritan Canal feeder. The record for 1901 is published herewith. Measurements of the flow of Perkiomen, Wissahickon, Tohickon, and Neshaminy creeks, all tributaries of Delaware River near Philadelphia, have been continued, as in former years, by Mr. John E. Codman, in charge of the hydrographic work of the bureau of water of the city of Philadelphia. The location of these creeks and the points of measurement are shown in fig. 16 of the Twentieth Annual Report, Part IV, page 89. On the following pages are given the records of these streams for 1901.

Estimated monthly discharge of Delaware River at Lambertville, N. J.

[Drainage area, 6,855 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	16,325	2,300	6,192	0.90	1.04
February			[a]2,500	.37	.39
March	74,890	2,600	23,268	3.39	3.91
April	64,075	15,475	31,811	4.64	5.17
May	65,620	14,625	24,524	3.58	4.13
June	48,110	5,300	16,902	2.47	2.75
July	10,000	1,825	4,676	.68	.78
August	69,740	2,300	16,285	2.38	2.75
September	21,200	5,300	10,785	1.57	1.75
October	18,050	5,550	9,542	1.39	1.60
November	10,800	4,320	6,680	.97	1.08
December	161,410	6,375	31,366	4.58	5.28
The year			15,377	2.24	30.63

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 214; rating table on page 318 of same paper.

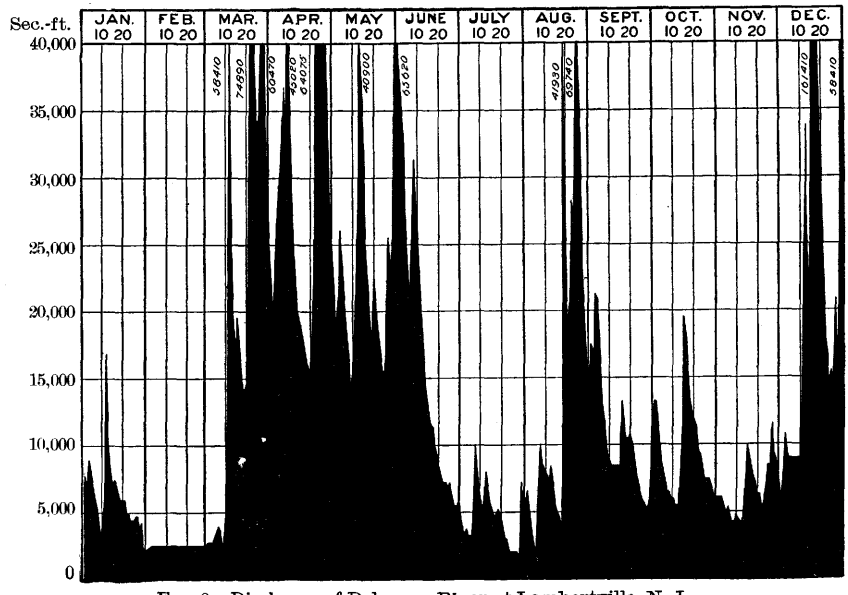


FIG. 8.—Discharge of Delaware River at Lambertville, N. J.

Estimated monthly discharge of Tohickon River at Point Pleasant, Pa.

[Drainage area, 102 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	1,768	12	145	1.42	1.64
February	11	4	9	.09	.09
March	3,353	9	461	4.52	5.11
April	2,388	31	372	3.63	4.05
May	1,219	7	202	1.98	2.28
June	289	3	58	.57	.64
July	7	3	5	.05	.06
August	893	4	123	1.21	1.40
September	608	7	40	.39	.44
October	52	5	17	.17	.20
November	201	4	27	.26	.29
December	4,039	19	622	6.10	7.02
The year	4,039	3	173	1.70	23.22

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 215.

Estimated monthly discharge of Neshaminy Creek, Pennsylvania, below the forks.

[Drainage area, 139 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	1,965	31	151	1.09	1.26
February	72	41	46	.33	.34
March	4,624	51	421	3.03	3.48
April	1,774	92	434	3.12	3.49
May	1,029	88	253	1.82	2.10
June	509	41	111	.80	.89
July	1,320	31	179	1.29	1.48
August	2,385	63	331	2.38	2.75
September	1,676	45	196	1.41	1.57
October	73	22	39	.28	.32
November	1,173	18	78	.56	.62
December	3,829	48	549	3.95	4.55
The year	4,624	18	232	1.67	22.85

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 216.

Estimated monthly discharge of Perkiomen Creek at Frederick, Pa.

[Drainage area, 152 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	1,623	31	139	0.91	1.05
February	84	29	44	.29	.30
March	4,717	46	441	2.91	3.35
April	2,237	58	337	2.22	2.48
May	1,113	67	236	1.55	1.79
June	547	36	119	.78	.87
July	137	12	44	.29	.33
August	1,433	36	184	1.21	1.40
September	250	38	87	.57	.64
October	260	31	80	.33	.61
November	368	36	72	.47	.52
December	6,017	51	557	3.67	4.22
The year	6,017	12	195	1.27	17.56

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 217.

Estimated monthly discharge of Wissahickon Creek, near Philadelphia, Pa.

[Drainage area, 65 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	240	12	54	0.83	0.96
February	64	16	38	.58	.60
March 1–9	24	17	18	.28	.09
August	1,095	19	138	2.12	2.45
September	99	20	32	.49	.55
October	48	16	30	.46	.53
November	515	13	37	.57	.64
December	1,269	17	133	2.05	2.37

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 65, page 218.

SUSQUEHANNA RIVER AND TRIBUTARIES.

During 1901 measurements have been made of Susquehanna River and its principal tributaries, as follows: North Branch of Susquehanna River at Wilkesbarre, Pa., and at Danville, Pa.; West Branch of Susquehanna River at Williamsport, Pa., and at Allenwood, Pa.; Juniata River at Newport, Pa., and Susquehanna River at Harrisburg, Pa. Owing to lack of sufficient discharge measurements the monthly figures of flow for the Williamsport, Wilkesbarre, and Allenwood stations were not computed for 1901. Results for the other stations are given in the following tables, the figures of discharge for the Susquehanna at Harrisburg including the flow of the Pennsylvania Canal at that point:

Estimated monthly dischage of North Branch of Susquehanna River at Danville, Pa.

[Drainage area, 11,070 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	----------	----------	[a]30,000	2.71	3.12
February	----------	----------	[a]30,000	2.71	2.82
March	----------	----------	[a]52,136	4.71	5.43
April	88,640	22,400	38,120	3.44	3.84

Estimated monthly discharge of North Branch of Susquehanna River at Danville, Pa.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
May	83,600	14,310	25,209	2.28	2.63
June	74,960	6,800	20,223	1.83	2.04
July	6,400	2,500	4,079	.37	.43
August	56,240	2,750	12,646	1.14	1.31
September	13,135	3,300	6,042	.55	.61
October	8,100	3,600	5,535	.50	.58
November	27,440	2,750	6,412	.58	.65
December	139,760	7,200	35,246	3.18	3.67
The year	139,760	2,500	22,121	2.00	27.13

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 220; rating table on page 318 of same paper.

Estimated monthly discharge of Juniata River at Newport, Pa.

[Drainage area, 3,476 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	3,500	1,200	2,224	0.64	0.74
February	4,000	1,600	2,634	.76	.79
March	59,500	2,040	12,155	3.50	4.04
April	49,000	5,850	16,957	4.88	5.45
May	46,500	3,250	13,187	3.79	4.37
June	24,000	3,250	6,792	1.95	2.18
July	6,900	1,600	2,845	.82	.95
August	11,150	1,200	3,880	1.12	1.29
September	7,700	1,400	3,134	.90	1.00
October	2,270	1,000	1,447	.42	.48
November	5,850	1,000	1,637	.47	.52
December	70,000	2,040	13,731	3.95	4.55
The year	70,000	1,000	6,719	1.93	26.36

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 226; rating table on page 318 of same paper.

Estimated monthly discharge of Susquehanna River at Harrisburg, Pa.

[Drainage area, 24,030 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	27,925	7,830	14,498	0.60	0.69
February	35,400	11,900	20,236	.84	.87
March	193,160	11,125	82,431	3.43	3.96
April	205,690	47,275	105,569	4.39	4.90
May	211,060	27,925	63,966	2.66	3.07
June	187,790	24,500	55,296	2.30	2.56
July	24,500	10,100	14,012	.58	.67
August	123,350	8,475	33,663	1.40	1.61
September	54,435	11,125	22,262	.93	1.04
October	19,800	9,450	13,669	.57	.66
November	58,910	6,880	15,265	.64	.71
December	347,100	15,100	70,990	2.95	3.41
The year	347,100	6,880	42,655	1.77	24.15

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 227; rating table on page 318 of same paper.

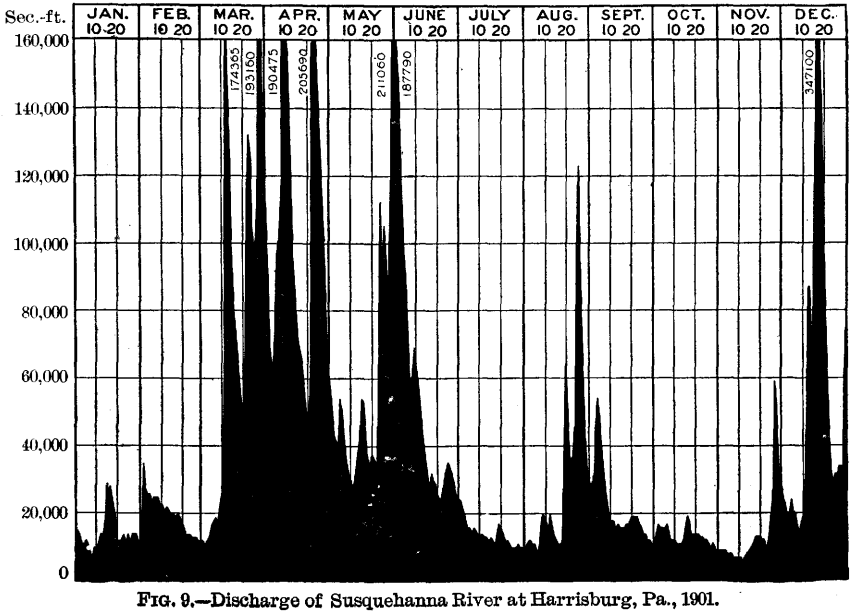


FIG. 9.—Discharge of Susquehanna River at Harrisburg, Pa., 1901.

PATAPSCO RIVER.

The river rises in the north central part of Maryland and empties into Chesapeake Bay about 13 miles below Baltimore. Its watershed is a hilly country, largely under cultivation. The station at Woodstock, Md., was established August 6, 1896, since which time continuous records have been kept, which have been published in former annual reports. The record for 1901 is given herewith.

Estimated monthly discharge of Patapsco River at Woodstock, Md.

[Drainage area, 251 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	670	122	207	0.82	0.95
February	310	186	239	.95	.99
March	5,075	252	792	3.16	3.64
April	2,102	160	508	2.02	2.25
May	1,600	160	380	1.51	1.74
June	1,100	91	276	1.10	1.23
July	1,600	100	245	.98	1.13
August	5,280	66	366	1.46	1.68
September[a]					
October	590	111	209	.83	.96
November	2,000	91	239	.95	1.06
December	8,048	310	1,014	4.04	4.66

[a] No record.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 228; rating table on page 318 of same paper.

POTOMAC RIVER AND TRIBUTARIES.

Potomac River is formed by the junction of the North and South branches, about 15 miles below Cumberland, Md. Regular gaging stations have been maintained on the North Branch at Piedmont, W. Va., on the South Branch near Springfield, W. Va., on Antietam Creek near Sharpsburg, Md., on the North Branch of Shenandoah River near Riverton, Va., on the South Branch of Shenandoah River near Front Royal, Va., on Shenandoah River at Millville, W. Va., on Potomac River at Point of Rocks, Md., and on Monocacy River near Frederick, Md. During a flood in the early part of 1902 the bridge and the gage near Springfield were carried away and the sta-

tion was abandoned. It was established June 26, 1899, and the results of the measurements for the entire period are published below.

Estimated monthly discharge of North Branch of Potomac River at Piedmont, W. Va.

[Drainage area, 407 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	2,360	336	682	1.68	1.94
February	705	305	403	.99	1.03
March	3,480	305	1,258	3.09	3.56
April	4,280	672	1,810	4.45	4.97
May	4,200	475	1,422	3.49	4.02
June	1,720	390	937	2.30	2.57
July	3,400	175	482	1.18	1.36
August	1,800	149	423	1.04	1.20
September	430	124	224	.55	.61
October	230	100	130	.32	.37
November	352	77	137	.34	.38
December	5,240	202	1,271	3.12	3.60
The year	5,240	77	765	1.88	25.61

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 229; rating table on page 318 of same paper.

Estimated monthly discharge of South Branch of Potomac River near Springfield, W. Va.

[Drainage area, 1,440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1899.					
July	730	240	358	0.25	0.29
August	400	250	286	.20	.23
September	400	250	333	.23	.26
October	890	250	332	.23	.27
November	2,240	400	1,134	.79	.88
December	2,150	335	1,051	.73	.84

Estimated monthly discharge of South Branch of Potomac River near Springfield, W. Va.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
January	4,335	500	1,154	.80	.92
February	3,750	1,500	2,576	1.79	1.86
March	5,415	1,070	3,129	2.17	2.51
April	3,600	285	1,486	1.03	1.15
May	890	265	507	.35	.40
June	6,135	540	1,728	1.20	1.34
July	1,790	250	856	.59	.68
August	730	230	331	.23	.27
September	980	230	347	.24	.27
October	600	285	367	.26	.30
November	5,685	265	1,085	.75	.84
December	5,685	335	1,307	.91	1.05
The year	6,135	230	1,239	.86	11.59
1901.					
January	4,425	335	1,151	0.80	0.92
February	600	500	518	.36	.38
March	7,575	490	2,216	1.54	1.78
April	10,185	730	3,777	2.62	2.92
May	8,295	980	2,910	2.02	2.33
June	7,035	890	2,441	1.70	1.90
July	3,050	250	1,316	.91	1.05
August	980	265	498	.35	.40
September	4,380	285	774	.54	.60
October	1,070	265	357	.25	.29
November	1,610	250	375	.26	.29
December	9,735	335	2,611	1.81	2.09
The year	10,185	250	1,579	1.10	14.95

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 229; rating table on page 318 of same paper.

Estimated monthly discharge of Antietam Creek near Sharpsburg, Md.

[Drainage area, 293 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	123	60	76	0.26	0.30
February	154	48	79	.27	.28
March	2,241	60	293	1.00	1.15
April	2,127	416	649	2.22	2.48
May	2,543	249	532	1.82	2.10
June	485	281	359	1.23	1.37
July	382	154	255	.87	1.00
August	1,058	123	225	.77	.89
September	416	95	171	.58	.65
October	281	75	123	.42	.48
November 1–16			83	.28	.31

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 230; rating table on page 318 of same paper.

Estimated monthly discharge of North Branch of Shenandoah River near Riverton, Va.

[Drainage area, 1,034 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	2,645	215	676	0.65	0.75
February	380	240	288	.28	.29
March	11,270	190	1,378	1.33	1.53
April	15,870	747	3,622	3.50	3.90
May	13,915	920	2,578	2.49	2.87
June	10,925	1,265	2,787	2.70	3.01
July	4,945	530	1,597	1.54	1.78
August	3,450	430	960	.93	1.07
September	2,760	165	740	.72	.80
October	1,610	190	406	.39	.45
November	2,070	140	376	.36	.40
December	14,145	270	2,911	2.82	3.25
The year	15,870	140	1,527	1.48	20.10

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 231; rating table on page 319 of same paper.

Estimated monthly discharge of South Branch of Shenandoah River near Front Royal, Va.

[Drainage area, 1,569 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1899.					
July	915	385	493	0.31	0.36
August	1,250	315	556	.35	.40
September	2,050	440	717	.46	.51
October	640	410	514	.33	.38
November	6,070	605	1,205	.77	.86
December	4,090	470	1,093	.70	.81
1900.					
January	10,840	915	2,186	1.39	1.60
February	7,600	915	2,400	1.53	1.59
March	10,750	1,640	3,482	2.22	2.56
April	3,640	1,100	1,744	1.11	1.24
May	1,975	675	1,127	.72	.83
June	5,890	605	1,703	1.09	1.22
July	1,100	470	736	.46	.53
August	750	360	493	.31	.36
September	1,052	315	457	.29	.32
October	4,090	502	1,020	.65	.75
November	6,790	535	1,255	.80	.89
December	5,260	675	1,394	.89	1.03
The year	10,840	315	1,500	.96	12.92

Estimated monthly discharge of South Branch of Shenandoah River near Front Royal, Va.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	5,260	470	1,353	0.87	1.00
February	1,200	535	779	.50	.52
March	11,020	470	1,909	1.22	1.41
April	27,580	1,580	6,611	4.21	4.69
May	23,980	1,640	4,920	3.14	3.62
June	11,380	1,900	4,279	2.73	3.04
July	13,180	1,410	3,834	2.44	2.82
August	6,340	1,052	3,259	2.08	2.40
September	7,600	675	1,807	1.15	1.28
October	9,220	712	1,772	1.13	1.30
November	2,920	605	930	.59	.66
December	27,580	1,200	4,658	2.97	3.43
The year	27,580	470	3,009	1.92	26.17

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 232; rating table on page 319 of same paper.

Estimated monthly discharge of Shenandoah River at Millville, W. Va.

[Drainage area, 2,995 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	5,790	840	1,828	0.61	0.70
February	1,950	740	1,272	.42	.44
March	17,840	840	3,302	1.10	1.27
April	29,520	2,515	10,612	3.54	3.95
May	29,840	2,600	7,674	2.56	2.96
June	26,640	3,740	7,592	2.54	2.83
July	12,880	1,310	4,344	1.45	1.67
August	2,780	1,725	3,480	1.16	1.34
September	11,280	1,250	2,487	.83	.93
October	6,320	1,140	1,784	.60	.69
November	3,950	940	1,366	.46	.51
December	30,160	1,370	6,421	2.14	2.47
The year	30,160	740	4,347	1.45	19.76

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 233; rating table on page 319 of same paper.

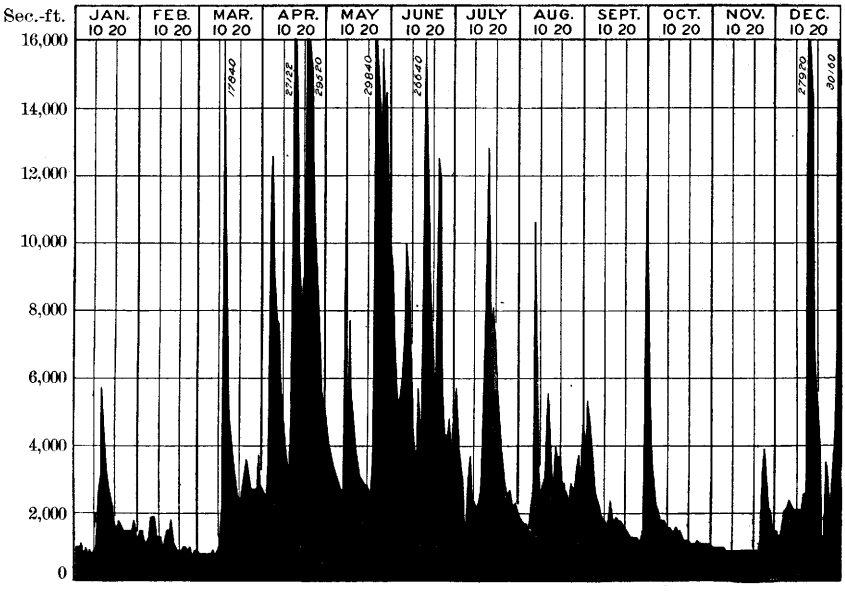


FIG. 10.—Discharge of Shenandoah River at Millville, W. Va., 1901.

Estimated monthly discharge of Potomac River at Point of Rocks, Md.

[Drainage area, 9,654 square miles]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	21,560	1,860	4,923	0.51	0.59
February	6,020	2,360	3,578	.37	.39
March	86,610	2,360	13,976	1.45	1.67
April	172,150	7,000	40,829	4.23	4.72
May	111,180	6,020	28,747	2.98	3.44
June	49,300	7,980	19,398	2.00	2.23
July	27,050	4,700	10,715	1.11	1.28
August	20,950	3,950	8,256	.86	.99
September	28,270	3,600	7,539	.78	.87
October	11,900	2,630	4,206	.44	.51
November	20,340	2,380	4,681	.48	.54
December	139,390	4,300	26,426	2.74	3.16
The year	172,150	1,860	14,440	1.50	20.39

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 233; rating table on page 319 of same paper.

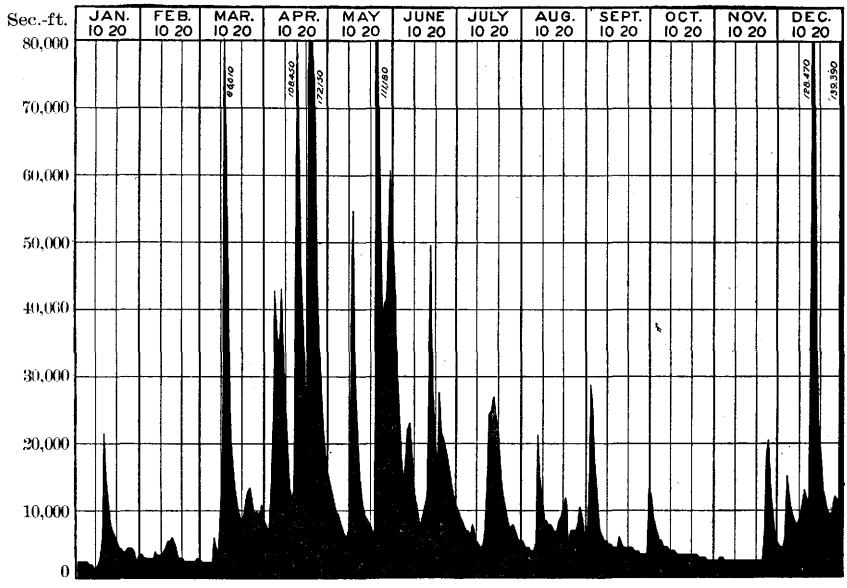


FIG. 11.—Discharge of Potomac River at Point of Rocks, Md., 1901.

Estimated monthly discharge of Monocacy River near Frederick, Md.

[Drainage area, 665 square miles].

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	3,170	150	461	0.69	0.80
February	550	240	347	.52	.54
March	15,984	270	2,085	3.14	3.62
April	14,264	700	2,650	3.98	4.44
May	5,750	420	1,521	2.29	2.64
June	2,740	305	875	1.32	1.47
July	750	180	332	.50	.58
August	1,966	150	464	.70	.81
September	1,622	180	311	.47	.52
October	600	180	283	.43	.50
November	3,944	210	495	.74	.83
December	14,264	380	2,193	3.30	3.81
The year	15,984	150	1,001	1.51	20.56

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 234; rating table on page 319 of same paper.

JAMES RIVER AND TRIBUTARIES.

Records of measurements have been kept as in previous years on North (of James) River at Glasgow, Va.; on James River at Buchanan, Va., Holcomb Rock, Va., and at Cartersville, Va. A station was established on Appomattox River at Mattoax, Va., on August 26, 1900, and was maintained during 1901. The results of measurements at this station for the entire period are given below. No results are here given for the station at Holcomb Rock, as no discharge measurements are made at that place.

Estimated monthly discharge of North (of James) River at Glasgow, Va.

[Drainage area, 831 square miles.]

Month.	Discharge in second-feet.			Run-off	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	3,602	280	751	0.90	1.04
February	400	280	339	.41	.43
March	7,050	280	1,757	2.11	2.44
April	12,170	720	3,124	3.76	4.20
May	12,170	650	1,996	2.40	2.77
June	14,015	685	2,246	2.69	3.00
July	2,100	400	847	1.02	1.18
August	7,050	330	1,793	2.16	2.49
September	3,008	450	724	.87	.97
October	845	280	395	.48	.55
November	450	250	289	.35	.39
December	24,060	280	3,240	3.90	4.50
The year	24,060	250	1,418	1.75	23.96

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 235; rating table on page 319 of same paper.

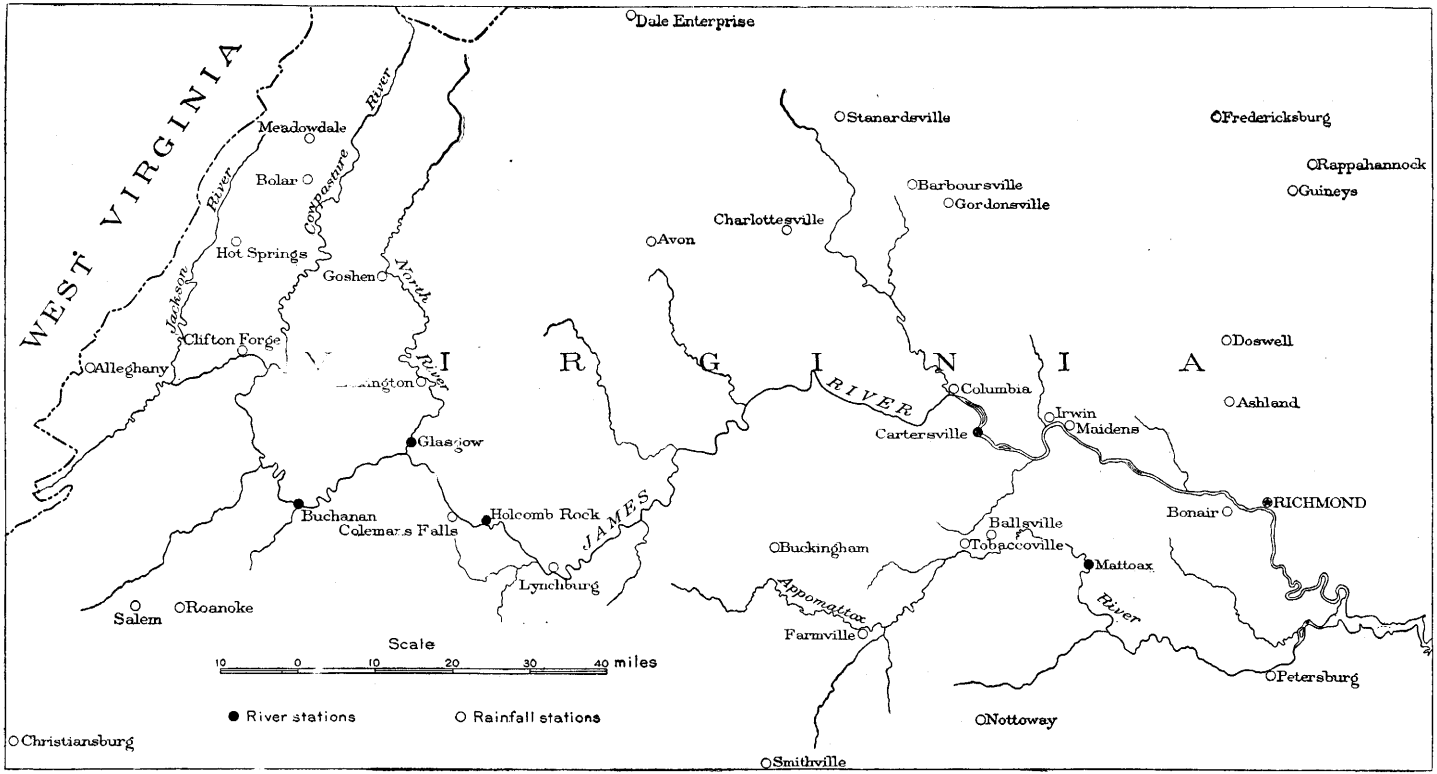


FIG. 12.—Location of river and rainfall stations in basin of James River.

Estimated monthly discharge of James River at Buchanan, Va.

[Drainage area, 2,058 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	18,956	750	2,739	1.33	1.53
February	1,980	750	1,234	.60	.62
March	16,580	750	3,786	1.84	2.12
April	25,820	2,870	8,589	4.17	4.65
May	31,620	1,650	5,882	2.86	3.30
June	25,028	1,980	5,609	2.72	3.03
July	6,185	840	2,594	1.26	1.45
August	20,276	750	4,683	2.27	2.62
September	9,980	670	1,605	.78	.87
October	1,650	540	726	.35	.40
November	840	430	518	.25	.28
December	48,260	540	6,736	3.27	3.77
The year	48,260	430	3,725	1.81	24.64

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 236; rating table on page 319 of same paper.

Estimated monthly discharge of James River at Cartersville, Va.

[Drainage area, 6,232 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	34,880	2,755	9,220	1.48	1.71
February	4,666	2,668	3,648	.59	.61
March	29,600	2,411	8,217	1.32	1.52
April	62,765	6,765	24,509	3.93	4.38
May	75,800	5,300	17,762	2.85	3.29
June	53,360	7,240	17,172	2.76	3.08
July	17,390	3,021	7,750	1.24	1.43
August	47,090	2,496	16,668	2.67	3.08
September	26,300	3,294	6,836	1.10	1.23
October	12,200	2,327	3,725	.60	.69
November	9,390	2,078	2,816	.45	.50
December	75,470	2,582	15,926	2.56	2.95
The year	75,800	2,078	11,187	1.80	24.47

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 238; rating table on page 319 of same paper.

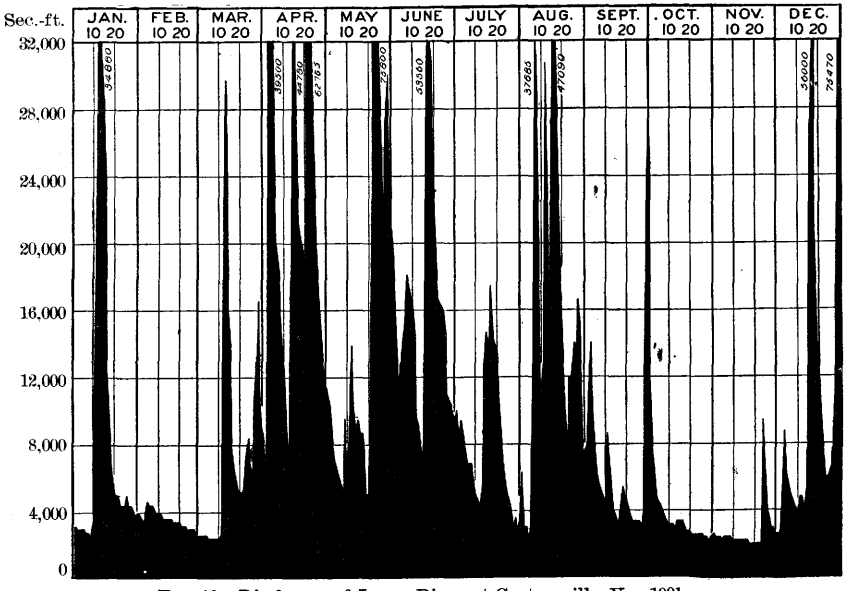


FIG. 13.—Discharge of James River at Cartersville, Va., 1901.

Estimated monthly discharge of Appomattox River at Mattoax, Va.

[Drainage area, 745 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
September	663	78	171	0.23	0.26
October	277	153	183	.24	.28
November	487	171	232	.31	.35
December	1,600	165	383	.51	.59
1901.					
January	5,560	243	986	1.32	1.52
February	580	249	339	.45	.47
March	2,755	243	517	.69	.80
April	8,050	378	2,433	3.26	3.64
May	12,050	279	2,084	2.79	3.22
June	825	243	427	.57	.64
July	2,160	195	524	.70	.81
August	6,550	165	2,664	3.57	4.12
September	1,680	261	446	.60	.67
October	1,280	249	333	.45	.52
November	1,120	249	314	.42	.47
December	5,950	285	1,456	1.96	2.26
The year	12,050	165	1,043	1.40	19.61

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, on page 238; rating table on page 319 of same paper.

PRECIPITATION IN THE BASIN OF JAMES RIVER.

The principal observations of rainfall made within the James River Basin are at the stations enumerated in the following table, which also gives their geographic location, elevation above sea level, and length of record of observations. The relative location of the points is shown in fig. 12, in connection with the points of river measurement, which are located at Buchanan, Glasgow, Holcomb Rock, Cartersville, and Mattoax.

Location of rainfall stations in James River Basin.

Station.	County.	State.	Latitude.	Longitude.	Elevation.	Length of record.
			° ′	° ′	*Feet.*	*Years.*
Ashland	Hanover	Virginia	37 45	77 30	220	9-10
Barboursville	Orange	do			500	5-6
Bedford City	Bedford	do			900	10-12
Bonair	Chesterfield	do			325	7-8
Buckingham	Buckingham	do			550	5-8
Christiansburg	Montgomery	do	37 5	80 23	2,760	12-15
Clifton Forge	Alleghany	do	37 50	79 55	1,047	4-6
Dale Enterprise	Rockingham	do	38 40	78 45	850	22
Doswell	Hanover	do			134	4-5
Farmville	Prince Edward	do			316	3-5
Fredericksburg	Spottsylvania	do			47	7-9
Hot Springs	Bath	do			2,195	7-10
Lexington	Rockbridge	do			946	25-31
Lynchburg	Campbell	do	37 25	79 9	681	29-31
Petersburg	Dinwiddie	do	37 12	77 20	11	14-16
Richmond	Henrico	do	37 32	77 26	172	22-24
Salem	Roanoke	do				11-12
Stanardsville	Greene	do			1,150	10-11
Staunton	Augusta	do	38 9	79 4	1,340	13-16

The following table gives the figures of normal or average monthly precipitation from the beginning of the record and including 1901, together with the total precipitation by months for the years 1896 to 1901, and also the annual totals. In obtaining the normal precipitation the average is taken for all of the months during which observations were made.

Precipitation at stations in drainage basin of James River.

ASHLAND, VA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	2.93	3.33	3.41	3.78	4.90	3.36	5.25	3.53	3.65	3.70	2.57	2.45	42.86
1896	2.35	3.56	4.12	2.00	3.37	3.67	6.64	1.46	5.49	.56	2.42	.51	36.15
1897	1.52	6.26	4.56	2.82	3.01	3.64	4.93	2.23	.80	6.93	3.47	2.67	42.89
1898	1.61	.78	4.18	5.09	6.05	3.94	4.42	4.82	2.86	4.33	1.93	3.33	43.34
1899	3.84	4.60	5.82	1.11	3.14	2.38	6.76	5.11	4.48	3.98	1.57	2.42	45.21
1900	3.29	5.09	2.62	3.42	2.59	5.25	1.62	1.21	3.47	3.63	2.43	2.83	37.45
1901	3.11	.36	3.82	5.66	6.46	1.40	6.82	10.13	3.89	1.40	1.40	5.40	49.85

Precipitation at stations in drainage basin of James River—Continued.

BARBOURSVILLE, VA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	3.04	3.36	3.45	3.40	5.58	4.10	4.43	3.98	3.86	2.23	2.52	3.66	43.61
1896	(3.04)	(3.36)	(3.45)	(3.40)	(5.58)	(4.10)	(4.43)	(3.98)	6.40	.28	4.02	.06	42.10
1897	1.76	5.56	2.71	2.06	6.04	3.63	4.50	1.08	.80	4.56	2.16	3.92	38.78
1898	2.80	.72	4.68	3.19	7.66	3.97	4.69	(3.98)	(3.86)	(2.23)	(2.52)	(3.66)	43.96
1899	3.76	5.65	(3.45)	1.81	2.50	2.80	5.46	3.14	4.90	3.50	1.55	3.01	41.53
1900	4.17	4.45	3.60	2.50	1.41	5.63	1.60	2.72	4.34	2.35	2.48	2.80	38.05
1901	2.73	.42	2.80	7.46	10.28	4.46	5.89	9.00	2.87	.47	2.37	8.51	57.26

BEDFORD CITY, VA.

Normal	2.89	3.54	3.21	3.13	4.21	3.58	3.75	4.76	3.69	3.31	2.33	3.29	41.69
1896	2.16	4.30	5.13	1.89	1.82	(3.58)	(3.75)	3.55	6.75	(3.31)	5.00	(3.29)	44.53
1897	(2.89)	(3.54)	3.10	1.50	3.70	3.68	1.70	.87	1.00	3.63	2.52	3.55	31.68
1898	2.48	1.02	4.03	3.21	7.81	2.53	4.26	3.67	4.08	8.66	2.05	4.16	47.96
1899	3.96	(3.54)	(3.21)	(3.13)	(4.21)	5.76	5.22	6.86	4.27	2.18	.69	1.82	44.85
1900	4.39	5.57	1.56	3.93	2.92	4.67	3.65	1.31	5.30	2.93	1.87	4.25	42.35
1901	2.68	.90	3.72	6.13	4.99	4.24	5.07	15.17	2.73	.43	1.34	8.10	55.50

BONAIR, VA.

Normal	3.19	3.39	4.31	4.13	3.93	3.09	5.03	3.71	3.61	3.44	2.73	3.17	43.73
1896	2.98	4.21	3.98	2.22	4.21	6.11	7.13	1.26	4.61	.89	3.27	1.27	41.94
1897	1.90	6.27	5.00	2.62	2.46	2.11	3.74	1.73	.86	6.52	4.37	4.01	41.69
1898	1.72	.81	3.43	4.71	6.95	2.34	3.50	4.74	3.22	4.89	2.93	3.25	42.49
1899	4.23	5.85	6.28	1.48	2.16	2.83	4.24	5.34	5.55	3.43	.86	1.95	44.20
1900	2.54	4.10	2.58	4.37	2.47	3.57	2.49	1.15	3.64	3.97	2.99	3.00	36.87
1901	3.79	.69	4.28	5.63	4.19	2.61	8.86	9.66	3.31	.99	7.71	6.94	52.66

BUCKINGHAM, VA.

Normal	3.32	3.46	3.94	3.24	4.19	2.83	3.81	4.76	4.14	3.13	2.24	2.89	41.95
1896	3.30	3.74	(3.94)	2.02	4.96	4.41	6.08	2.27	4.83	.29	3.79	T.	39.63
1897	.92	6.70	3.56	2.95	3.02	1.90	2.92	.73	1.05	4.72	3.47	2.77	34.71
1898	2.00	.40	2.23	3.20	3.53	1.75	5.00	3.90	2.08	6.60	2.17	3.56	36.42
1899	4.53	5.61	8.05	1.94	4.36	3.29	2.97	7.46	4.76	3.35	.88	1.70	40.90
1900	3.62	5.42	3.45	2.92	2.65	5.62	3.21	2.22	2.66	2.10	3.46	3.03	40.36
1901	3.49	.59	2.40	6.40	[a]6.47	2.46	2.49	13.75	6.02	.46	.30	7.43	[a]52.26

CHRISTIANSBURG, VA.

Normal	2.63	3.08	3.55	2.36	4.30	3.63	3.60	3.53	3.59	3.12	1.95	2.13	37.47
1896	1.07	2.64	6.36	2.80	3.91	3.76	6.94	1.21	5.20	1.15	3.72	.60	39.36
1897	1.59	6.80	3.62	1.76	2.88	2.04	4.34	3.23	2.13	3.88	.81	3.66	36.74
1898	2.78	.30	3.08	1.93	5.86	2.52	4.21	3.13	4.17	5.11	2.28	2.54	38.00
1899	4.07	4.97	7.11	3.36	3.39	4.52	2.64	2.92	4.01	1.11	2.42	2.08	42.60
1900	2.09	3.53	5.37	2.24	4.34	8.87	1.37	2.38	5.67	3.85	3.10	3.20	46.01

CLIFTON FORGE, VA.

Normal	2.08	3.05	3.49	2.69	4.51	3.17	2.78	3.05	3.15	2.97	2.69	1.65	35.28
1896	(2.08)	(3.05)	(3.49)	(2.69)	(4.51)	(3.17)	(2.78)	(3.05)	6.43	.28	5.56	T.	37.09
1897	2.35	5.19	3.35	1.13	4.46	3.83	3.78	4.32	.46	2.87	2.64	3.54	37.92
1898	2.66	.51	3.24	2.58	4.13	1.28	3.69	2.78	3.65	7.92	(2.69)	2.33	37.46
1899	1.49	4.29	3.70	(2.69)	(4.51)	1.65	1.42	2.12	.31	.89	.38	1.23	24.68
1900	1.78	4.92	2.67	2.10	3.80	4.23	2.25	.77	5.02	5.46	4.11	.80	37.91
1901	2.12	.35	4.50	4.96	5.65	4.85	(2.78)	5.24	3.02	.40	.76	2.00	36.63

[a] Incomplete.

Precipitation at stations in drainage basin of James River—Continued.

DALE ENTERPRISE, VA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	2.68	3.19	3.26	3.17	4.87	5.36	4.31	3.89	3.95	2.92	2.39	2.63	42.62
1896	1.75	3.40	3.70	1.19	1.99	5.17	5.69	1.55	7.85	.16	4.30	.....	34.73
1897	1.56	5.64	2.40	1.70	5.37	2.88	4.15	.68	.43	2.55	2.40	3.23	32.99
1898	2.37	.61	3.90	2.91	4.94	4.83	6.24	9.54	2.23	7.39	1.82	3.60	50.38
1899	1.87	5.57	4.34	1.21	3.75	1.86	3.15	2.18	4.40	1.75	.91	1.00	31.99
1900	3.20	2.87	3.38	1.70	2.06	8.01	3.47	2.44	3.22	2.45	3.11	1.61	37.52
1901	2.04	.28	3.86	5.78	5.11	14.37	4.83	6.36	3.84	2.06	1.39	6.37	56.29

DOSWELL, VA.

Normal	2.93	2.20	3.37	3.15	3.21	2.46	3.35	4.14	2.68	2.97	3.02	1.98	35.46
1897	3.15	(2.20)	4.10	1.90	2.70	2.38	2.09	2.40	.70	5.60	2.57	2.80	32.59
1898	1.60	.79	4.35	5.23	3.82	2.26	5.23	(4.14)	2.80	(2.97)	3.47	1.16	37.82
1899	4.26	4.68	4.90	.96	2.45	2.22	2.45	(4.14)	4.50	2.02	(3.02)	(1.98)	37.58
1900	(2.93)	3.32	1.50	2.89	2.40	2.28	2.01	.92	1.58	2.73	(3.02)	(1.98)	27.56
1901	2.72	.02	1.98	4.78	4.68	3.14	4.99	9.11	3.82	1.51	(3.02)	(1.98)	41.75

FARMVILLE, VA.

Normal	2.38	4.24	4.59	3.25	4.88	4.33	4.77	3.16	2.41	2.65	1.78	2.51	40.95
1897	(2.38)	(4.24)	4.20	1.01	3.65	3.85	6.93	.33	T.	4.83	1.50	1.91	34.83
1898	.65	(4.24)	3.09	4.23	5.49	2.80	6.63	3.67	3.01	4.81	2.25	3.35	44.22
1899	3.55	6.14	9.72	1.82	2.84	4.61	2.50	8.02	2.98	2.01	1.95	1.02	47.16
1900	(2.38)	5.15	2.87	3.30	2.48	8.19	3.58	1.82	2.68	1.48	1.82	4.00	39.75
1901	2.95	1.45	3.10	6.00	9.97	2.20	4.20	1.95	3.40	.10	1.40	[a]2.30	[a]39.02

FREDERICKSBURG, VA.

Normal	2.63	3.82	3.47	3.54	4.67	3.62	4.06	3.37	2.95	3.42	2.18	2.93	40.66
1896	1.54	3.65	3.85	1.90	4.60	5.41	5.50	1.28	4.93	.14	2.60	.08	35.48
1897	1.70	6.40	3.02	2.31	4.59	3.63	5.04	2.04	.68	5.25	1.99	3.17	39.82
1898	3.17	1.19	4.55	4.28	7.47	2.02	3.10	4.44	1.19	5.39	2.07	4.01	42.88
1899	4.61	6.79	5.41	1.50	5.18	3.40	3.39	4.45	5.36	4.38	1.59	1.82	47.88
1900	3.16	4.73	3.00	3.83	1.17	7.09	2.81	.96	4.36	5.32	2.09	3.43	41.95
1901	3.09	.50	3.02	6.34	3.89	2.56	5.33	8.23	2.48	.46	1.58	7.90	45.38

HOT SPRINGS, VA.

Normal	2.42	3.87	3.21	2.83	4.36	4.16	3.89	3.39	3.35	3.27	2.11	3.11	39.97
1896	(2.42)	3.68	5.80	.94	3.63	3.79	4.47	4.16	6.42	.47	5.16	.19	41.13
1897	2.15	6.96	2.89	1.21	5.73	3.52	3.26	1.08	.63	2.11	2.02	3.98	35.54
1898	1.99	.79	4.10	(2.83)	(4.36)	(4.16)	5.11	8.00	3.90	11.80	(2.11)	2.73	51.88
1899	2.84	8.18	5.91	1.58	2.34	3.78	6.72	3.45	.36	5.24	.50	1.23	42.13
1900	2.31	5.86	2.84	1.79	3.50	4.46	5.25	1.79	4.91	4.33	(2.11)	2.70	41.85
1901	2.33	.23	3.91	8.26	7.74	6.22	3.79	6.22	4.20	.70	2.35	9.50	55.45

LEXINGTON, VA.

Normal	3.35	3.27	3.39	3.03	3.79	3.62	3.98	3.73	4.03	2.85	2.90	2.75	40.69
1896	2.93	4.21	4.97	1.11	1.55	4.31	8.10	5.65	5.88	.31	5.35	.15	44.52
1897	1.76	5.79	3.44	1.58	4.63	3.33	3.99	3.03	1.09	2.56	2.44	3.42	37.06
1898	2.58	.77	3.47	2.59	5.81	4.72	4.44	6.24	3.61	7.83	2.10	2.90	47.06
1899	3.79	5.41	6.69	1.25	5.00	2.62	3.18	5.41	4.01	2.08	.50	1.47	41.41
1900	2.92	4.38	4.03	2.73	2.70	7.49	3.12	1.12	3.79	3.08	2.73	2.21	40.30
1901	3.00	.57	3.97	5.40	4.61	(3.62)	(3.98)	(3.73)	(4.03)	(2.05)	1.32	8.12	44.40

[a] Incomplete.

Precipitation at stations in drainage basin of James River—Continued.

LYNCHBURG, VA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	3.89	3.63	3.91	3.28	4.16	3.62	4.20	4.13	3.89	3.25	2.88	3.15	43.99
1896	2.30	4.54	5.54	1.61	5.01	3.82	8.58	2.04	7.08	1.07	4.92	.13	46.64
1897	2.19	7.84	3.46	2.08	4.27	2.70	6.75	.94	1.12	3.12	2.24	3.37	40.08
1898	2.16	.74	3.25	2.94	9.08	2.98	7.17	2.82	4.50	7.33	2.61	4.35	49.93
1899	4.95	5.86	9.01	1.52	2.99	4.84	3.87	7.50	4.54	3.87	2.22	1.74	52.91
1900	4.36	4.38	4.35	3.74	4.07	8.31	1.92	2.29	4.78	3.49	2.31	3.10	47.10
1901	3.59	.78	3.66	5.98	5.34	4.93	4.33	12.36	3.17	.48	1.47	8.72	54.81

PETERSBURG, VA.

Normal	2.62	3.61	4.55	3.79	5.22	3.73	4.84	3.73	4.13	3.44	2.80	2.56	45.02
1896	2.58	4.64	3.33	1.91	7.25	5.90	8.33	.70	3.05	.63	2.53	1.93	42.78
1897	1.96	5.85	5.71	2.52	3.40	2.19	2.72	1.20	1.69	4.88	2.78	2.66	37.56
1898	1.21	.78	3.95	4.90	5.35	2.57	4.74	2.83	2.31	3.33	2.43	2.04	36.44
1899	2.94	5.57	5.93	1.73	4.16	3.07	6.13	5.81	4.09	3.05	1.26	1.97	45.71
1900	2.95	4.54	2.74	2.50	1.69	6.49	4.14	2.42	3.67	2.82	4.87	2.88	41.71
1901	2.68	.70	3.99	5.00	5.12	2.81	3.64	7.13	3.45	2.71	2.48	6.15	45.86

RICHMOND, VA.

Normal	3.08	3.64	3.81	3.71	3.90	3.32	4.62	5.15	4.16	3.41	2.53	3.40	44.73
1898	1.05	1.05	3.78	4.83	5.28	2.98	4.15	6.31	2.38	4.59	2.22	3.08	41.65
1899	2.94	4.72	5.56	2.04	2.14	2.41	4.13	5.61	6.21	4.03	1.19	2.33	43.30
1900	2.71	4.42	2.89	3.62	2.20	3.08	3.13	3.66	4.03	2.55	2.87	2.60	37.76
1901	2.80	.55	3.79	5.29	3.80	2.32	5.06	6.99	3.21	.79	1.37	6.08	42.05

SALEM, VA.

Normal	2.94	3.88	3.75	2.98	4.34	3.67	4.09	4.59	3.87	3.07	1.94	2.96	42.08
1896	2.82	4.37	5.77	2.46	2.01	4.79	6.53	1.41	4.92	.53	5.16	.41	41.18
1897	1.69	7.56	3.73	1.56	4.03	1.31	3.64	1.76	2.56	4.17	1.25	3.82	37.08
1898	2.95	.58	3.35	1.99	6.74	2.82	5.06	4.14	3.66	8.63	1.50	2.58	44.00
1899	3.37	6.09	5.87	2.59	2.35	3.27	3.46	4.44	4.44	2.08	1.24	2.13	41.33
1900	3.73	4.03	4.80	2.89	3.12	4.20	2.41	.33	5.43	5.18	(1.94)	(2.96)	41.02
1901	2.20	.76	3.43	6.31	8.21	7.35	6.02	10.90	3.59	.71	1.07	6.71	57.26

STANARDSVILLE, VA.

Normal	3.32	3.11	3.64	3.02	4.61	3.38	4.57	4.63	3.72	3.58	2.39	2.82	42.79
1896	2.41	4.79	2.74	1.83	3.73	3.13	7.41	2.97	5.41	.11	5.34	T.	39.87
1897	1.88	5.08	2.51	1.86	4.45	3.51	7.70	2.27	.65	3.81	2.68	4.40	40.80
1898	2.49	.65	4.52	3.24	5.72	2.51	5.22	6.06	3.11	12.01	2.46	4.20	52.19
1899	4.11	4.43	6.25	1.47	3.55	2.74	3.15	4.14	5.17	2.87	1.52	2.10	41.50
1900	3.88	3.56	(3.64)	2.77	1.13	5.87	2.03	.97	4.40	4.07	(2.39)	(3.10)	37.81
1901	1.62	T.	4.34	6.52	9.30	2.76	5.51	8.90	3.08	(3.58)	1.70	4.90	52.21

STAUNTON, VA.

Normal	2.61	2.93	3.40	2.91	4.55	3.98	3.29	3.55	3.84	2.97	2.23	2.66	38.92
1896	2.55	3.81	4.41	1.33	4.13	6.58	6.10	3.92	8.08	.23	5.01	T.	46.15
1897	.92	3.99	2.56	1.56	5.75	2.18	3.70	2.30	.73	2.84	2.14	3.31	31.98
1898	2.89	.55	3.10	2.95	4.82	2.16	4.41	5.16	2.22	7.13	1.74	3.00	40.13
1899	3.46	4.89	6.15	1.56	3.64	1.39	1.33	5.46	3.89	3.06	.90	1.14	36.87
1900	3.01	3.38	3.45	2.27	3.19	5.66	2.57	2.34	3.64	4.58	2.88	2.05	39.02
1901	2.29	.32	3.39	8.42	7.88	4.97	5.39	6.71	3.46	.51	1.40	6.44	51.18

Depth of run-off, in inches, from the drainage basin of north (of James) River at Glasgow, Va.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.63	3.99	2.32	1.19	2.83	0.62	0.51	0.31	0.23	0.28	0.32	0.72	13.95
1898	.99	.53	1.28	2.00	2.38	.80	.72	2.38	.41	2.48	1.23	1.39	16.59
1899	2.05	2.83	[a]4.44	1.03	.77	.30	.24	.28	.31	.24	.31	.33	13.13
1900	1.41	2.32	2.91	1.29	.82	1.36	.48	.31	.37	.56	1.03	1.22	14.08
1901	1.04	.43	2.44	4.20	2.77	3.00	1.18	2.49	.97	.55	.39	4.50	23.96
Average	1.22	2.12	2.68	1.94	1.91	1.22	.63	1.15	.46	.82	.66	1.63	16.34

[a] Approximate.

Depth of run-off, in inches, from the drainage basin of James River at Buchanan, Va.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.48	3.75	1.90	0.88	1.86	0.52	0.54	0.36	0.23	0.23	0.20	0.54	11.49
1898	1.06	.55	1.29	1.93	1.98	.48	.47	1.84	.49	1.98	1.08	1.20	14.35
1899	1.83	3.03	4.53	1.68	1.99	1.05	.30	.26	.36	.21	.24	.38	15.86
1900	1.27	2.10	3.21	1.44	.66	1.17	.42	.23	.32	.84	2.01	1.65	15.32
1901	1.53	.62	2.12	4.65	3.30	3.03	1.45	2.62	.87	.40	.28	3.77	24.64
Average	1.23	2.01	2.61	2.12	1.96	1.25	.64	1.06	.45	.73	.76	1.51	16.33

Depth of run-off, in inches, from the drainage basin of James River at Cartersville, Va.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1899	4.55	3.35	4.55	1.67	1.29	0.62	0.32	0.54	0.52	0.31	0.59	0.51	18.82
1900	1.53	1.96	2.55	1.81	.89	1.37	.47	.25	.30	.67	1.13	1.48	14.41
1901	1.71	.61	1.52	4.38	3.29	3.08	1.43	3.08	1.23	.69	.50	2.95	24.47
Average	2.60	1.97	2.87	2.62	1.82	1.69	.74	1.29	.68	.56	.74	1.65	19.23

Depth of run-off, in inches, from the drainage basin of Appomattox River at Mattoax, Va.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1900	.....	.....	.....	.....	.....	.....	.....	.....	0.26	0.28	0.35	0.59	.....
1901	1.52	0.47	0.80	3.64	3.22	0.64	0.81	4.12	.67	.52	.47	2.26	19.61
Average	1.52	.47	.80	3.64	3.22	.64	.81	4.12	.67	.52	.47	2.26	19.61

Rainfall and run-off in James River Basin.

Station.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RAINFALL.							
Ashland	42.86	36.15	42.89	43.34	45.21	37.45	49.85
Barbourville	43.61	42.10	38.78	43.96	41.53	38.05	57.26
Bedford City	41.69	44.53	31.68	47.96	44.85	42.35	55.50
Bonair	43.73	41.94	41.69	42.49	44.20	36.87	52.66
Buckingham	41.95	39.63	34.71	36.42	48.90	40.36	52.26
Christiansburg	37.47	39.36	36.74	38.00	42.60	46.01	------
Clifton Forge	35.28	37.09	37.92	37.46	24.68	37.91	36.63
Dale Enterprise	42.62	34.73	32.99	50.38	31.99	37.52	56.29
Doswell	35.46	------	32.59	37.82	37.58	27.56	41.75
Farmville	40.95	------	34.83	44.22	47.16	39.75	39.02
Fredericksburg	40.66	35.48	39.82	42.88	47.88	41.95	45.38
Hot Springs	39.97	41.13	35.54	51.88	42.13	41.85	55.45
Lexington	40.69	44.52	37.06	47.06	41.41	40.30	44.40
Lynchburg	43.99	46.64	40.08	49.93	52.91	47.10	54.81
Petersburg	45.02	42.78	37.56	36.44	45.71	41.71	45.86
Richmond	44.73	------	------	41.65	43.30	37.76	42.05
Salem	42.08	41.18	37.08	44.00	41.33	41.02	57.26
Stanardsville	42.79	39.87	40.80	52.19	41.50	37.81	52.21
Staunton	38.92	46.15	31.98	40.13	36.87	39.02	51.18
Average	41.29	40.83	36.93	43.59	42.20	39.60	49.38
RUN-OFF.							
North (of James) at Glasgow	15.29	18.14	13.95	16.59	13.13	[a]14.08	23.96
James at Buchanan	11.68	10.77	11.49	14.35	15.86	15.32	24.64
James at Cartersville	------	------	------	------	18.82	14.41	24.47
Appomattox at Mattoax	------	------	------	------	------	------	19.61
Average run-off	13.49	14.46	12.72	15.47	15.94	14.60	23.17
Percentage of rainfall	32.67	35.42	34.44	35.49	37.75	36.87	46.92

[a] Approximate.

SOUTHERN ATLANTIC COAST DRAINAGE.

Systematic measurements of discharge of many of the larger rivers of the Southern Atlantic States have been made during the year. The drainage areas of the rivers in that region are in general similar. Most of the streams rise in the southern Appalachian Mountains or their foothills. In the upper part of their courses they are rapid, with considerable fall. Across the Piedmont Plain their valleys are wide and their flow in general is sluggish, with occasional falls over rocky beds. Many of them have falls that could be utilized for water power, and it is largely to that end that data of the flow are being collected. In the study of water power it is important to know the flow and the fall. The fall can readily be determined by an engineer, but the variations in flow often require long and careful study. Gaging stations, to determine the latter, have been established on nearly all of the larger streams in the region, and it is hoped that in the near future our information of their fall will be extended.

The stations maintained by the survey in previous years were kept up during 1901 on the following rivers: On Roanoke River and tributaries; on Cape Fear, Yadkin, and Catawba rivers; on Savannah River and tributaries; on Oconee River and tributaries, and on Ocmulgee River. New stations were established in Georgia during 1901 on Middle Oconee River near Athens; on Oconee River at Barnett Shoals; on Apalachee River near Buckhead; on Alcovy River near Covington; and on Ocmulgee River near Flovilla.

The results for the year 1901, where available, are given on the following pages. In addition to these so-called permanent stations, many temporary stations are being maintained on streams in the Southern Appalachian region, the results for which will be found in the water-supply papers on operations at river stations.

Storms of considerable magnitude and duration during May and June, 1901, were the cause of high floods on the rivers draining from the Appalachian region into the Atlantic and the Gulf of Mexico. The damage caused by the freshets on some of the rivers was very heavy, particularly along the Catawba and Yadkin rivers, and along Cane Creek and Elkhorn Creek, in McDowell County, W. Va. Although the precipitation in these instances was unusually great, the rapidity and the violence of the run-off must be attributed in no small measure to the partial deforestation that has taken place at the headwaters of these streams. The accompanying illustrations will furnish an idea of the nature of the havoc wrought in some localities.

ROANOKE RIVER.

Estimated monthly discharge of Staunton River at Randolph, Va.

[Drainage area, 3,076 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
September	8,625	1,120	1,878	0.61	0.68
October	17,900	1,350	2,597	.84	.97
November	13,100	2,025	2,938	.96	1.07
December	18,600	2,550	3,944	1.28	1.48
1901.					
January	35,980	2,550	5,362	1.74	2.01
February	3,860	2,410	2,948	.98	1.02
March	14,850	2,340	4,000	1.30	1.50
April	36,910	3,580	9,620	3.13	3.49
May	37,940	2,980	8,148	2.65	3.16
June	9,750	3,140	4,759	1.55	1.73
July	30,980	2,690	6,259	2.03	2.34
August	45,100	2,620	13,185	4.29	4.94
September	6,955	2,620	3,998	1.30	1.45
October	6,725	2,795	3,346	1.09	1.26
November	5,260	2,725	2,984	.97	1.08
December	75,100	2,830	9,621	3.13	3.61
The year	75,100	2,340	6,186	2.01	27.59

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 239; rating table on page 319 of same paper.

Estimated monthly discharge of Dan River at South Boston, Va.

[Drainage area, 2,750 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
September	7,605	700	1,430	0.52	0.58
October	6,500	1,200	1,842	.67	.77
November	4,600	1,360	1,804	.66	.74
December	15,100	2,075	2,785	1.01	1.16

Estimated monthly discharge of Dan River at South Boston, Va.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	21,965	1,860	3,387	1.23	1.42
February	2,675	1,600	2,042	.74	.77
March	25,000	1,600	3,504	1.27	1.46
April	38,800	2,375	6,382	2.32	2.59
May	45,600	2,300	7,297	2.65	3.06
June	3,100	1,925	2,292	.83	.93
July	44,200	2,150	6,132	2.23	2.58
August	36,600	1,860	9,866	3.59	4.14
September	5,100	2,150	2,902	1.06	1.18
October	4,100	1,860	2,353	.86	.99
November	3,730	1,730	2,032	.74	.83
December	51,200	2,000	6,875	2.50	2.89
The year	51,200	1,600	4,589	1.67	22.84

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 240; rating table on page 319 of same paper.

Estimated monthly discharge of Roanoke River at Roanoke, Va.

[Drainage area, 388 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	3,367	187	522	1.35	1.56
February	374	140	245	.63	.66
March	3,233	170	559	1.44	1.66
April	8,924	429	1,837	4.73	5.27
May	17,016	349	2,396	6.18	7.13
June	2,094	429	940	2.42	2.70
July	4,372	205	924	2.38	2.75
August	18,104	240	2,098	5.41	6.23
September	1,156	260	435	1.12	1.25
October	723	205	277	.71	.82
November	280	170	199	.51	.57
December	15,044	170	1,488	3.84	4.43
The year	18,104	140	993	2.56	35.03

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 241; rating table on page 319 of same paper.

Estimated monthly discharge of Roanoke River at Neal, N. C.

[Drainage area, 8,717 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	34,125	4,190	10,053	1.15	1.33
February	7,700	3,630	5,186	.59	.61
March	41,550	3,420	9,370	1.07	1.23
April	56,960	11,070	24,914	2.86	3.19
May	85,200	4,980	20,817	2.39	2.76
June	27,640	5,240	11,138	1.28	1.43
July	51,055	5,205	15,898	1.82	2.10
August	57,300	4,190	30,897	3.54	4.08
September	30,550	5,130	10,919	1.25	1.39
October	13,380	4,190	6,563	.75	.86
November	8,305	3,980	4,637	.53	.59
December	52,535	4,400	14,865	1.70	1.96
The year	85,200	3,420	13,763	1.58	21.53

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 242; rating table on page 320 of same paper.

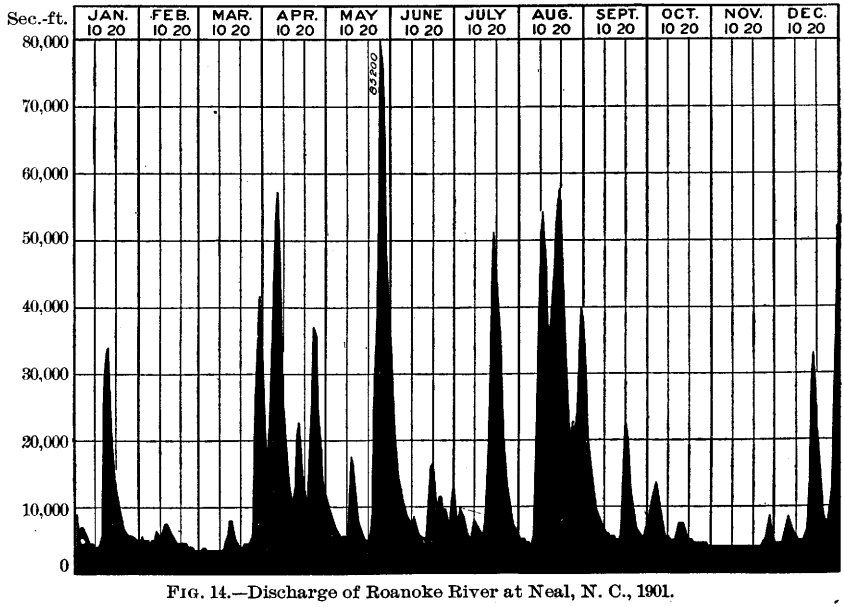


FIG. 14.—Discharge of Roanoke River at Neal, N. C., 1901.

CAPE FEAR RIVER.

Estimated monthly discharge of Deep River at Cumnock, N. C.

[Drainage area, 1,110 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
July (18 days)			274	0.25	0.17
August	394	72	138	.12	.14
September	3,990	116	308	.28	.31
October	274	80	139	.12	.14
November	4,550	106	368	.33	.37
December	5,190	126	878	.79	.91
1901.					
January	4,830	250	827	.75	.86
February	2,990	262	656	.59	.61
March	27,100	181	3,564	3.21	3.70
April	9,075	95	1,958	1.76	1.96
May	6,820	80	989	.89	1.03
June	9,918	334	2,129	1.92	2.14
July	13,540	322	2,500	2.25	2.60
August	14,135	322	4,179	3.76	4.34
September	10,950	298	1,805	1.63	1.82
October	1,125	322	434	.39	.45
November	334	250	286	.26	.29
December	16,696	274	1,824	1.64	1.89
The year	27,100	80	1,763	1.59	21.69

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 243; rating table on page 320 of same paper.

Estimated monthly discharge of Cape Fear River at Fayetteville, N. C.

[Drainage area, 4,493 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	7,120	1,600	3,048	0.68	0.78
February	4,850	1,560	2,659	.59	.61
March	28,050	1,200	4,209	.94	1.08
April	49,065	2,440	9,624	2.14	2.39
May	71,625	1,560	11,502	2.56	2.95
June	11,800	1,760	4,352	.97	1.08
July	37,675	1,520	8,072	1.80	2.08
August	43,450	1,440	13,965	3.11	3.59
September	41,350	1,600	7,296	1.62	1.81
October	4,450	1,400	2,342	.52	.60
November	2,440	1,400	1,555	.35	.39
December	27,200	1,440	3,828	.85	.98
The year	71,625	1,200	6,038	1.34	18.34

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 244; rating table on page 320 of same paper.

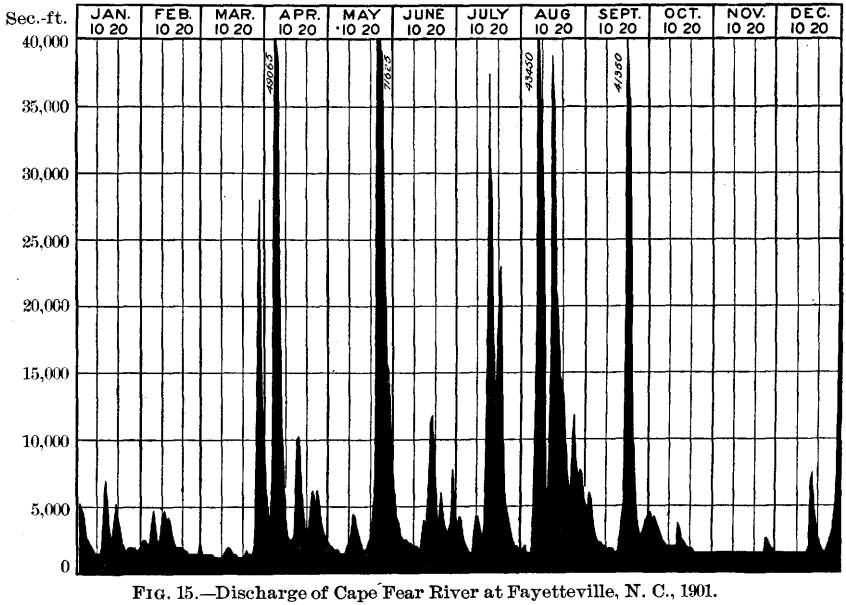
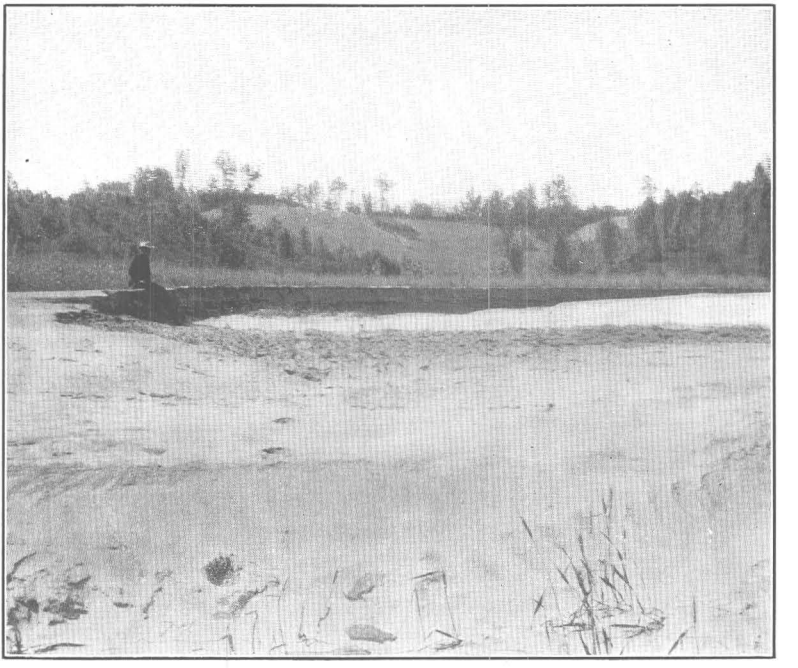
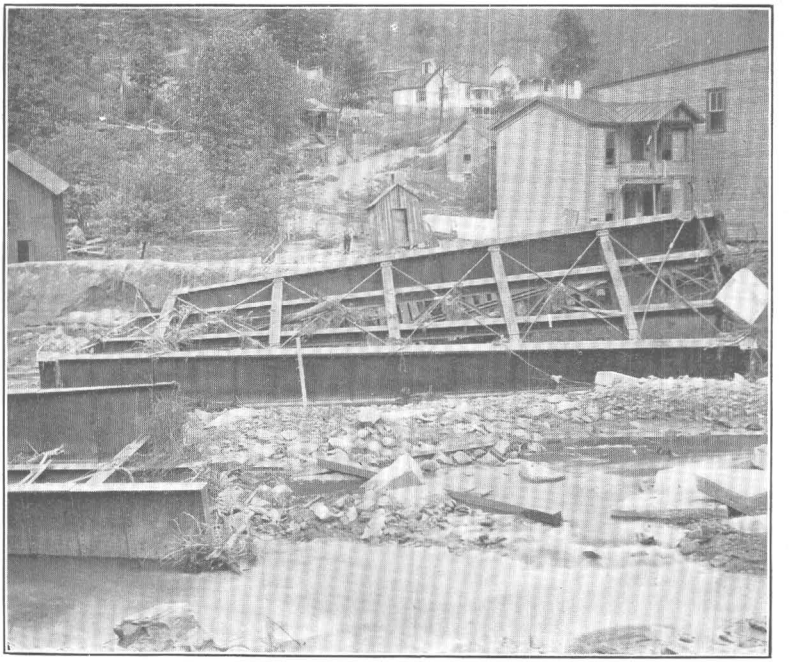


FIG. 15.—Discharge of Cape Fear River at Fayetteville, N. C., 1901.



A. WHEAT FIELD WASHED OUT AND COVERED WITH SAND BY FLOOD ON YADKIN RIVER NEAR ELKIN, N C.



B. PLATE-GIRDER BRIDGE ON ELKHORN CREEK AT NORWOOD, W. VA., DEMOLISHED BY FLOOD.

YADKIN RIVER.

Estimated monthly discharge of Yadkin River at Salisbury, N. C.

[Drainage area, 3,399 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	31,180	2,925	5,284	1.55	1.79
February	6,195	2,420	3,507	1.03	1.07
March	37,780	2,585	5,922	1.74	2.01
April	81,030	4,180	13,787	4.06	4.53
May	70,870	4,000	11,152	3.28	3.78
June	32,220	4,540	10,950	3.22	3.59
July	29,200	3,820	8,455	2.49	2.87
August	44,132	3,640	16,509	4.86	5.60
September	16,120	4,360	6,764	1.99	2.22
October	13,420	3,640	5,116	1.51	1.74
November	6,380	3,100	3,683	1.08	1.20
December	104,640	3,280	12,506	3.68	4.24
The year	104,640	2,420	8,636	2.54	34.64

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 246; rating table on page 320 of same paper.

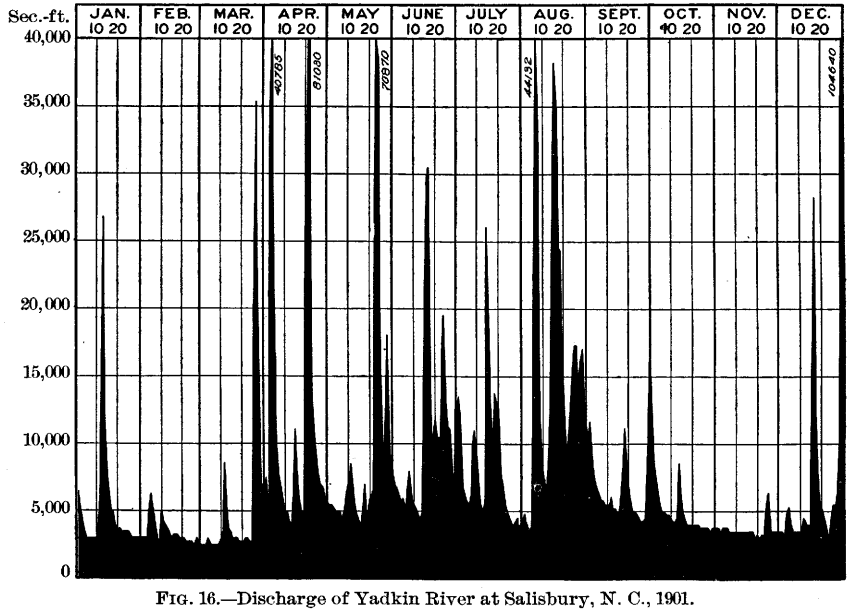


FIG. 16.—Discharge of Yadkin River at Salisbury, N. C., 1901.

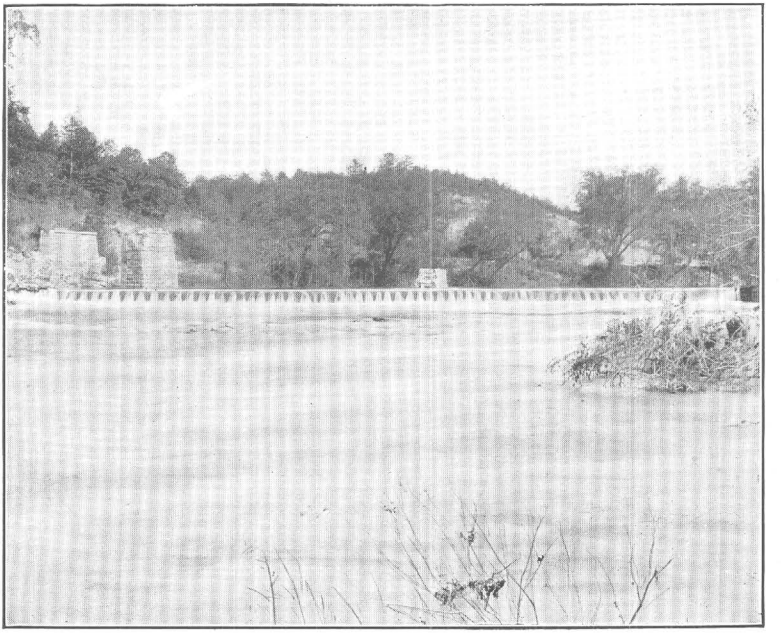
CATAWBA RIVER.

Estimated monthly discharge of Catawba River at Catawba, N. C.

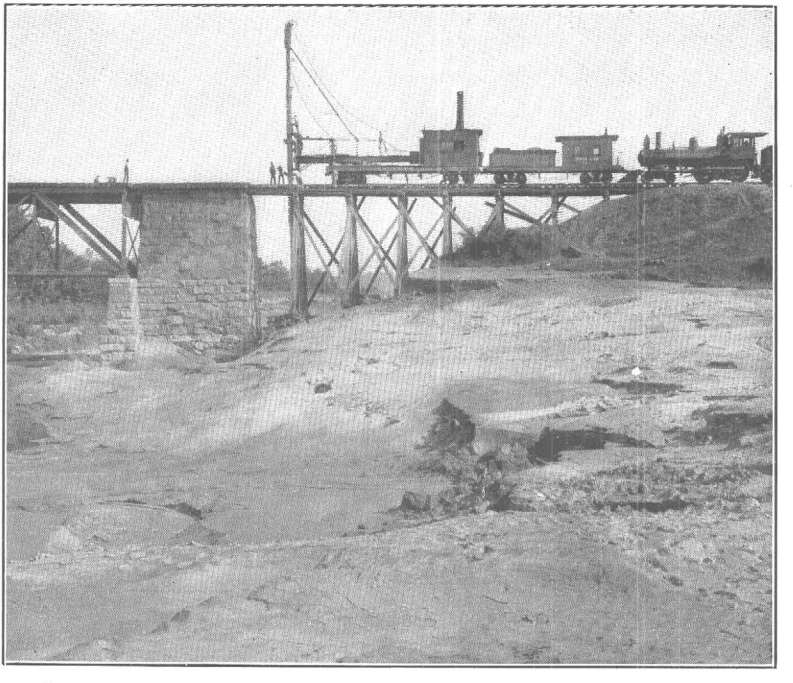
[Drainage area, 1,514 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	17,240	2,720	3,777	2.49	2.87
February	4,175	2,720	3,009	1.99	2.07
March	38,375	2,855	5,130	3.39	3.91
April 1-20			9,911	6.55	4.87
May	81,500	3,150	8,260	5.46	6.29
June	24,540	2,810	5,358	3.54	3.95
July	6,655	2,275	3,383	2.23	2.57
August	40,250	2,450	10,326	6.82	7.87
September	6,590	2,495	3,493	2.31	2.58
October	4,120	2,315	2,601	1.72	1.98
November	3,500	2,000	2,311	1.53	1.71
December	45,875	2,090	5,830	3.85	4.44

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 247; rating table on page 320 of same paper.



A CATAWBA RIVER NEAR MORGANTON, N. C., AT SITE OF STEEL HIGHWAY BRIDGE DESTROYED BY FLOOD.



B. CATAWBA RIVER AT CATAWBA, N. C., SHOWING BANKS WASHED OUT BY FLOOD.

Estimated monthly discharge of Catawba River near Rockhill, S. C.

[Drainage area, 2,937 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	26,500	3,825	5,245	1.76	2.03
February	7,750	3,665	4,240	1.42	1.48
March	57,250	3,505	7,219	2.42	2.79
April	107,850	4,625	15,812	5.29	5.90
May	127,850	4,145	14,302	4.79	5.52
June	30,000	4,625	9,211	3.08	3.44
July	20,400	3,825	6,159	2.06	2.37
August	64,125	3,825	18,983	6.36	7.34
September	14,850	4,850	7,130	2.39	2.67
October	8,550	4,145	4,980	1.67	1.93
November	4,545	3,985	4,121	1.38	1.54
December	98,850	3,825	13,775	4.61	5.31
The year	127,850	3,505	9,265	3.10	42.32

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 248; rating table on page 320 of same paper.

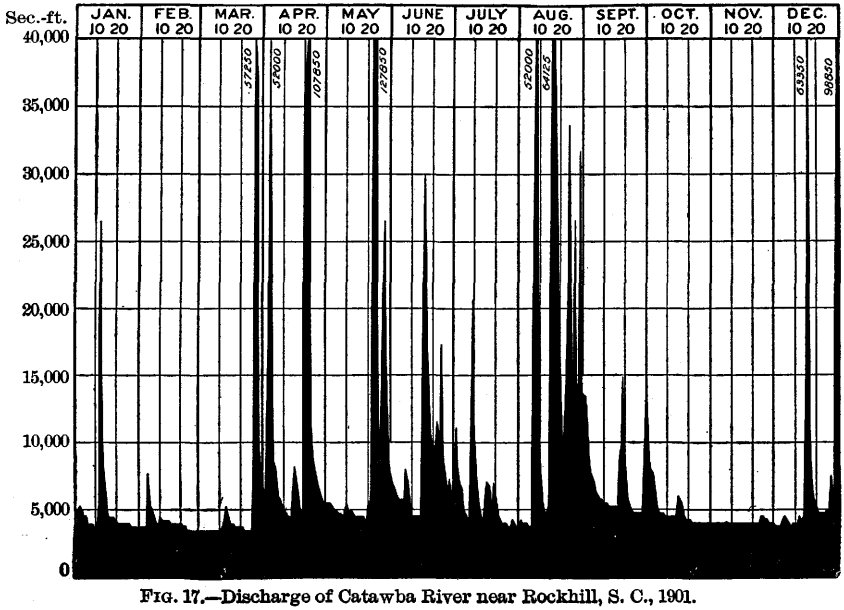


FIG. 17.—Discharge of Catawba River near Rockhill, S. C., 1901.

BROAD RIVER (OF THE CAROLINAS).

Estimated monthly discharge of Broad River (of the Carolinas) near Alston, S. C.

[Drainage area, 4,609 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	23,550	4,105	7,227	1.57	1.81
February	32,100	3,816	7,775	1.69	1.76
March	100,987	3,340	11,784	2.56	2.95
April	103,300	5,075	22,490	4.88	5.44
May	131,050	3,765	15,331	3.33	3.84
June	54,675	4,540	13,666	2.96	3.30
July	13,350	4,450	6,349	1.38	1.59
August	104,225	3,765	30,201	6.55	7.55
September	89,425	6,750	18,113	3.93	4.38
October	14,850	5,075	7,123	1.55	1.79
November	6,960	4,360	4,892	1.07	1.18
December	121,337	4,450	16,457	3.57	4.12
The year	131,050	3,340	13,451	2.92	39.71

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 250; rating table on page 320 of same paper.

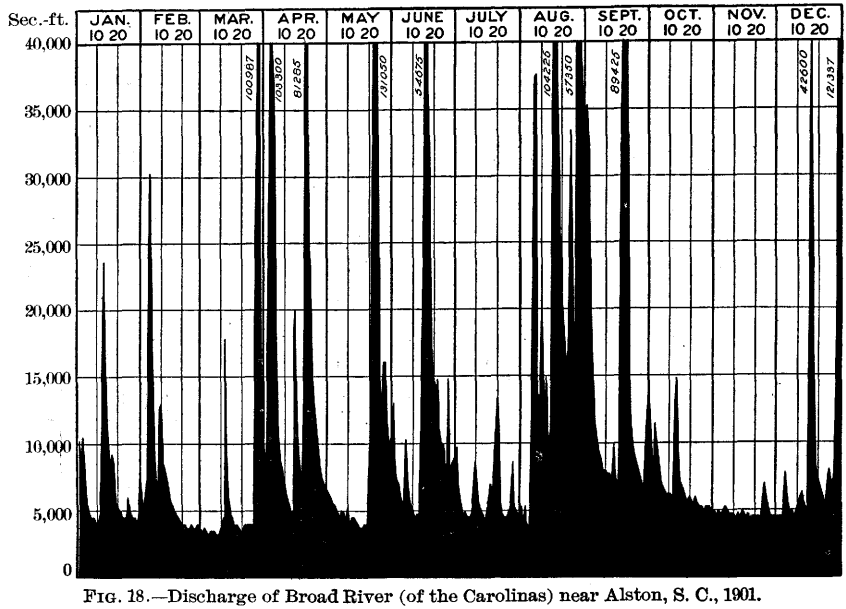


FIG. 18.—Discharge of Broad River (of the Carolinas) near Alston, S. C., 1901.

SALUDA RIVER.

Estimated monthly discharge of Saluda River at Waterloo, S. C.

[Drainage area, 1,056 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	5,670	780	1,834	1.74	2.01
February	7,166	672	2,066	1.96	2.04
March	10,668	843	2,203	2.09	2.41
April	11,212	1,046	3,382	3.20	3.57
May	10,906	650	2,539	2.40	2.77
June	12,810	1,114	3,136	2.97	3.31
July	2,474	750	1,491	1.41	1.63
August	12,028	430	4,949	4.69	5.41
September	12,878	1,556	3,795	3.59	4.01
October	3,732	1,148	1,862	1.76	2.03
November	1,964	526	1,261	1.19	1.33
December	12,368	526	2,709	2.57	2.96
The year	12,878	430	2,602	2.46	33.48

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 250; rating table on page 320 of same paper.

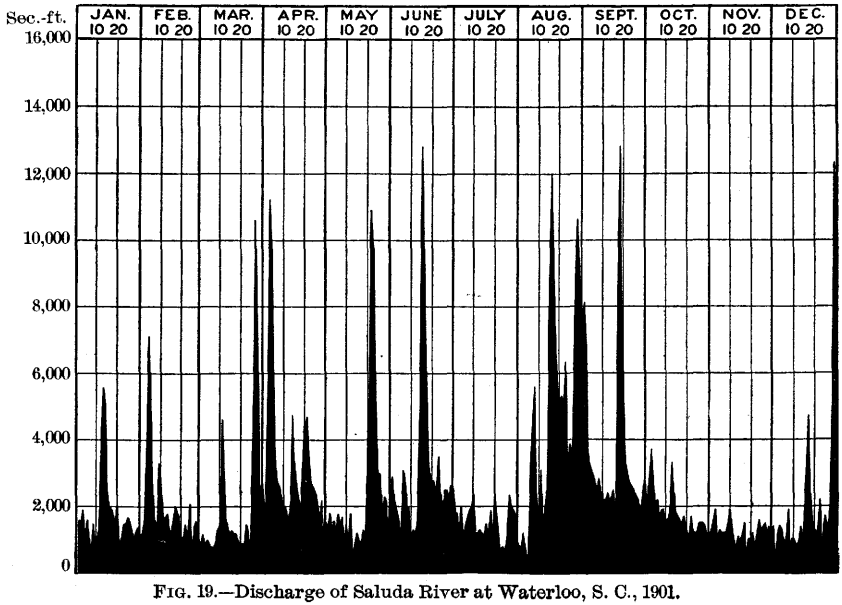


FIG. 19.—Discharge of Saluda River at Waterloo, S. C., 1901.

SAVANNAH RIVER.

Estimated monthly discharge of Tallulah River at Tallulah Falls, Ga.

[Drainage area, 191 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	----------	----------	[a] 810	4.24	4.89
February	1,365	587	687	3.60	3.75
March	4,550	461	976	5.11	5.89
April	3,850	770	1,424	7.46	8.32
May	5,250	540	1,065	5.58	6.43
June	1,050	540	817	4.28	4.78
July	875	429	625	3.27	3.77
August	4,690	391	1,608	8.42	9.71
September	2,030	640	1,358	7.11	7.93
October	613	429	511	2.68	3.09
November	429	391	398	2.08	2.32
December	6,650	391	1,013	5.30	6.11
The year	6,650	391	941	4.93	66.99

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 251; rating table on page 320 of same paper.

Estimated monthly discharge of Tugaloo River near Madison, S. C.

[Drainage area, 593 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	8,780	1,180	2,153	3.63	4.19
February	4,380	1,180	1,719	2.90	3.02
March	15,540	1,135	2,444	4.12	4.75
April	16,460	2,060	3,804	6.42	7.16
May	12,540	1,475	2,932	4.95	5.71
June	6,140	1,475	2,549	4.30	4.80
July	2,300	1,180	1,570	2.65	3.06
August	13,660	1,045	4,876	8.22	9.48
September	6,620	1,860	3,047	5.14	5.74
October	2,060	1,225	1,542	2.60	3.00
November	1,225	960	1,091	1.84	2.05
December	14,860	960	2,577	4.35	5.01
The year	16,460	960	2,525	4.26	57.97

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 252; rating table on page 320 of same paper.

Estimated monthly discharge of Savannah River near Calhoun Falls, S. C.

[Drainage area, 2,712 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	16,950	4,335	7,113	2.62	3.02
February	19,560	3,150	5,817	2.14	2.23
March	62,625	2,690	9,040	3.33	3.84
April	40,875	7,380	13,006	4.80	5.35
May	35,220	3,900	8,895	3.28	3.78
June	47,400	5,640	11,193	4.13	4.61
July	8,250	2,910	4,800	1.77	2.04
August	48,705	2,910	15,328	5.65	6.51
September	65,670	3,500	10,066	3.71	4.14
October	5,640	2,280	3,578	1.32	1.52
November	2,280	1,660	1,911	.70	.78
December	68,715	1,870	10,411	3.84	4.43
The year	68,715	1,660	8,430	3.10	42.25

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 253; rating table on page 320 of same paper.

Estimated monthly discharge of Savannah River at Augusta, Ga.

[Drainage area, 7,294 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	48,590	7,680	14,295	1.96	2.26
February	75,060	7,440	16,566	2.27	2.36
March	86,400	6,500	15,133	2.07	2.39
April	111,920	10,460	25,365	3.48	3.88
May	77,600	7,280	15,344	2.10	2.42
June	76,720	8,400	19,574	2.68	2.99
July	16,430	6,350	8,981	1.23	1.42
August	92,560	5,600	26,256	3.60	4.15
September	111,920	8,740	20,568	2.82	3.15
October	14,200	7,120	9,172	1.26	1.45
November	7,920	7,120	7,547	1.03	1.15
December	107,520	7,120	18,565	2.54	2.93
The year	111,920	5,600	16,447	2.25	30.55

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 254; rating table on page 320 of same paper.

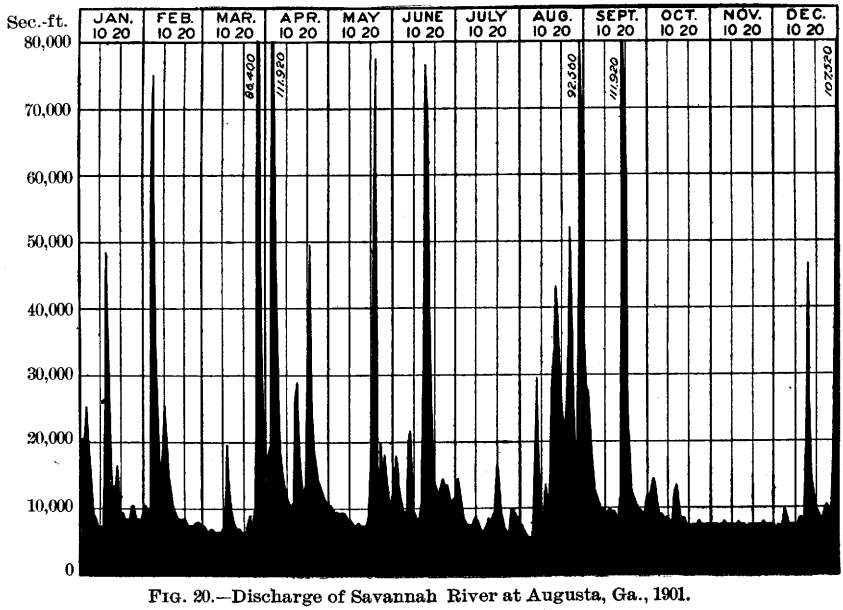


FIG. 20.—Discharge of Savannah River at Augusta, Ga., 1901.

Estimated monthly discharge of Broad River (of Georgia) near Carlton, Ga.

[Drainage area, 762 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	11,575	940	2,093	2.75	3.17
February	6,715	1,010	1,697	2.23	2.32
March	15,288	870	2,266	2.97	3.42
April	12,182	1,080	2,421	3.18	3.55
May	6,715	870	1,673	2.20	2.54
June	11,170	1,010	2,354	3.09	3.44
July	4,550	800	1,270	1.67	1.93
August	9,550	730	3,196	4.19	4.83
September	16,030	1,010	2,153	2.82	3.14
October	2,750	870	1,083	1.42	1.64
November	1,010	870	898	1.18	1.32
December	22,915	870	2,769	3.63	4.18
The year	22,915	730	1,989	2.61	35.48

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 255; rating table on page 321 of same paper.

ALTAMAHA RIVER.

Estimated monthly discharge of Middle Oconee River near Athens, Ga.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
November	572	430	486	1.23	1.37
December	12,900	464	1,373	3.48	4.01

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 257; rating table on page 321 of same paper.

Estimated monthly discharge of Oconee River at Barnett Shoals, Ga.

[Drainage area, 835 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
August 13–31	----------	----------	4,092	4.90	3.46
September	9,542	824	1,763	2.11	2.35
October	1,958	780	916	1.10	1.27
November	918	780	801	.96	1.07
December	16,410	780	2,294	2.75	3.17

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 257; rating table on page 321 of same paper.

Estimated monthly discharge of Apalachee River near Buckhead, Ga.

[Drainage area, 440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
March	2,972	470	847	1.92	2.21
April	3,660	552	1,123	2.55	2.84
May	1,680	388	553	1.26	1.45
June	2,147	552	910	2.07	2.31
July	1,460	333	582	1.32	1.52
August	2,697	305	896	2.04	2.35
September	3,247	305	711	1.62	1.81
October	525	280	349	.79	.91
November	415	280	326	.74	.83
December	5,772	333	1,027	2.33	2.69

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 258; rating table on page 321 of same paper.

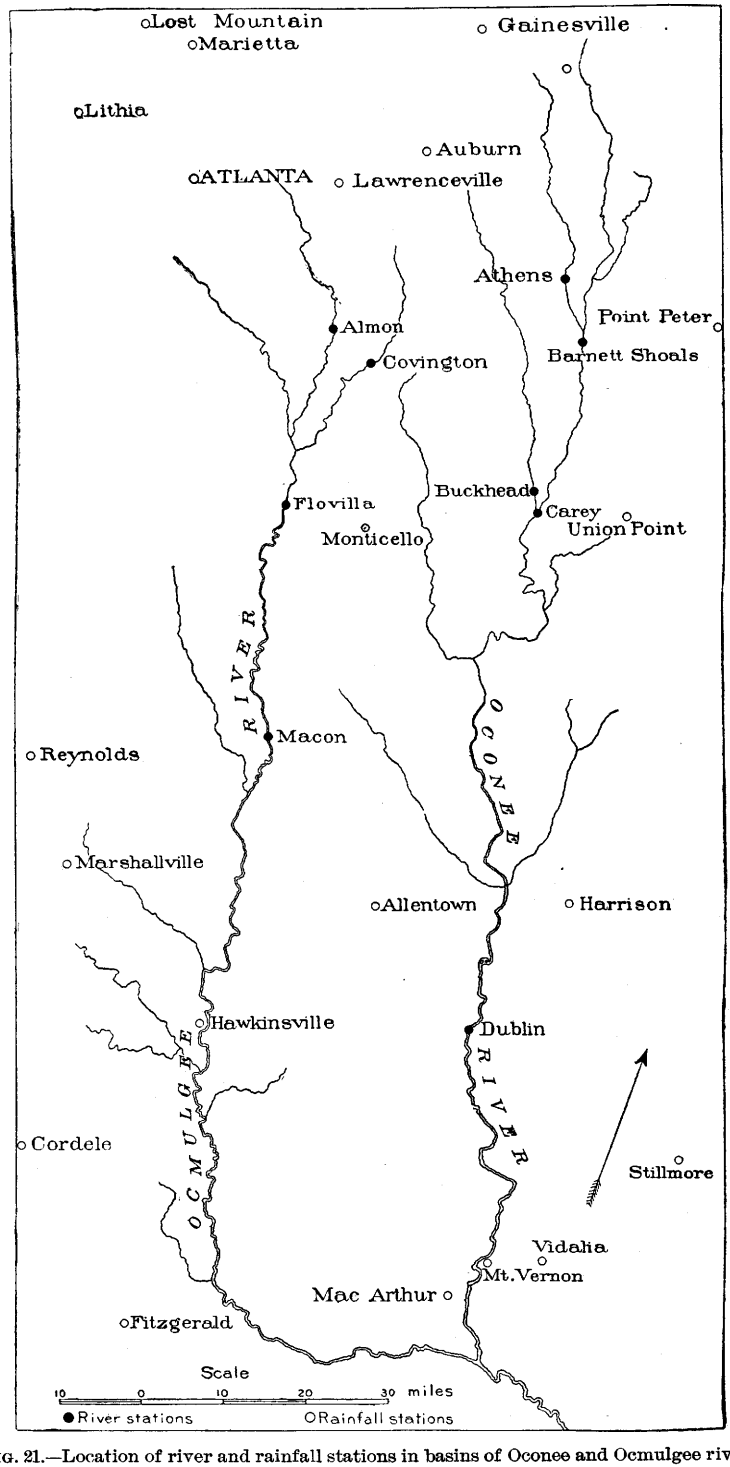


FIG. 21.—Location of river and rainfall stations in basins of Oconee and Ocmulgee rivers

Estimated monthly discharge of Oconee River near Dublin, Ga.

[Drainage area, 4,182 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	15,706	5,105	9,396	2.25	2.60
February	17,872	4,670	9,315	2.23	2.32
March	18,670	3,490	6,494	1.55	1.79
April	25,624	4,287	12,344	2.95	3.29
May	9,094	2,742	4,250	1.02	1.18
June	12,856	4,199	8,065	1.93	2.15
July	7,270	2,559	4,258	1.02	1.18
August	11,602	2,080	5,999	1.43	1.65
September	21,976	2,125	8,035	1.92	2.14
October	5,674	2,173	3,046	.73	.84
November	2,742	2,223	2,369	.56	.62
December	9,664	2,329	4,435	1.06	1.22
The year	25,624	2,080	6,500	1.55	20.98

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 259; rating table on page 321 of same paper.

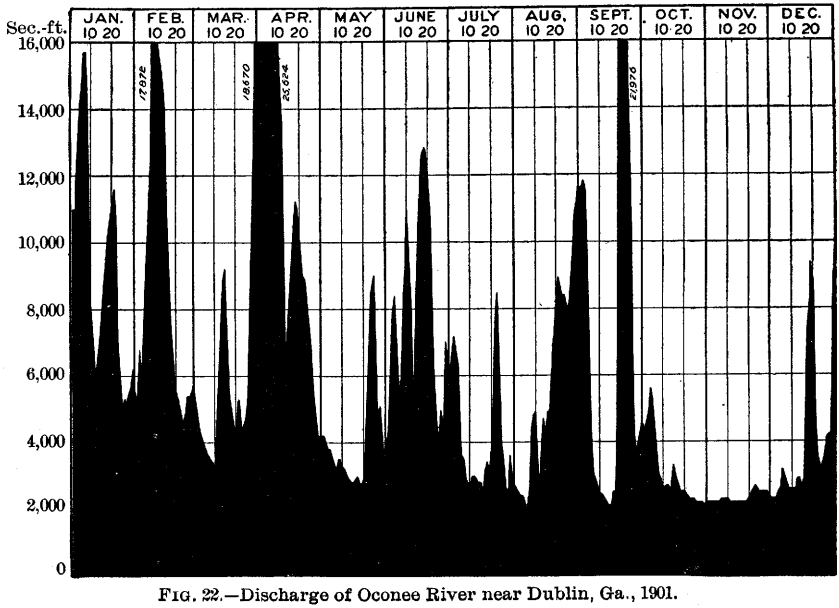


FIG. 22.—Discharge of Oconee River near Dublin, Ga., 1901.

Estimated monthly discharge of Alcovy River near Covington, Ga.

[Drainage area, 228 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
May	593	162	271	1.19	1.37
June	821	198	442	1.94	2.16
July	840	143	377	1.65	1.90
August	1,030	111	582	2.55	2.94
September	935	152	361	1.58	1.76
October	555	152	228	1.00	1.15
November	273	162	183	.80	.89
December	1,144	162	393	1.72	1.98

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 260; rating table on page 321 of same paper.

Estimated monthly discharge of Yellow River at Almon, Ga.

[Drainage area, 379 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	3,070	511	934	2.46	2.84
February	5,020	455	1,076	2.84	2.96
March	3,070	361	710	1.87	2.16
April	4,591	482	1,221	3.22	2.59
May	2,095	320	551	1.45	1.67
June	1,900	406	741	1.96	2.19
July	3,070	250	488	1.29	1.49
August	3,070	235	988	2.61	3.01
September	3,070	361	655	1.73	1.93
October	925	266	397	1.05	1.21
November	406	250	320	.84	.94
December	6,970	283	880	2.32	2.68
The year	6,970	235	947	1.97	25.67

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No 65, page 261; rating table on page 321 of same paper.

Estimated monthly discharge of Ocmulgee River near Flovilla, Ga.

[Drainage area, 1,500 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
August	7,987	835	2,916	1.94	2.24
September	8,451	1,037	2,219	1.48	1.65
October	2,837	907	1,223	.82	.94
November	1,138	907	1,593	1.06	1.18
December	11,850	907	2,531	1.69	1.95

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 262; rating table on page 321 of same paper.

Estimated monthly discharge of Towaliga River near Juliette, Ga.

[Drainage area, 350 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	1,173	327	602	1.72	1.98
February	1,461	345	576	1.65	1.72
March	1,965	309	520	1.49	1.72
April	2,379	363	707	2.02	2.25
May	1,245	255	380	1.09	1.26
June	885	237	440	1.26	1.41
July	1,533	144	337	.96	1.11
August	1,893	154	531	1.52	1.75
September	1,245	154	360	1.03	1.15
October	417	165	209	.60	.69
November	309	154	185	.53	.59
December	1,857	190	475	1.36	1.57
The year	2,379	144	444	1.27	17.20

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 264; rating table on page 321 of same paper.

Estimated monthly discharge of Ocmulgee River at Macon, Ga.

[Drainage area, 2,425 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	13,010	2,244	4,908	2.02	2.33
February	21,880	2,185	5,165	2.13	2.22
March	22,720	1,693	4,586	1.89	2.18
April	34,060	2,244	6,556	2.70	3.01
May	13,590	1,546	2,806	1.16	1.34
June	6,704	1,693	3,323	1.37	1.53
July	19,780	1,314	2,521	1.04	1.20
August	16,420	1,184	4,686	1.93	2.23
September	29,440	1,227	3,913	1.61	1.80
October	3,081	978	1,412	.58	.67
November	1,314	978	1,104	.46	.51
December	30,280	1,059	4,324	1.78	2.05
The year	34,060	978	3,775	1.56	21.07

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 265; rating table on page 321 of same paper.

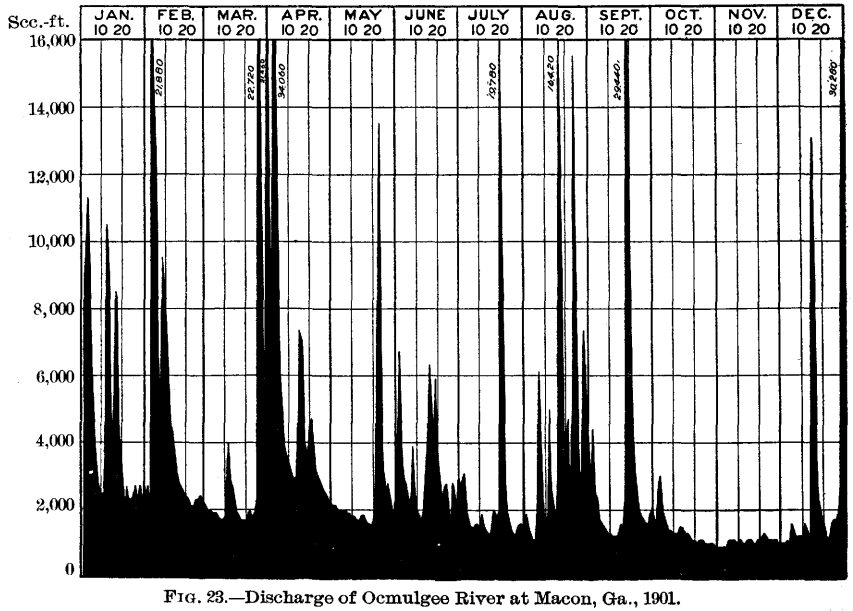


FIG. 23.—Discharge of Ocmulgee River at Macon, Ga., 1901.

PRECIPITATION IN THE BASINS OF OCONEE AND OCMULGEE RIVERS.

The principal observations of rainfall made within the Oconee and Ocmulgee river basins, considered here in conjunction, the two rivers being the principal tributaries of the Altamaha, are at the stations enumerated in the following table, which also gives their geographic location, elevation above sea level, and length of record of observations. The relative location of these points is shown in fig. 21, in connection with the points of river measurements which are located at Athens, Almon, Covington, Flovilla, Juliette, Macon, Barnett Shoals, Buckhead, Carey, and Dublin.

Location of rainfall stations in Oconee and Ocmulgee basins.

Station.	County.	State.	Latitude.	Longitude.	Elevation.	Length of record.
			° ′	° ′	*Feet.*	*Years.*
Atlanta	Fulton	Georgia	33 45	84 23	1,050	28–32
Athens	Clarke	do	33 58	83 23	850	21–27
Allentown	Wilkinson	do				5–6
Covington	Newton	do	33 37	83 49	748	8–12
Gillsville	Hall	do	34 13	83 56	1,052	11–13
Gainesville	do	do	34 16	83 47	1,227	15–29
Macon	Bibb	do	32 50	83 38	334	17–32
Marshallville	Macon	do				9–11
Point Peter	Oglethorpe	do	33 57	82 59	1,000	12–13

The following table gives the figures of normal or average monthly precipitation from the beginning of the record and including 1900, together with the total precipitation by months for the years 1896, 1897, 1898, 1899, 1900, and 1901, and also the annual totals. In obtaining the normal precipitation the average is taken for all of the months during which observations were made.

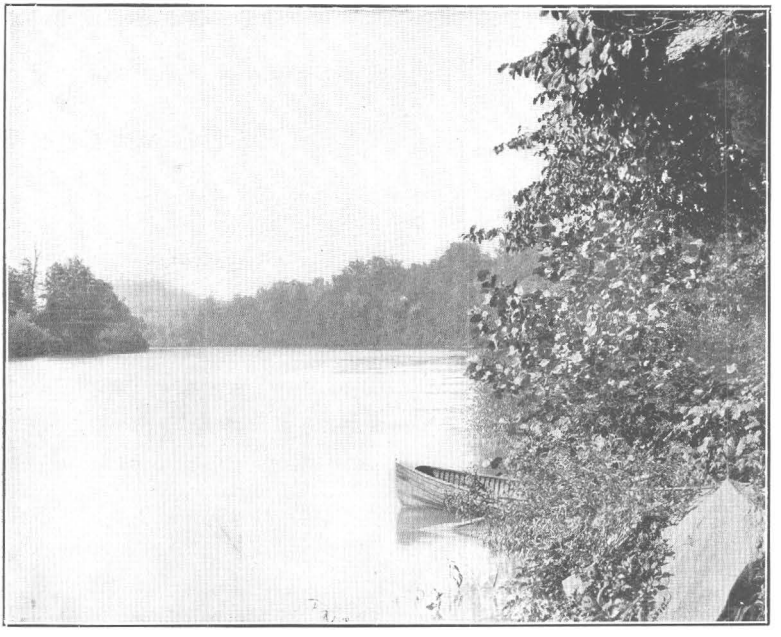
Precipitation at stations in drainage basins of Oconee and Ocmulgee rivers.

ATLANTA.

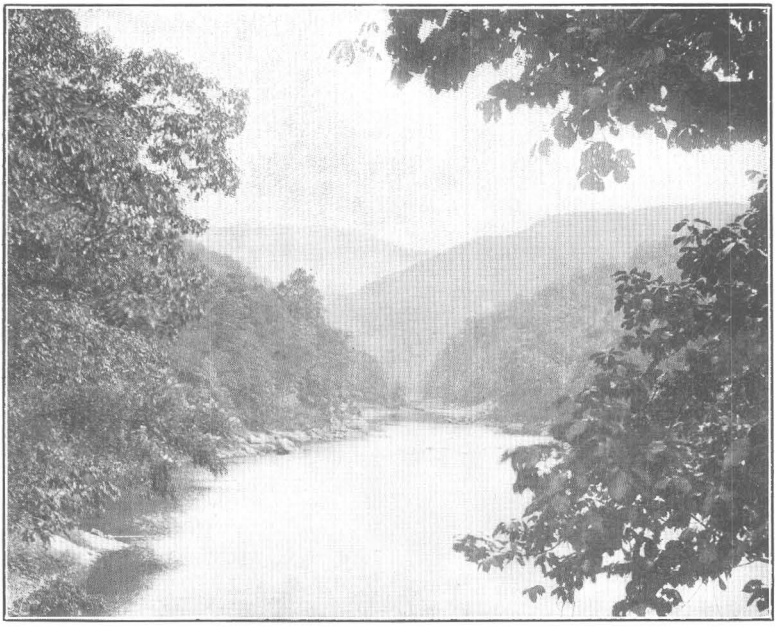
Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	5.13	5.27	5.47	4.14	3.57	4.03	4.67	4.49	3.80	2.32	3.62	4.73	51.24
1896	3.12	3.04	3.29	.58	1.95	2.66	7.55	1.97	1.36	1.28	5.90	1.42	34.12
1897	3.48	4.59	5.74	5.06	.34	2.07	4.74	6.01	.14	1.80	2.29	3.00	39.26
1898	2.99	.62	4.09	5.15	1.35	.89	10.22	6.66	6.33	5.06	3.36	3.84	50.56
1899	3.69	6.62	5.38	1.71	1.21	1.46	6.42	3.15	2.27	3.71	2.65	4.15	42.42
1900	2.32	9.58	5.69	6.27	2.94	8.96	4.51	1.79	3.62	2.79	3.62	6.74	58.83
1901	5.95	4.04	5.71	5.27	7.55	3.10	5.37	9.83	3.76	.59	.99	7.61	59.77

ATHENS.

Normal	5.78	5.30	5.34	3.92	3.78	4.89	4.87	5.14	3.67	2.60	2.99	3.98	52.26
1896	(5.78)	(5.30)	(5.34)	(3.92)	1.78	3.93	10.31	1.00	.66	1.82	(2.99)	(3.98)	46.81
1897	(5.78)	(5.30)	(5.34)	(3.92)	.61	2.85	3.19	4.17	.64	3.12	1.10	2.83	38.85
1898	2.93	.66	3.55	5.58	2.48	1.53	5.43	5.73	6.36	7.40	3.85	3.81	49.31
1899	7.21	8.56	4.88	1.98	.83	1.55	2.50	3.93	1.45	3.59	1.35	2.78	40.61
1900	2.10	8.45	6.54	7.76	2.97	11.39	4.13	1.27	3.89	4.80	3.74	5.68	62.72
1901	4.14	3.57	4.78	5.59	4.90	6.53	3.51	17.87	3.30	1.05	.77	5.42	61.43



A. MONONGAHELA RIVER AT MORGANTOWN, W. VA



B. CHEAT RIVER, LOOKING UPSTREAM FROM CAMP EDEN, MONONGALIA COUNTY, W. VA.

Precipitation at stations in drainage basins of Oconee and Ocmulgee rivers—Continued.

ALLENTOWN.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	3.23	6.70	4.74	3.94	2.08	3.13	5.26	5.03	3.55	3.86	4.01	4.21	49.74
1896	(3.23)	(6.70)	2.99	1.60	2.34	2.76	5.71	3.79	2.74	.72	7.49	5.21	45.28
1897	1.92	8.31	9.58	4.16	2.82	1.97	5.38	3.04	.73	2.51	.95	1.86	43.23
1898	1.48	1.02	1.13	7.22	.93	2.29	6.66	7.35	4.99	8.24	6.44	2.99	50.74
1899	6.38	9.32	3.13	3.15	1.72	1.69	3.50	3.26	.40	7.12	1.52	2.86	44.05
1900	2.42	10.26	5.57	4.10	2.59	6.96	6.03	3.11	1.90	3.61	6.61	8.06	61.22
1901	3.96	4.59	6.07	3.41	(2.08)	(3.13)	4.28	9.63	10.54	.97	1.03	4.26	53.95

COVINGTON.

Normal	4.44	5.02	4.96	4.94	2.79	4.04	4.96	6.09	2.69	3.03	2.81	4.33	50.10
1896	4.59	2.67	2.95	2.94	1.88	3.71	7.24	3.16	.90	2.62	9.78	1.11	43.55
1897	2.51	6.27	7.58	4.29	.95	2.68	3.52	5.44	.98	2.98	1.32	3.07	41.59
1898	3.86	1.06	3.59	5.93	1.98	1.46	10.20	10.69	5.33	9.55	4.04	4.85	62.54
1899	8.06	8.38	3.71	2.66	3.26	2.16	2.66	2.96	1.54	4.62	2.46	3.14	45.61
1900	2.35	10.46	3.40	7.54	2.21	14.78	4.08	5.16	4.08	1.90	3.69	7.66	67.31
1901	3.89	3.95	6.56	4.32	5.99	4.28	3.34	10.75	4.49	.61	.50	7.83	56.51

GILLSVILLE.

Normal	4.47	5.08	5.39	3.94	3.26	4.14	5.88	5.13	4.17	2.44	2.54	3.26	49.70
1896	4.45	2.14	2.11	.80	4.68	2.82	7.62	1.48	1.48	1.57	6.13	.40	35.68
1897	4.26	5.40	6.50	6.62	.00	2.48	10.94	2.95	a.00	5.11	1.83	3.91	50.00
1898	1.26	.36	3.54	4.20	1.03	2.64	6.75	7.78	10.13	8.18	3.17	3.54	52.58
1899	4.28	8.87	8.63	2.32	2.35	1.94	2.92	3.48	.53	2.37	2.80	3.61	44.10
1900	3.42	10.77	5.72	8.10	2.94	8.82	3.42	1.36	3.04	4.07	3.25	3.20	58.11
1901	6.44	3.43	6.50	6.20	6.11	5.89	5.57	11.73	5.38	.62	.10	6.14	64.11

GAINESVILLE.

Normal	5.96	6.34	6.78	4.30	3.39	4.67	5.04	6.03	3.99	2.74	3.71	5.24	58.19
1896	(5.96)	(6.34)	(6.78)	(4.30)	1.53	2.08	10.61	.77	1.62	(2.74)	6.77	2.02	51.52
1897	4.49	4.89	6.90	(4.30)	1.15	3.03	14.43	2.48	.05	2.67	3.46	2.78	50.54
1898	3.24	.79	4.41	5.29	1.03	1.23	12.12	9.58	6.71	7.30	3.58	3.37	58.65
1899	4.11	8.17	10.46	3.76	1.46	3.41	2.40	4.10	.40	2.43	2.82	4.49	48.01
1900	2.97	8.84	6.75	5.76	1.31	12.09	3.88	1.34	1.49	2.66	3.16	(5.24)	55.49
1901	8.02	3.53	6.69	5.84	6.35	6.89	5.47	13.58	4.65	1.24	.15	6.37	68.78

MACON.

Normal	3.83	4.50	5.82	3.94	3.03	4.23	4.78	4.89	2.68	2.10	3.03	4.45	47.28
1896	3.58	5.85	3.47	1.73	1,82	3.29	6.16	5.66	.68	1.58	7.09	5.01	45.92
1897	1.95	8.33	10.58	3.30	.87	6.16	5.10	3.37	1.12	.70	(3.03)	(4.45)	48.96
1898	(3.83)	(4.50)	(5.82)	(3.94)	.45	2.63	6.15	8.76	4.17	6.60	(3.03)	(4.45)	54.33
1899	(3.83)	(4.50)	(5.82)	a3.11	1.83	1.61	2.47	1.94	1.61	5.20	1.73	3.45	37.10
1900	1.87	7.64	3.68	4.80	2.97	6.69	3.26	5.93	1.25	1.27	4.53	5.89	49.78
1901	3.53	3.91	6.94	3.86	2.85	3.82	1.15	3.95	4.64	1.59	.42	5.37	42.03

a Approximate.

Precipitation at stations in drainage basins of Oconee and Ocmulgee rivers—Continued.

MARSHALLVILLE.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	4.22	6.23	5.75	4.17	2.36	3.72	5.62	5.19	2.45	3.08	2.95	4.28	50.02
1896	5.25	8.08	4.15	3.60	3.10	2.04	12.56	2.60	1.17	2.15	8.78	4.75	58.23
1897	1.93	8.85	10.06	5.57	.96	5.87	3.20	4.10	1.16	1.02	.70	2.83	46.25
1898	1.35	1.19	2.00	9.12	1.19	3.76	6.84	9.27	1.34	7.83	6.79	4.19	54.87
1899	6.22	6.50	2.91	4.99	1.46	.96	2.89	3.59	.72	8.24	1.59	2.87	42.94
1900	2.51	10.72	4.25	4.02	1.10	4.38	4.74	3.30	.44	2.68	4.20	8.66	51.00
1901	4.53	3.98	6.78	3.28	4.41	6.57	2.22	6.68	9.38	2.55	1.06	5.65	57.09

POINT PETER.

Normal	5.09	5.16	5.27	3.83	2.75	4.03	5.44	5.80	3.68	2.87	3.12	3.57	50.61
1896	5.40	4.60	3.35	2.90	2.55	1.45	8.65	1.10	1.25	2.35	6.60	[a]3.15	43.35
1897	4.06	6.50	5.68	6.51	.96	3.91	4.37	6.74	[a]2.05	2.21	3.00	3.05	49.04
1898	3.10	.70	4.25	5.38	.17	1.82	11.51	8.74	2.59	8.79	4.58	3.62	55.25
1899	7.25	8.19	5.00	1.99	.68	2.06	2.54	4.27	1.14	4.28	2.69	3.14	43.23
1900	1.85	8.34	4.54	6.27	3.47	12.71	6.90	.73	4.74	2.89	3.62	5.69	61.75
1901	4.08	3.68	5.12	5.12	6.22	4.18	2.84	15.67	7.35	.54	.87	6.86	62.53

[a] Approximate.

Depth of run-off, in inches, from the drainage basin of Yellow River at Almon.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1900	1.30	4.10	2.93	4.21	1.89	4.09	1.73	1.08	1.45	1.13	1.12	2.46	27.49
1901	2.84	2.96	2.16	2.59	1.67	2.19	1.49	3.01	1.93	1.21	.94	2.68	25.67
Average	2.07	3.53	2.54	3.40	1.78	3.14	1.61	2.04	1.69	1.17	1.03	2.57	26.57

Depth of run-off, in inches, from the drainage basin of Middle Oconee River at Athens.

Year.	Nov.	Dec.
1901	1.37	4.01

Depth of run-off, in inches, from the drainage basin of Apalachee River at Buckhead.

Year.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	2.21	2.84	1.45	2.31	1.52	2.35	1.81	0.91	0.83	2.69

Depth of run-off, in inches, from the drainage basin of Oconee River at Barnett Shoals.

Year.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	3.46	2.35	1.27	1.07	3.17

Depth of run-off, in inches, from the drainage basin of Alcovy River at Covington.

Year.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	1.37	2.16	1.90	2.94	1.76	1.15	0.89	1.98

Depth of run-off, in inches, from the drainage basin of Oconee River at Dublin.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1898	.....	.....	0.71	1.34	0.49	0.32	0.85	1.57	2.84	2.05	1.90	2.02	.....
1899	2.96	3.73	3.36	2.04	.94	.50	.46	.58	.44	.72	.45	.84	17.02
1900	.97	2.99	2.73	2.53	1.31	2.23	1.76	.63	.64	.61	.86	1.61	18.87
1901	2.60	2.32	1.79	3.29	1.18	2.15	1.18	1.65	2.14	.84	.62	1.22	20.98
Average	2.18	3.01	2.15	3.30	.98	1.30	1.06	1.11	1.52	1.06	.96	1.42	19.05

Depth of run-off, in inches, from the drainage basin of Ocmulgee River at Flovilla.

Year.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	2.24	1.65	0.94	1.18	1.95

Depth of run-off, in inches, from the drainage basin of Towaliga River at Juliette.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1901	1.98	1.72	1.72	2.25	1.26	1.41	1.11	1.75	1.15	0.69	0.59	1.57	17.20

Depth of run-off, in inches, from the drainage basin of Ocmulgee River at Macon.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.64	1.83	4.22	2.51	0.81	0.79	0.91	0.84	0.32	0.30	0.36	0.51	14.04
1898	.62	.42	.60	1.20	.44	.30	.78	2.20	2.77	2.72	1.70	1.69	15.44
1899	2.66	3.50	2.62	2.06	1.00	.61	.56	.51	.40	.63	.46	.75	15.76
1900	.73	4.16	2.21	3.22	1.36	3.78	1.72	.95	1.18	.89	1.06	1.94	23.20
1901	2.33	2.22	2.18	3.01	1.34	1.53	1.20	2.23	1.80	.67	.51	2.05	21.07
Average	1.40	2.43	2.37	2.40	.99	1.40	1.03	1.35	1.29	1.04	.82	1.39	17.91

Depth of run-off, in inches, from the drainage basin of Oconee River at Carey.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	1.81	2.25	2.61	1.19	0.97	0.65	1.16	0.81	0.38	0.63	0.69	0.95	14.10
1898	1.15	.83	1.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Average	1.48	1.54	1.86	1.19	.97	.65	1.16	.81	.38	.63	.69	.95	12.31

Rainfall and run-off in Oconee and Ocmulgee basins.

Station.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RAINFALL.							
Atlanta	51.24	34.12	39.26	50.56	42.42	58.83	59.77
Athens	52.26	46.81	38.85	49.31	40.61	62.72	61.43
Allentown	49.74	45.28	43.23	50.74	44.05	61.22	53.95
Covington	50.10	43.55	41.59	62.54	45.61	67.31	56.51
Gillsville	49.70	35.68	50.00	52.58	44.10	58.11	64.11
Gainesville	58.19	51.52	50.54	58.65	48.01	55.49	68.78
Macon	47.28	45.92	48.96	54.33	37.10	49.78	42.03
Marshallsville	50.02	58.23	46.25	54.87	42.94	51.00	57.09
Point Peter	50.61	43.35	49.04	55.25	43.23	61.75	62.53
Average	51.02	44.94	45.30	54.31	43.12	58.47	58.47
RUN-OFF.							
Almon	26.57	.....	.....	.....	.....	27.49	25.67
Dublin	19.05	.....	.....	.....	17.02	18.87	20.98
Juliette	17.20	.....	.....	.....	.....	.....	17.20
Macon	17.91	.....	14.04	15.44	15.76	23.20	21.07
Carey	12.31	.....	14.10	.....	.....	.....	.....
Average run-off	18.61	.....	14.07	15.44	16.39	23.19	21.23
Percentage of rainfall	36.48	.....	31.06	28.43	38.01	39.66	36.31

EASTERN GULF DRAINAGE.

The rivers flowing into the eastern portion of the Gulf of Mexico are for the most part of a character similar to those in the Southern Atlantic drainage, though in their lower courses their flow is usually more sluggish. Regular gaging stations have been maintained during the year 1901 as follows: On Flint River at Woodbury, Ga., and Albany, Ga.; on Chattahoochee River near Gainesville, Ga., near Buford, Ga., at Oakdale, Ga., and at West Point, Ga.; on Etowah River at Canton, Ga.; Coosawattee River at Carters, Ga.; on Oostanaula River at Resaca, Ga.; on Coosa River at Rome, Ga., near Riverside, Ala., and at Locks Nos. 4 and 5, Alabama; on Talladega Creek at Nottingham, Ala.; on Hillabee Creek near Alexander City, Ala.; on Big Sandy Creek near Dadeville, Ala.; on Tallapoosa River near Sturdevant, Ala., near Susanna, Ala., and near Milstead, Ala.; on Alabama River at Montgomery, Ala., and at Selma, Ala.; on Cahaba River at Centerville, Ala.; on Mulberry Fork of Black Warrior River near Cordova, Ala.; on Black Warrior River at Tuscaloosa,

Ala.; on Tombigbee River at Columbus, Miss., and at Epes, Ala.; and on Pearl River at Jackson, Miss. The locations of the river stations in the Apalachicola and Mobile river basins are shown in figs. 24 and 36.

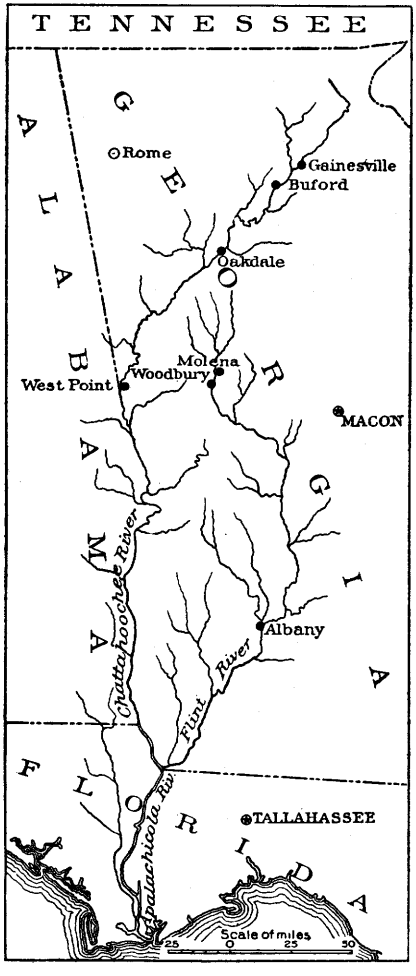


FIG. 24.—Drainage basin of Apalachicola River.

The floods that occurred during the year 1901 on the rivers of the southeastern States have been of marked severity, notably the high water of December 29 to 31, which resulted in the destruction of a number of masonry mill dams and other valuable property.

APALACHICOLA RIVER.

Estimated monthly discharge of Flint River at Woodbury, Ga.

[Drainage area, 988 square miles.]

Month.	Discharge in second-feet.			Run-off	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	5,840	1,370	2,803	2.84	3.27
February	6,820	1,120	2,395	2.42	2.52
March	7,100	800	1,774	1.80	2.08
April	9,900	890	2,818	2.85	3.18
May	13,260	580	2,285	2.31	2.66
June	3,740	580	1,617	1.64	1.83
July	2,200	460	780	.79	.91
August	10,460	460	2,467	2.50	2.88
September	5,980	460	1,249	1.26	1.41
October	3,040	430	679	.69	.80
November	650	460	526	.53	.59
December	14,100	530	2,005	2.03	2.34
The year	14,100	430	1,783	1.81	24.47

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 266; rating table on page 321 of same paper.

Estimated monthly discharge of Chattahoochee River near Buford, Ga.

[Drainage area, 1,050 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
June 24 to 30	----------	----------	3,554	3.38	0.88
July	8,768	1,700	2,507	2.39	2.76
August	18,064	1,450	4,985	4.75	5.48
September	10,224	2,300	3,031	2.89	3.22
October	3,105	1,560	1,863	1.77	2.04
November	1,630	1,450	1,537	1.46	1.63
December	23,100	1,450	3,624	3.45	3.98

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 268; rating table on page 321 of same paper.

Estimated monthly discharge of Chattahoochee River at Oakdale, Ga.

[Drainage area, 1,560 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	24,180	2,044	5,191	3.33	3.84
February	5,028	2,272	3,214	2.06	2.15
March	25,890	2,044	4,929	3.16	3.65
April	12,780	2,846	5,149	3.30	3.68
May	21,900	2,511	4,624	2.96	3.42
June	10,500	2,934	4,749	3.04	3.39
July	9,474	2,040	3,225	2.07	2.39
August	21,672	1,829	7,697	4.93	5.69
September	15,744	2,676	4,145	2.66	2.97
October	4,344	1,758	2,600	1.67	1.93
November	1,898	1,690	1,763	1.13	1.26
December	29,880	1,690	4,285	2.75	3.17
The year	29,880	1,690	4,298	2.75	37.54

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 269; rating table on page 322 of same paper.

Estimated monthly discharge of Chattahoochee River at West Point, Ga.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	42,630	4,920	11,748	3.56	4.11
February	37,100	4,920	10,015	3.03	3.16
March	33,410	4,280	7,952	2.41	2.78
April	23,360	4,920	11,022	3.34	3.73
May	52,750	4,700	10,814	3.28	3.79
June	16,110	4,920	8,487	2.57	2.87
July	12,456	3,000	4,964	1.50	1.73
August	52,290	3,000	12,982	3.93	4.54
September	32,030	3,520	7,145	2.16	2.41
October	11,628	2,840	3,883	1.18	1.36
November	4,280	2,380	2,835	.86	.96
December	88,630	2,380	12,116	3.67	4.24
The year	88,630	2,380	8,664	2.62	35.68

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 270; rating table on page 322 of same paper.

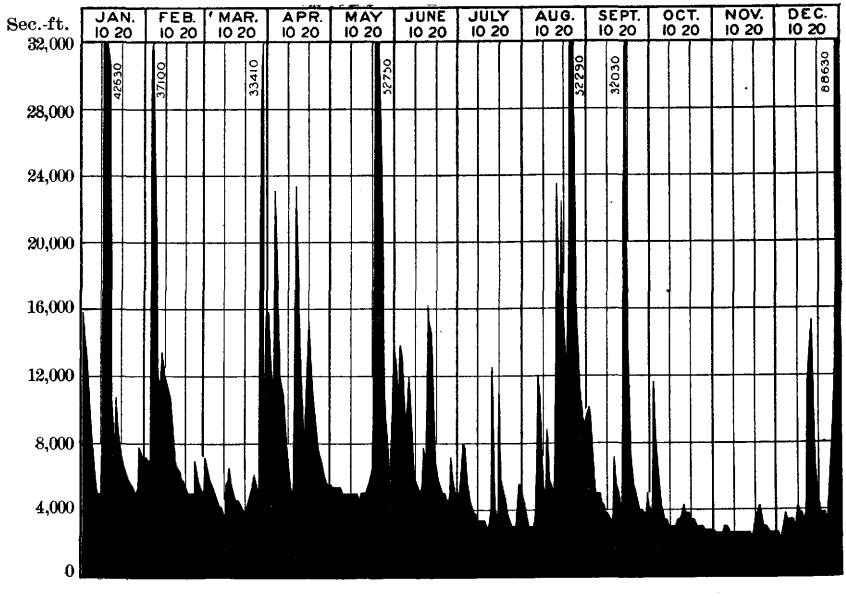


FIG. 25.—Discharge of Chattahoochee River at West Point, Ga., 1901.

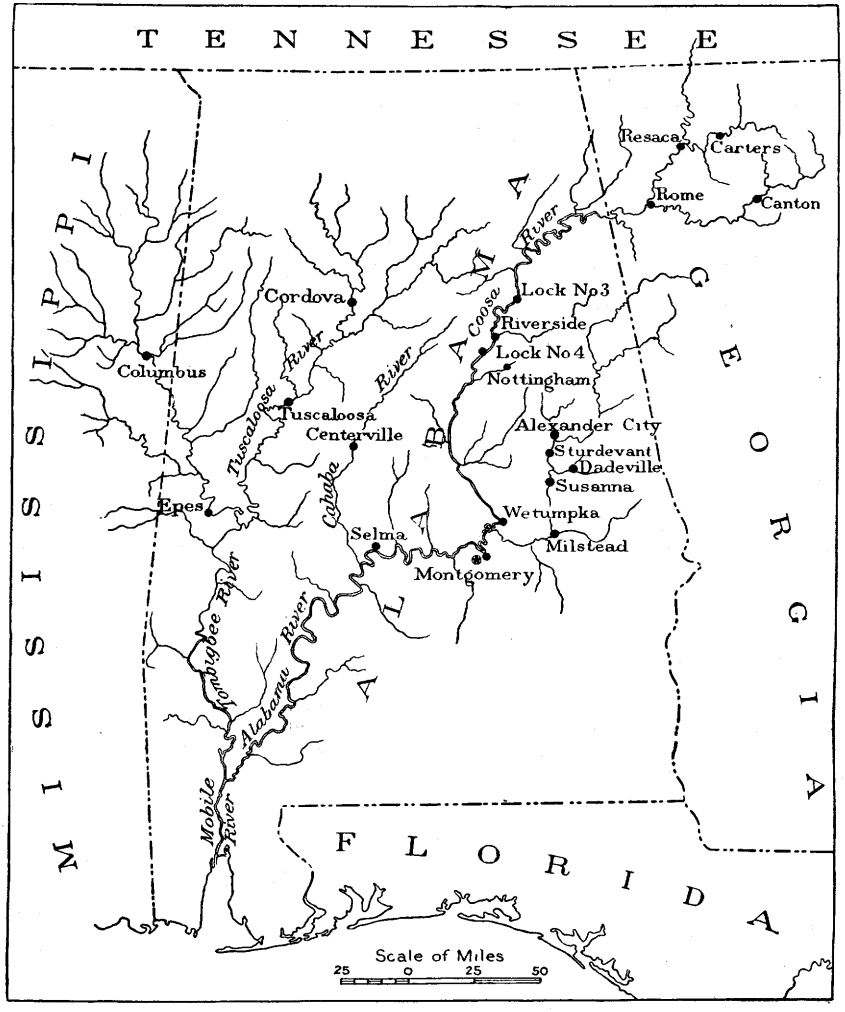


FIG. 26.—Drainage basin of Mobile River.

TALLAPOOSA RIVER.

Estimated monthly discharge of Hillabee Creek near Alexander City, Ala.

[Drainage area, 214 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
September	3,074	146	370	1.73	1.93
October	2,106	146	387	1.81	2.09
November	2,502	184	471	2.20	2.45
December	2,150	263	716	3.35	3.86
1901.					
January	3,030	566	1,198	5.60	6.46
February	3,646	566	920	4.30	4.48
March	1,798	434	617	2.88	3.32
April	3,910	566	911	4.26	4.75
May	1,226	434	624	2.92	3.37
June	830	230	439	2.05	2.29
July	1,006	169	357	1.67	1.93
August	1,446	138	535	2.50	2.89
September	654	138	249	1.16	1.29
October	786	138	181	.85	.98
November	169	138	148	.69	.77
December	4,350	138	526	2.46	2.84
The year	4,350	138	559	2.61	35.37

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 271, rating table on page 322 of same paper.

Estimated monthly discharge of Big Sandy Creek near Dadeville, Ala.

[Drainage area, 195 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	880	308	425	2.18	2.51
February	2,700	282	545	2.78	2.90
March	6,392	256	552	2.83	3.26
April	3,428	334	689	3.53	3.94
May	3,220	230	480	2.46	2.84
June	2,492	178	523	2.68	2.99
July	516	152	227	1.16	1.34
August	2,180	115	369	1.89	2.18
September	620	67	257	1.32	1.47
October	1,764	45	462	2.37	2.73
November	115	67	92	.47	.52
December	10,500	85	1,265	6.49	7.48
The year	10,500	45	490	2.51	34.16

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 273; rating table on page 322 of same paper.

Estimated monthly discharge of Tallapoosa River near Susanna, Ala.

[Drainage area, 2,610 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	53,780	5,630	13,265	5.08	5.86
February	44,780	5,630	11,303	4.33	4.51
March	26,330	3,850	7,546	2.89	3.31

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 274; rating table on page 322 of same paper.

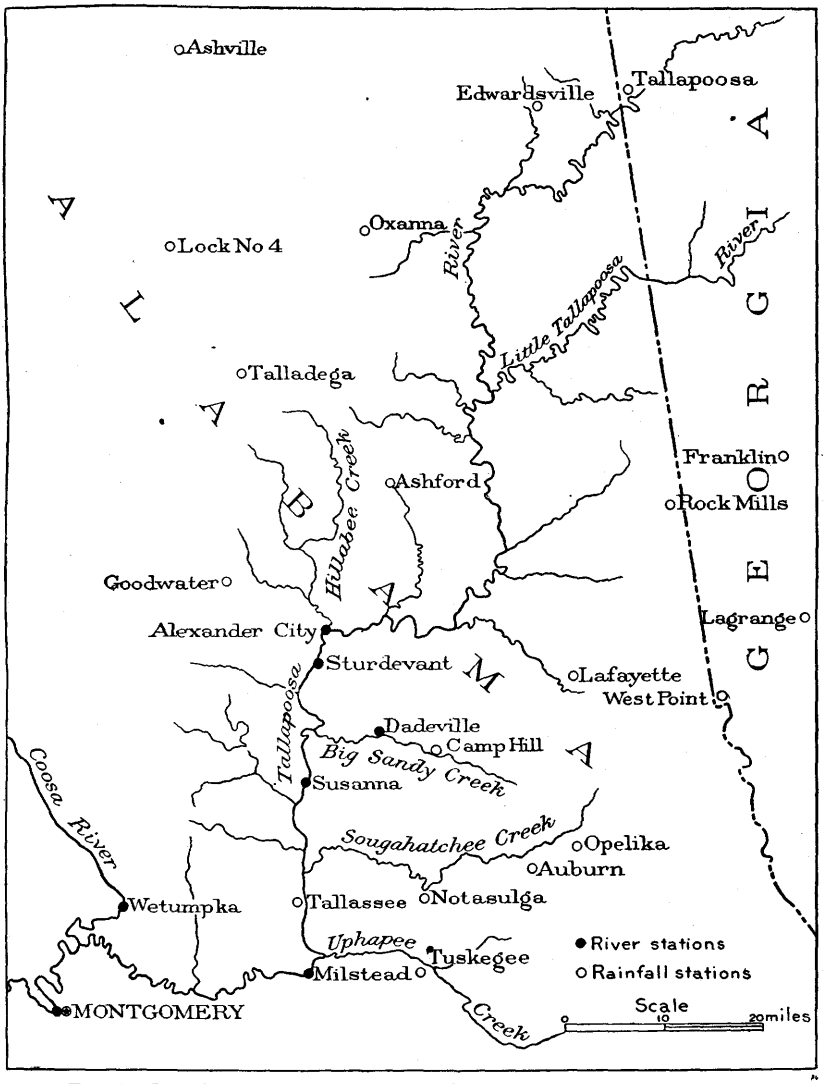


FIG 27.—Location of river and rainfall stations in basin of Tallapoosa River.

Estimated monthly discharge of Tallapoosa River near Milstead, Ala.

[Drainage area, 3,840 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	33,962	5,275	11,476	2.99	3.45
February	28,900	5,837	10,440	2.72	2.83
March	35,087	4,150	8,374	2.18	2.52
April	28,900	5,499	12,020	3.13	3.49
May	17,875	3,587	6,440	1.68	1.94
June	13,262	2,775	5,976	1.56	1.74
July	5,387	2,012	3,398	.88	1.01
August	23,275	2,012	5,904	1.54	1.78
September	9,887	1,675	3,137	.82	.91
October	6,849	1,562	2,364	.62	.71
November	2,237	1,562	1,855	.48	.54
December	[a]70,000	1,843	8,282	2.16	2.49
The year	[a]70,000	1,562	6,639	1.73	23.41

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 274; rating table on page 322 of same paper.

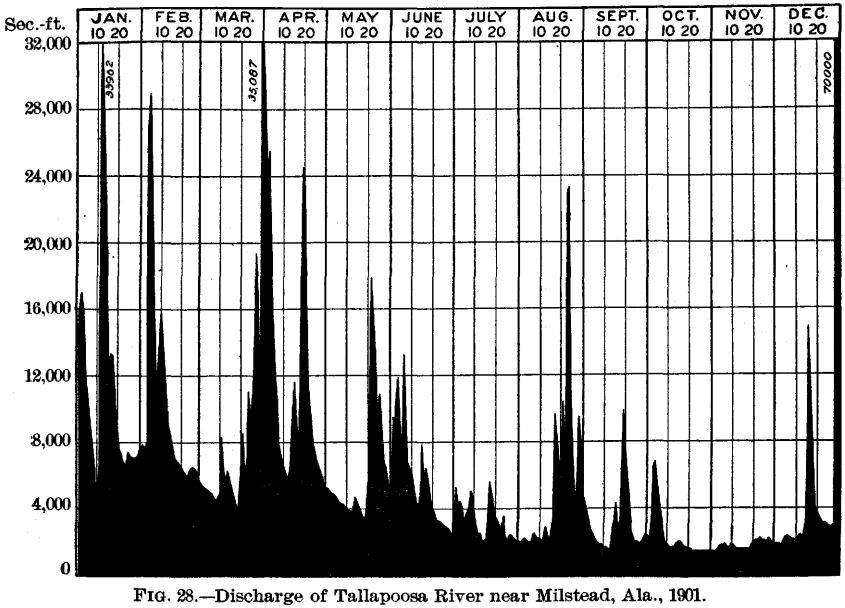


FIG. 28.—Discharge of Tallapoosa River near Milstead, Ala., 1901.

PRECIPITATION IN THE BASIN OF TALLAPOOSA RIVER.

The principal observations of rainfall made within the Tallapoosa River Basin are at the stations enumerated in the following table, which also gives their geographic location, elevation above sea level, and length of record of observations. The relative location of these points is shown in fig. 27, in connection with the points of river measurement which are located at Alexander City, Dadeville, Sturdevant, Susanna, and Milstead.

Location of rainfall stations in Tallapoosa River Basin.

Station.	County.	State.	Latitude.	Longitude.	Length of record.
			° ′	° ′	*Years.*
Ashville	St. Clair	Alabama			6- 7
Goodwater	Coosa	do			6- 9
Lock No. 4	Talladega	do			7- 9
Opelika	Lee	do	32 38	85 25	6-22
Oxanna	Calhoun	do	32 23	86 18	9-11
Tallassee	Elmore	do			8-11
Wetumka	do	do			9-11

The following table gives the figures of normal or average monthly precipitation from the beginning of the record and including 1901, together with the total precipitation by months for the years 1896, 1897, 1898, 1899, 1900, and 1901, and also the annual totals. In obtaining the normal precipitation the average is taken for all of the months during which observations were made:

Precipitation at stations in drainage basin of Tallapoosa River.

ASHVILLE, ALA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	4.54	4.65	7.16	6.30	7.90	4.01	5.12	4.48	2.52	2.94	3.04	4.95	57.61
1896	4.42	3.78	4.48	4.21	2.35	3.14	2.22	1.20	1.89	1.09	4.78	1.11	34.67
1897	4.15	6.09	7.42	5.00	1.62	.96	5.17	2.63	.30	1.00	.77	7.04	42.15
1898	5.48	.80	3.40	5.37	.48	2.97	6.81	3.50	3.79	7.53	4.25	2.12	46.14
1899	4.82	6.27	11.14	4.21	1.28	2.46	8.27	3.43	.14	1.30	3.81	6.10	53.23
1900	2.65	7.40	6.35	12.56	2.93	11.98	6.45	1.44	5.35	6.73	3.83	3.41	71.08
1901	5.73	3.56	10.14	6.42	5.65	2.65	2.51	11.45	3.81	.56	1.63	10.87	64.98

GOODWATER, ALA.

Normal	4.50	5.00	5.68	4.17	2.28	4.37	5.63	4.64	2.18	3.17	3.32	4.62	49.56
1896	5.93	4.36	6.39	2.83	3.89	3.36	4.57	.69	3.05	1.05	3.14	.50	39.76
1897	3.20	4.33	8.38	3.90	.10	3.18	4.16	3.62	.94	.00	(3.32)	(4.62)	39.75
1898	1.45	.75	2.29	4.41	.16	4.92	8.18	9.02	1.37	3.76	5.32	2.20	43.83
1899	5.21	(5.00)	7.26	3.41	2.79	2.27	10.22	3.25	.26	2.21	2.70	5.85	50.43
1900	4.08	10.28	5.85	6.10	2.30	10.35	6.60	4.79	3.44	8.74	5.57	7.38	75.48
1901	7.11	5.26	5.01	4.39	5.31	4.78	6.14	8.54	2.67	1.28	1.84	7.76	60.09

Precipitation at stations in drainage basin of Tallapoosa River—Continued.

LOCK NO. 4, ALABAMA.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	5.88	5.23	5.60	4.86	2.85	4.33	6.11	4.62	2.20	2.59	2.82	4.25	51.34
1896	4.50	4.80	4.25	2.44	3.25	4.77	5.85	1.90	1.04	1.71	2.61	.87	37.99
1897	4.69	5.61	8.23	3.64	1.72	.43	4.51	3.45	.73	.74	1.96	6.74	42.45
1898	4.67	.69	4.11	4.18	1.49	5.27	5.60	4.35	2.44	6.82	4.84	2.01	46.47
1899	3.79	7.21	5.86	4.32	2.61	1.38	6.25	3.82	.06	1.19	3.61	7.01	47.11
1900	2.86	7.34	7.30	9.36	3.43	13.06	6.97	2.51	4.43	4.83	5.04	4.26	71.39
1901	11.72	3.96	6.22	6.27	3.98	1.85	3.79	8.64	5.08	2.50	1.10	8.38	63.49

OPELIKA, ALA.

Normal	5.64	5.13	5.28	3.78	3.14	4.33	5.32	4.44	2.64	2.98	3.11	5.09	50.88
1896	6.53	3.87	2.48	1.29	1.63	1.94	5.54	1.39	1.94	1.02	5.10	1.30	34.03
1897	1.25	5.92	9.09	5.37	1.03	.70	6.33	5.38	.96	2.14	3.29	3.33	44.79
1898	4.89	1.85	3.15	4.11	.11	1.26	6.39	9.30	3.43	9.27	7.26	7.66	58.68
1899	7.41	6.42	5.58	2.54	2.39	2.47	3.98	3.69	.31	2.78	1.75	5.96	45.28
1900	3.52	10.87	6.10	4.51	.07	9.89	4.64	4.05	6.16	8.29	7.80	7.17	73.07
1901	9.59	7.14	9.63	7.60	4.09	4.08	3.45	5.82	3.35	.50	1.25	10.88	67.38

OXANNA, ALA.

Normal	5.18	4.90	5.38	4.77	4.07	4.47	5.40	4.30	2.45	1.66	2.75	4.27	49.59
1896	4.13	3.76	3.76	2.64	2.72	4.10	4.25	.98	2.49	1.53	3.80	.66	34.56
1897	3.67	5.29	8.65	2.77	1.73	1.38	7.16	2.91	.00	.53	1.87	6.10	42.06
1898	3.00	.80	3.79	4.17	1.12	2.88	5.19	8.15	1.85	(1.66)	4.32	1.75	38.68
1899	4.36	6.42	5.93	2.99	1.30	2.05	8.81	3.66	.05	1.92	2.50	5.91	45.91
1900	3.95	8.80	5.52	8.99	2.29	10.86	6.41	1.56	4.69	3.52	5.24	3.99	65.82
1901	4.64	4.54	5.17	6.28	6.11	4.73	5.13	7.37	3.16	.70	1.44	8.40	57.67

TALLASSEE, ALA.

Normal	5.11	6.39	6.60	3.65	2.59	4.18	5.01	5.67	2.48	1.97	3.51	5.29	52.45
1896	(5.11)	6.40	5.55	2.72	4.39	(4.18)	(5.01)	(5.67)	(2.48)	(1.97)	(3.51)	1.30	48.29
1897	3.28	7.28	11.25	5.03	1.39	(4.18)	4.53	6.21	(2.48)	.41	1.92	4.11	52.12
1898	2.12	1.91	3.70	5.25	.25	3.71	7.23	7.40	1.35	(1.97)	7.12	(5.29)	47.30
1899	6.62	7.12	4.42	1.83	1.30	2.15	6.82	3.39	.24	3.79	2.17	4.79	44.64
1900	.78	8.84	6.07	5.55	1.58	6.48	(5.01)	4.06	3.20	2.57	4.30	5.55	53.99
1901	6.44	4.03	7.17	4.88	4.89	2.14	2.40	4.65	3.85	.82	1.87	12.77	55.91

WETUMKA, ALA.

Normal	4.80	5.13	5.39	4.41	3.23	3.37	5.19	4.75	2.07	2.94	3.14	4.78	49.20
1896	6.49	5.46	5.54	3.33	4.26	6.74	5.69	4.51	1.62	1.13	3.02	1.78	49.57
1897	2.92	5.81	14.02	5.46	.93	.86	2.04	6,73	1.78	.20	2.47	4.36	47.58
1898	2.12	2.15	3.03	6.05	.62	2.00	7.74	8.52	1.93	3.84	6.71	3.87	48.58
1899	6.95	6.15	3.92	2.08	2.76	2.75	6.39	2.41	.22	4.36	2.46	4.62	45.07
1900	3.12	9.30	5.97	6.54	1.88	6.96	2.71	5.52	5.26	7.73	5.13	6.42	66.54
1901	5.07	3.40	6.35	4.93	4.11	2.63	1.96	3.68	3.72	.97	1.44	8.96	47.22

The amount of water delivered from the drainage basin as measured at the points named below has been computed in terms of depth in inches. The normals given are the monthly averages for times during which measurements or computations were had. The figures for the yearly normal are the sums of these monthly averages.

Depth of run-off, in inches, from the drainage basin of Tallapoosa River at Milstead, Ala.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	1.96	2.78	2.50	2.60	1.13	1.28	1.22	1.38	.86	1.09	1.02	1.90	19.70
1898	.72	.52	.69	1.67	.45	.38	.75	2.22	.77	2.19	1.76	1.73	13.85
1899	2.53	4.26	3.72	2.62	1.00	.59	1.50	.67	.29	.30	.53	1.42	19.43
1900	1.12	3.50	3.07	2.62	1.12	2.42	1.63	.84	1.45	1.14	1.23	1.95	22.09
1901	3.45	2.83	2.52	3.49	1.94	1.74	1.01	1.78	.91	.71	.54	2.49	23.41

Rainfall and run-off in basin of Tallapoosa River.

Station.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RAINFALL.							
Ashville	57.61	34.67	42.15	46.14	53.23	71.08	64.98
Goodwater	49.56	39.76	39.75	43.83	50.43	75.48	60.09
Lock No. 4	51.34	37.99	42.45	46.47	47.11	71.39	63.49
Opelika	50.88	34.03	44.79	58.68	45.28	73.07	67.38
Oxanna	49.59	34.56	42.06	38.68	45.91	65.82	57.67
Tallassee	52.45	48.29	52.12	47.30	44.64	53.99	55.91
Wetumka	49.20	49.57	47.58	48.58	45.07	66.54	47.22
Average	51.52	39.74	44.41	47.10	47.38	68.20	59.53
RUN-OFF.							
Tallapoosa at Milstead	19.70	.....	.....	13.85	19.43	22.09	23.41
Percentage of rainfall	38.24	.....	.....	29.41	41.01	32.39	39.32

COOSA RIVER.

Estimated monthly discharge of Etowah River at Canton, Ga.

[Drainage area, 604 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	14,185	988	1,965	3.25	3.75
February	5,470	1,154	2,135	3.53	3.68
March	14,600	988	1,890	3.13	3.61
April	4,474	1,154	2,290	3.81	4.25
May	14,268	1,154	2,394	3.96	4.57
June	4,889	1,154	2,442	4.04	4.51
July	2,648	905	1,317	2.18	2.51
August	11,280	820	2,533	4.19	4.83
September	2,814	988	1,483	2.46	2.74
October	2,897	590	1,039	1.72	1.98
November	1,320	905	1,052	1.74	1.94
December	17,090	988	2,715	4.50	5.19
The year	17,090	590	1,938	3.21	43.56

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 275; rating table on page 322 of same paper.

Estimated monthly discharge of Coosawattee River at Carters, Ga.

[Drainage area, 531 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	14,790	765	1,625	3.06	3.53
February	5,070	970	1,871	3.52	3.67
March	14,070	815	2,214	4.17	4.81
April	9,750	1,290	2,306	4.34	4.84
May	16,950	917	2,153	4.06	4.68
June	2,694	970	1,538	2.90	3.24
July	1,455	535	923	1.74	2.01
August	16,230	622	2,778	5.23	6.03
September	12,630	970	1,761	3.32	3.70
October	1,075	622	783	1.47	1.69
November	815	622	686	1.29	1.44
December	15,510	765	2,689	5.06	5.83
The year	16,950	535	1,777	3.35	45.47

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 277; rating table on page 322 of same paper.

Estimated monthly discharge of Oostanaula River at Resaca, Ga.[a]

[Drainage area, 1,614 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	22,274	1,700	6,222	3.86	4.45
February	12,522	1,880	4,655	2.88	3.00
March	21,446	1,700	5,597	3.47	4.00
April	16,846	2,870	6,699	4.15	4.63
November 13–30			1,211	.75	.50
December	22,182	1,000	5,958	3.69	4.25

[a] Half year station.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 278; rating table on page 322 of same paper.

Estimated monthly discharge at Coosa River at Rome, Ga.

[Drainage area, 4,006 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	52,930	4,600	15,450	3.86	4.45
February	35,845	4,900	12,186	3.04	3.17
March	52,930	4,600	13,406	3.34	3.85
April	36,046	6,901	15,578	3.88	4.33
May	51,724	4,150	12,533	3.12	3.60
June	19,966	4,450	8,316	2.08	2.32
July	9,715	2,850	4,441	1.10	1.27
August	45,292	2,850	13,780	3.44	3.97
September	21,172	3,120	6,389	1.59	1.77
October	5,230	2,350	3,414	.85	.98
November	2,850	2,110	2,316	.58	.65
December	64,186	2,475	13,428	3.35	3.86
The year	64,186	2,110	10,103	2.52	34.22

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 278; rating table on page 322 of same paper.

Estimated monthly discharge of Coosa River near Riverside, Ala.

[Drainage area, 7,065 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	55,900	8,970	26,089	3.69	4.25
February	41,100	8,970	21,784	3.08	3.21
March	56,700	7,400	20,613	2.92	3.37
April	51,100	14,500	30,616	4.33	4.83
May	40,700	6,670	16,195	2.29	2.64
June	26,100	6,810	12,335	1.75	1.95
July	10,300	4,900	6,535	.93	1.07
August	44,700	4.400	20,370	2.88	3.32
September	23,100	5,700	9,977	1.41	1.57
October	10,300	4,280	5,694	.81	.93
November	4,650	3,830	4,016	.57	.64
December	57,100	4,050	18,885	2.67	3.08
The year	57,100	3,830	16,092	2.28	30.86

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 279; rating table on page 322 of same paper.

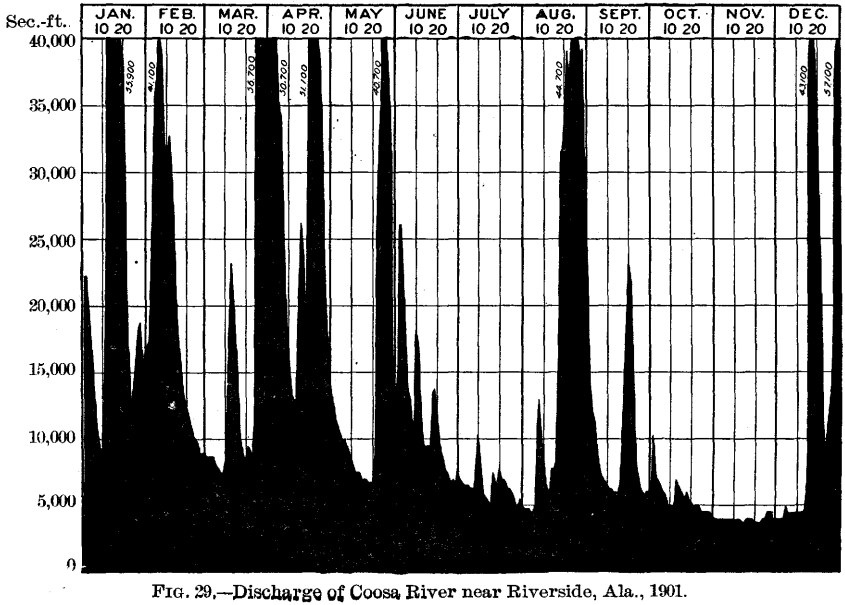


FIG. 29.—Discharge of Coosa River near Riverside, Ala., 1901.

Estimated monthly discharge of Talladega Creek at Nottingham, Ala.

[Drainage area, 156 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
August 16–31			113	0.72	0.43
September	2,286	74	575	3.69	4.12
October	636	90	190	1.22	1.41
November	724	130	249	1.60	1.79
December	746	152	291	1.87	2.16
1901.					
January	1,802	284	485	3.11	3.59
February	1,626	306	449	2.88	3.00
March	1,824	240	405	2.60	3.00
April	2,330	328	591	3.79	4.23
May	724	240	306	1.96	2.26
June	526	152	218	1.40	1.56
July	196	130	149	.96	1.11
August	372	90	148	.95	1.10
September	614	90	148	.95	1.06
October	482	90	123	.79	.91
November	152	90	97	.62	.69
December	1,714	90	264	1.69	1.95
The year	2,330	90	282	1.81	24.46

Note.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 281; rating table on page 322 of same paper.

ALABAMA RIVER

Estimated monthly discharge of Alabama River at Selma, Ala.

[Drainage area, 13,500 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
January	50,110	9,676	26,495	1.96	2.26
February	128,540	10,920	63,763	4.72	4.91
March	89,478	37,874	58,272	4.32	4.98
April	109,960	21,648	60,909	4.51	5.03
May	41,864	13,668	21,090	1.56	1.80
June	94,000	12,220	35,288	2.61	2.91
July	93,468	12,660	33,964	2.52	2.90
August	38,140	9,124	14,156	1.05	1.21
September	52,504	7,189	17,366	1.29	1.44
October	35,480	7,097	14,492	1.07	1.23
November	46,120	7,596	18,506	1.37	1.53
December	48,780	8,750	28,989	2.15	2.48
The year	128,540	7,097	33,772	2.34	32.68
1901.					
January	107,300	22,446	61,213	4.53	5.22
February	95,862	30,692	55,037	4.08	4.25
March	92,670	21,382	39,017	2.89	3.33
April	104,640	32,288	73,048	5.41	6.04
May	59,420	10,120	26,966	2.00	2.31
June	53,568	7,818	26,030	1.93	2.15
July	21,318	7,596	13,536	1.00	1.15
August	66,868	9,532	30,853	2.29	2.64
September	46,120	10,428	19,394	1.44	1.61
October	21,914	7,931	11,022	.82	.95
November	8,750	7,931	8,266	.61	.68
December	94,000	8,511	26,638	1.97	2.27
The year	107,300	7,596	32,585	2.47	32.60

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 282; rating table on page 323 of same paper.

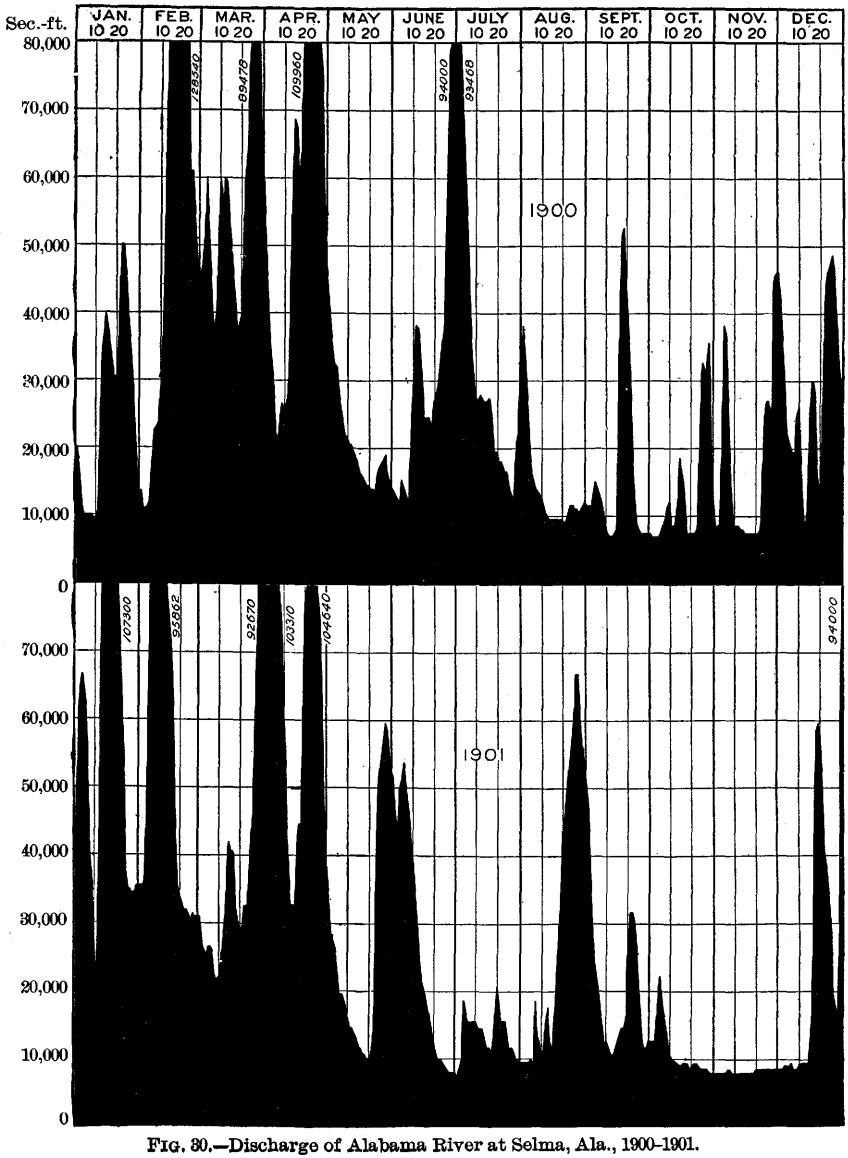


FIG. 30.—Discharge of Alabama River at Selma, Ala., 1900–1901.

BLACK WARRIOR RIVER.

Estimated monthly discharge of Mulberry Fork of Black Warrior River near Cordova, Ala.

[Drainage area, 1,900 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
June	49,284	1,134	16,185	8.52	9.51
July	11,248	810	2,975	1.57	1.81
August	2,144	660	1,016	.53	.61
September	1,951	205	556	.29	.32
October	13,098	60[a]	1,732	.91	1.05
November	6,808	384	1,487	.78	.87
December	6,660	968	2,154	1.13	1.30
1901.					
January	51,800	1,762	8,713	4.59	5.29
February	31,820	1,486	6,616	3.48	3.62
March	29,600	1,486	6,637	3.49	4.02
April	23,088	2,242	6,967	3.67	4.10
May	10,064	968	2,539	1.34	1.54
June	5,920	320	1,582	.83	.93
July	3,404	205	631	.33	.38
August	17,168	205	4,155	2.19	2.53
September	6,660	320	1,415	.74	.83
October	1,669	320	687	.36	.42
November	660	320	468	.25	.28
December	31,820	518	4,923	2.59	2.99
The year	51,800	205	3,778	1.99	26.93

[a] This minimum is estimated from rating curve. The lowest actual discharge measured was at gage height .40, and was 385 second-feet.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 283; rating table on page 323 of same paper.

Estimated monthly discharge of Black Warrior River at Tuscaloosa, Ala.

[Drainage area, 4,900 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	108,375	4,370	22,938	4.68	5.39
February	55,100	4,165	15,094	3.08	3.21
March	40,900	3,815	11,947	2.44	2.81
April	57,020	5,330	17,370	3.55	3.96
May	10,765	2,330	4,355	.89	1.03
June	9,010	850	3,217	.66	.74
July	3,815	415	1,210	.25	.29
August	29,550	340	7,117	1.45	1.67
September	8,660	710	2,626	.54	.60
October	4,775	445	1,536	.31	.36
November	1,022	512	712	.15	.17
December	80,250	710	13,293	2.71	3.12
The year	108,375	340	8,454	1.73	23.35

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 284; rating table on page 323 of same paper.

TOMBIGBEE RIVER.

Estimated monthly discharge of Tombigbee River at Columbus, Miss.

[Drainage area, 4,440 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
January	13,864	2,962	5,588	1.26	1.45
February	16,486	2,686	8,659	1.95	2.03
March	23,938	6,688	15,285	3.42	3.85
April	40,498	3,100	21,265	4.79	5.34
May	13,450	1,464	4,944	1.11	1.28
June	37,600	3,790	27,692	6.24	6.96
July	29,596	2,410	11,411	2.57	2.97
August	10,414	707	2,257	.51	.59
September	1,775	632	950	.21	.23
October	10,138	566	3,989	.90	1.04
November	10,000	1,097	4,304	.97	1.08
December	11,794	1,464	5,239	1.18	1.36
The year	40,498	566	9,299	2.09	28.18
1901.					
January	33,736	2,410	14,193	3.20	3.69
February	24,352	3,790	12,533	2.83	2.95
March	29,182	3,514	10,884	2.45	2.83
April	21,040	3,376	9,890	2.23	2.49
May	11,656	1,328	4,949	1.11	1.28
June	7,792	707	2,767	.62	.69
July	1,097	582	730	.16	.18
August	24,352	582	7,673	1.73	1.99
September	7,240	753	2,008	.45	.50
October	915	650	748	.17	.20
November	1,000	650	756	.17	.19
December	17,590	810	6,730	1.52	1.75
The year	33,736	582	6,155	1.39	18.74

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 285; rating table on page 323 of same paper.

Estimated monthly discharge of Tombigbee River at Epes, Ala.

[Drainage area, 8,830 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	47,100	3,878	25,579	2.90	3.34
February	35,700	6,350	20,999	2.38	2.48
March	30,300	6,350	16,198	1.83	2.11
April	34,500	6,350	18,102	2.05	2.29
May	12,900	3,002	6,880	.78	.90
June	12,900	1,484	4,585	.52	.58
July	1,484	810	1,295	.15	.17
August 16–31	----------	----------	21,541	2.44	1.41
September	7,500	1,484	3,205	.36	.40
October	5,820	1,164	1,633	.18	.21
November	2,200	880	1,550	.18	.20
December	30,900	1,960	12,249	1.39	1.60

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 286; rating table on page 323 of same paper.

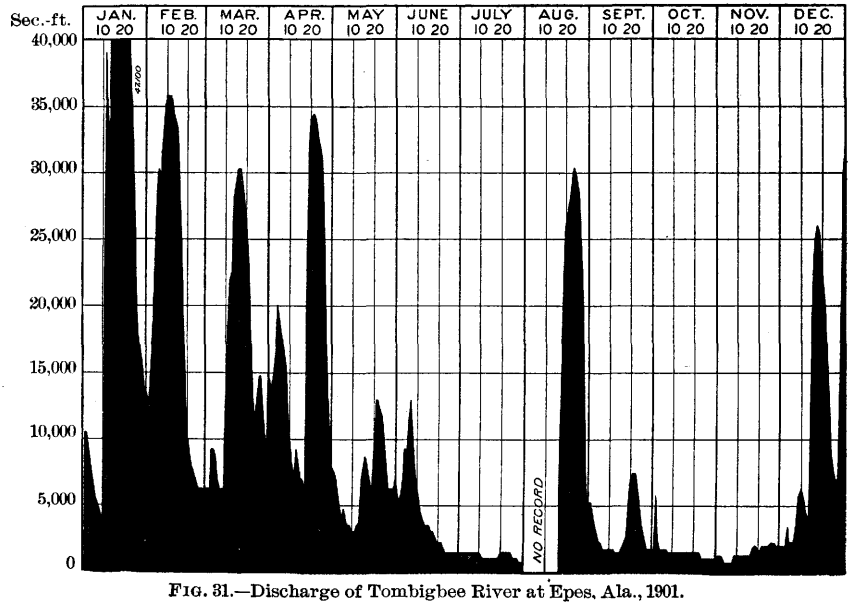


FIG. 31.—Discharge of Tombigbee River at Epes, Ala., 1901.

EASTERN MISSISSIPPI RIVER DRAINAGE.

For convenience of classification the tributaries of the Mississippi River draining from the east and including the main river above its junction with the Missouri, have here been grouped together. These eastern tributaries vary widely in character, both as regards type of rivers and the topography of the areas which they drain. Those draining the comparatively low rolling country adjacent to the valley of the Mississippi are as a rule sluggish streams with few falls of importance, while the upper Ohio River and its numerous tributaries, on the contrary, drain a country of high elevations, their upper courses being through narrow V-shaped valleys, with frequent falls and with high rocky banks. Owing to the steep slopes the run-off is rapid, causing sudden fluctuations in the streams and giving rise to the high floods and extreme low waters for which the Ohio Basin is noted, and the influence of which is felt to a marked degree even in the flow of Mississippi River below Cairo.

Systematic records have been kept during 1901 at numerous points along the principal tributaries of the Ohio River, on the Mississippi River at St. Paul, and on the Yazoo River at Yazoo City.

UPPER OHIO RIVER.

Estimated monthly discharge of Youghiogheny River at Friendsville, Md.

[Drainage area, 295 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	1,942	575	803	2.72	3.14
February	600	600	600	2.03	2.11
March	4,450	600	1,824	6.18	7.12
April	4,336	865	2,103	7.13	7.96
May	3,082	400	1,167	3.96	4.57
June	1,942	300	692	2.35	2.62
July	785	130	231	.78	.90
August	400	130	194	.66	.76
September	300	95	159	.54	.60
October	130	95	105	.36	.42
November	350	95	176	.60	.67
December	5,362	300	1,651	.56	.65
The year	5,362	95	809	2.32	31.52

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 289; rating table on page 323 of same paper.

Estimated monthly discharge of Cheat River near Uneva, W. Va.

[Drainage area 1,375 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1899.					
July	.....	.....	1,370	1.00	1.00
August	2,232	357	924	.67	.77
September	3,210	404	952	.69	.77
October	465	273	336	.24	.28
November	3,070	538	1,732	1.26	1.41
December	6,442	1,000	2,387	1.74	2.01
1900.					
July	4,610	730	1,888	1.37	1.58
August	1,956	273	614	.45	.52
September	730	190	254	.18	.20
October	730	190	340	.25	.29
November	3,070	273	903	.66	.59
December	7,270	1,136	2,682	1.95	2.03

NOTE.—Gage heights and discharge measurements have been published as follows: For 1899, in Water-Supply Paper No. 36, page 160; for 1900, in Water-Supply Paper No. 48, page 177; rating table in Water-Supply Paper No. 65, page 323; later measurements on page 290 of same paper.

GREAT KANAWHA RIVER.

Estimated monthly discharge of Greenbrier River at Alderson, W. Va.

[Drainage area, 1,344 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	21,050	590	2,339	1.74	2.01
February	2,440	590	1,031	.77	.80
March	14,300	590	2,685	2.00	2.31
April	19,340	1,535	6,320	4.70	5.24
May	20,875	857	4,349	3.24	3.74
June	20,530	920	3,938	2.93	3.27
July	4,080	280	1,277	.95	1.10
August	2,550	250	845	.63	.73
September	2,110	280	689	.51	.57
October	315	145	230	.17	.20
November	425	120	188	.14	.16
December	37,700	250	4,765	3.55	4.10
The year	37,700	120	2,388	1.78	24.23

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 290; rating table on page 323 of same paper.

Estimated monthly discharge of New River at Radford, Va.

[Drainage area, 2,725 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1898.					
August	16,080	2,220	4,257	1.56	1.80
September	31,160	1,800	5,587	2.05	2.29
October	49,880	2,450	9,068	3.33	3.84
November	4,765	2,450	3,475	1.28	1.43
December	11,920	2,970	4,806	1.76	2.03
1899.					
January	19,200	3,250	5,595	2.05	2.36
February	28,040	2,970	12,521	4.60	4.79
March	53,000	7,240	18,126	6.65	7.68
April	19,720	3,860	8,493	3.12	3.48
May	9,320	2,970	5,390	1.98	2.28
June	18,680	2,000	4,307	1.58	1.76
July	3,860	1,400	2,043	.75	.86
August	4,290	1,400	1,968	.72	.83
September	6,720	1,400	2,513	.92	1.03
October	2,000	1,400	1,452	.53	.61
November	3,860	950	1,645	.60	.67
December	20,240	950	3,165	1.16	1.34
The year	53,000	950	5,602	2.06	27.69
1900.					
January	14,000	1,800	4,173	1.53	1.76
February	23,360	2,000	6,802	2.50	2.60
March	32,720	3,860	11,244	4.13	4.76
April	19,200	2,970	6,656	2.44	2.72
May	8,800	3,250	4,156	1.53	1.76
June	8,800	2,970	4,824	1.77	1.97
July	9,840	1,400	2,635	.97	1.12
August	2,220	575	1,209	.44	.51
September	13,220	600	2,239	.82	.91
October	118,000	850	7,810	2.87	3.31
November	38,960	2,000	5,371	1.97	2.20
December	21,800	2,700	5,315	1.95	2.25
The year	118,000	575	5,203	1.91	25.87

Estimated monthly discharge of New River at Radford, Va.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	22,320	2,220	4,325	1.59	1.83
February	6,200	1,600	3,155	1.16	1.21
March	24,400	675	4,587	1.68	1.94
April	128,400	3,540	16,214	5.95	6.64
May	137,760	3,860	16,651	6.11	7.05
June	42,080	5,715	14,807	5.43	6.06
July	34,800	3,860	8,997	3.30	3.80
August	106,560	3,540	21,850	8.02	9.24
September	32,200	3,540	8,264	3.03	3.38
October	14,000	2,220	4,604	1.69	1.95
November	4,765	1,400	2,092	.77	.86
December	99,800	1,600	15,605	5.73	6.60
The year	137,760	675	10,096	3.71	50.56

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 293; rating table on page 323 of same paper.

Estimated monthly discharge of New River at Fayette, W. Va.

[Drainage area, 6,200 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	29,100	5,520	11,220	1.81	2.09
February	12,350	5,520	8,036	1.30	1.35
March	32,400	5,520	12,775	2.06	2.38
April [a]	107,740	14,946	41,855	6.75	7.53
May 1–22 [a]	60,430	11,100	17,700	2.85	2.33

[a] Approximate from Apr. 21 to May 4.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 294.

TENNESSEE RIVER.

Estimated monthly discharge of French Broad River near Asheville, N. C.

[Drainage area, 987 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	12,940	2,170	3,206	3.25	3.75
February	4,135	2,055	2,396	2.42	2.51
March	22,220	1,945	4,166	4.22	4.86
April	15,655	3,145	6,772	6.86	7.65
May	24,160	2,620	5,043	5.11	5.89
June	10,800	3,060	4,852	4.92	5.49
July [a]					
August	20,320	2,000	10,740	10.88	12.54
September	11,500	2,760	5,132	5.20	5.80
October	7,300	2,170	2,810	2.84	3.28
November	2,170	1,890	1,984	2.01	2.24
December	26,350	1,890	6,288	6.37	7.35

[a] No record.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 301; rating table on page 323 of same paper.

Estimated monthly discharge of Tennessee River at Knoxville, Tenn.

[Drainage area, 8,990 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1900.					
January	19,322	3,850	8,717	0.97	1.12
February	56,505	4,850	18,202	2.02	2.10
March	58,830	15,818	28,349	3.15	3.64
April	27,210	11,082	14,942	1.66	1.85
May	11,082	6,170	8,179	.91	1.05
June	33,720	5,882	12,860	1.43	1.60
July	25,350	5,322	9,867	1.10	1.27
August	11,082	4,250	5,697	.63	.73
September	14,570	3,450	5,722	.64	.71
October	41,160	3,450	7,568	.84	.97
November	42,090	4,850	10,282	1.14	1.27
December	28,140	6,462	10,814	1.20	1.38
The year	58,830	3,450	11,767	1.31	17.69

Estimated monthly discharge of Tennessee River at Knoxville, Tenn.—Continued.

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	60,225	7,062	17,154	1.91	2.20
February	18,822	6,760	12,202	1.36	1.42
March	71,850	6,760	16,188	1.80	2.08
April	76,965	16,242	37,089	4.13	4.61
May	146,250	10,010	30,837	3.43	3.96
June	44,880	13,362	23,340	2.60	2.90
July	20,237	6,760	11,622	1.29	1.49
August	77,430	6,760	34,046	3.79	4.37
September	36,510	8,322	15,342	1.71	1.91
October	15,398	6,170	8,546	.95	1.10
November	6,760	5,050	5,698	.63	.70
December	141,600	5,322	30,796	3.43	3.95
The year	146,250	5,050	20,238	2.25	30.69

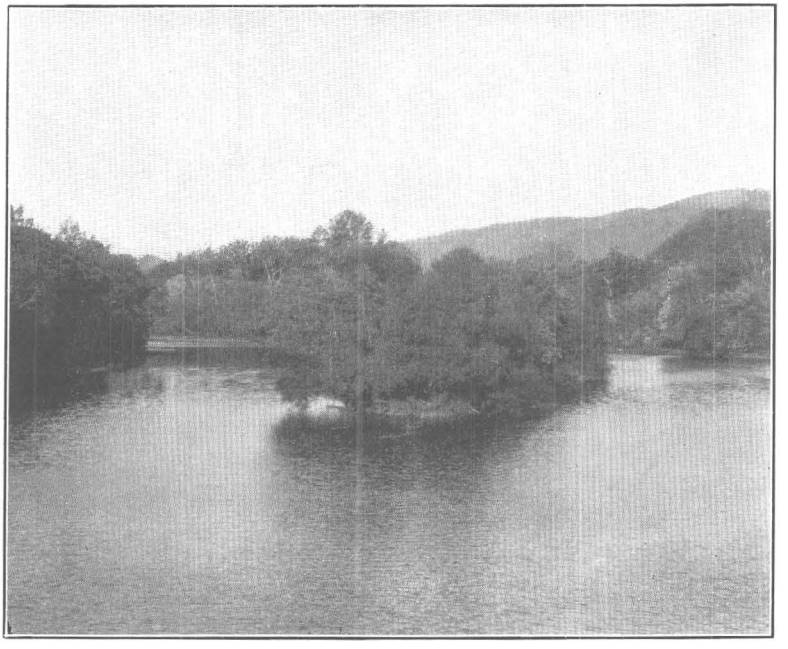
NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 303; rating table on page 324 of same paper.

Estimated monthly discharge of Tuckasegee River at Bryson, N. C.

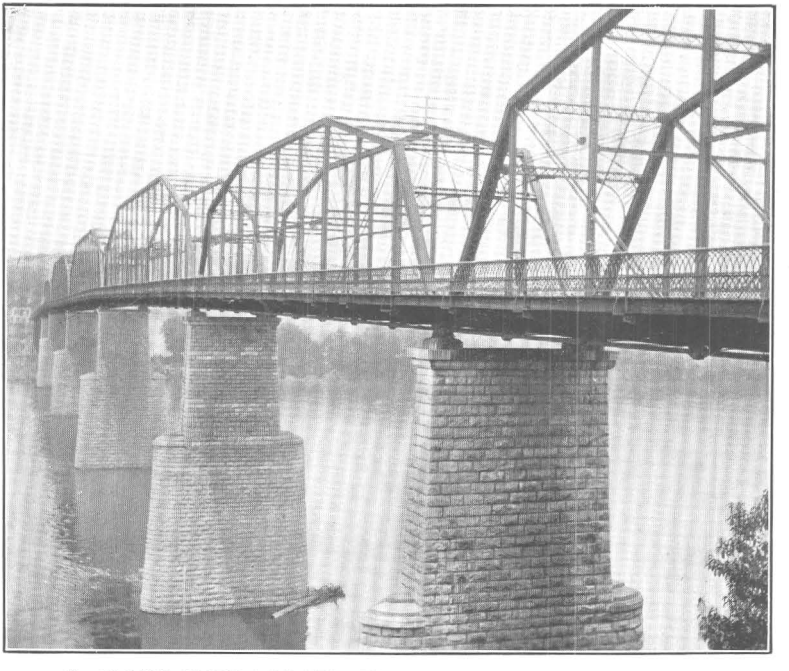
[Drainage area, 662 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	19,580	1,015	2,432	3.67	4.23
February	3,675	950	1,538	2.32	2.41
March	17,550	950	2,862	4.32	4.98
April	11,125	2,255	3,828	5.78	6.45
May	26,250	1,370	3,536	5.34	6.15
June	3,675	1,700	2,255	3.41	3.81
July	2,850	830	1,250	1.89	2.18
August	19,000	710	4,653	7.03	8.10
September	5,515	1,295	2,003	3.02	3.37
October	2,650	830	1,034	1.56	1.80
November	950	600	707	1.07	1.19
December	35,820	600	4,285	6.47	7.46
The year	35,820	600	2,532	3.82	52.13

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 304; rating table on page 324 of same paper.



A. GREENBRIER RIVER NEAR WHITE SULPHUR SPRINGS, W. VA.



B. GAGING STATION ON TENNESSEE RIVER AT CHATTANOOGA, TENN.

Estimated monthly discharge of Little Tennessee River at Judson, N. C.

[Drainage area, 675 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	13,800	1,250	2,349	3.48	4.01
February	2,955	1,250	1,642	2.43	2.53
March	23,650	1,185	2,277	4.86	5.60
April	14,000	1,725	3,987	5.91	6.59
May	40,580	1,250	3,762	5.57	6.43
June	7,560	1,435	2,740	4.06	4.53
July	3,510	1,125	1,745	2.59	2.99
August	22,125	1,125	6,183	9.16	10.56
September	3,140	1,250	1,550	2.30	2.57
October	3,625	1,125	1,374	2.04	2.36
November	1,125	785	909	1.35	1.51
December	57,540	735	8,120	12.00	13.83
The year	57,540	735	3,136	4.65	63.51

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 305; rating table on page 324 of same paper.

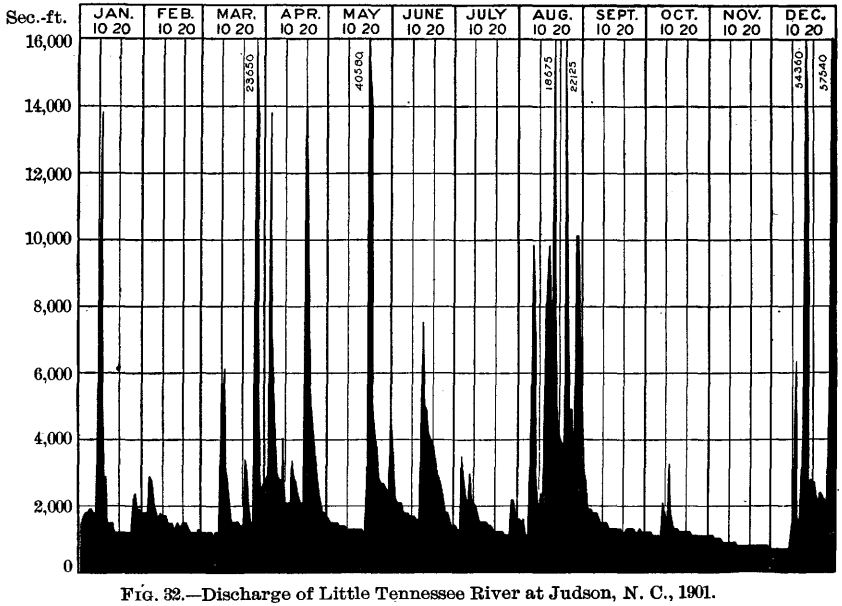


FIG. 32.—Discharge of Little Tennessee River at Judson, N. C., 1901.

Estimated monthly discharge of Hiwassee River at Murphy, N. C.

[Drainage area, 410 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	6,960	670	1,599	3.90	4.50
February	3,990	750	1,429	3.49	3.63
March	9,840	710	1,554	3.79	4.37
April	10,920	1,380	2,535	6.18	6.89
May	9,480	750	1,941	4.73	5.45
June	2,100	840	1,265	3.09	3.45
July	3,180	520	829	2.02	2.33
August	13,260	450	3,068	7.48	8.62
September	3,360	750	1,254	3.06	3.42
October	1,560	485	627	1.53	1.76
November	630	420	484	1.18	1.32
December	14,340	450	1,976	4.82	5.55
The year	14,340	420	1,547	3.77	51.29

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 306; rating table on page 324 of same paper.

Estimated monthly discharge of Nottely River at Ranger, N. C.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
February 16–28	----------	----------	514	1.89	0.91
March	3,410	440	774	2.85	3.29
April	2,000	620	956	3.51	3.92
May	3,860	410	894	3.29	3.79
June	1,460	530	790	2.90	3.24
July	2,300	380	639	2.35	2.71
August	4,100	290	1,486	5.46	6.29
September	2,660	530	823	3.03	3.38
October	590	350	463	1.70	1.96
November	560	350	386	1.42	1.58
December	5,360	380	927	3.41	3.93

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 308; rating table on page 324 of same paper.

Estimated monthly discharge of Hiwassee River at Reliance, Tenn.

[Drainage area, 1,180 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	30,800	1,805	5,015	4.25	4.91
February	12,560	1,485	3,448	2.92	3.04
March	34,640	1,805	4,595	3.89	4.49
April	25,040	3,350	6,282	5.32	5.93
May	37,520	2,170	5,468	4.63	5.35
June	7,250	2,375	3,576	3.03	3.38
July	3,620	1,485	2,116	1.79	2.06
August	33,680	1,340	8,190	6.94	8.00
September	5,790	2,375	3,348	2.84	3.17
October	2,375	1,340	1,796	1.52	1.75
November	1,805	1,340	1,494	1.27	1.42
December	32,240	1,340	6,257	5.30	6.12
The year	37,520	1,340	4,299	3.68	49.62

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 308; rating table on page 324 of same paper.

Estimated monthly discharge of Hiwassee River at Charleston, Tenn.

[Drainage area, 2,297 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	34,000	3,550	7,774	3.38	3.90
February	13,845	3,695	5,860	2.55	2.66
March	29,505	3,550	7,549	3.28	3.79
April	28,780	5,725	10,384	4.51	5.03
May	35,740	3,985	8,999	3.91	4.51
June	12,540	4,275	6,329	2.75	3.07
July	6,595	2,825	3,789	1.65	1.90
August	25,735	2,390	11,052	4.81	5.55
September	16,165	3,840	5,624	2.45	2.73
October	5,290	2,825	3,340	1.45	1.67
November	3,405	2,390	2,709	1.18	1.32
December	37,190	2,390	8,840	3.84	4.43
The year	37,190	2,390	6,854	2.98	40.56

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 309; rating table on page 324 of same Paper.

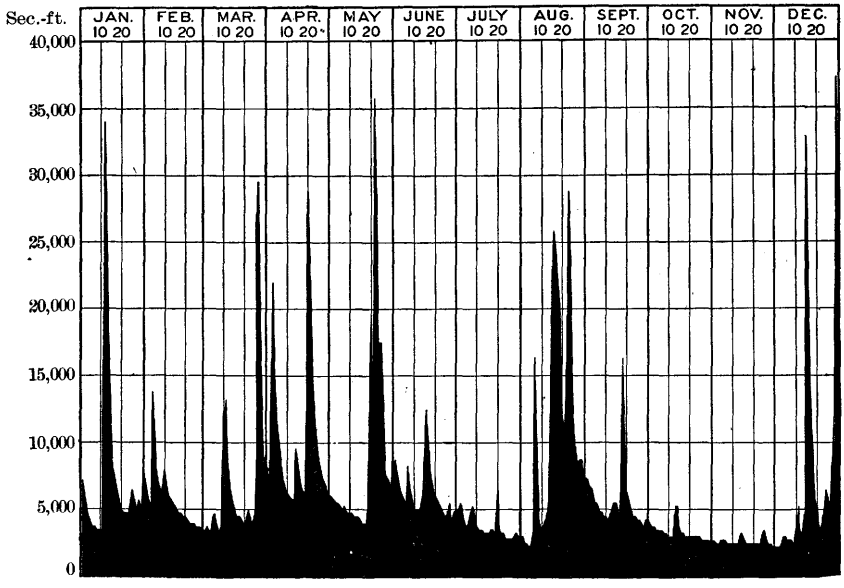


FIG. 33.—Discharge of Hiwassee River at Charleston, Tenn., 1901.

Estimated monthly discharge of Toccoa River, near Blueridge, Ga.

[Drainage area, 231 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	5,228	552	1,100	4.76	5.49
February	1,590	552	765	3.31	3.44
March	4,800	666	1,077	4.66	5.37
April	3,195	1,062	1,458	6.31	7.04
May	9,080	666	1,599	6.92	7.98
June	1,590	666	1,011	4.38	4.88
July	1,590	666	768	3.32	3.82
August	12,290	666	2,248	9.73	11.22
September	1,590	666	1,144	4.95	5.52
October	804	552	619	2.68	3.09
November	552	460	493	2.13	2.38
December	10,150	552	2,248	9.73	11.22
The year	12,290	460	1,211	5.24	71.45

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 310; rating table on page 324 of same Paper.

Estimated monthly discharge of Tennessee River at Chattanooga, Tenn.

[Drainage area, 21,418 square miles.]

Month.	Discharge in second-feet.			Run-off.	
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.
1901.					
January	189,200	19,600	50,641	2.36	2.72
February	59,850	19,050	36,516	1.70	1.77
March	139,150	19,050	44,952	2.10	2.42
April	166,450	38,400	95,080	4.44	4.95
May	205,450	26,380	68,736	3.21	3.70
June	72,200	33,850	47,673	2.23	2.49
July	37,100	14,680	23,932	1.12	1.29
August	207,400	13,800	75,761	3.54	4.08
September	61,150	22,660	38,859	1.81	2.02
October	25,760	13,360	18,979	.89	1.03
November	13,800	11,660	13,076	.61	.68
December	237,300	12,080	65,509	3.06	3.53
The year	237,300	11,660	48,310	2.26	30.68

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 311; rating table on page 324 of same Paper.

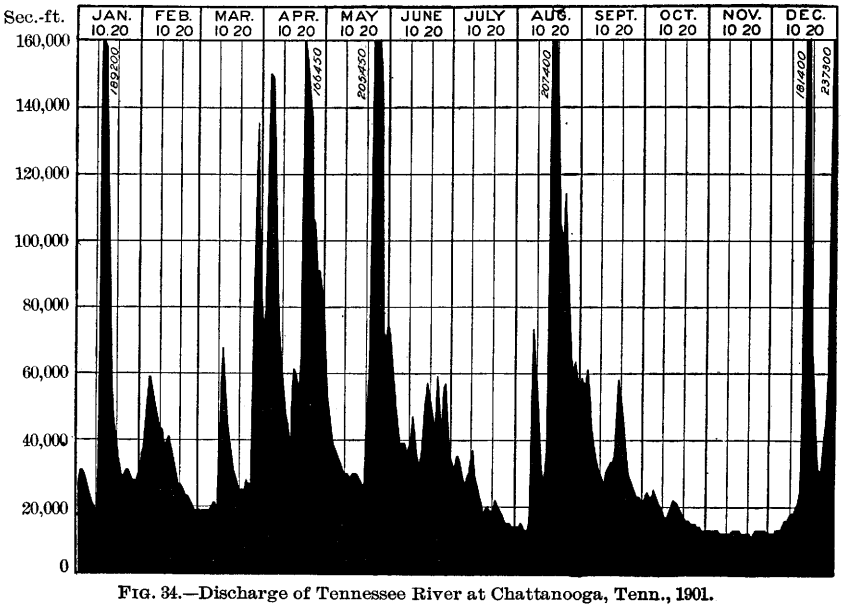


FIG. 34.—Discharge of Tennessee River at Chattanooga, Tenn., 1901.

GREAT LAKES DRAINAGE.

Stations have been maintained, as in past years, on Sandusky River at Fremont, Ohio, and on Maumee River near Waterville, Ohio, but owing to lack of sufficient discharge measurements the flow of the former during 1901 has not been computed. Stations were maintained during 1901 on Grand River at North Lansing, Mich., and at several points in the city of Grand Rapids, Mich. Results of measurements made of Grand River at the Chicago and West Michigan Railroad bridge at Grand Rapids, Mich., are given for the years 1897 to 1900, the records of daily discharge of which were published in Water-Supply Paper No. 49, page 243.

MAUMEE RIVER.

In the following pages are given the results of measurements made during 1901 for Maumee River at Waterville, Ohio, together with a comparison of the run-off from the drainage basin with the precipitation observed at the rainfall stations in the basin.

Estimated monthly discharge of Maumee River near Waterville, Ohio.

[Drainage area, 6,111 square miles.]

Month.	Discharge in second-feet.			Run-off.			Rainfall.
	Maximum.	Minimum.	Mean.	Second-feet per square mile.	Depth in inches.	Per cent of rainfall.	
1901.							*Inches.*
January	6,110	480	2,389	0.391	0.451	23.7	1.90
February	9,450	580	3,716	.608	.633	43.6	1.45
March	27,600	2,240	11,207	1.834	2.114	81.9	2.58
April	8,160	1,020	3,646	.596	.658	30.2	2.18
May	22,750	530	3,147	.515	.594	15.3	3.90
June	15,220	660	3,599	.589	.657	17.1	3.84
July	14,215	80	2,503	.410	.473	15.5	3.06
August	140	5	47	.008	.009	.3	2.74
September	80	10	42	.007	.008	.6	1.35
October	1,020	10	246	.040	.046	1.7	2.73
November	180	60	98	.016	.018	1.2	1.53
December	11,200	110	2,585	.423	.488	13.5	3.63
The year	27,600	5	2,771	.453	6.149	19.9	30.89

Note.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 65, page 313.

PRECIPITATION IN BASIN OF MAUMEE RIVER.

The principal observations of rainfall made within the basin of Maumee River are at the stations enumerated in the following table, which gives the precipitation by months for 1901. The figures of

average monthly precipitation derived from this table are compared in the next preceding table with the monthly discharge of Maumee River near Waterville, showing the relation between precipitation and run-off in the basin.

Precipitation at stations in drainage basin of Maumee River.

Station.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1901.													
Angola	3.19	1.93	3.26	2.54	2.75	4.10	5.95	4.58	0.87	6.15	1.81	3.47	40.60
Auburn	1.58	1.44	1.15	1.94	2.45	2.87	1.38	3.71	1.30	3.71	1.15	1.57	24.25
Bluffton	1.17	.93	2.76	2.34	4.16	3.29	1.23	4.79	1.12	3.40	1.50	4.01	30.70
Fort Wayne	1.49	1.74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Adrian	2.12	1.31	2.37	1.33	2,53	2.23	1.75	2.05	.97	3.46	1.89	2.91	24.92
Coldwater	2.79	1.75	2.71	2.18	1.78	4.96	4.67	4.10	.73	6.56	1.82	3.25	37.30
Hillsdale	2.53	2.63	2.95	1.98	2.64	3.55	2.68	2.20	.93	5.63	2.00	3.12	32.84
Benton Ridge	1.42	2.10	3.15	2.03	3.70	3.59	2.66	2.02	1.82	.24	.....	3.59	.....
Bowling Green	2.57	1.30	2.86	2.23	4.91	3.98	4.42	4.38	1.32	1.15	2.33	4.21	35.66
Celina	1.74	.80	3.14	2.27	4.79	3.98	3.24	1.86	1.95	.94	.95	3.58	29.24
Defiance	1.10	1.07	2.35	1.87	3.93	3.47	6.08	2.16	1.54	2.63	1.41	4.14	31.75
Findlay	1.46	1.45	3.30	2.46	4.65	2.79	1.36	2.96	1.85	.86	.94	3.87	37.95
Hedges	1.12	1.03	3.02	2.19	5.28	3.26	1.89	2.25	1.76	2.27	1.35	4.03	29.45
Kenton	2.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Leipsic	1.33	1.70	2.20	1.81	3.95	3.95	3.20	2.14	.....	1.22	1.01	4.43	.....
Montpelier	3.30	1.70	2.44	2.82	3.52	4.01	5.07	2.45	.92	4.09	1.71	3.10	35.03
Napoleon	1.58	1.25	2.51	2.01	4.03	5.10	2.98	2.53	.64	1.73	1.27	3.02	28.65
New Bremen	1.28	.77	1.26	2.11	4.67	5.14	1.68	2.11	1.44	1.09	1.25	3.75	26.55
Ottawa	1.64	1.26	2.60	2.34	4.32	2.46	3.32	2.61	1.61	.59	1.64	2.25	27.64
Swanton	2.01	1.44	2.05	2.12	3.58	6.68	3.71	2.55	1.32	1.36	1.92	3.88	32.62
Van Wert	1.68	1.46	2.04	2.11	6.63	2.32	1.63	1.50	1.74	2.24	1.28	4.64	29.27
Wauseon	2.10	1.38	3.57	2.99	3.67	5.15	2.36	1.93	1.95	2.88	1.61	5.73	35.32
Total	41.81	30.44	51.69	43.67	77.94	76.88	61.26	54.88	25.68	51.96	29.14	72.55	.....
Mean	1.90	1.45	2.58	2.18	3.90	3.84	3.06	2.74	1.35	2.73	1.53	3.63	30.89

GRAND RIVER.

Estimated monthly discharge of Grand River at the Chicago and West Michigan Railroad bridge, Grand Rapids, Mich.

[Drainage area, 4,900 square miles.]

Month.	Mean discharge in second-feet.	Run-off	
		Second-feet per square mile.	Depth in inches.
1897.			
May	2,892	0.59	0.68
June	1,761	.36	.40
July	1,582	.33	.38
August	1,517	.31	.36
September	1,370	.28	.31
October	1,181	.24	.28

Estimated monthly discharge of Grand River at the Chicago and West Michigan Railroad bridge, Grand Rapids, Mich.—Continued.

Month.	Mean discharge in second-feet.	Run-off.	
		Second-feet per square mile.	Depth in inches.
1897.			
November	1,483	0.30	0.33
December	2,382	.49	.56
1898.			
January	3,007	.61	.70
February	7,240	1.48	1.54
April	4,933	1.01	1.13
May	2,365	.48	.55
June	1,735	.35	.39
July	1,487	.30	.35
August	1,867	.38	.44
September	1,694	.35	.39
October	1,833	.37	.43
November	2,645	.54	.60
December	3,024	.62	.71
1899.			
January	6,965	1.42	1.64
February	4,723	.96	1.00
March	9,643	1.97	2.27
April	10,708	2.18	2.43
May	3,088	.63	.72
June	2,236	.46	.52
July	1,719	.35	.40
August	1,617	.33	.38
September	1,741	.36	.40
October	1,715	.35	.40
November	1,798	.37	.41
December	2,059	.42	.48
The year	4,001	.82	11.05
1900.			
January	2,620	.53	.61
February	7,524	1.53	1.59
March	5,945	1.21	1.39
April	11,991	2.45	2.73

HUDSON BAY DRAINAGE.

During the year 1901 systematic measurements were commenced in the basin of Red River of the North within the United States, under the direction of Prof. Charles M. Hall, director of the State agricultural and economic survey of North Dakota. Red River has its source in Lake Traverse and in its course through the United States forms the boundary between the States of Minnesota and North and South Dakota, draining a broad level area of highly fertile lands. After crossing the international boundary it receives from the west Mouse River, a tributary of considerable length, which drains a large area of North Dakota; it then flows into Lake Winnipeg, whence, after mingling with the waters of the Saskatchewan, it discharges through Nelson River into Hudson Bay.

Stations were maintained during 1901 on Red River at Grand Forks, N. Dak., Moorhead, Minn., and Pembina, N. Dak., and on Red Lake River at Crookston, Minn., with a view to studying the feasibility of irrigating lands in Red River Valley. No results of measurements for 1901 are here published, however, the data being insufficient for the present to warrant computation of the flow at these points.

ST. MARY RIVER.

In connection with the contemplated water storage and diversion of St. Mary River into Milk River, a station was established during 1901 on St. Mary River at Main, Mont. The river is a tributary of Belly River, which in its turn flows into the Saskatchewan. A full description of St. Mary River was published in the Twenty-second Annual Report, Part IV, pages 268 to 271, and additional information is set forth in the following pages, relating to the diversion scheme alluded to.

Estimated monthly discharge of St. Mary River at Main, Mont.

[Drainage area, 298 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
July 14–31	------	------	1,906	68,049	6.40	4.29
August	1,574	653	932	57,306	3.13	3.61
September	677	485	576	34,274	1.93	2.15
October	465	326	401	24,657	1.35	1.56
November	345	265	292	17,375	.98	1.09
December	278	220	241	14,819	.80	.92

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 15; rating table on page 170 of same paper.

UPPER MISSOURI RIVER DRAINAGE.

The Missouri is formed by the junction in southeastern Montana, at Three Forks, of Jefferson, Madison, and Gallatin rivers. Its principal tributaries are the Milk and Yellowstone, which for convenience are considered separately. Discharge measurements are in progress on all of these streams, as well as on Crow Creek, a tributary of Missouri River, and on the Upper Missouri proper at Townsend, Mont., where the Missouri River Commission maintains a gage. Results for 1901 are given in the following pages.

PRECIPITATION IN UPPER BASIN OF MISSOURI RIVER.

The principal observations of rainfall made within the basin of the headwaters of Missouri River are at the stations enumerated in the

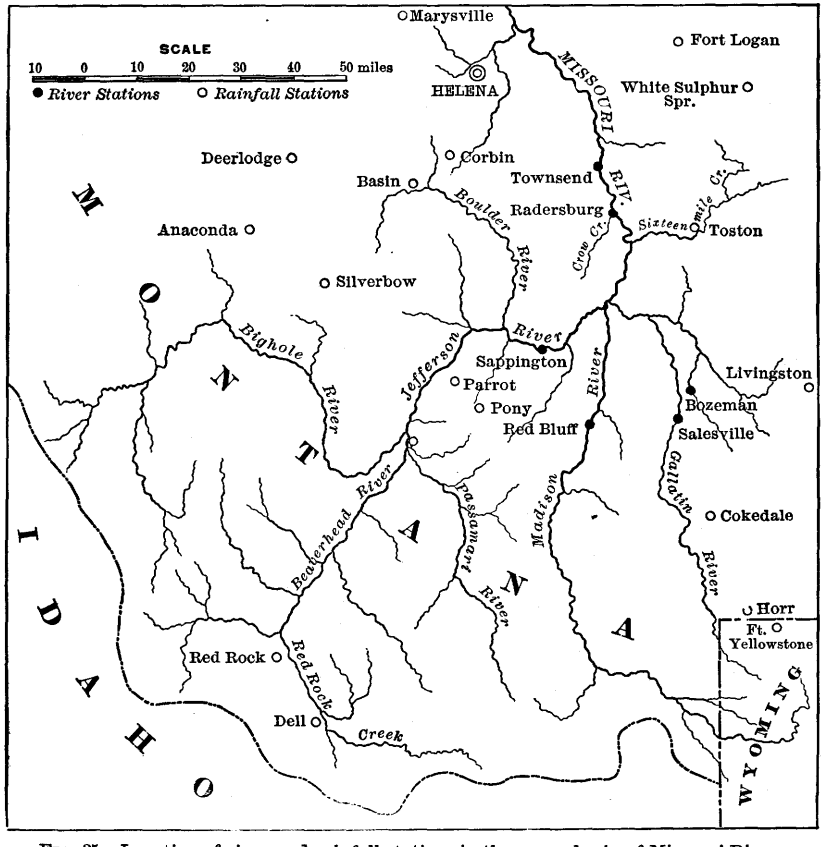


FIG. 35.—Location of river and rainfall stations in the upper basin of Missouri River.

following table, which also gives their geographic location, elevation above sea level, and length of record of observations. The relative location of these points is shown in fig. 35, in connection with the points of river measurement which are located at Salesville, Logan, Redbluff, Sappington, Bozeman, Radersburg, and Townsend.

Location of rainfall stations in Upper Missouri River Basin.

Station.	County.	State.	Latitude.	Longitude.	Elevation.	Length of record.
			° ′	° ′	*Feet.*	*Years.*
Butte	Silverbow	Montana				7–8
Fort Logan	Meagher	do				11–13
Fort Yellowstone.	Yellowstone National Park.	Wyoming	44 58	110 41	6,370	13–16
Helena	Lewis and Clarke	Montana	46 34	112 4		21–22
Livingston	Park	do			4,487	5–7

The following table gives the figures of normal or average monthly precipitation from the beginning of the record and including 1901, together with the total precipitation by months for the years 1896, 1897, 1898, 1899, 1900, and 1901, and also the annual totals. In obtaining the normal precipitation, the average is taken for all of the months during which observations were made.

Precipitation at stations in drainage basin of Upper Missouri River.

BUTTE, MONT.

Year.	Jan.	Feb.	Mar.	Apr.	May	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	6.05	0.69	1.04	1.32	1.95	1.62	1.05	0.73	1.16	0.94	0.56	0.77	17.88
1896	.30	.37	.32	.55	1.43	1.07	1.19	.87	1.95	.47	1.62	.37	10.51
1897	1.20	.70	1.04	1.63	1.44	3.02	1.19	.30	.98	1.10	1.52	1.12	15.24
1898	.57	.55	1.56	.51	(1.95)	3.06	.54	.45	.91	(.94)	(.56)	(.77)	12.37
1899	2.35	1.39	1.21	1.57	2.46	.55	.90	2.35	.55	1.65	.14	1.10	16.22
1900	.30	1.05	1.20	2.75	2.90	.66	1.13	.48	1.40	2.08	.20	.40	14.55
1901	.60	.65	1.65	2.35	3.40	2.00	.55	.30	.90	.45	T.	1.70	14.55

FORT LOGAN, MONT.

Normal	0.61	0.48	0.79	1.04	1.89	2.25	0.95	0.60	1.08	0.86	0.89	0.70	12.14
1896	(.61)	.02	.19	.26	1.48	.62	2.90	(.60)	(1.08)	.44	2.71	(.70)	11.61
1897	.62	.62	.74	.82	1.22	3.98	2.21	T.	.48	1.96	2.59	(.70)	15.94
1898	.09	.00	1.68	.66	4.48	3.23	1.76	.49	.40	1.23	2.04	.56	16.62
1899	1.26	.40	.64	.42	.67	(2.25)	T.	1.00	.30	1.71	.10	.82	9.57
1900	T.	.54	.79	1.33	1.61	.67	.15	.49	1.31	1.18	.36	.34	8.77
1901	.72	1.50	.72	1.71	(1.89)	3.59	.70	.85	2.43	.11	T.	1.50	15.72

FORT YELLOWSTONE, WYO.

Normal	2.51	2.15	2.23	1.45	1.91	1.62	1.20	1.15	1.02	1.26	2.20	2.32	21.02
1896	2.21	2.07	2.62	1.29	3.85	.73	2.09	.37	1.10	.06	3.92	.46	20.77
1897	1.12	.83	1.08	1.21	1.55	2.34	1.11	.57	.31	1.72	2.98	.80	15.62
1898	.31	1.21	1.40	.95	1.95	2.67	1.15	2.05	.90	2.25	1.55	.67	17 06
1899	4.21	3.40	3.00	2.30	2.52	1.90	1.42	2.23	.90	2.02	.04	1.90	25.84
1900	.92	1.65	3.13	1.93	2.42	1.17	.80	.28	.86	1.22	1.17	1.18	16.73
1901	2.28	.72	1.46	1.08	2.72	1.43	.80	1.65	2.85	.90	1.25	2.53	19.67

Precipitation at stations in drainage basin of Upper Missouri River—Continued.

HELENA, MONT.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	1.15	0.73	0.83	1.17	1.95	2.26	1.07	0.65	1.33	0.85	0.81	0.85	13.65
1896	.72	.59	1.71	1.23	2.25	.71	.89	.86	2.54	.24	3.29	.35	15.38
1897	.80	1.49	1.23	1.15	1.14	3.66	1.89	.52	.66	.81	2.22	.59	16.16
1898	.20	.52	2.39	.56	4.88	3.52	1.71	.71	.87	1.10	.66	.28	17.40
1899	1.60	.53	1.27	.70	1.98	.84	.63	1.26	.64	1.45	.26	.62	11.78
1900	.03	.64	.90	2.49	3.22	.19	.23	.59	1.39	1.21	.30	.43	11.62
1901	.56	.44	1.05	1.58	4.11	1.83	.40	.17	2.63	.07	.16	1.71	14.71

LIVINGSTON, MONT.

Normal	0.60	0.37	0.76	0.59	3.76	1.92	0.75	0.42	1.28	5.83	0.96	0.36	17.60
1896	.37	.10	1.26	.70	2.40	.35	.59	.15	2.37	.83	1.56	T.	10.68
1897	.44	.35	.49	.52	.60	3.30	1.63	T.	.43	1.80	1.66	.55	11.77
1898	T.	.23	1.20	1.04	4.03	4.28	1.23	1.26	.61	1.32	.78	.10	16.08
1899	1.06	1.26	1.20	.50	(3.76)	(1.92)	(.75)	(.42)	(1.28)	(5.83)	.46	1.20	19.64
1900	T.	.14	.44	(.59)	(3.76)	.00	.01	.05	.90	1.20	.03	.40	7.52
1901	(.60)	.01	.05	.77	8.00	1.65	.30	.62	2.10	.25	.23	.94	15.32

Depth of run-off, in inches, from the drainage basin of Middle Creek near Bozeman, Mont.

Year.	Jan.	Feb.	Mar.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1898	.....	.....	.....	10.73	11.42	9.79	8.90	8.40	.....	10.14	8.38
1899	8.91	9.00	8.91	8.73	11.88	10.01	9.35	8.48	8.61	.....	.....
1900	.....	.....	.....	.....	.....	1.87	1.15	.97	.....	.....	.....
Average	8.91	9.00	8.91	9.73	11.65	7.22	6.47	5.95	8.61	10.14	8.38

Depth of run-off, in inches, from the drainage basin of Gallatin River at Logan, Mont.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1896	0.48	0.44	0.49	0.49	0.77	3.11	0.86	0.49	0.47	0.48	0.47	0.51	9.06
1897	.49	.42	.46	.68	2.69	2.00	.49	.32	.36	.44	.47	.46	9.28
1898	.09	.06	.46	.71	1.69	3.15	.71	.26	.45	.56	.37	(.49)	9.00
1900	.65	.64	.71	.78	2.23	1.55	.23	.24	.33	.43	.48	.45	8.72
Average	.63	.39	.53	.67	1.85	2.45	.57	.33	.40	.48	.45	.48	9.02

Depth of run-off, in inches, from the drainage basin of Madison River at Red Bluff, Mont.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.89	0.80	0.89	1.01	1.85	2.36	1.41	0.93	0.82	0.87	0.90	0.93	13.66
1898	.....	.....	.....	.....	.....	3.21	2.01	1.48	1.20	1.20	.....	.....	.....
1899	.....	.....	.....	.....	4.49	2.85	1.51	1.15	1.01	.98	.....	.....	.....
1900	.....	.....	.47	.95	2.36	1.93	1.03	.92	.90	1.03	.89	.91	.....
1901	.61	.55	.61	1.05	2.82	1.80	1.12	.86	.79	.82	.81	.....	.....
Average	.75	.68	.66	1.00	2.88	2.43	1.42	1.07	.94	.98	.87	.92	13.66

Depth of run-off, in inches, from the drainage basin of West Gallatin River at Salesville, Mont.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1897	0.33	0.30	0.40	0.75	5.15	3.64	1.76	0.85	0.65	0.70	0.58	0.60	15.71
1898	.81	.97	.75	1.09	3.44	6.02	2.62	1.25	1.04	1.05	.91	1.01	20.96
1899	.93	.84	.90	.94	1.65	7.22	6.12	1.76	1.18	1.14	1.10	1.00	24.78
1900	.81	.60	.67	1.25	4.09	4.23	1.06	.69	.60	.66	.52	.48	15.67
1901	.68	.56	.61	.69	4.89	2.90	1.07	.70	.64	.65	.60	.61	14.60
Average	.71	.63	.67	.94	3.84	4.80	2.53	1.05	1.62	.83	.74	.74	18.34

Depth of run-off, in inches, from the drainage basin of Jefferson River at Sappington, Mont.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.20	0.18	0.20	0.41	1.10	0.54	0.30	0.10	0.09	0.12	0.16	0.18	3.58
1898	.20	.18	.17	.44	.77	1.01	.44	.14	.14	.17	.19	.18	4.03
1899	.....	.....	.....	.25	.63	1.36	.80	.25	.16	.21	.25	.11	.....
1900	.....	.....	.....	.38	.83	.50	.13	.07	.09	.17	.19	.20	.....
1901	.....	.....	.....	.29	.89	.47	.15	.07	.08	.10	.13	.....	.....
Average	.20	.18	.19	.35	.84	.78	.36	.13	.11	.15	.18	.17	3.81

Depth of run-off, in inches, from the drainage basin of Missouri River at Townsend, Mont.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.22	0.20	0.24	0.55	1.26	0.87	0.43	0.21	0.20	0.26	0.27	0.29	5.00
1898	1.09	1.05	.36	.46	.81	1.41	.49	.18	.20	.24	.....	.....	.....
1899	.....	.....	.....	.....	.77	2.24	1.12	.39	.26	.31	.31	.35	.....
1900	.54	.73	.69	.46	1.09	.73	.17	.14	.16	.22	.29	.29	5.51
1901	.52	.67	.46	.33	1.20	.70	.23	.12	.13	.21	.22	.73	5.52
Average	.59	.66	.44	.45	1.03	1.19	.49	.21	.19	.25	.27	.42	5.34

Rainfall and run-off in Upper Missouri River Basin.

Stations.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RAINFALL.							
Butte	17.88	10.51	15.24	12.37	16.22	14.55	14.55
Fort Logan	12.14	11.61	15.94	16.62	9.57	8.77	15.72
Fort Yellowstone	21.02	20.77	15.62	17.06	25.84	16.73	19.67
Helena	13.65	15.38	16.16	17.40	11.78	11.62	14.71
Livingston	17.60	10.68	11.77	16.08	19.64	7.52	15.32
Average rainfall	16.46	13.79	14.95	15.91	16.61	11.84	15.99

Rainfall and run-off in Upper Missouri River Basin—Continued.

Stations.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RUN-OFF.							
Gallatin at Logan	9.02	9.06	9.28	9.00	.....	8.72	.....
Jefferson at Sappington	3.81	.....	3.58	4.03	.....	.....	.....
Madison at Red Bluff	13.66	.....	13.66	.....	.....	.....	.....
Missouri at Townsend	5.34	5.71	5.00	5.00	.....	5.51	5.52
West Gallatin at Salesville	18.34	17.66	15.71	20.96	.....	15.61	14.60
Average run-off	10.03	5.29	9.45	9.75	.....	9.95	10.06
Percentage of rainfall [a]	60.94	38.36	60.54	61.28	.....	84.05	62.91

[a] This high percentage is probably due to the fact that the rainfall as recorded is that for the lower country, and does not represent the true rainfall on the catchment area.

WEST GALLATIN RIVER.

Estimated monthly discharge of West Gallatin River near Salesville, Mont.

[Drainage area, 860 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	605	455	505	31,051	0.59	0.68
February	495	455	466	26,805	.54	.56
March	475	435	452	27,792	.53	.61
April	700	455	529	31,478	.62	.69
May	7,810	1,230	3,643	223,998	4.24	4.89
June	4,120	1,580	2,233	132,873	2.60	2.90
July	1,440	515	799	49,129	.93	1.07
August	620	495	528	32,465	.61	.70
September	495	475	494	29,395	.57	.64
October	495	475	485	29,821	.56	.65
November	475	435	465	27,669	.54	.60
December	475	455	458	28,161	.53	.61
The year	7,810	435	921	670,637	1.07	14.60

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 17; rating table on page 170 of same paper.

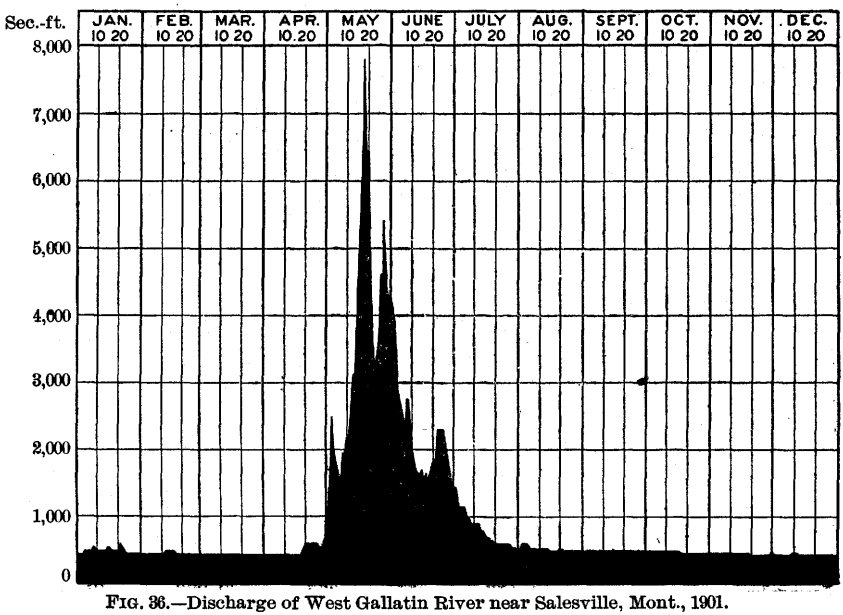


FIG. 36.—Discharge of West Gallatin River near Salesville, Mont., 1901.

MADISON RIVER.

Estimated monthly discharge of Madison River near Red Bluff, Mont.

[Drainage area, 2,085 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	------	------	[a] 1,106	68,005	0.53	0.61
February	------	------	[a] 1,106	61,424	.53	.55
March	------	------	[a] 1,106	68,005	.53	.61
April	2,275	1,900	1,958	116,509	.94	1.05
May	8,325	2,825	5,085	312,664	2.44	2.82
June	5,400	2,400	3,357	199,756	1.61	1.80
July	2,400	1,650	2,013	123,774	.97	1.12
August	1,900	1,475	1,560	95,920	.75	.86
September	1,475	1,475	1,475	87,769	.71	.79
October	1,475	1,475	1,475	90,695	.71	.82
November	1,650	1,475	1,516	90,208	.73	.81
December	------	------	[a] 1,475	90,695	.71	.82
The year	------	------	1,936	1,405,424	.93	12.66

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 19; rating table on page 170 of same paper.

JEFFERSON RIVER.

Estimated monthly discharge of Jefferson River at Sappington, Mont.

[Drainage area, 8,984 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
March	----------	----------	1,443	69,491	0.16	0.14
April	5,510	1,260	2,281	135,729	.26	.29
May	9,325	5,730	6,949	427,277	.77	.89
June	7,580	2,375	3,754	223,379	.42	.47
July	2,375	610	1,187	72,986	.13	.15
August	610	550	535	32,896	.06	.07
September	820	430	665	39,570	.07	.08
October	935	820	847	52,080	.09	.10
November	1,155	975	1,057	62,896	.12	.13
December	----------	----------	1,164	43,866	.13	.09

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 19; rating table on page 170 of same paper.

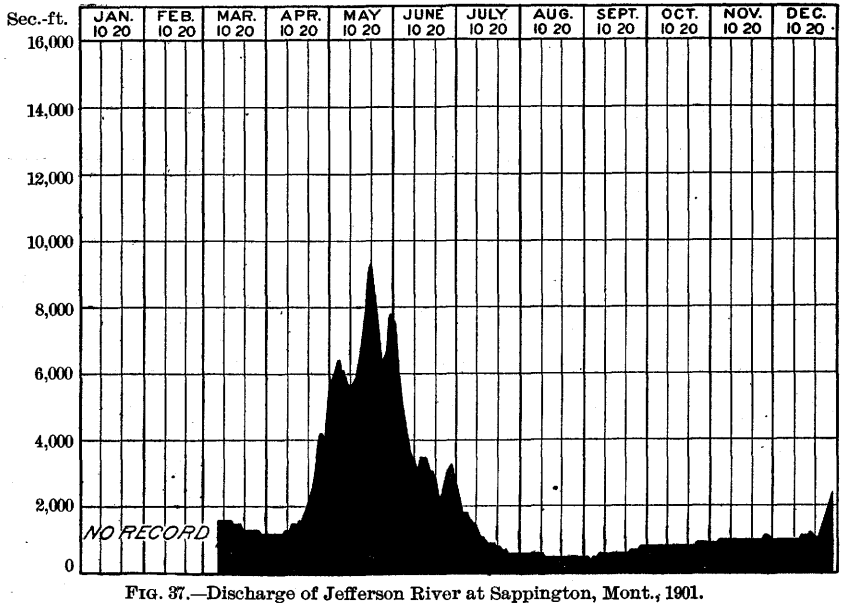


FIG. 37.—Discharge of Jefferson River at Sappington, Mont., 1901.

MISSOURI RIVER.

Estimated monthly discharge of Missouri River near Townsend, Mont.

[Drainage area, 14,500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	8,155	1,020	6,579	404,526	0.45	0.52
February	10,220	7,760	9,296	516,273	.64	.67
March	22,880	3,020	5,884	361,793	.40	.46
April	6,635	2,745	4,340	249,639	.30	.33
May	22,150	7,375	15,029	924,097	1.04	1.20
June	19,450	5,600	9,085	540,595	.63	.70
July	5,600	1,590	2,949	181,327	.20	.23
August	1,800	1,390	1,521	93,522	.10	.12
September	2,020	1,200	1,778	105,798	.12	.13
October	3,020	2,250	2,634	161,958	.18	.21
November	3,020	2,745	2,965	176,429	.20	.22
December	18,825	3,020	9,473	563,682	.65	.73
The year	22,880	1,020	5,961	4,279,639	.41	5.52

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 21; rating table on page 170 of same paper.

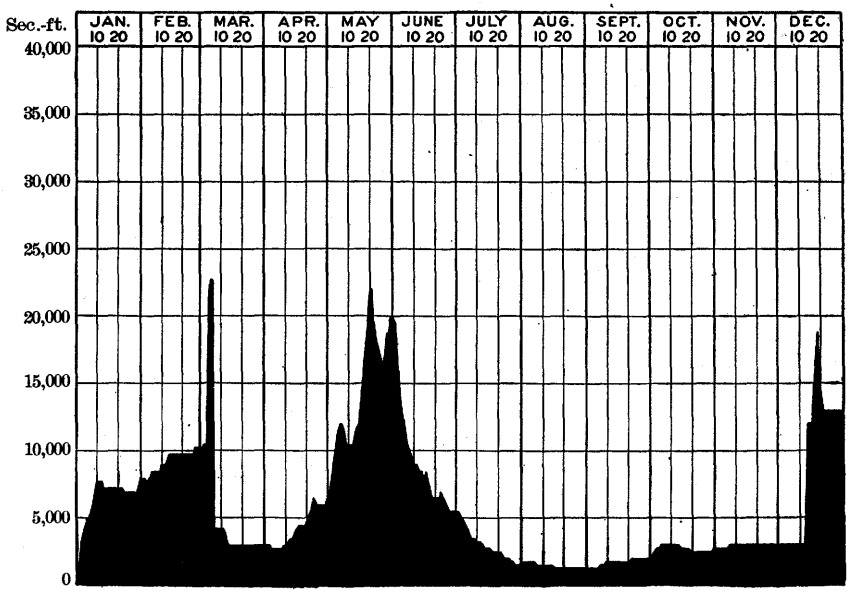


FIG. 38.—Discharge of Missouri River near Townsend, Mont., 1901.

MILK RIVER.

Estimated monthly discharge of Milk River at Havre, Mont.

[Drainage area, 7,300 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
March 10–30			600	36,893	0.082	0.095
April	330	115	205	12,198	.028	.031
May	2,540	230	648	39,844	.089	.103
June	1,340	330	553	32,906	.076	.085
July	460	65	184	11,314	.025	.029
August	65	12	28	1,722	.004	.005
September	95	11	56	3,332	.008	.009
October	95	65	82	5,042	.011	.013
November	95	65	80	4,760	.011	.012

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No 66, page 16; rating table on page 170 of same paper.

YELLOWSTONE RIVER.

Estimated monthly discharge of Yellowstone River near Livingston, Mont.

[Drainage area, 3,580 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			[a] 1,100	67,636	0.31	0.36
February			[a] 1,000	55,537	.28	.29
March	1,380	1,000	1,264	77,720	.35	.40
April	2,050	1,265	1,489	88,602	.42	.47
May	26,525	2,665	1,218	74,892	.34	.39
June	13,250	8,230	10,228	608,608	2.86	3.19
July	8,075	3,590	5,534	340,273	1.55	1.79
August	4,400	2,440	3,107	191,042	.87	1.00
September	2,560	2,050	2,248	133,765	.63	.70
October	2,050	1,750	1,926	118,425	.54	.62
November			[a] 1,593	94,790	.45	.50
December			[a] 1,200	73,785	.34	.39
The year			2,659	1,925,075	.75	10.10

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 22; rating table on page 170 of same paper.

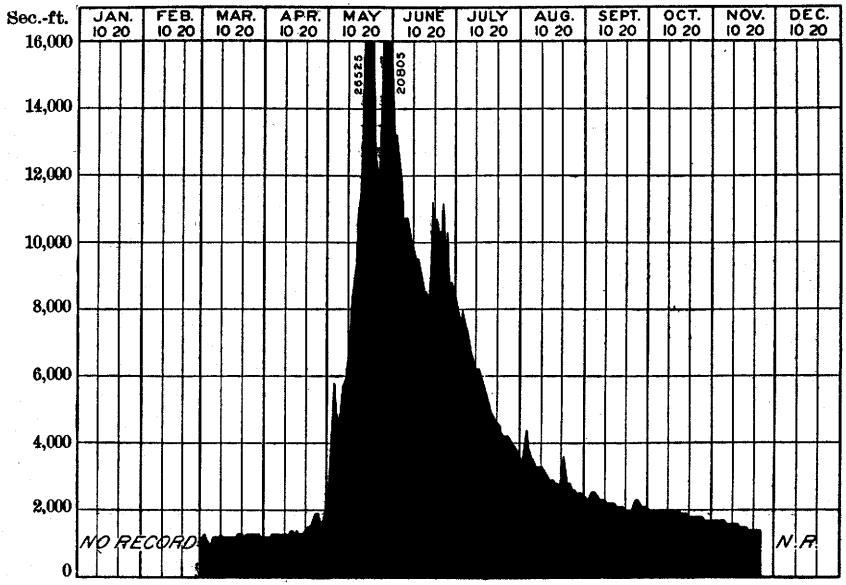


FIG. 39.—Discharge of Yellowstone River near Livingston, Mont., 1901.

Estimated monthly discharge of Bighorn River near Thermopolis, Wyo.

[Drainage area, 8,184 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	17,610	2,980	10,118	622,132	1.24	1.43
June	14,750	5,840	8,739	520,007	1.07	1.19
July	6,830	4,300	5,886	361,916	.72	.83
August	4,410	1,990	2,916	179,298	.36	.42
September	3,530	1,550	2,107	125,376	.26	.29

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 23; rating table on page 170 of same paper.

BIG SIOUX RIVER.

Estimated monthly discharge of Big Sioux River near Sioux Falls, S. Dak.

[Drainage area, 4,450 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
August 10–31			24	1,047	0.005	.004
September	44	14	26	1,547	.006	.007
October	64	14	45	2,767	.010	.012
November 1–17			50	1,685	.010	.004
1901.						
April 1–20			14	555	.003	.002
May 5–31			97	5,193	.022	.023
June	250	89	168	9,996	.038	.044
July	146	9	44	2,705	.010	.012
August 1–2, 11–31			9	411	.002	.002
September	17	3	14	833	.003	.003
October	21	17	18	1,107	.004	.005
November	31	17	27	1,607	.006	.007

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 24; rating table on page 170 of same paper.

PLATTE RIVER DRAINAGE.

Platte River rises on the eastern slope of the Rocky Mountains in Wyoming, Colorado, and Nebraska. Its headwaters are extensively utilized for irrigation, the most important drainage basin in Colorado being that of South Platte River which traverses a region unequaled in the United States for the extent to which intensive farming has been developed there by irrigation. As in previous years the greater number of river stations maintained in the Platte Basin are located on South Platte River and tributaries in Colorado. New stations were established during the year 1901 at Medicine Bow, Wyo., on Medicine Bow River, a tributary of the North Platte; at Mitchell, Nebr., on North Platte River, and at Kersey, Colo., on South Platte River. The station at Mitchell replaces the one previously maintained at Gering, Nebr., it being situated nearer the Wyoming-Nebraska State line and therefore of greater value in determining the flow at that point. Observations were discontinued at Orchard, Colo., on South Platte River, and the station moved to Kersey, where it is believed better results can be obtained. A detailed report on the

Platte River drainage in Colorado, together with a résumé of all the available records of flow, is contained in Water-Supply Paper No. 74, on the Water Resources of the State of Colorado, by A. L. Fellows.

NORTH PLATTE RIVER.

Estimated monthly discharge of Medicine Bow River at Medicine Bow, Wyo.

[Drainage area, 900 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	1,920		[a] 940	57,798	1.04	1.20
June	1,650	350	977	58,136	1.09	1.22
July	272	45	96	5,903	.11	.12
August	45	6	17	1,045	.02	.02
September	17	8	16	952	.02	.02

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 26; rating table on page 170 of same paper.

Estimated monthly discharge of North Platte River near Guernsey, Wyo.

[Drainage area, 16,243 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	10,435	682	2,066	122,936	0.13	0.15
May	13,217	5,930	8,589	528,117	.53	.61
June	13,880	5,400	9,154	544,701	.56	.62
July	5,532	1,070	1,899	116,765	.12	.14
August	1,070	420	706	43,410	.04	.05
September	420	80	316	18,803	.02	.02

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 27; rating table on page 170 of same paper.

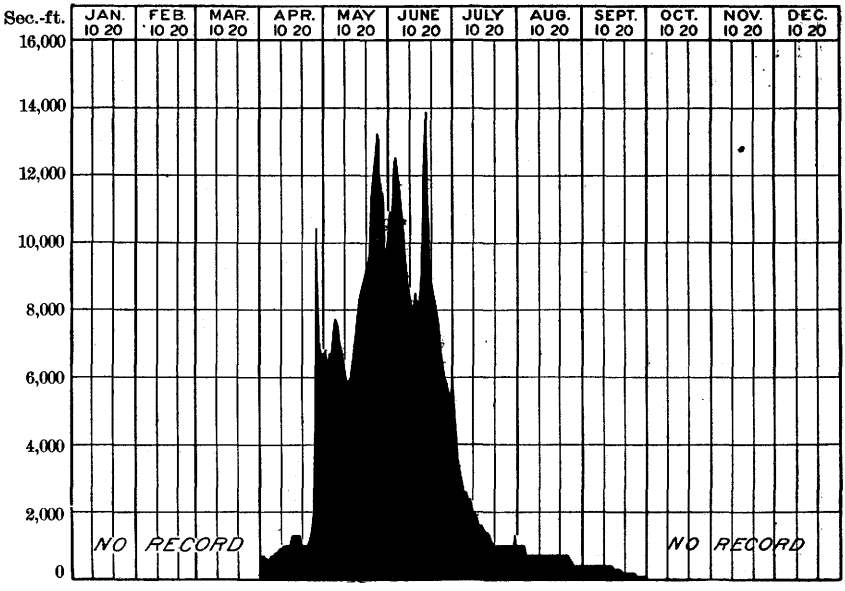


FIG. 40.—Discharge of North Platte River near Guernsey, Wyo., 1901.

Estimated monthly discharge of North Platte River at Mitchell, Nebr.

[Drainage area, 24,400 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
June 9–30			7,514	327,884	0.308	0.252
July 1–20			2,353	96,454	.096	.073
August 12–31			398	16,315	.016	.012
September	422	210	322	19,160	.013	.015
October	520	235	384	23,611	.016	.018

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 28.

SOUTH PLATTE RIVER.

Estimated monthly discharge of South Platte River at Denver, Colo.

[Drainage area, 3,840 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	242	186	212	13,035	0.06	0.07
February	242	186	217	12,052	.06	.06
March	306	213	241	14,818	.07	.08
April	1,121	242	516	30,704	.13	.15
May	1,026	113	553	34,003	.14	.16
June	1,386	113	715	42,545	.19	.21
July	575	25	250	15,310	.07	.08
August	611	242	366	22,443	.10	.12
September	422	51	216	12,853	.06	.07
October	213	25	94	5,657	.02	.02
November	136	12	73	4,284	.02	.02
December	341	113	234	14,388	.06	.07
The year	1,386	12	307	222,092	.08	1.11

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 30; rating table on page 171 of same paper.

Estimated monthly discharge of Bear Creek near Morrison, Colo.

[Drainage area, 170 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	132	11	54	3,213	0.32	0.36
May	168	93	116	7,132	.68	.78
June	187	93	114	6,784	.67	.75
July	96	24	52	3,197	.31	.36
August	190	18	40	2,459	.24	.28
September	51	13	22	1,309	.13	.15
October	29	13	20	1,230	.12	.14
November	21	9	15	893	.09	.10

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 31; rating table on page 171 of same paper.

Estimated monthly discharge of Clear Creek at Forkscreek, Colo.

[Drainage area, 345 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May 8–31	----------	----------	[a]558	34,310	1.62	1.87
June	775	544	652	38,856	1.89	2.11
July	692	235	433	26,624	1.25	1.44
August	367	155	227	14,019	.66	.76
September	179	66	114	6,783	.33	.37
October	93	58	73	4,489	.21	.24
November	58	20	37	2,202	11	.12

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 31; rating table on page 171 of same paper.

Estimated monthly discharge of South Boulder Creek near Marshall, Colo.

[Drainage area, 125 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	119	7	47	2,797	0.38	0.42
May	263	64	128	7,932	1.02	1.18
June	278	193	229	13,627	1.83	2.04
July	220	57	118	7,256	.94	1.08
August	78	34	48	2,951	.38	.44
September	34	13	20	1,190	.16	.18

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 33, rating table on page 171 of same paper.

Estimated monthly discharge of Boulder Creek near Boulder, Colo.

[Drainage area, 179 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	264	6	75	4,463	0.42	0.47
May	705	164	388	23,857	2.17	2.50
June	789	390	513	30,526	2.87	3.20
July	516	191	319	19,615	1.78	2.05
August	225	44	114	7,010	.64	.74
September	70	16	35	2,083	.20	.22
October	32	11	15	922	.08	.09
November	11	6	8	476	.04	.04
December	6	4	5	307	.03	.03

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 33; rating table on page 171 of same paper.

Estimated monthly discharge of St. Vrain Creek near Lyons, Colo.

[Drainage area, 209 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	253	4	102	6,069	0.49	0.55
May	667	148	337	20,844	1.61	1.86
June	730	304	490	29,157	2.34	2.61
July	478	196	301	18,569	1.44	1.66
August	269	87	157	9,653	.75	.86
September	126	25	59	3,511	.28	.31
October	38	19	30	1,845	.14	.16
November	25	4	14	833	.07	.08

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 35; rating table on page 171 of same paper.

Estimated monthly discharge of Big Thompson Creek near Arkins, Colo.

[Drainage area, 305 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	977	208	600	36,893	1.97	2.27
June	1,143	620	859	51,114	2.82	3.15
July	975	225	530	32,650	1.74	2.01
August	506	140	261	16,048	.86	.99
September	110	44	72	4,284	.24	.27

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 36; rating table on page 171 of same paper.

Estimated monthly discharge of Cache la Poudre River near Fort Collins, Colo.

[Drainage area, 1,060 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	5,100	619	1,757	108,034	1.66	1.91
June	2,449	1,425	1,956	116,390	1.85	2.06
July 1–23	------	------	885	42,129	.83	.74
August	510	242	337	20,721	.32	.37
September	294	98	152	9,045	.14	.16
October 1–15	------	------	119	3,540	.11	.06

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 66, page 37.

Estimated monthly discharge of South Platte River at Kersey, Colo.

[Drainage area, 9,470 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	5,856	62	1,393	85,653	0.15	0.17
June	5,004	450	1,820	108,297	.19	.21
July	450	290	314	19,307	.03	.03
August	330	290	296	18,200	.03	.03
September	705	290	395	23,504	.04	.04
October	516	370	456	28,039	.05	.06
November	591	450	526	31,299	.06	.07
December	1,155	540	903	55,524	.10	.12

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 38; rating table on page 171 of same paper.

PRECIPITATION IN THE UPPER BASIN OF SOUTH PLATTE RIVER.

The principal observations of rainfall made within the upper basin of South Platte River are at the stations enumerated in the following table, which also gives their geographic location, elevation above sea

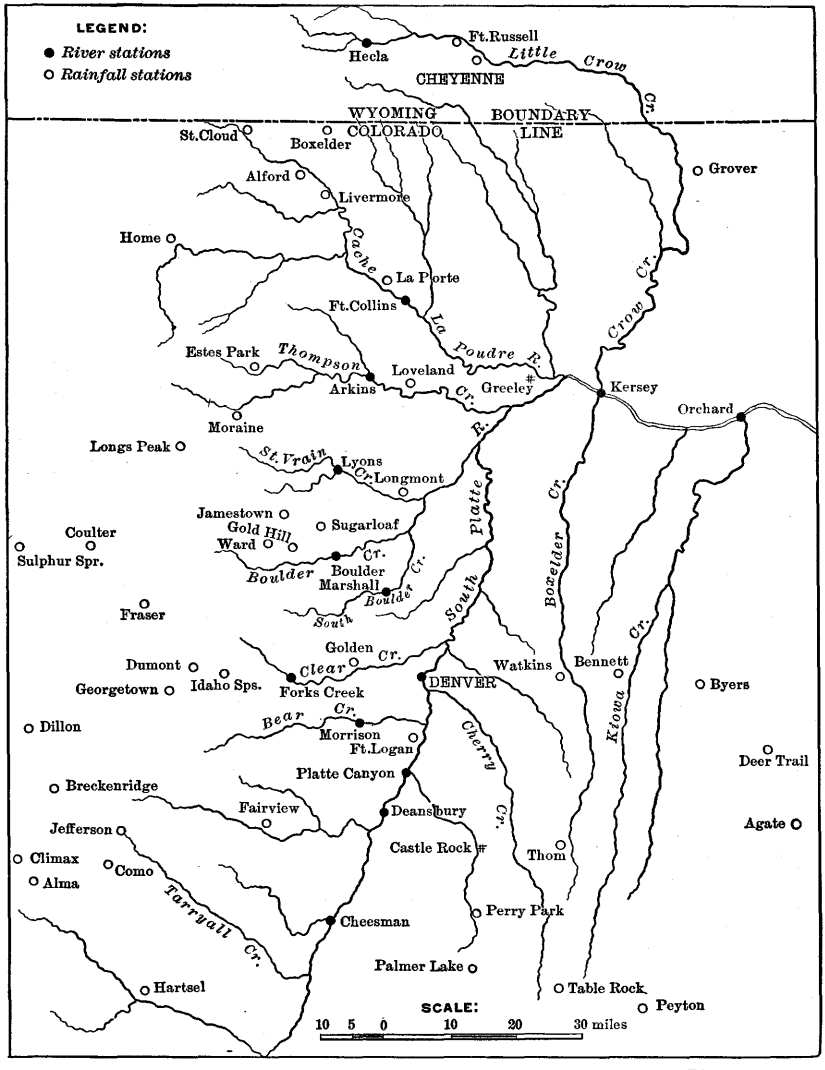


FIG. 41.—Location of rainfall and river stations in the upper basin of South Platte River.

level, and length of record of observations. The relative locations of the points are shown in fig. 41 in connection with the points of river measurement, which are located at Denver, Morrison, Forkscreek, Marshall, Boulder, Lyons, Arkins, Fort Collins, Orchard, and Kersey.

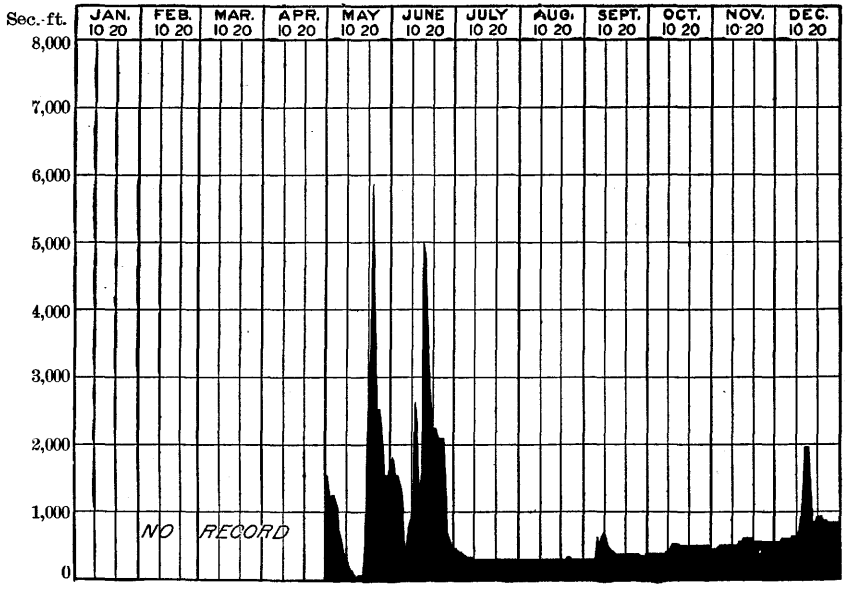


FIG. 42.—Discharge of South Platte River at Kersey, Colo., 1901.

Location of rainfall stations in South Platte River Basin.

Stations.	County.	State.	Latitude.	Longitude.	Elevation.	Length of record.
			° ′	° ′	*Feet.*	*Years.*
Boxelder	Larimer	Colorado				10-12
Breckenridge	Summit	do	39 31	106 0	9,524	11-13
Castlerock	Douglas	do				9-12
Cheyenne	Laramie	Wyoming	41 8	104 48		32
Denver	Arapahoe	Colorado	39 45	105 0	5,281	32
Dumont	Clear Creek	do	40 35	105 2	5,000	10-11
Fort Collins	Larimer	do	40 26	104 42	4,750	19-28
Greeley	Weld	do	40 38	105 6		10-13
Laporte	Larimer	do				11-13
Longs Peak	do	do				6-7
Moraine	do	do				11-13
Sugar Loaf	Boulder	do				10-12

The following table gives the figures of normal or average monthly precipitation from the beginning of the record and including 1901, together with the total precipitation, by months, for the years 1896, 1897, 1898, 1899, 1900, and 1901, and also the annual totals. In obtaining the normal precipitation the average is taken for all of the months during which observations were made.

Precipitation at stations in drainage basin of South Platte River.

BOXELDER, COLO.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	0.70	0.71	1.36	1.93	3.41	1.64	2.20	2.05	0.96	0.74	0.43	0.56	16.69
1896	.53	.06	3.24	1.10	2.53	2.16	1.93	3.05	2.86	.02	.27	.08	17.83
1897	.18	.65	2.75	2.22	3.49	1.59	4.03	4.31	.68	.84	.83	.85	21.42
1898	.70	.22	.58	1.32	5.62	1.66	1.36	1.71	1.36	.47	1.17	.17	16.34
1899	1.27	1.78	1.42	1.06	.52	1.79	2.23	1.46	.13	2.51	.08	.17	14.42
1900	.18	.86	.62	6.70	4.00	.54	2.72	.55	1.55	.00	.00	.21	17.93
1901	.19	.63	1.62	2.96	4.18	1.89	.57	1.66	.49	.46	.13	2.47	17.25

BRECKENRIDGE, COLO.

Normal	2.06	3.51	3.65	3.28	2.37	1.05	2.34	2.16	0.88	1.43	2.41	2.75	27.89
1896	1.88	1.89	4.83	.60	1.47	.30	3.10	2.29	2.25	.82	3.87	.73	24.03
1897	2.90	1.99	3.53	4.00	1.54	1.53	1.70	2.27	1.16	1.02	.60	2.25	24.49
1898	.29	.59	1.16	1.53	.46	1.14	2.19	1.59	.38	1.53	4.09	1.34	16.29
1899	4.75	5.08	7.94	1.31	.31	1.52	2.29	1.60	.29	2.54	.58	1.20	29.41
1900	.35	2.48	1.06	4.82	1.68	1.12	.33	.74	.30	.60	.44	.70	14.62
1901	2.36	3.02	2.40	3.12	2.87	1.58	.89	4.94	.08	.78	.90	2.86	25.80

CASTLEROCK, COLO.

Normal	0.54	0.81	1.03	2.44	2.41	1.82	2.91	2.47	0.73	1.19	0.50	0.75	17.60
1896	.65	.95	1.80	2.30	1.61	.70	3.67	3.57	2.80	1.62	.32	.45	20.44
1897	.47	1.20	2.50	1.37	(2.41)	3.12	3.59	8.10	.24	2.82	(.50)	1.23	27.55
1898	(.54)	(.81)	.40	1.76	6.48	1.82	4.20	1.49	1.35	1.17	1.00	.99	22.01
1899	.63	.67	.77	1.50	.53	1.10	4.48	2.39	T.	1.30	.17	1.16	14.70
1900	.10	.63	.62	7.90	.55	1.80	1.77	.24	.06	.40	.33	.30	14.70
1901	.25	.30	1.04	3.47	1.82	1.35	1.72	3.45	.50	.28	T.	.59	14.77

CHEYENNE, WYO.

Normal	0.39	0.50	0.87	1.64	2.24	1.52	1.96	1.46	0.94	0.68	0.35	0.35	12.90
1896	.68	.31	2.06	2.08	2.85	1.41	6.35	2.52	2.08	.28	.14	.03	20.79
1897	.27	.57	2.32	.60	3.07	1.60	3.77	1.66	.41	1.03	.68	1.27	17.25
1898	.48	.06	.37	.68	3.72	2.33	1.83	.90	.47	.25	1.58	.36	13.05
1899	1.23	1.63	1.89	.97	1.70	.74	3.38	1.15	.07	1.27	.07	.18	14.18
1900	.15	1.25	.72	7.66	.76	1.01	1.20	.70	2.19	.03	.07	.33	16.09
1901	.13	1.10	1.54	2.97	2.47	1.93	1.34	.83	.75	.31	T.	1.62	14.99

DENVER, COLO.

Normal	0.55	0.54	0.93	2.10	2.56	1.33	1.56	1.33	0.83	0.87	0.63	0.66	13.89
1896	.25	.24	1.43	.93	1.27	.89	2.80	.97	1.81	.84	.10	.31	11.84
1897	.58	.82	.90	1.31	3.15	2.16	2.06	1.44	.44	1.64	.24	.63	15.37
1898	.20	.68	.28	1.20	4.88	.94	.67	.96	.28	1.05	.85	.99	12.98
1899	.65	.58	1.10	.75	.15	.47	1.92	1.78	.20	1.01	T.	.72	9.33
1900	.13	.55	.63	8.24	.53	1.87	1.30	.05	.87	.33	.37	.42	15.29
1901	.05	.06	.88	1.96	1.18	2.09	.01	1.30	.22	.46	T.	.89	9.10

Precipitation at stations in drainage basin of South Platte River—Continued.

DUMONT, COLO.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	0.32	0.97	1.39	2.45	3.04	1.60	2.58	2.19	1.14	1.39	0.73	0.78	18.58
1896	.25	.45	2.48	1.22	1.15	.58	2.18	2.81	2.04	.78	.50	.60	15.01
1897	.45	.55	2.00	1.43	3.75	1.71	2.55	2.59	1.42	3.32	.20	.85	20.82
1898	.10	.90	.65	2.45	3.20	2.60	1.67	2.60	.48	.40	1.89	.82	17.76
1899	.60	1.34	2.40	1.45	.62	.76	3.60	2.00	.60	3.55	.42	.85	18.19
1900	.09	1.21	.76	9.23	1.02	2.33	1.37	.75	1.25	.82	.19	.52	19.54
1901	.45	.79	1.22	2.79	2.78	1.15	(2.58)	(2.19)	(1.14)	(1.39)	(.73)	(.78)	17.97

FORT COLLINS, COLO.

Normal	0.61	0.58	0.96	2.21	2.99	1.61	1.88	1.21	0.96	0.94	0.38	0.35	14.68
1896	.43	.03	1.73	1.26	1.68	3.05	3.05	2.20	1.55	.49	.05	.24	15.76
1897	.18	.54	2.15	1.39	2.06	1.69	2.65	1.74	.75	.75	.67	.67	15.24
1898	.14	.08	.50	1.08	3.65	1.37	.50	.98	.50	.82	1.24	.17	11.03
1899	.66	1.04	1.50	1.10	1.01	1.03	4.95	.99	.21	3.23	T.	.47	16.19
1900	.25	1.12	1.07	10.56	1.75	.82	1.14	.16	1.92	.24	.07	.11	19.21
1901	.19	.38	1.88	3.62	7.47	2.35	.71	.57	2.25	.36	.02	1.37	21.17

GREELEY, COLO.

Normal	0.27	0.46	0.67	1.94	2.22	1.42	1.79	0.96	0.56	0.79	0.55	0.29	11.92
1896	.67	.18	.93	1.18	1.42	.46	4.82	2.15	.99	.63	.02	.07	13.52
1897	.06	.61	2.02	.81	3.20	2.47	2.98	1.75	.29	1.11	.40	.38	16.09
1898	.20	.33	.23	(1.94)	5.83	1.69	3.50	.83	.13	.78	.60	.37	16.43
1899	1.14	.69	.71	.70	1.15	.47	2.34	1.04	.30	1.85	T.	.40	10.79
1900	.16	.58	.62	6.32	.96	.31	1.28	T.	1.07	.11	.04	.16	11.61
1901	.22	.45	.95	2.12	2.38	2.45	.26	.47	1.06	.75	.05	1.06	12.22

LAPORTE, COLO.

Normal	0.55	0.72	1.26	2.11	2.94	1.55	1.61	1.28	1.00	0.71	0.41	0.57	14.71
1896	.60	.30	2.70	1.00	2.25	2.59	2.47	1.40	1.27	.50	.01	.40	15.49
1897	.20	.50	2.15	1.62	3.35	1.80	2.51	1.14	2.05	.60	1.10	.70	17.72
1898	.45	.10	.45	.24	5.00	1.27	.67	1.72	.55	.88	1.90	.40	13.63
1899	.89	1.08	1.81	.80	.88	.71	2.62	.95	.18	3.02	.00	.40	13.34
1900	.34	1.47	.79	10.02	1.84	.59	1.75	1.20	1.53	.25	.05	.23	20.06
1901	.05	.27	1.42	4.28	4.32	2.41	.57	.87	.97	.05	.01	1.51	16.73

LONGS PEAK, COLO.

Normal	0.45	0.85	1.74	2.28	1.27	1.47	2.67	1.63	1.06	1.46	0.61	0.54	16.03
1896	.26	.55	3.17	1.00	1.21	.65	3.60	2.95	1.95	1.05	.37	.15	16.91
1897	.78	1.25	1.96	1.45	1.60	1.50	1.85	1.29	.95	1.41	1.07	.55	15.66
1898	.24	.83	.75	1.73	2.07	2.06	2.94	1.53	.81	.60	1.60	.60	15.76
1899	.54	1.15	3.01	1.18	.38	1.09	4.32	1.73	.11	2.50	.02	.64	16.67
1900	.16	.85	.35	6.34	.60	.80	.51	.17	1.93	1.14	.44	.64	13.93
1901	.69	.47	1.19	1.97	1.73	1.47	.85	2.22	1.59	.95	.18	1.00	14.31

Precipitation at stations in drainage basin of South Platte River—Continued.

MORAINE, COLO.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
Normal	0.70	1.42	1.69	2.21	2.66	1.21	2.20	1.81	1.02	1.06	0.70	0.72	17.40
1896	.53	.22	2.87	1.08	1.62	.49	3.88	2.50	2.74	.75	.30	.30	17.28
1897	.61	1.68	1.86	1.29	2.30	1.79	2.52	2.43	.78	1.16	1.25	1.20	18.87
1898	.50	1.05	1.32	1.44	3.05	1.93	2.19	1.67	.40	.99	1.77	.55	16.86
1899	.77	2.32	2.98	1.39	.45	1.57	3.02	1.32	.15	1.96	.00	.65	16.58
1900	.21	1.11	.30	7.74	1.30	.91	.36	.23	2.19	1.42	.47	.48	16.72
1901	.61	.72	1.06	2.36	3.32	1.52	1.43	2.65	.42	.38	.27	1.15	15.89

SUGAR LOAF, COLO.

Normal	1.01	1.32	3.16	2.62	3.85	2.04	2.97	2.75	1.30	1.52	1.17	1.07	24.78
1896	1.10	.40	3.60	1.60	1.15	1.69	3.56	4.45	1.92	1.40	.30	.20	21.37
1897	.40	2.10	6.30	2.81	(3.85)	3.80	3.65	3.91	1.95	3.85	.80	.70	34.12
1898	.90	.90	.80	3.36	3.95	3.51	2.93	2.78	1.30	1.35	2.17	1.18	25.13
1899	1.20	1.22	5.29	1.59	1.11	.74	2.83	3.98	.60	(1.52)	(1.17)	(1.07)	22.32
1900	(1.01)	(1.32)	(3.16)	(2.62)	(3.85)	.95	1.97	1.12	2.97	.60	.20	.97	20.74
1901	.84	.33	2.17	5.60	3.60	2.20	2.80	4.90	.50	.66	.12	1.40	25.12

Depth of run-off, in inches, from the drainage basin of Bear Creek near Morrison, Colo.

Year.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	.....	1.02	1.15	0.78	1.35	0.44	0.37	0.22	0.14
1898	.....	.74	.93	1.01	.45	.30	.20	.16	.....
1899	.....	.70	.61	.59	.70	.20	.....	.....	.....
1900	.....	3.30	2.49	.78	.33	.....	.20	.11	.....
1901	0.36	.78	.75	.36	.28	.15	.14	.10	.....
Average	.36	1.31	1.19	.70	.62	.27	.23	.15	.14

Depth of run-off, in inches, from the drainage basin of Big Thompson Creek at Arkins, Colo.

Year.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	.....	1.58	1.68	1.00	0.49	0.13	0.07	0.10	0.15
1898	.....	.62	1.38	.90	.29	.11	.04	.02	.....
1899	0.52	1.14	3.36	2.47	1.07	.33	.24	.....	.....
1900	1.51	5.22	4.94	1.31	.52	.28	.....	.....	.....
1901	.....	2.27	3.15	2.01	.99	.27	.....	.....	.....
Average	1.02	2.17	2.90	1.54	.67	.22	.12	.06	.15

Depth of run-off, in inches, from the drainage basin of Boulder Creek near Boulder, Colo.

Year.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	.....	2.09	2.86	2.18	1.37	0.52	0.30	0.23	0.39
1898	.....	1.50	2.79	1.37	.40	.19	.05	.24	.....
1899	0.72	2.27	4.13	3.71	1.71	.55	.25	.14	.....
1900	.....	.76	6.99	2.87	1.06	.60	.37	.....	.....
1901	.47	2.50	3.20	2.05	.74	.22	.09	.04	.03
Average	.60	1.82	3.99	2.44	1.06	.42	.21	.19	.22

Depth of n-off, in inches, from the drainage basin of South Platte River at Kersey, Colo.

Year.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901	0.17	0.21	0.03	0.03	0.04	0.06	0.07	0.12
Average	.17	.21	.03	.03	.04	.06	.07	.12

Depth of run-off, in inches, from the drainage basin of St. Vrain Creek near Lyons, Colo.

Year.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	.....	2.82	3.56	2.53	1.51	0.65	0.24	0.19	0.22
1898	.....	1.16	2.30	1.27	.58	.32	.08	.07	.....
1899	1.15	1.43	3.95	3.59	1.65	.46	.22	1.11	.....
1900	.....	3.50	3.32	1.49	.54	.36	.25	.....	.....
1901	.55	1.86	2.61	1.66	.86	.31	.16	.08	.....
Average	.85	2.15	3.15	2.11	1.03	.42	.19	.36	.22

Depth of run-off, in inches, from the drainage basin of South Boulder Creek near Marshall, Colo.

Year.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1897	.....	2.82	3.58	2.17	1.19	0.38	0.36	0.31	0.28
1898	.....	1.79	2.54	1.27	.39	.20	.18	.16	.....
1899	1.02	2.56	3.72	2.24	.84	.31	.....	.....	.....
1900	.....	.....	3.18	.85	.27	.08	.....	.....	.....
1901	.42	1.18	2.04	1.08	.44	.18	.....	.....	.....
Average	.72	2.09	3.01	1.52	.63	.23	.27	.24	.28

Depth of run-off, in inches, from the drainage basin of South Platte River at Denver, Colo.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1897	0.03	0.02	0.05	0.14	0.22	0.30	0.12	0.21	0.08	0.08	0.12	0.06	1.43
1898	.04	.04	.03	.11	.44	.45	.21	.10	.06	.04	.03	.03	1.58
1899	.02	.05	.12	.13	.13	.23	.20	.16	.08	.03	.59	.04	1.78
1900	.06	.05	.06	.48	1.26	.81	.12	.05	.03	.03	.06	.06	.07
1901	.07	.06	.08	.15	.16	.21	.08	.12	.07	.02	.02	.07	1.11
Average	.04	.04	.07	.20	.44	.40	.15	.13	.06	.04	.16	.05	1.79

Depth of run-off, in inches, from the drainage basin of South Platte River at Orchard, Colo.

Year.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual.
1896	0.072	0.026	0.054	.....	.....	.....	.....	.....	.....	.....	.....	0.074	.....
1897	.059	.047	.013	0.048	0.084	0.240	0.032	0.075	0.009	0.029	0.100	.115	0.851
1898	.100	.730	.070	.030	.180	.080	.010	.030	.010	.020	.080	.250	1.590
1899	.280	.280	.220	.120	.044	.110	.150	.071	.004	.040	.072	.150	1.541
1900	.150	.100	.070	.380	.810	.420	.010	.010	.010	.050	.060	.060	2.130
Average	.132	.237	.085	.145	.255	.212	.051	.047	.008	.035	.078	.130	1.528

Rainfall and run-off, South Platte River Basin.

Station.	Normal.	1896.	1897.	1898.	1899.	1900.	1901.
RAINFALL.							
Boxelder	16.69	17.83	21.42	16.34	14.42	17.93	17.25
Breckenridge	27.89	24.03	24.49	16.29	29.41	14.62	25.80
Castlerock	17.60	20.44	27.55	22.01	14.70	14.70	14.77
Cheyenne	12.90	20.79	17.25	13.05	14.18	16.09	14.99
Denver	13.89	11.84	15.37	12.98	9.33	15.29	9.10
Dumont	18.58	15.01	20.82	17.76	18.19	19.54	17.97
Fort Collins	14.68	15.76	15.24	11.03	16.19	19.21	21.17
Greeley	11.92	13.52	16.09	16.43	10.79	11.61	12.22
Laporte	14.71	15.49	17.72	13.63	13.34	20.06	16.73
Longs Peak	16.03	16.91	15.66	15.76	16.67	13.93	14.31
Moraine	17.40	17.28	18.87	16.86	16.58	16.72	15.89
Sugar Loaf	24.78	21.37	34.12	25.13	22.32	20.74	25.12
Average	17.26	17.52	20.38	16.44	16.34	16.70	17.11
RUN-OFF.[a]							
South Platte at Denver	1.790	.....	1.430	1.580	1.780	3.070	1.110
South Platte at Orchard	1.528	.....	.851	1.590	1.541	2.130	.....
Average	1.659	.....	1.141	1.585	1.660	2.600	1.110
Percentage of rainfall	9.61	.....	5.60	9.64	10.16	15.57	6.49

[a] This represents only the excess water over the demands for irrigation, together with the return or seepage waters.

LOUP RIVER.

Estimated monthly discharge of Loup River near Columbus, Nebr.

[Drainage area, 13,542 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	4,681	2,573	3,254	193,626	0.24	0.27
May	2,743	1,847	2,346	144,250	.17	.20
June	5,902	1,723	3,467	206,300	.26	.29
July	3,048	(a)	1,609	98,934	.12	.14
August	1,825	(a)	1,377	84,668	.10	.12
September	4,776	1,763	2,853	169,765	.21	.23
October	2,647	1,898	2,243	137,916	.17	.20
November	3,367	1,743	2,325	138,942	.17	.19

[a] On account of shifting of the bed of the river the low-water flow is somewhat uncertain.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 38.

PLATTE RIVER.

Estimated monthly discharge of Platte River near Columbus, Nebr.

[Drainage area, 56,867 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	28,400	1,300	8,827	525.243	0.16	0.18
May	9,200	2,054	5,300	325,884	.09	.10
June	12,875	5,500	9,363	557,137	.16	.18
July 1–11	-------	-------	1,991	47,389	.04	.02
August	0	0	0	0	.00	.00
September	0	0	0	0	.00	.00
October	0	0	0	0	.00	.00
November	978	375	672	40,641	.01	.01

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 39.

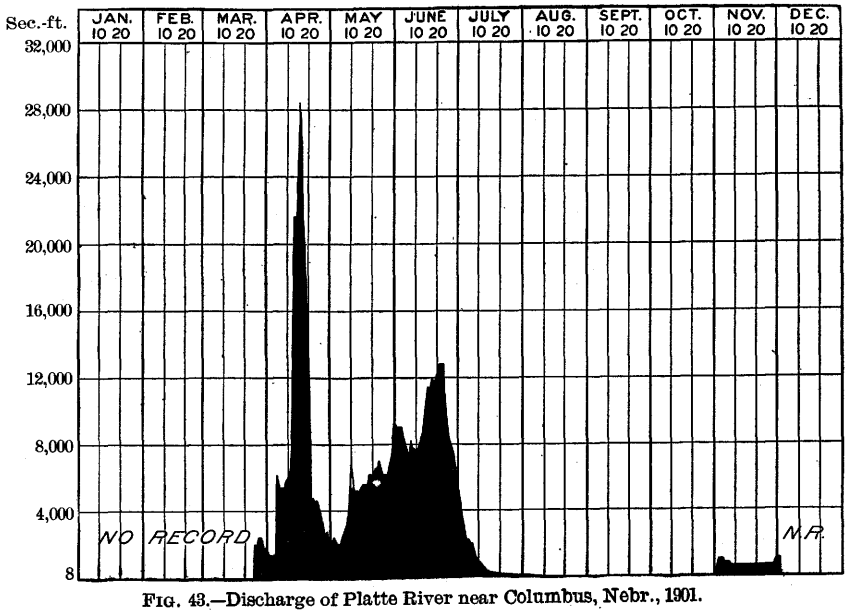


FIG. 43.—Discharge of Platte River near Columbus, Nebr., 1901.

ELKHORN RIVER.

Estimated monthly discharge of Elkhorn River near Norfolk, Nebr.

[Drainage area, 2,474 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	933	431	648	38,559	0.26	0.29
May	881	306	489	30,067	.20	.23
June	3,438	270	1,271	75,630	.51	.57
July	2,003	215	765	47,038	.31	.35
August	231	149	172	10,576	.07	.08
September	362	142	269	16,006	.11	.12
October	342	308	323	19,860	.13	.15
November	357	319	332	19,755	.13	.15

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 40; rating table on page 171 of same paper.

Estimated monthly discharge of Elkhorn River near Arlington, Nebr.

[Drainage area, 5,980 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	1,335	833	1,065	63,372	0.18	0.20
May	2,133	613	1,136	69,850	.19	.22
June	4,745	541	1,869	111,213	.31	.35
July	3,989	544	1,373	84,422	.23	.27
August	533	317	421	25,886	.07	.08
September	705	300	514	30,585	.09	.10
October	679	544	599	36,831	.10	.12
November	726	537	627	37,309	.10	.11

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 41.

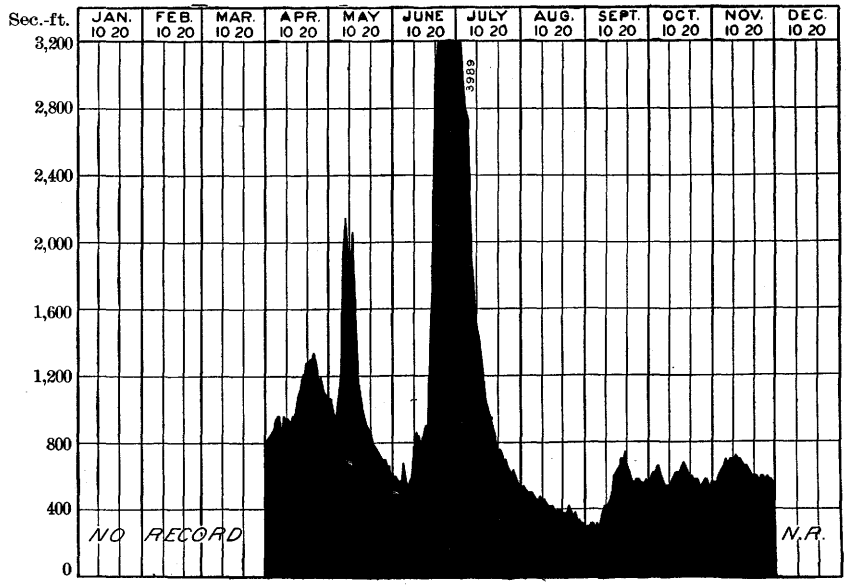


FIG. 44.—Discharge of Elkhorn River near Arlington, Nebr., 1901.

KANSAS RIVER DRAINAGE.

As in previous years systematic measurements were carried on during 1901 at seven points in the basin of Kansas River, the main river being gaged at Lecompton, Kans., and its principal tributaries being gaged at or near their mouths. Kansas River is the largest river which rises in the region of the Great Plains and presents together with its numerous tributaries a typical example of Great Plains drainage.

REPUBLICAN RIVER.

Estimated monthly discharge of Republican River near Superior, Nebr.

[Drainage area, 22,347 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	1,507	637	961	57,183	0.043	0.048
May	622	146	364	22,381	.016	.018
June	480	117	219	13,031	.010	.011
July	154	5	44	2,618	.002	.002
August	856	5	70	4,304	.003	.003
September	4,991	10	1,246	74,142	.056	.062
October	1,490	285	443	27,239	.020	.020
November	1,030	312	419	24,932	.019	.021

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 41; rating table on page 171 of same paper.

Estimated monthly discharge of Republican River at Junction, Kans.

[Drainage area, 25,837 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	570	405	510	31,359	0.020	0.023
February	1,015	450	669	37,154	.026	.027
March	1,750	850	1,030	63,332	.040	.046
April	5,010	930	1,530	91,041	.059	.066
May	1,015	405	747	45,931	.029	.033
June	510	315	406	24,159	.016	.018
July	450	75	177	10,883	.007	.008
August	110	20	53	3,259	.002	.002
September	3,160	20	906	53,911	.036	.040
October	770	405	564	34,679	.022	.025
November	510	405	472	28,086	.018	.020
December	660	450	594	36,524	.023	.027
The year	5,010	20	638	460,318	.025	.335

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 43; rating table on page 171 of same paper.

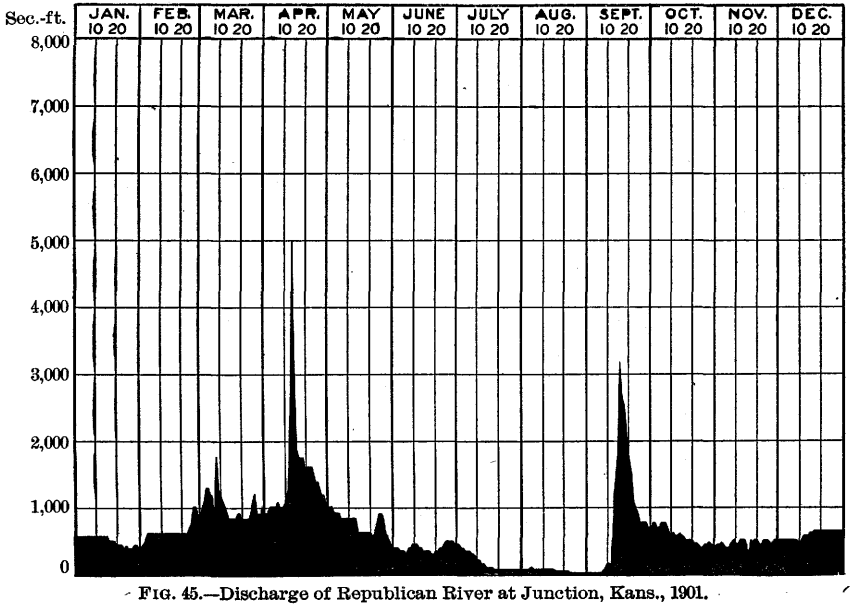


FIG. 45.—Discharge of Republican River at Junction, Kans., 1901.

SOLOMON RIVER.

Estimated monthly discharge of Solomon River near Niles, Kans.

[Drainage area, 6,815 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	114	46	91	5,595	0.013	0.015
February	193	54	90	4,998	.013	.014
March	341	100	152	9,346	.022	.025
April	2,020	114	452	26,896	.066	.074
May	303	89	142	8,731	.021	.024
June	989	46	157	9,342	.023	.026
July	54	7	27	1,660	.004	.005
August	62	7	18	1,107	.003	.003
September	1,604	70	243	14,460	.036	.040
October	89	38	67	4,120	.010	.012
November	176	38	99	5,891	.015	.017
December	100	54	79	4,858	.012	.014
The year	2,020	7	135	97,004	.020	.269

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 44; rating table on page 172 of same paper.

SALINE RIVER.

Estimated monthly discharge of Saline River near Salina, Kans.

[Drainage area, 3,311 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	71	47	56	3,443	0.017	0.020
February	115	55	74	4,110	.022	.023
March	122	51	76	4,673	.023	.027
April	3,580	85	470	27,967	.142	.158
May	315	60	112	6,887	.034	.039
June	2,680	37	376	22,374	.114	.127
July	51	22	31	1,906	.009	.010
August	153	25	47	2,890	.014	.016
September	85	40	53	3,154	.016	.018
October	60	37	47	2,890	.014	.016
November	65	40	53	3,154	.016	.018
December	65	47	57	3,505	.017	.020
The year	3,580	22	121	86,953	.036	.492

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 45; rating table on page 172 of same paper.

SMOKY HILL RIVER.

Estimated monthly discharge of Smoky Hill River at Ellsworth, Kans.

[Drainage area, 7,980 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	120	18	50	3,074	0.006	0.007
February	165	20	72	3,999	.009	.009
March	50	20	33	2,029	.004	.005
April	662	23	124	7,378	.016	.018
May	81	23	47	2,890	.006	.007
June	142	23	48	2,856	.006	.007
July	18	5	9	553	.001	.001
August	142	5	46	2,828	.006	.007
September	142	12	62	3,689	.008	.009
October	73	14	36	2,214	.005	.006
November	14	8	11	655	.001	.001
December	50	12	22	1,353	.003	.003
The year	652	5	47	33,518	.006	.080

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 45; rating table on page 172 of same paper.

BLUE RIVER.

Estimated monthly discharge of Blue River near Manhattan, Kans.

[Drainage area, 9,490 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	815	522	682	41,935	0.07	0.08
February	4,082	635	1,471	81,695	.16	.17
March	3,013	770	1,129	69,420	.12	.14
April	13,155	1,010	2,146	127,696	.23	.26
May	2,325	725	1,152	70,834	.12	.14
June	1,500	460	828	49,269	.09	.10
July	770	305	473	29,084	.05	.06
August	2,800	380	775	47,653	.08	.09
September	1,010	305	511	30,407	.05	.06
October	590	380	470	28,899	.05	.06
November	1,325	460	590	35,107	.06	.07
December	680	380	498	30,621	.05	.06
The year	13,155	305	894	642,620	.09	1.29

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 46; rating table on page 172 of same paper.

KANSAS RIVER.

Estimated monthly discharge of Kansas River at Lecompton, Kans.

[Drainage area, 58,550 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,375	1,210	1,772	108,956	0.03	0.03
February	8,820	1,210	3,142	174,497	.05	.05
March	11,110	4,465	6,353	390,631	.11	.13
April	25,000	4,332	12,844	764,271	.22	.25
May	7,005	2,625	4,767	293,111	.08	.09
June	4,465	2,375	3,231	192,258	.06	.07
July	2,625	275	1,123	69,051	.02	.02
August	4,465	275	2,173	133,613	.04	.05
September	6,710	2,375	4,367	259,855	.07	.08
October	5,000	445	2,270	139,577	.04	.05
November	1,885	275	1,222	72,714	.02	.02
December	1,000	625	805	49,498	.01	.01
The year	25,000	275	3,672	2,648,032	.06	.85

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 46; rating table on page 172 of same paper.

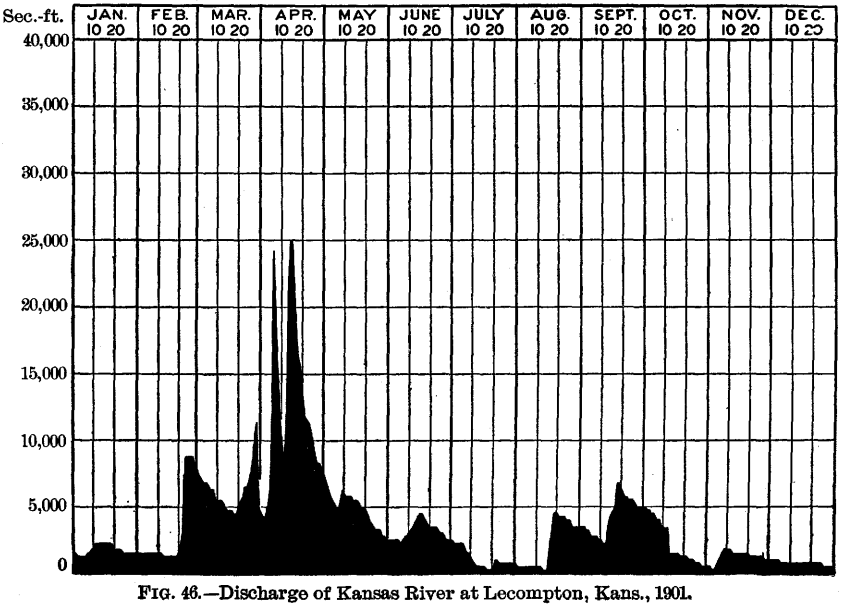


FIG. 46.—Discharge of Kansas River at Lecompton, Kans., 1901.

ARKANSAS RIVER DRAINAGE.

Arkansas River rises in the central portion of Colorado, its headwaters having their source near the summit of the Rockies. The river derives the greater part of its flow from the mountainous regions of Colorado, its volume diminishing greatly as it approaches the level of the plains through constant diversion for irrigation purposes. By far the greater number of gaging stations maintained in the Arkansas River Basin are located in the irrigation districts of Colorado. During 1901 a station was established near Barton, Colo., a few miles west of the Kansas line, the records of which will be of value in determining the amount of water passing from Colorado into Kansas. As in previous years, stations were maintained in Kansas on the Arkansas proper at Hutchinson, on Verdigris River near Liberty, and on Neosho River near Iola. A detailed report on the Arkansas River drainage in Colorado, together with a résumé of all the available records of flow, is contained in Water-Supply Paper No. 74, on the Water Resources of the State of Colorado, by A. L. Fellows.

ARKANSAS RIVER.

Estimated monthly discharge of Arkansas River near Canyon, Colo.

[Drainage area, 3,060 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	663	217	373	22,195	0.12	0.13
May	3,799	442	1,681	103,300	.55	.63
June	2,633	1,690	2,182	129,938	.71	.79
July	1,912	407	795	48,883	.26	.30
August	1,967	407	630	38,737	.21	.24
September	715	270	352	20,945	.12	.13
October	377	270	313	19,246	.10	.12

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 49; rating table on page 172 of same paper.

Estimated monthly discharge of Arkansas River at Pueblo, Colo.

[Drainage area, 4,600 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	625	430	474	29,145	0.10	0.12
February	430	254	414	22,992	.09	.09
March	380	254	322	19,799	.07	.08
April	932	234	547	32,549	.12	.13
May	11,060	625	1,784	109,694	.39	.41
June	4,326	1,660	2,347	139,656	.51	.56
July	2,662	338	1,004	61,733	.22	.25
August	1,560	430	776	47,714	.17	.20
September	1,367	214	429	25,527	.09	.10
October	430	254	321	19,737	.07	.08
November	430	254	328	19,517	.07	.08
December	698	296	447	27,485	.10	.11
The year	11,060	214	803	555,548	.17	2.21

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 50; rating table on page 172 of same paper.

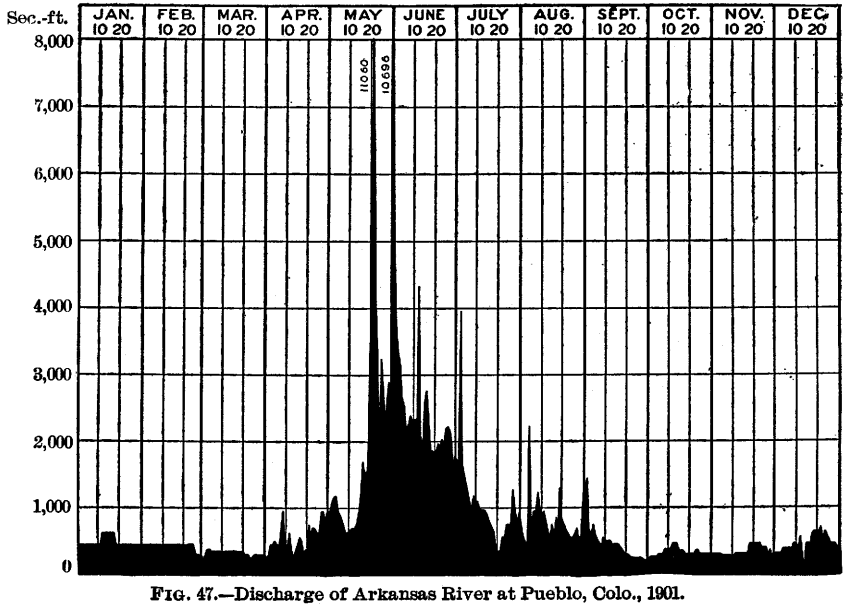


FIG. 47.—Discharge of Arkansas River at Pueblo, Colo., 1901.

Estimated monthly discharge of Arkansas River at Prowers, Colo.

[Drainage area, 19,180 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	120	36	60	3,689	0.003	0.003
February	103	25	64	3,554	.003	.003
March	50	25	40	2,460	.002	.002
April	61	15	41	2,440	.002	.002
May	2,546	48	564	34,679	.029	.033
June	6,086	120	2,129	126,684	.111	.124
July	658	36	176	10,822	.009	.010
August	2,782	48	518	31,851	.027	.031
September	658	10	120	7,140	.006	.007
October	88	10	46	2,828	.002	.002
November	88	36	59	3,510	.003	.003
December	120	25	55	3,382	.003	.003
The year	6,086	10	323	233,039	.017	.223

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 53; rating table on page 172 of same paper.

Estimated monthly discharge of Arkansas River at Hutchinson, Kans.

[Drainage area, 34,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	140	80	94	5,780	0.003	0.003
February	530	80	167	9,275	.005	.005
March	295	140	171	10,514	.005	.006
April	960	140	375	22,314	.011	.012
May	190	100	146	8,977	.004	.005
June	2,820	100	747	44,450	.022	.025
July	205	30	83	5,103	.002	.002
August	60	20	27	1,660	.001	.001
September	205	20	64	3,808	.002	.002
October	140	45	76	4,673	.002	.002
November	52	37	39	2,321	.001	.001
December	70	37	45	2,767	.001	.001
The year	2,820	20	169	121,642	.005	.065

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 56; rating table on page 172 of same paper.

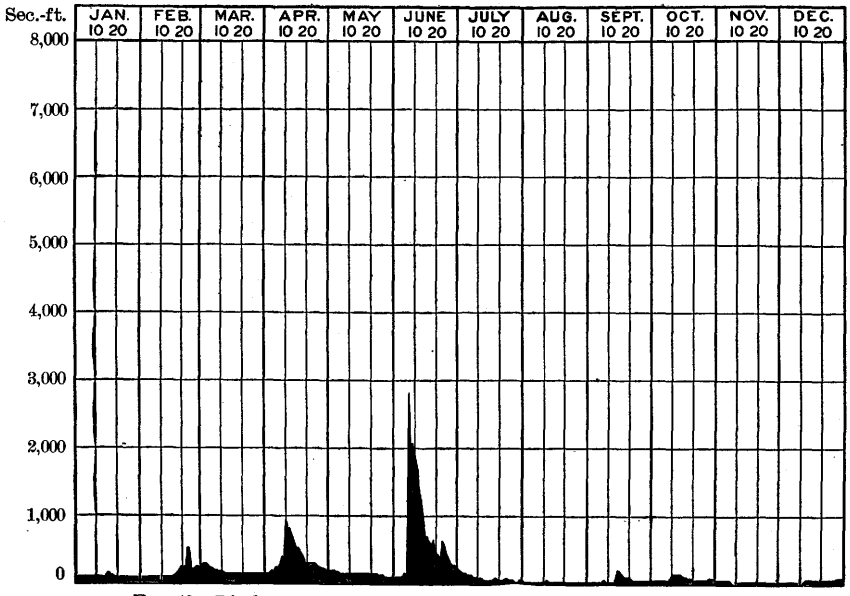


FIG. 48.—Discharge of Arkansas River at Hutchinson, Kans., 1901.

VERDIGRIS RIVER.

Estimated monthly discharge of Verdigris River near Liberty, Kans.

[Drainage area, 3,067 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	860	280	465	28,592	0.151	0.174
February	2,200	368	920	51,094	.300	.312
March	7,458	368	1,006	61,857	.328	.379
April	16,260	760	3,272	194,697	1.067	1.195
May	2,550	90	554	34,064	.181	.209
June	810	40	122	7,259	.040	.045
July	90	3	13	799	.004	.005
August	205	2	30	1,845	.010	.012
September	2,200	2	153	9,104	.050	.056
October	90	40	55	3,382	.018	.021
November	40	27	37	2,202	.012	.013
December	55	40	51	3,136	.017	.020
The year	16,260	2	556	398,031	.182	2.441

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 57; rating table on page 172 of same paper.

NEOSHO RIVER.

Estimated monthly discharge of Neosho River near Iola, Kans.

[Drainage area, 3,670 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	985	353	444	27,300	0.121	0.140
February	3,570	353	1,224	67,978	.334	.348
March	1,900	552	999	61,426	.272	.314
April	19,250	1,382	6,969	414,684	1.899	2.119
May	1,500	678	1,065	65,484	.290	.334
June	4,250	450	955	56,826	.260	.290
July	353	190	254	15,618	.069	.080
August	190	154	178	10,945	.048	.055
September	142	58	102	6,069	.028	.031
October	58	10	33	2,029	.009	.010
November	70	10	32	1,904	.009	.010
December	94	10	35	2,152	.010	.012
The year	19,250	10	102	732,415	.279	3.743

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 57; rating table on page 172 of same paper.

WESTERN GULF DRAINAGE.

During 1901 measurements were continued on the Brazos River at Waco, Tex., and on the Colorado River at Austin, Tex. Results of measurements are here published for the Waco station for the entire period of observation, 1898 to 1901. A hydrographic reconnaissance was made during the month of December, 1901, by Prof. Thomas U. Taylor, of a number of Texas streams, the results of which reconnaissance are published in Water-Supply Paper No. 66, pages 58 to 63. Descriptions of the principal irrigation systems of Texas deriving their water supply from rivers or wells in that State are contained in Water-Supply Paper No. 71, entitled Irrigation Systems of Texas, by Prof. Thomas U. Taylor.

Systematic measurements were kept during 1901 at fifteen gaging stations scattered along the Rio Grande and its tributaries, the first station being at Del Norte, at the head of the San Luis Valley, Colorado, and the last station at Eagle Pass, Tex. The stations along the Lower Rio Grande are maintained by the International (Water) Boundary Commission.

The accompanying diagrams, figs. 50, 51, and 52, furnish an interesting graphic comparison of the discharge of the Rio Grande near El Paso, below Presidio, and near Eagle Pass for 1900 and 1901.

BRAZOS RIVER.

Estimated monthly discharge of Brazos River at Waco, Tex.

[Drainage area, 30,750 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1898.						
September 14–30			797	26,874	0.026	0.016
October	1,126	95	347	21,336	.011	.013
November	145	61	85	5,058	.003	.003
December	721	61	144	8,854	.005	.006
1899.						
January	179	76	116	7,133	.004	.005
February	95	61	82	4,554	.003	.003
March	68	26	41	2,521	.001	.001
April	2,968	26	161	9,580	.005	.006
May	5,085	40	1,457	89,587	.047	.054
June	70,682	668	11,203	666,624	.364	.526
July	50,110	1,800	10,945	672,981	.356	.407
August	2,185	118	533	32,773	.017	.019
September	106	50	74	4,403	.002	.002
October	16,750	32	1,127	67,075	.037	.043
November	77,076	365	7,582	451,160	.246	.277
December	11,600	748	2,974	182,864	.097	.112
The year	77,076	26	3,025	2,191,255	.098	1.455
1900.						
January	9,620	860	1,914	117,687	.062	.071
February	830	365	615	34,155	.020	.021
March	3,435	315	791	48,637	.026	.030
April	83,094	668	15,585	927,371	.507	.566
May	46,218	3,365	9,092	559,045	.292	.332
June	35,095	1,322	6,090	362,380	.198	.221
July	10,240	1,220	3,148	193,563	.102	.114
August	5,277	540	2,257	138,777	.073	.084
September	98,832	365	22,213	1,321,767	.722	.802

Estimated monthly discharge of Brazos River at Waco, Tex.—Continued.

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
October	35,376	1,082	4,953	304,548	.161	.186
November	12,150	775	1,826	108,655	.059	.066
December	775	415	575	35,355	.019	.022
The year	98,832	315	5,755	4,151,940	.187	2.515
1901.						
January	415	267	344	21,213	.011	.013
February	616	221	392	21,771	.013	.014
March	415	145	232	14,265	.008	.009
April	1,172	179	560	33,322	.020	.018
May	38,017	76	3,670	225,660	.119	.137
June	18,974	221	2,944	175,180	.096	.107
July	267	61	107	6,479	.003	.003
August	1,126	68	431	39,332	.022	.025
September	3,100	61	662	26,501	.014	.016
October	565	95	246	15,126	.008	.009
November	748	76	303	18,030	.010	.011
December	267	76	136	8,362	.004	.005
The year	38,017	61	836	605,241	.026	.367

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 59; rating table on page 173 of same paper.

COLORADO RIVER.

Estimated monthly discharge of Colorado River at Austin, Tex.

[Drainage area, 37,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,704	2,306	2,569	157,962	0.07	0.08
February	2,306	1,908	1,920	106,631	.05	.05
March	1,908	1,190	1,455	89,464	.04	.05
April	3,102	980	1,490	88,661	.04	.04
May	8,674	980	3,148	193,624	.09	.10
June	7,480	290	1,996	118,770	.05	.06
July	40,912	210	4,037	248,225	.11	.13
August	1,908	175	558	34,310	.02	.02
September	21,808	210	4,161	247,597	.11	.13
October	825	290	415	25,517	.01	.01
November	10,664	290	1,690	10,056	.05	.06
December	580	380	484	29,760	.01	.01
The year	40,912	175	1,994	1,350,577	.05	.74

Note.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 64; rating table on page 173 of same paper.

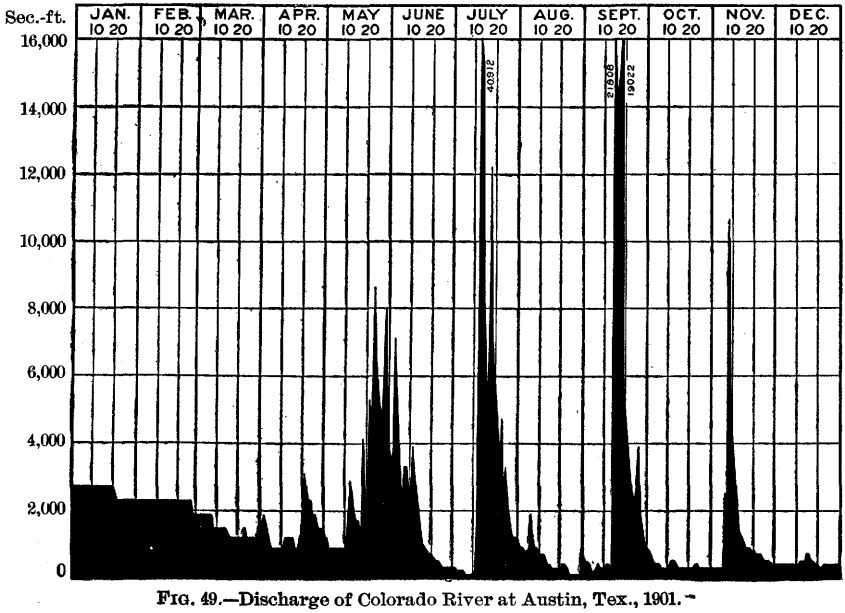


Fig. 49.—Discharge of Colorado River at Austin, Tex., 1901.

RIO GRANDE.

Estimated monthly discharge of Rio Grande near Del Norte, Colo.

[Drainage area, 1,400 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			[a]800	49,190	[a]0.57	[a]0.66
February			[a]900	49,983	[a].64	[a].67
March			[a]500	30,744	[a].36	[a].40
April	1,734	289	710	42,248	.51	.57
May	4,479	1,463	2,570	158,023	1.84	2.12
June	2,754	1,149	1,782	116,036	1.27	1.42
July	1,063	384	594	36,524	.42	.48
August	660	320	464	28,530	.33	.38
September	895	258	446	26,539	.32	.36
October	320	228	262	16,110	.19	.22
November			283	16,840	.20	.22
December			366	22,504	.26	.30
The year			806	593,271	.58	7.80

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 65; rating table on page 173 of same paper.

Estimate monthly discharge of Rio Grande at Cenicero, Colo.

[Drainage area, 7,695 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	594	594	594	36,524	0.0770	0.0890
February	594	414	581	32,267	.0760	.0790
March	774	107	365	22,443	.0470	.0540
April	1,044	107	278	16,542	.0360	.0400
May	2,664	1,224	1,680	103,299	.2180	.2500
June	1,854	236	1,032	61,408	.1340	.1500
July	236	22	82	5,041	.0110	.0130
August	142	31	60	3,689	.0078	.0090
September	58	43	50	2,975	.0063	.0070
October	79	43	54	3,320	.0072	.0083
November	142	43	72	4,284	.0094	.0105
December	414	142	337	20,721	.0440	.0510
The year	2,664	22	432	312,513	.0561	.7608

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 65; rating table on page 173 of same paper.

Estimated monthly discharge of Rio Grande at Embudo, N. Mex.

[Drainage area, 10,090 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	400	280	341	20,967	0.034	0.039
February	680	350	466	25,880	.046	.048
March	680	350	518	31,851	.051	.059
April	2,020	350	628	37,369	.062	.069
May	6,950	1,700	3,461	212,809	.343	.396
June	4,200	530	1,714	101,990	.170	.190
July	9,700	220	398	24,472	.039	.045
August	1,470	300	451	27,730	.045	.052
September	590	300	359	21,362	.036	.040
October	540	300	331	20,352	.033	.038
November	460	340	359	21,362	.036	.040
December	500	360	423	26,009	.042	.048
The year	9,700	220	787	572,153	.078	1.064

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 66; rating table on page 173 of same paper.

Estimated monthly discharge of Rio Grande at Rio Grande, N. Mex.

[Drainage area, 14,050 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	610	255	397	24,410	0.028	0.032
February	1,360	420	658	36,543	.047	.049
March	1,275	390	742	45,624	.053	.061
April	4,940	420	1,402	83,425	.100	.112
May	8,400	4,000	5,194	319,367	.370	.430
June	4,740	815	2,199	130,850	.157	.175
July	2,930	280	729	44,824	.052	.060
August	3,450	200	827	50,850	.059	.068
September	2,295	280	580	34,512	.041	.046
October	1,870	320	491	30,190	.035	.040
November	580	380	462	27,491	.033	.037
December	640	260	463	28,468	.033	.038
The year	8,400	200	1,179	856,554	.084	1.148

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 67; rating table on page 173 of same paper.

Estimated monthly discharge of Rio Grande near San Marcial, N. Mex.

[Drainage area, 28,067 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	450	30	341	20,967	0.0121	0.0140
February	1,000	290	458	25,468	.0163	.0170
March	480	30	246	15,114	.0088	.0101
April	3,560	0	398	23,683	.0142	.0158
May	5,570	2,880	4,165	256,126	.1484	.1711
June	4,740	60	1,616	96,178	.0574	.0640
July	6,600	0	964	59,286	.0341	.0394
August	5,865	120	1,066	65,534	.0379	.0437
September	6,210	0	632	37,607	.0225	.0251
October	2,320	0	277	17,018	.0099	.0114
November	1,460	160	337	20,053	.0120	.0134
December	460	230	313	19,240	.0111	.0128
The year	6,600	0	901	656,274	.0320	.4388

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 68.

Estimated monthly discharge of Rio Grande near El Paso, Tex.

[Drainage area, 30,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	30	0	5	278	0.0002	0.0002
February	270	0	81	4,503	.0027	.0028
March	410	0	60	3,669	.0016	.0018
April	0	0	0	0	.0000	.0000
May	3,983	110	2,571	158,102	.0857	.0988
June	3,620	20	1,295	77,038	.0432	.0482
July	2,480	0	205	12,576	.0068	.0078
August	3,070	90	986	60,655	.0329	.0379
September	2,650	0	353	21,005	.0118	.0132
October	450	0	87	5,336	.0029	.0033
November	810	40	215	12,813	.0072	.0080
December	130	130	130	7,993	.0043	.0050
The year	3,980	0	499	363,968	.0166	.2270

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 70.

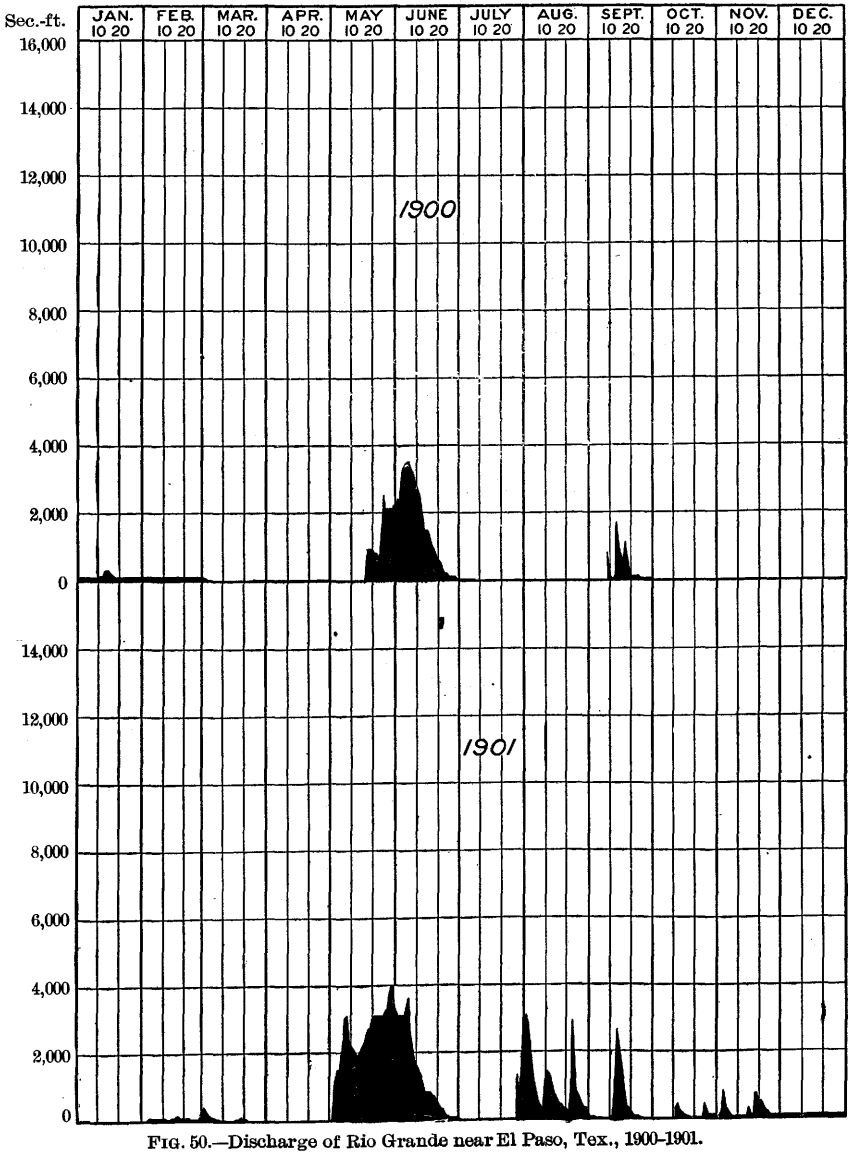


FIG. 50.—Discharge of Rio Grande near El Paso, Tex., 1900-1901.

Estimated monthly discharge of Rio Grande near Fort Hancock, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	2,680	0	1,742	107,127
June	2,710	0	1,015	60,417
July	1,250	0	67	4,126
August	1,770	0	622	38,221
September	1,800	0	241	14,321
October	630	0	94	5,752
November	1,000	30	210	12,476
December	450	40	123	7,736
The year	2,710	0	343	250,176

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 71.

Estimated monthly discharge of Rio Grande above Presidio, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	0	0	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	1,370	0	770	47,326
June	1,620	0	731	43,478
July	830	0	137	8,450
August	1,270	10	462	28,423
September	1,780	30	453	26,936
October	970	0	185	11,365
November	1,020	30	157	9,322
December	130	60	81	4,979
The year	1,780	0	248	180,279

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 72.

Estimated monthly discharge of Rio Grande below Presidio, Tex. (including the flow of Conchos River).

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	200	160	181	11,107
February	780	160	314	17,434
March	440	80	198	12,198
April	80	20	41	2,420
May	1,300	20	720	44,291
June	1,530	50	763	45,422
July	3,470	20	999	61,408
August	3,120	820	1,793	110,241
September	5,410	640	2,206	131,266
October	5,690	330	1,223	75,213
November	1,500	330	593	35,266
December	450	260	300	18,466
The year	5,690	20	778	564,732

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 74.

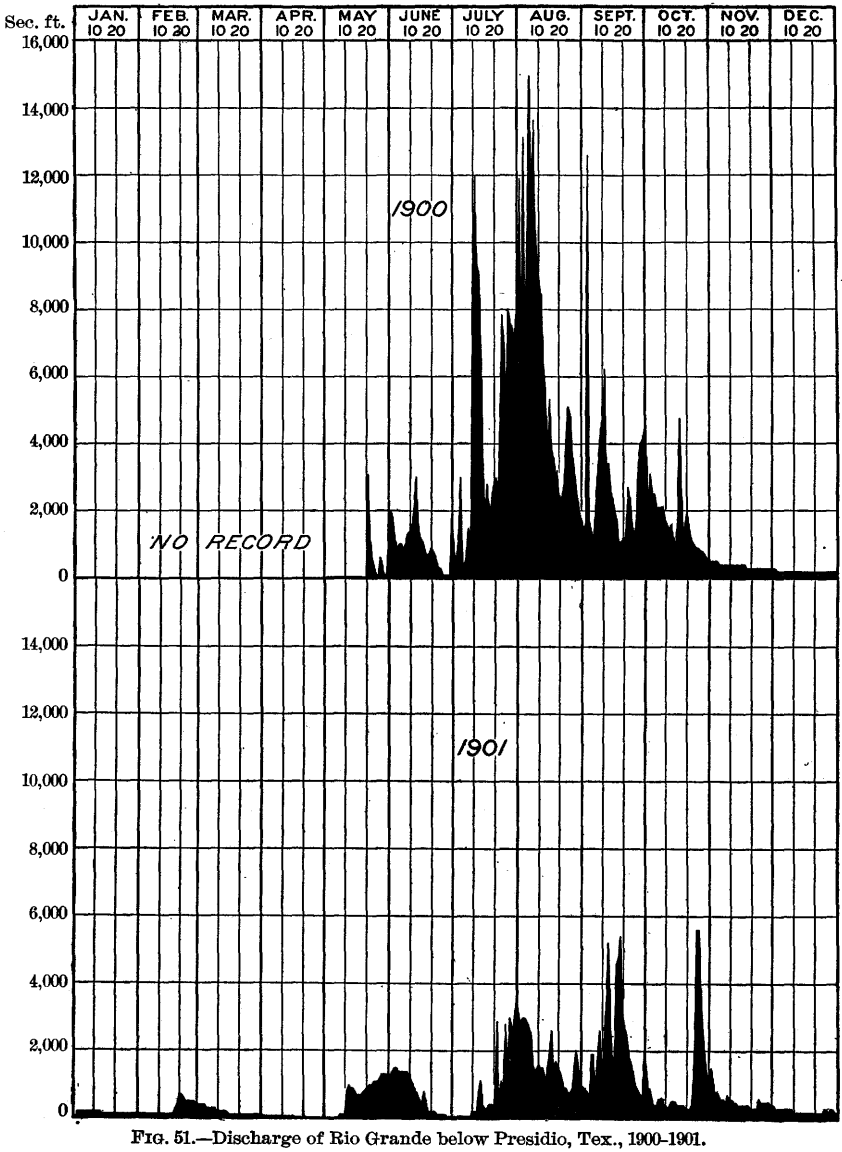


FIG. 51.—Discharge of Rio Grande below Presidio, Tex., 1900-1901.

Estimated monthly discharge of Rio Grande near Langtry, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	620	570	600	36,893
February	920	520	599	33,263
March	890	450	627	38,559
April	920	370	425	25,309
May	3,500	450	1,163	71,524
June	2,350	600	1,465	87,174
July	3,510	500	1,314	80,767
August	3,920	820	2,306	141,818
September	14,700	1,210	3,418	203,385
October	5,120	1,100	1,900	116,846
November	2,610	930	1,367	81,322
December	1,120	800	875	53,772
The year	14,700	370	1,338	970,632

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 75.

Estimated monthly discharge of Pecos River near Moorhead, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	570	440	508	31,240
February	610	500	563	31,260
March	530	360	443	27,213
April	380	280	306	18,208
May	670	280	348	21,421
June	440	190	321	19,121
July	1,270	160	341	20,945
August	1,220	200	688	42,307
September	9,200	350	1,295	77,078
October	850	420	561	34,512
November	2,690	490	1,435	85,369
December	1,200	500	790	48,575
The year	9,200	160	633	457,249

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 78.

Estimated monthly discharge of Devils River at Devilsriver, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	840	810	831	51,074
February	840	750	801	44,489
March	830	720	748	46,017
April	750	670	685	40,760
May	670	660	665	40,919
June	670	580	604	35,921
July	750	570	583	35,841
August	670	500	556	34,215
September	700	510	529	31,478
October	520	520	520	31,974
November	520	510	515	30,664
December	510	480	489	30,069
The year	840	480	627	453,421

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 79.

Estimated monthly discharge of Rio Grande near Devilsriver, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	2,330	2,160	2,277	140,033
February	2,870	2,120	2,260	125,497
March	2,570	1,920	2,180	133,964
April	2,070	1,620	1,719	102,288
May	3,610	1,750	2,189	134,588
June	3,770	1,950	2,669	158,816
July	5,250	1,830	2,452	150,783
August	6,000	2,650	3,907	240,218
September	34,280	2,490	5,863	348,873
October	11,500	2,630	3,938	242,122
November	5,180	2,969	3,897	231,888
December	3,350	2,360	2,748	168,992
The year	34,280	1,620	3,008	2,178,062

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 80.

Estimated monthly discharge of Rio Grande near Eagle Pass, Tex.

Month.	Discharge in second-feet.			Total in acre-feet.
	Maximum.	Minimum.	Mean.	
1901.				
January	3,420	2,750	3,054	187,795
February	2,740	2,510	2,616	145,369
March	2,610	2,020	2,277	140,033
April	2,300	1,780	1,934	115,081
May	4,410	2,200	3,108	191,107
June	5,430	1,770	3,571	212,509
July	3,800	1,600	2,376	146,122
August	5,240	2,800	4,249	261,243
September	21,460	2,840	5,593	332,807
October	7,600	2,380	3,444	211,775
November	4,400	2,680	3,644	216,833
December	2,670	2,010	2,245	138,089
The year	21,460	1,600	3,176	2,298,763

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 81.

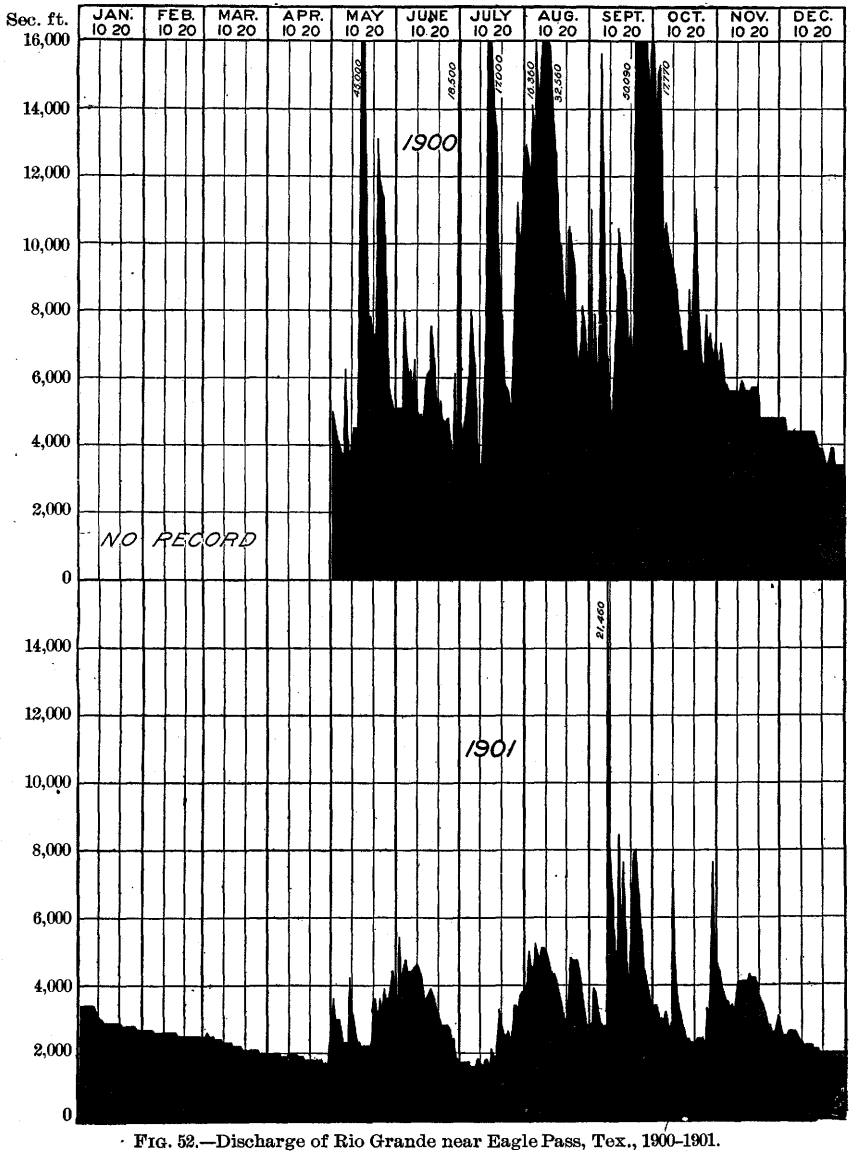


FIG. 52.—Discharge of Rio Grande near Eagle Pass, Tex., 1900–1901.

COLORADO RIVER DRAINAGE.

Considerable hydrographic work was carried on in the basin of Colorado River during the field season of 1901. Systematic stream measurements were made at all the stations maintained during the preceding year, with the exception of the station on Grand River at Grand Junction, Colo., which was abandoned. New stations were established during the year at Craig, Colo., on Yampa River; at

Meeker, Colo., on White River; at Whitewater, Colo., on Gunnison River; near Livingston, Ariz., on Tonto Creek, and on Salt River above the mouth of Tonto Creek. The latter two stations were established in connection with an investigation into the water supply for the proposed reservoir on Salt River. Similar investigations were conducted on Verde River during 1901. A detailed report of these investigations containing plans and estimates of the proposed dams has been published in Water-Supply Paper No. 73, entitled "Water Storage on Salt River, Arizona," by Arthur P. Davis, under whose direction the work was carried on.

Regular measurements were resumed at Greenriver station on Green River, in Wyoming, which station had been discontinued in March of the preceding year. The stations established on Duchesne River and tributaries during the fall of 1899 by C. C. Babb, in connection with his surveys for a water supply for the Uinta Indian Reservation, were maintained during 1901. Results of this investigation are given elsewhere in this report.

Two more investigations were carried on in the Colorado River Basin during the field season of 1901, one being a project for diverting water from Gunnison River into the valley of the Uncompahgre River for irrigating purposes, and the other consisting of a reconnaissance of Lower Colorado River for the purpose of discovering dam and reservoir sites.

GREEN RIVER.

Estimated monthly discharge of Green River at Greenriver, Wyo.

[Drainage area, 7,450 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	2,880	500	1,325	78,843	0.18	0.20
May	12,410	1,782	6,753	415,226	.91	1.05
June	10,214	3,405	5,416	322,274	.73	.81
July	4,202	1,845	2,751	169,152	.37	.43
August	2,455	905	1,411	86,759	.19	.22
September	905	500	632	37,607	.08	.09

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 82; rating table on page 173 of same paper.

UINTA RIVER.

Estimated monthly discharge of Uinta River near Whiterocks, Utah.

[Drainage area, 218 square miles.]

Month.	Mean discharge in second-feet.	Total in acre-feet.	Run-off.	
			Second-feet per square mile.	Depth in inches.
1901.				
January	a140	8,608	0.64	0.74
February	a140	7,775	.64	.67
March	a150	9,223	.69	.80
April	a179	10,651	.82	.92
May	a684	42,058	3.14	3.62
June	a355	21,124	1.63	1.82
July	a251	15,433	1.15	1.33
August	a242	14,880	1.11	1.28
September	a193	11,484	.89	.99
October	a163	10,022	.75	.86
November	a142	8,450	.65	.73
December	a147	9,039	.67	.77
The year	a232	168,747	1.07	14.53

a Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 84; rating table on page 173 of same paper.

Estimated monthly discharge of Whiterocks River near Whiterocks, Utah.

[Drainage area, 114 square miles.]

Month.	Mean discharge in second-feet.	Total in acre-feet.	Run-off.	
			Second-feet per square mile.	Depth in inches.
1901.				
January	a50	3,074	0.44	0.51
February	a50	2,777	.44	.46
March	a50	3,074	.44	.51
April	a74	4,403	4.65	.73
May	a507	31,174	.45	5.13
June	a179	10,651	1.57	1.75
July	a101	6,210	.89	1.03
August	a128	7,870	1.12	1.29
September	a95	5,653	.83	.93
October	a75	4,612	.66	.76
November	a63	3,749	.55	.61
December	a61	3,751	.54	.62
The year	a119	86,998	1.05	14.33

a Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 85; rating table on page 173 of same paper.

Estimated monthly discharge of Uinta River at Fort Duchesne, Utah.

[Drainage area, 672 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			[a]135	8,301	0.20	0.23
February			[a]135	7,498	.20	.21
March	295	77	132	8,116	.20	.23
April	184	87	117	6,962	.17	.19
May	4,520	218	1,188	73,047	1.77	2.04
June	485	184	261	15,531	.39	.44
July	201	97	140	8,608	.21	.24
August	2,120	87	168	10,330	.25	.29
September	184	97	121	7,200	.18	.20
October	184	97	116	7,133	.17	.20
November	137	109	117	6,962	.17	.19
December			[a]130	7,993	.19	.22
The year			[a]230	167,681	.34	4.68

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 86; rating table on page 174 of same paper.

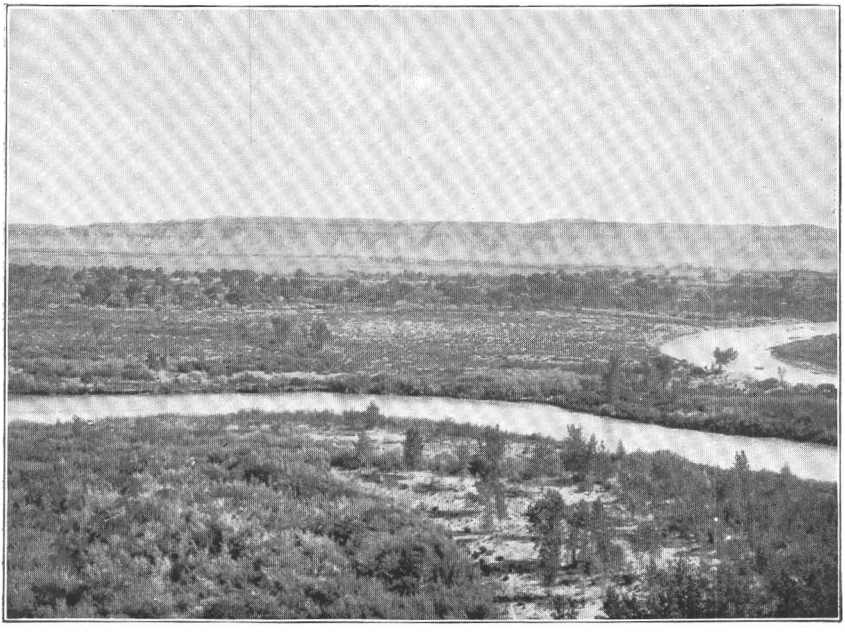
Estimated monthly discharge of Uinta River at Ouray School, Utah.

[Drainage area, 967 square miles.]

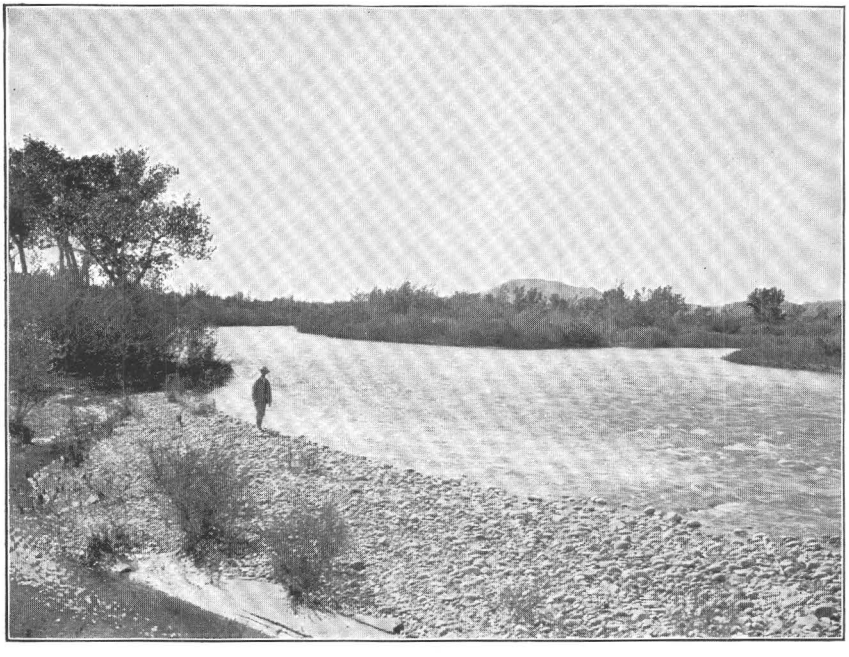
Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			[a]120	7,379	0.12	0.14
February			[a]120	6,664	.12	.12
March		92	116	7,133	.12	.14
April	151	92	116	6,902	.12	.13
May	3,450	215	1,137	69,911	1.18	1.36
June	598	181	309	18,387	.32	.36
July	192	58	114	7,010	.12	.14
August	953	52	164	10,084	.17	.20
September	192	100	121	7,200	.13	.15
October	181	108	123	7,563	.13	.15
November	142	116	126	7,498	.13	.15
December			[a]115	7,071	.12	.14
The year			[a]223	162,802	.23	3.18

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 87; rating table on page 174 of same paper.



A. DUCHESNE RIVER 1 MILE ABOVE PRICE ROAD BRIDGE, UTAH.



B. DUCHESNE RIVER IMMEDIATELY ABOVE MOUTH OF UINTA RIVER, UTAH.

Estimated monthly discharge of Lake Creek, Utah, near mouth.

[Drainage area, 475 square miles.]

Month.	Mean discharge in second-feet.	Total in acre-feet.	Run-off.	
			Second-feet per square mile.	Depth in inches.
1901.				
January	a 95	5,841	0.20	0.23
February	a 95	5,276	.20	.21
March	a 100	6,149	.21	.24
April	a 132	7,855	.28	.31
May	a 1,272	78,212	2.68	3.09
June	a 556	33,084	1.17	1.31
July	a 250	15,372	.53	.61
August	a 255	15,679	.54	.62
September	a 144	8,569	.30	.33
October	a 132	8,116	.28	.32
November	a 112	6,664	.24	.27
December	a 110	6,764	.23	.27
The year	a 271	197,581	.57	7.81

a Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 88 rating; table on page 174 of same paper.

Estimated monthly discharge of Duchesne River at Price road bridge, Utah.

[Drainage area, 2,746 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			a 280	17,217	0.10	0.13
February			a 280	15,550	.10	.10
March		278	289	17,770	.11	.13
April	1,193	247	498	29,633	.18	.20
May	6,675	1,193	3,169	194,854	1.15	1.33
June	2,862	870	1,485	88,364	.54	.60
July	910	408	597	36,708	.22	.25
August	950	313	453	27,854	.16	.18
September	408	262	307	18,268	.11	.12
October	439	278	322	19,799	.12	.14
November	355	278	316	18,803	.12	.13
December			a 300	18,446	.11	.13
The year			691	503,266	.25	3.43

a Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 89; rating table on page 174 of same paper.

ASHLEY CREEK.

This stream drains an area in northeastern Utah directly east of the Uinta River drainage. It flows southeasterly, entering Green River about 25 miles below the place where the latter stream crosses the State line between Colorado and Utah. About 7½ miles above the town of Vernal the creek leaves its mountainous area and enters what is known as Vernal Valley. This valley is approximately 20 miles long and 3 miles wide, its boundaries being sharply defined by the foothills. A large portion of the valley has been taken up by

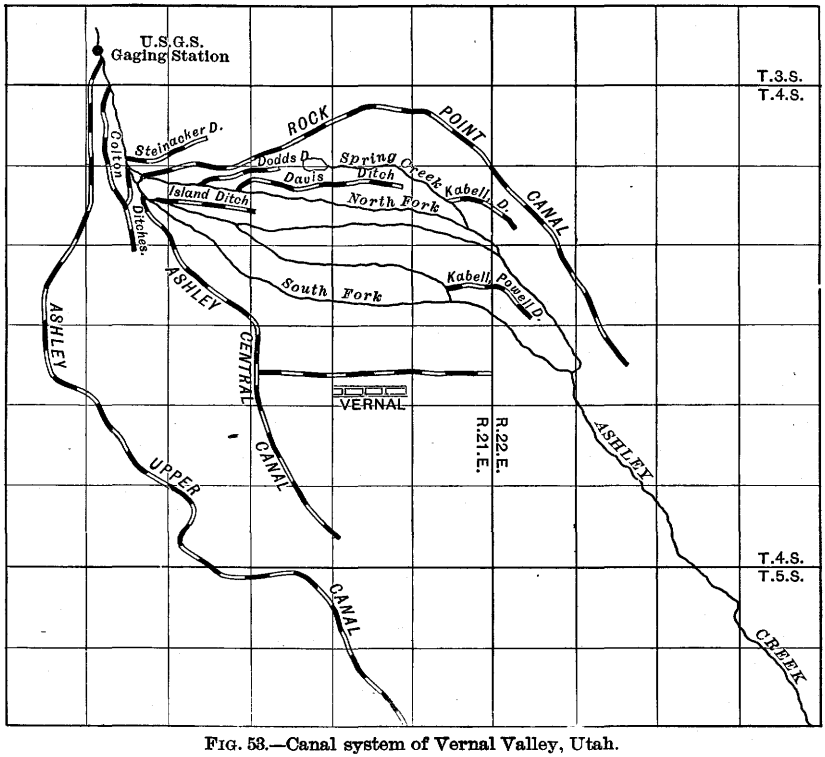


FIG. 53.—Canal system of Vernal Valley, Utah.

white settlers, and a considerable acreage is now under cultivation through irrigation.

There are three principal canals in use. Upper Ashley canal, on the west, built in 1882, covers 11,200 acres. The stock of the company is divided into 1,120 shares of a face value of $25 per share, and each share is for water to irrigate 10 acres. During the census year 1900 the area irrigated under this canal was 6,500 acres. Central Ashley canal, on the west side, built in 1880, covers 8,400 acres, 7,000 acres of which were irrigated in 1900. Each share is for sufficient water for 20 acres and is worth $50, or $2.50 per acre. Rock Point canal, on the east side, built in 1880, covers about 2,000 acres, 1,400

acres of which were irrigated in 1900. The stock of the company is divided into 250 shares of a face value of $10 per share, and each share is for water sufficient for 7½ acres. There are a number of smaller canals lower down, the principal one being known as Island ditch, which controls 900 acres, 400 acres of which were irrigated in the census year 1900. The stock of the various canal companies is private property. A farmer, if entitled to a certain amount of water, is not supposed to rent or otherwise dispose of any portion of it, but it is often the case that he does.

By a decree of the district court dated November 17, 1897, the waters of Ashley Creek are divided as follows: Upper Irrigation Canal Company (Upper Ashley canal), $\frac{80}{81}$ of one-third of the discharge; Ashley Central Irrigation Canal Company, $\frac{86}{87}$ of one-third of the discharge; Rock Point and other canals (Union, Turner & Dodds, Island, Steinacker, and Colton), $\frac{75}{77}$ of one-third of the discharge; and Green River interveners the remainder. In accordance with this bill the water commissioner ordered all canal companies to install weirs so constructed as to bring the water to a quiet state 60 feet above the weirs. A weir 30 feet wide was placed in the river above the head of all canals, and weirs of the following dimensions were ordered placed in the canals, the sum of the width of the weirs being approximately the width of the river weir:

Weirs on Ashley Creek canals.

	Ft.	In.
Upper Ashley canal	9	10.4
Central Ashley canal, including Green River interveners (5.75 inches) and deducting Colton canal (3.70 inches)	10	.47
Union canal		7.11
Turner & Dodds ditch		11.52
Island ditch		17.41
Steinacker ditch		3.52
Rock Point canal	5	8.79
Colton ditch (decree of court $\frac{164}{252}$, deed from Central Ashley canal $\frac{3}{97}$)		12.21

The two Ashley canals and the Rock Point canal are the only ones maintaining weirs. They are of the rectangular type, so constructed that each has two end contractions. No attempt is made to measure the quantity of water. When the creek is at its lowest stages, and it becomes necessary to divide the water among the canals, the flow into them is so regulated that exactly the same height of water is permitted to pass over each weir, the regulation stake, which is level with the crest of the weir, being placed a short distance above. As the lengths of the weirs correspond with the court decrees the amount of water is supposed to be in the required proportion. On account of the end contractions of the weirs of the two Ashley canals and the Rock Point canal, those ditches do not receive the same proportion of water for varying heights, as the reduction of length for end contractions is a function of the height of the water.

During the flood stages of the creek more water passes down it than the canals can carry, and therefore no attempt is then made to divide the water. It is only when lower stages of the creek are reached that the water is divided. No head gates are maintained in the canals, the flow being regulated by placing or removing rocks in the rough dam—an unsatisfactory method, of course.

The principal canals of the valley were measured twice during 1900, once in May, when the creek was in flood and a considerable amount of water was passing all canals and wasting into the stream below. The measurements, therefore, show approximately the maximum capacity of the various ditches. A second series of measurements was made in August, when the creek was at a low stage and after the water had been divided. The following table contains the results of the measurements made:

Discharge measurements in Vernal Valley, Utah.

Date.	Stream.	Locality.	Discharge.
1900.			*Sec. feet.*
May 28	Ashley Creek	Gaging station	776.0
May 29	Upper Ashley canal	Measuring weir	181.0
Do	Central Ashley canal	do	138.0
Do	Rock Point canal	Near head	25.0
Do	Steinacker canal	do	1.5
Aug. 21	Ashley Creek	Gaging station	40.0
Do	Upper Ashley canal	Measuring weir	12.0
Do	Central Ashley canal	do	10.0
Do	Rock Point canal	Near measuring weir	6.8

The population of Vernal Valley is 6,000. There are 38,000 acres of land on the valley tax rolls, only 25,000 acres of which are under ditch, according to the Twelfth Census. The following data are taken from the same authority:

The amount of land irrigated in 1900 was 17,471 acres. The average cost of a water right in the valley is $3 per acre, and the annual cost for maintenance is 15 cents per acre. An acre of land without water is valued at $1.25, but as soon as it is placed under ditch and is assured a good water supply the value increases to $30. The length of the irrigation season is six months—from April 1 to October 1.

The records of the flow of Ashley Creek at the gaging station in the canyon for the season of 1900 showed a total discharge of 56,225 acre-feet. The combined maximum capacity of the canals of the valley is 350 second-feet. May was the only month in 1900 in which there was more water than the canals could carry, as the average discharge for that month was 478 second-feet, or an excess of 128 second-feet. The latter amount represents an excess of 7,870 acre-feet. Subtracting this amount from the total discharge of the river for the period

will leave 48,355 acre-feet, the amount of water which approximately was spread over the area irrigated, 17,471 acres, during 1900. This is an average depth of 2.8 feet.

The discharge of 48,355 acre-feet for the six months represents a mean flow of 133 second-feet, or, expressed in other terms, the duty of water was 1 second-foot to 131 acres. The autumn is the season of low-water stages for the streams in this vicinity. The principal crops of the valley are alfalfa and oats. In the lower portion of the valley seepage water is now appearing in the river channels and is being used for irrigation purposes, thus increasing the duty of water in that section.

There is a voluntary observer of the Weather Bureau at Vernal, who has kept a continuous record for five years, the mean annual precipitation for that period being 9.38 inches. The precipitation in 1899 was 8.41 inches, and the mean temperature 46 degrees. There is no well-defined rainy season, but the principal rainfalls occur in June or July. The snowfall is generally light, the air usually dry, and strong winds are infrequent. The soil is a sandy loam. The mineral resources are said to be excellent in the surrounding mountains, deposits of gold, silver, and copper being worked to some extent. Coal is also found near by, and some deposits of uintaite of the asphaltum series. Transportation facilities are poor. The railroad is reached at Price, 140 miles distant, by way of Fort Duchesne.

East of Ashley Creek are two peculiar streams of the "disappearing" type, known as Little Brush Creek and Big Brush Creek. The main Brush Creek enters Green River 3 miles above the mouth of Ashley Creek. The peculiarity of these two forks is that their waters disappear and then reappear at various points along their courses. At one place Big Brush Creek enters a long, precipitous tunnel which has been only partly explored, and in which icicles and banks of ice are said to exist the year round.

As a result of a number of reports upon certain curious conditions said to exist in the basin of the Dry Fork, a tributary of Ashley Creek, a reconnaissance of the basin was made in August, 1901, by Mr. C. T. Prall, and from his report the following facts are taken:

The Dry Fork has its source in a lake in the Uinta Mountains about 35 miles northwest of Vernal. Its length is about 28 miles, 23 miles of which is in canyon varying in width from 500 feet to a half mile, and 5 miles is through a valley 1½ miles wide. The general course of the stream is southeast and the fall is heavy, at least 150 feet to the mile. It enters Ashley Creek about 8 miles above the town of Vernal. About midway the stream's length, or 10 miles northwest of Dry Fork post-office, a gaging was made on August 20, 1901, which gave a discharge of 96 second-feet. About 1,200 feet below that point occurs a pool or sink lying in a circular basin, whose banks, except on the

upstream side, are from 75 to 100 feet high. The stream enters this pool through several inlets. It is apparently bottomless, and the water in the larger end has a slow, circular motion, but whether this is caused by the incoming streams or by suction from below could not be determined. The only visible outlet from the pool is a narrow, rocky channel which has been widened, by blasting, in an effort to increase its flow. It was carrying about 10 second-feet when measured, but this water sank in a mile, or thereabouts.

Three miles below the pool the North Branch enters. One mile above its mouth 8 second-feet were flowing at the time of measurement, but the water vanished almost immediately upon reaching the main channel. Seven miles below the pool are located several springs, the upper and largest being a hole 25 feet in diameter. This spring was perfectly dry, but the lower ones were sending out 33 second-feet. A resident in the Dry Fork settlement since 1879 stated that only once before, to his knowledge, had these springs furnished water after the subsidence of the usual spring freshet. It was also stated that owing to recent rains the stream above the pool was higher than usual. Two miles below the springs, at the canyon's mouth, are located two ditches, but they had carried no water for several weeks. The stream bed was dry from the heads of the ditches to its mouth, a distance of 5 miles.

About 250 feet above the mouth of the Dry Fork a gaging of Ashley Creek showed 132 second-feet. About 400 feet below the mouth of the Dry Fork the discharge was 128 second-feet. A closer check than this would probably be impossible in view of the rather rough character of the creek's bed. One mile below the Dry Fork, at the regular gaging station, a discharge of 154 second-feet was found. The increase shown here is due to a ditch diverting water from the east side of Ashley Creek a short distance above the mouth of the Dry Fork and returning the water to the creek again above the gaging station. Two small ditches carrying a total of 3 second-feet are taken out of Ashley Creek between the Dry Fork and the gaging station.

The Dry Fork Valley comprises about 1,000 acres of arable land, all of which is under cultivation. Good crops are raised through use of spring flood waters, but much better results could be obtained by a more certain supply. However, a very small portion of the flow of the stream would suffice, leaving a large amount which could be used to excellent advantage in Ashley Valley. The visible supply in the two branches of the Dry Fork on August 21 was 104 second-feet, of which amount 33 second-feet found its way into the ditches. A flume 7 miles in length would carry the water below all known sinks, where it could be turned back into the stream and be subject to only the usual losses from seepage, etc. Even if 30 per cent were lost in trans-

mission, a stream capable of much good would still be available. A V-shaped flume was partly constructed some years ago, starting above the pool. It has fallen into disuse, but it is understood that plans are being made to rebuild it.

March 15, 1900, a gaging station, described in Water-Supply Paper No. 50, page 368, was established by C. T. Prall in the canyon of Ashley Creek, 7½ miles above the town of Vernal, and a short distance above the head of the upper canal. The gage is a vertical rod, painted white, fastened to the west side of the single pier of the wagon bridge. The bench mark is a 20-penny nail driven in the pier opposite the 4-foot mark. Results of measurements for 1901 are given in the following table:

Estimated monthly discharge of Ashley Creek near Vernal, Utah.

[Drainage area, 250 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	36	36	36	2,214	0.14	0.16
February	43	36	36	1,999	.14	.15
March	55	34	37	2,275	.15	.17
April	864	34	122	7,260	.49	.55
May	1,136	354	683	41,996	2.73	3.15
June	460	141	232	13,805	.93	1.04
July	141	72	100	6,149	.40	.46
August	932	72	149	9,162	.60	.69
September	131	72	96	5,712	.38	.42
October	72	55	62	3,812	.25	.29
November	63	48	58	3,451	.23	.26
December	55	48	52	3,197	.21	.24
The year	1,136	34	139	101,032	.55	7.58

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 83; rating table on page 173 of same paper.

GRAND RIVER.

Estimated monthly discharge of Grand River at Glenwood Springs, Colo.

[Drainage area, 5,838 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	810	550	688	42,180	0.12	0.14
February	970	630	746	41,430	.13	.13
March	970	727	837	51,465	.14	.16
April	7,100	727	1,888	112,343	.32	.36
May	22,895	6,420	13,797	848,529	2.36	2.72
June	15,660	9,620	12,174	724,404	2.09	2.33
July	10,765	2,090	4,833	297,170	.83	.96
August	3,630	1,350	1,907	117,072	.33	.38
September	1,460	840	1,045	62,182	.18	.20
October	970	870	917	56,445	.16	.18
November	935	810	879	52,364	.15	.17
December	935	630	788	48,452	.14	.16
The year	22,895	550	3,375	2,454,039	.58	7.89

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 92; rating table on page 174 of same paper.

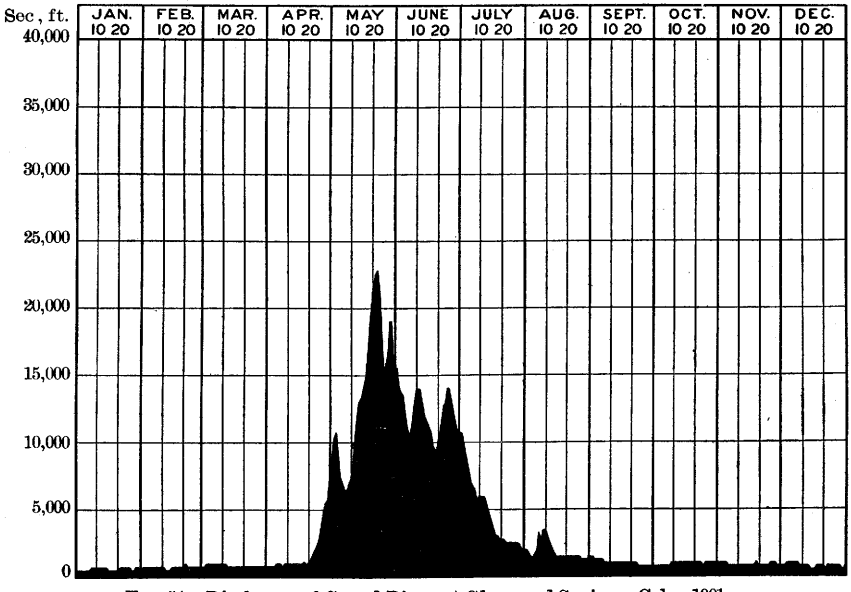


FIG. 54.—Discharge of Grand River at Glenwood Springs, Colo., 1901.

GUNNISON RIVER.

Estimated monthly discharge of Gunnison River at Iola, Colo.

[Drainage area, 2,298 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	2,442	426	910	54,148	0.39	0.44
May	7,402	2,137	3,756	230,949	1.55	1.79
June	3,686	2,289	2,892	172,086	1.24	1.38
July	2,289	663	1,151	70,773	.49	.56
August	1,118	496	676	41,750	.29	.33
September	663	300	399	23,742	.16	.18
October	361	300	322	19,799	.12	.14
November	361	300	310	18,446	.12	.13

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 93; rating table on page 174 of same paper.

DOLORES RIVER.

Estimated monthly discharge of Dolores River at Dolores, Colo.

[Drainage area, 524 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
March	555	82	178	10,945	0.34	0.39
April	2,386	82	878	52,245	1.68	1.87
May	3,086	1,371	2,085	128,201	3.98	4.59
June	1,686	810	1,206	71,524	2.30	2.46
July	627	141	266	16,355	.51	.59
August	343	100	174	10,698	.33	.38
September	220	19	42	2,499	.08	.09
October	37	19	26	1,599	.05	.06

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 95; rating table on page 174 of same paper.

LOS PINOS RIVER.

Estimated monthly discharge of Los Pinos River at Ignacio, Colo.

[Drainage area, 450 square miles.]

Month.	Discharge in second-feet			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	1,166	109	452	26,896	1.00	1.12
May	1,569	735	1,026	63,086	2.28	2.63
June	887	645	763	45,402	1.70	1.90
July	555	83	226	13,896	.50	.58
August	825	95	202	12,420	.45	.52
September 1–26			[a]186	9,592	.41	[a].40

[a] Partial month.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 96; rating table on page 174 of same paper.

FLORIDA RIVER.

Estimated monthly discharge of Florida River near Durango, Colo.

[Drainage area, 136 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	339	21	110	6,545	0.81	0.90
May	625	248	377	23,181	2.77	3.20
June	326	41	172	10,235	1.27	1.42

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 96; rating table on page 174 of same paper.

VERDE RIVER.

Estimated monthly discharge of Verde River near McDowell, Ariz.

[Drainage area, 6,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,500	259	351	21,575	0.059	0.067
February	6,613	394	1,859	103,249	.310	.323
March	2,863	211	895	55,018	.149	.172
April	221	155	185	10,988	.031	.034
May	185	125	140	8,606	.023	.027
June	164	59	105	6,222	.017	.019
July	1,680	29	210	12,916	.035	.040
August	3,000	163	627	38,561	.105	.121
September	172	45	93	5,514	.015	.017
October	730	82	134	8,210	.022	.025
November	336	187	245	14,571	.041	.046
December	288	247	268	16,485	.045	.052
The year	6,613	29	426	302,615	.071	.943

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 103.

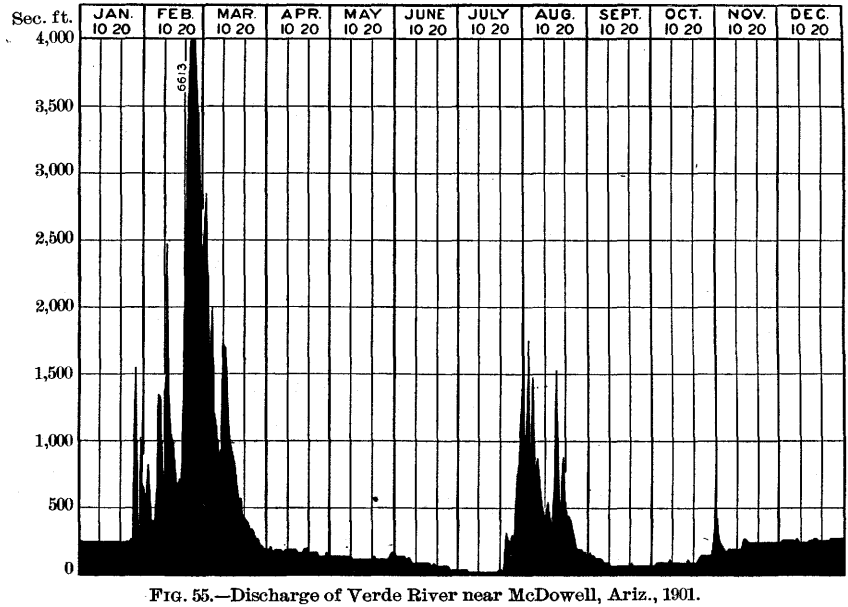


FIG. 55.—Discharge of Verde River near McDowell, Ariz., 1901.

SALT RIVER.

Estimated monthly discharge of Salt River at reservoir site, Arizona.

[Drainage area, 5,756 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	------	------	454	27,945	0.08	0.09
February	4,172	928	2,414	134,047	.42	.44
March	3,468	740	1,423	87,472	.25	.29
April	1,562	740	1,050	62,442	.18	.20
May	1,267	462	735	45,203	.13	.15
June	508	147	288	17,262	.05	.06
July	3,556	71	346	21,296	.06	.07
August	2,221	207	529	32,504	.09	.10
September	670	123	309	17,907	.05	.06
October	215	117	152	9,334	.03	.03
November	215	183	189	10,629	.03	.03
December	195	180	190	11,663	.03	.03
The year	------	------	672	477,704	.11	1.55

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 99.

Estimated monthly discharge of Tonto Creek near Livingston, Ariz.

[Drainage area, 1,030 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	40	16	27	1,622	0.026	0.029
May	43	6	14	865	.014	.016
June	9	0	5	201	.005	.006
July	959	2	37	2,255	.036	.042
August	279	0	27	1,686	.026	.030
September	8	2	3	175	.003	.003
October	2	2	2	123	.002	.002
November	3	2	3	170	.003	.003
December	2	2	2	123	.002	.002

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 101.

Estimated monthly discharge of Salt River near McDowell, Ariz.

[Drainage area, 6,260 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	3,172	235	582	35,788	0.09	0.10
February	5,100	1,412	2,422	134,517	.39	.41
March	3,157	827	1,634	100,494	.26	.30
April 1–19[a]			1,005	37,895	.16	.11
June	590	128	284	16,972	.05	.06
July			[b] 152	[b] 9,350	[b] .02	[b] .02
August	1,130	205	[b] 369	[b] 22,711	[b] .06	[b] .07
September	710	121	192	11,420	.03	.03
October	191	118	143	8,816	.02	.02
November	209	155	189	11,218	.03	.03
December	189	157	182	11,185	.03	.03

[a] No observations made from April 20 to June 1. [b] Estimated.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 102.

GILA RIVER.

Estimated monthly discharge of Gila River at San Carlos, Ariz.

[Drainage area, 13,455 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,330	110	199	12,236	0.0148	0.0171
February	2,080	450	1,079	59,925	.0802	.0835
March	1,070	155	446	27,423	.0332	.0383
April	155	5	53	3,154	.0039	.0044
May	8	5	5	307	.0004	.0005
June	5	0	3	178	.0002	.0002
July	4,200	0	368	22,627	.0273	.0315
August	3,050	10	536	32,957	.0398	.0459
September	8,500	2	250	14,876	.0186	.0208
October	1,000	2	91	5,595	.0068	.0078
November	680	125	232	13,805	.0172	.0192
December	125	100	109	6,702	.0081	.0093
The year	8,500	0	281	199,785	.0209	.2785

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 99.

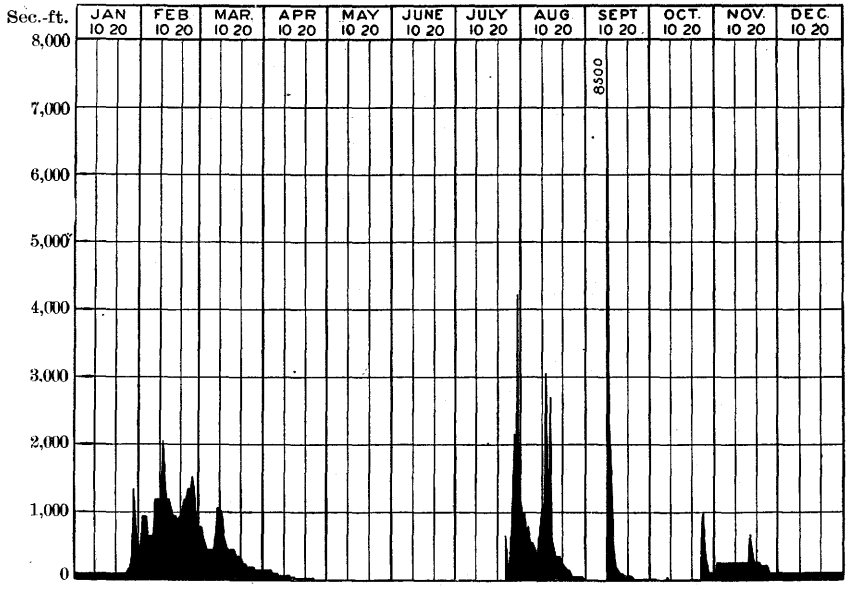


FIG. 56.—Discharge of Gila River at San Carlos, Ariz., 1901.

INTERIOR BASIN DRAINAGE.

Under this head is comprised the large extent of arid country which includes nearly the whole of Nevada, the northern and western parts of Utah, and small portions of California and Idaho. Having no outlet to the sea, the entire drainage of this vast basin is lost mainly through evaporation from the numerous lakes and sinks in which the waters of the rivers collect. During 1901 measurements were made of the streams draining into all of the principal lakes of the interior basin, with the exception of Walker River draining into Walker Lake.

In the Great Salt Lake drainage the following rivers were measured: Bear River and tributaries, Weber River, and Ogden River. In Utah Lake drainage, American Fork, Provo River, and Spanish Fork. In Sevier Lake drainage, Sevier River and its tributaries, the San Pitch and the Salina.

Humboldt River, draining into Humboldt sink, was measured at four places, viz, near Elko, near Golconda, and near Oreana, on the main stream, and at Mason's ranch, on the South Fork.

Truckee River, flowing into Lake Tahoe and thence into Pyramid Lake, is measured at Tahoe at the outlet of the lake, at the California-Nevada State line, and at Vista, Nev. Steamboat Creek, a tributary of the Truckee, is gaged at Steamboat Springs.

Carson River, the waters of which disappear in Carson sink, is measured at Empire, Nev. Its main tributaries, the East and West

forks, are gaged near Gardnerville, Nev., and at Woodfords, Cal., respectively.

A number of reservoir sites were surveyed in the Truckee River Basin during the season of 1901. Descriptions of these sites, together with estimates of cost of construction and of the amount of land to be irrigated, are published in Water-Supply Paper No. 68, entitled Water Storage in the Truckee River Basin, by L. H. Taylor, under whose direction the surveys were made.

The principal tributary of Honey Lake is Susan River. Measurements have been made on this stream during 1901 near Susanville, Cal., and on Willow Creek, a tributary, near Standish, Cal.

HUMBOLDT RIVER.

Estimated monthly discharge of Humboldt River, near Elko, Nev.

[Drainage area, 2,840 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	70	63	65	3,997	0.023	0.027
February	2,339	49	671	37,265	.236	.246
March	1,121	284	480	29,514	.169	.195
April	374	253	295	17,553	.104	.116
May	822	319	511	31,420	.180	.208
June	594	32	353	21,005	.124	.138
July	123	14	50	3,074	.018	.021
August	43	.5	12	738	.004	.005
September	18	.5	6	357	.002	.002
October	22	4	8	492	.003	.003
November	10	7	9	536	.003	.003
December	10	10	10	615	.004	.005
The year	2,339	0.5	206	146,566	.072	.969

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 104; rating table on page 174 of same paper.

Estimated monthly discharge of South Fork of Humboldt River at Mason's Ranch, Nev.

[Drainage area, 1,150 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	35	24	33	2,029	0.029	0.033
February	1,478	35	408	22,659	.355	.370
March	382	122	173	10,637	.150	.173
April	263	122	180	10,711	.157	.175
May	619	276	457	28,100	.397	.458
June	589	182	379	22,552	.330	.368
July	182	41	81	4,980	.070	.081
August	41	4	21	1,291	.018	.021
September	19	4	8	476	.007	.008
October	47	19	37	2,275	.032	.037
November	67	47	55	3,273	.048	.054
December	67	35	51	3,136	.044	.051
The year	1,478	4	157	112,119	.136	1.829

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 105; rating table on page 174 of same paper.

Estimated monthly discharge of Humboldt River near Golconda, Nev.

[Drainage area, 10,780 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	108	40	65	3,997	0.0060	0.0069
February	1,290	59	323	17,939	.0300	.0312
March	3,080	558	1,501	92,293	.1392	.1605
April	558	334	423	25,170	.0392	.0437
May	521	65	382	23,488	.0354	.0408
June	416	156	276	16,423	.0256	.0285
July	139	4	48	2,951	.0045	.0052
August	24	4	12	738	.0011	.0013
September	5	1	2	119	.0002	.0002
October	6	0.5	4	246	.0004	.0005
November	46	5	9	536	.0008	.0009
December	52	8	31	1,906	.0029	.0033
The year	3,080	0.5	256	185,806	.0288	.3230

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 106; rating table on page 175 of same paper.

Estimated monthly discharge of Humboldt River near Oreana, Nev.

[Drainage area, 13,800 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	205	60	113	6,948	0.008	0.009
February	430	99	222	12,329	.016	.017
March	2,616	301	1,318	81,041	.096	.111
April	986	330	587	34,929	.043	.048
May	511	167	317	19,492	.023	.027
June	167	99	133	7,914	.010	.011
July	150	60	108	6,641	.008	.009
August	88	21	39	2,398	.003	.003
September	21	10	17	1,012	.001	.001
October	274	21	48	2,951	.003	.003
November	38	26	30	1,785	.002	.002
December	78	32	51	3,136	.004	.005
The year	2,616	10	249	170,576	.018	.246

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 107; rating table on page 175 of same paper.

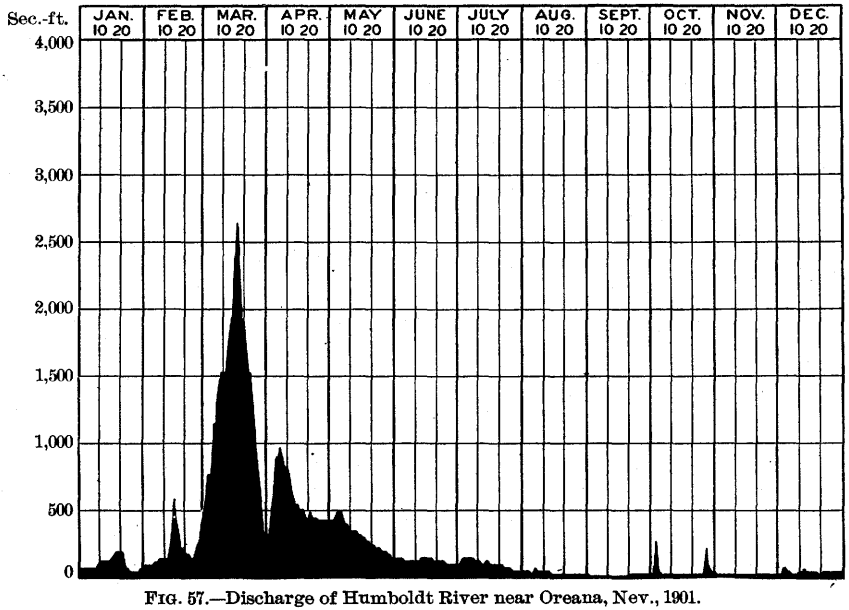


FIG. 57.—Discharge of Humboldt River near Oreana, Nev., 1901.

TRUCKEE RIVER.

Estimated monthly discharge of Truckee River at Tahoe, Cal.

[Drainage area, 519 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	117	85	102	6,262	0.196	0.226
February	117	30	81	4,502	.156	.163
March	30	30	30	1,845	.058	.067
April	30	0	9	565	.018	.020
May	0	0	0	0	.000	.000
June	178	0	30	1,765	.058	.064
July	293	156	225	13,809	.433	.499
August	555	293	419	25,760	.803	.931
September	390	117	326	19,395	.628	.701
October	308	251	282	17,308	.542	.625
November	293	189	247	14,678	.475	.530
December	189	100	111	6,841	.214	.247
The year	555	0	155	112,730	.299	4.073

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 111; rating table on page 175 of same paper.

Estimated monthly discharge of Truckee River at Nevada-California State line.

[Drainage area, 955 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	559	230	314	19,308	0.329	0.379
February	3,435	247	1,082	60,092	1.133	1.176
March	2,280	732	1,280	78,708	1.340	1.544
April	2,505	613	1,476	87,829	1.545	1.728
May	4,370	1,508	2,478	152,370	2.595	2.992
June	2,505	989	1,595	94,910	1.670	1.862
July	1,194	421	686	42,181	.718	.828
August	795	349	486	29,884	.509	.588
September	559	247	472	28,086	.494	.552
October	559	247	470	28,900	.492	.566
November	613	383	469	27,908	.491	.549
December	1,194	247	445	27,347	.466	.536
The year	4,370	230	938	677,521	.982	13.300

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 112; rating table on page 175 of same paper.

Estimated monthly discharge of Steamboat Creek at Steamboat Springs, Nev.

[Drainage area, 123 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	56.0	3.0	7.6	467	0.061	0.071
February	72.0	3.0	15.6	866	.126	.132
March	20.5	5.0	10.8	664	.087	.101
April	11.5	3.0	7.7	458	.062	.069
May	29.5	11.5	21.4	1,316	.174	.200
June	39.0	17.0	29.6	1,761	.240	.268

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 114; rating table on page 175 of same paper.

Estimated monthly discharge of Truckee River at Vista, Nev.

[Drainage area, 1,519 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,505	418	661	40,644	0.435	0.502
February	4,213	418	1,486	82,529	.978	1.019
March	2,209	938	1,328	81,657	.874	1.008
April	1,942	747	1,380	82,117	.908	1.014
May	4,213	1,410	2,145	131,894	1.412	1.628
June	1,942	854	1,263	75,155	.831	.928
July	995	146	425	26,133	.280	.323
August	492	128	315	19,369	.207	.227
September	467	251	329	19,577	.217	.242
October	720	370	477	29,330	.314	.362
November	882	467	557	33,144	.367	.409
December	1,287	322	510	31,357	.336	.387
The year	4,213	128	906	652,906	.597	8.049

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 113; rating table on page 175 of same paper.

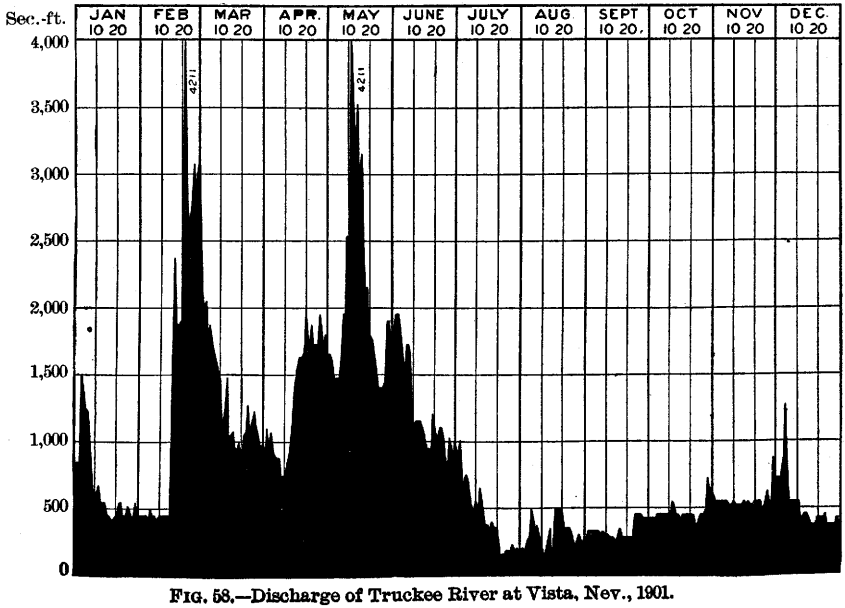


FIG. 58.—Discharge of Truckee River at Vista, Nev., 1901.

CARSON RIVER.

Estimated monthly discharge of East Fork of Carson River near Gardnerville, Nev.

[Drainage area, 381 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
October			38	2,337	0.100	[a]0.058
November	75	30	41	2,440	.108	.120
December	35	30	34	2,091	.089	.103
1901.						
January	86	14	34	2,091	.089	.103
February	2,267	14	664	36,877	1.743	1.815
March	927	219	464	28,531	1.218	1.256
April	927	261	582	34,632	1.527	1.704
May	3,162	856	1,822	112,033	4.782	5.513
June	2,008	1,141	1,492	88,780	3.916	4.369
July	1,512	313	741	45,562	1.945	2.242
August	626	85	259	16,026	.680	.789
September	220	85	139	8,271	.365	.407
October	271	102	137	8,424	.360	.415
November	332	122	196	11,663	.514	.574
December	1,213	134	280	17,217	.735	.847
The year	3,162	14	568	410,107	1.490	20.034

[a] Partial month.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 108; rating table on page 175 of same paper.

Estimated monthly discharge of West Fork of Carson River at Woodfords, Cal.

[Drainage area, 70 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
October 18–31			44	1,222	0.63	0.33
November	60	37	48	2,856	.69	.77
December	71	37	53	3,259	.76	.87
1901.						
January	66	41	51	3,136	.73	.84
February	256	41	111	6,165	1.59	1.65
March	256	121	170	10,453	2.43	2.80
April	412	121	234	13,924	3.34	3.73
May	896	295	476	29,268	6.80	7.84
June	396	187	289	17,197	4.13	4.61
July	187	97	136	8,363	1.94	2.24
August	166	50	77	4,735	1.10	1.27
September	50	41	43	2,559	.61	.69
October	60	41	49	3,013	.70	.81
November	60	50	56	3,332	.80	.89
December	112	60	82	5,042	1.17	1.35
The year	896	41	148	107,187	2.11	28.72

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 109; rating table on page 175 of same paper.

Estimated monthly discharge of Carson River near Empire, Nev.

[Drainage area, 988 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
October			70	4,304	0.071	0.082
November	550	46	109	6,486	.110	.123
December	113	68	93	5,718	.094	.109
1901.						
January	772	40	115	7,071	.116	.134
February	2,470	40	645	35,822	.653	.682
March	1,001	478	634	38,984	.642	.740
April	1,420	329	700	41,653	.709	.790
May	3,791	924	1,994	122,606	2.018	2.328
June	2,304	853	1,422	84,615	1.438	1.605
July	1,084	167	468	28,777	.474	.546
August	297	40	126	7,748	.128	.147
September	70	25	39	2,321	.040	.044
October	213	70	113	6,948	.114	.132
November	297	189	197	11,722	.199	.222
December	758	213	311	19,122	.315	.363
The year	3,791	25	563	407,389	.570	7.733

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 111; rating table on page 175 of same paper.

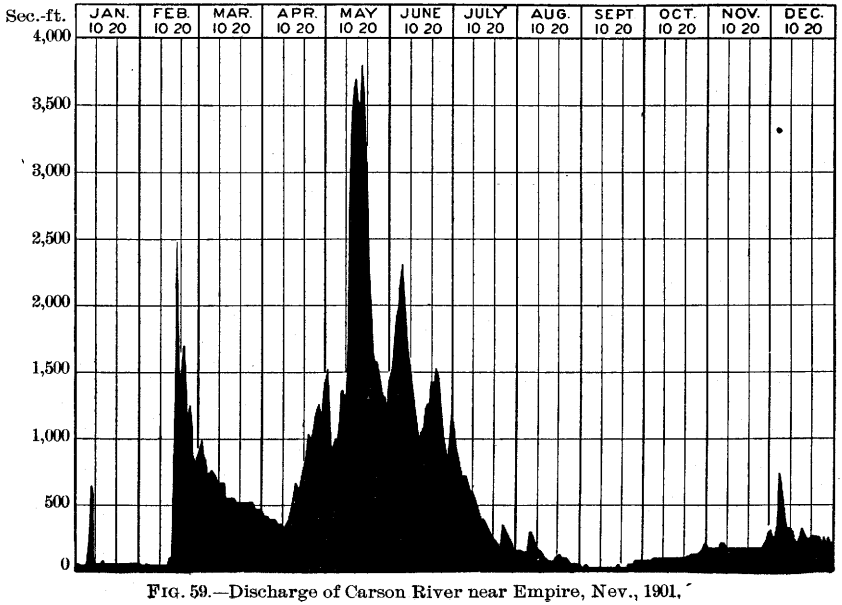


FIG. 59.—Discharge of Carson River near Empire, Nev., 1901.

SUSAN RIVER.

Estimated monthly discharge of Susan River near Susanville, Cal.

[Drainage area, 210 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
June			31	1,669	0.15	0.15
July	18	11	13	799	.06	.07
August	12	10	11	676	.05	.06
September	11	10	11	655	.05	.06
October	36	11	17	1,045	.08	.09
November	390	15	47	2,797	.22	.25
December	470	26	60	3,689	.29	.33
1901.						
January	52	36	43	2,644	.20	.23
February	1,070	36	308	17,105	1.47	1.53
March	770	197	363	22,320	1.73	1.99
April	730	134	371	22,076	1.77	1.97
May	590	168	420	25,825	2.00	2.31
June	156	15	56	3,332	.27	.30
July	24	9	18	1,107	.09	.10
August	13	5	10	615	.05	.06
September	9	4	6	369	.03	.03
October	16	7	10	615	.05	.06
November	101	10	19	1,131	.09	.10
December	470	11	61	1,783	.29	.33
The year	1,070	4	140	98,922	.67	9.01

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 116; rating table on page 175 of same paper.

BEAR RIVER.

Estimated monthly discharge of Bear River at Battlecreek, Idaho.

[Drainage area, 4,500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	522	497	503	30,928	0.11	0.13
February	1,650	497	663	36,821	.15	.16
March	1,650	1,070	1,217	74,830	.27	.31
April	2,568	1,070	1,619	96,337	.36	.40
May	2,925	2,466	2,726	167,614	.61	.70
June	2,415	737	1,425	84,793	.32	.36
July	704	400	487	29,944	.11	.13
August	434	400	418	25,702	.09	.10
September	474	400	436	25,944	.10	.11
October	578	474	505	31,051	.11	.13
November	578	497	561	33,384	.12	.13
December	704	522	614	37,753	.13	.15
The year	2,925	400	931	675,101	.21	2.81

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 117; rating table on page 176 of same paper.

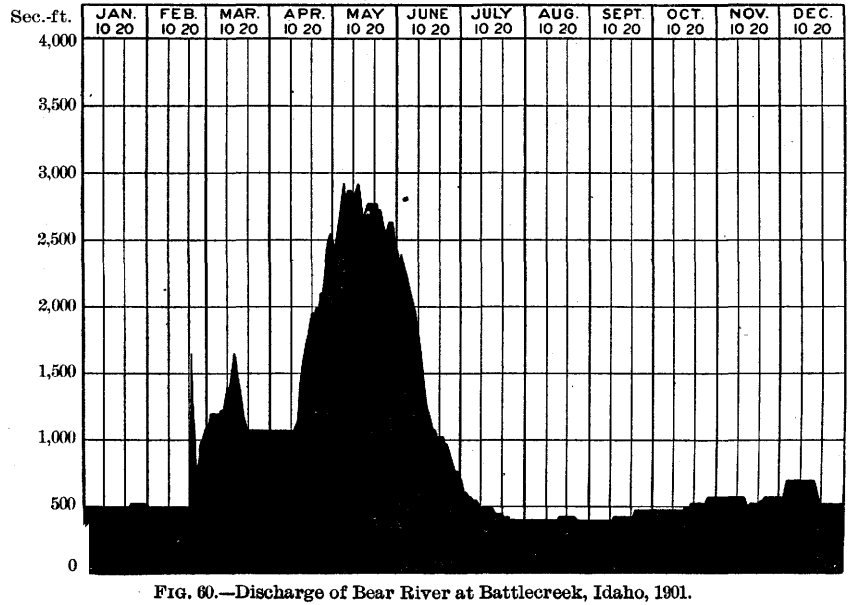


FIG. 60.—Discharge of Bear River at Battlecreek, Idaho, 1901.

Estimated monthly discharge of Logan River near Logan, Utah.

[Drainage area, 218 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	167	143	159	9,777	0.73	0.84
February	167	150	155	8,608	.71	.74
March	167	150	156	9,592	.72	.83
April	450	150	236	14,043	1.08	1.20
May	1,440	422	901	55,400	4.13	4.76
June	850	511	667	39,689	3.06	3.53
July 9–31			289	13,184	1.33	1.13
August	258	227	240	14,757	1.10	1.27
September	227	213	213	12,674	.98	1.09
October	213	188	197	12,113	.90	1.04

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66; rating table on page 176 of same paper.

Estimated monthly discharge of Blacksmith Fork at Hyrum, Utah.

[Drainage area, 286 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	124	108	115	7,071	0.40	0.46
February	128	108	113	6,276	.40	.42
March	147	112	119	7,317	.42	.48
April	147	112	132	7,855	.46	.51
May	514	112	187	11,498	.65	.75
June	347	147	187	11,127	.65	.73
July	147	128	133	8,178	.47	.54
August	147	128	134	8,239	.47	.54
September	128	120	122	7,261	.43	.48
October	293	120	131	8,056	.46	.53
November	120	120	120	7,141	.42	.47
December	120	112	119	7,317	.42	.48
The year	514	108	134	97,336	.47	6.39

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 119; rating table on page 176 of same paper.

Estimated monthly discharge of Bear River near Collinston, Utah.

[Drainage area, 6,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,550	915	1,239	76,183	0.21	0.24
February	2,880	1,105	1,555	86,354	.26	.27
March	2,880	1,700	2,032	124,943	.34	.39
April	3,575	1,700	2,399	142,750	.40	.45
May	4,950	3,575	4,469	274,788	.74	.85
June	3,640	1,025	2,029	120,734	.34	.38
July	987	415	686	42,180	.11	.13
August	717	415	574	35,294	.10	.12
September	915	635	724	43,081	.12	.13
October	1,105	880	1,006	61,857	.17	.20
November	1,232	1,025	1,144	68,073	.19	.21
December	1,405	1,025	1,197	73,600	.20	.23
The year	4,950	415	1,588	1,149,837	.27	3.60

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Pap e No, 66, page 120; rating table on page 176 of same paper.

WEBER RIVER.

Estimated monthly discharge of Weber River near Uinta, Utah.

[Drainage area, 1,600 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	263	263	263	15,171	0.16	0.18
February	1,655	263	681	37,821	.43	.45
March	1,865	500	707	43,472	.44	.51
April	1,970	500	948	56,410	.59	.66
May	2,425	1,235	1,981	121,807	1.24	1.43
June	1,235	440	712	42,367	.45	.50
July	380	110	207	12,728	.13	.15
August	320	110	200	12,297	.13	.15
September	210	210	210	12,496	.13	.15
October	320	263	272	16,725	.17	.20

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 122; rating table on page 176 of same paper.

UTAH LAKE DRAINAGE.

Estimated monthly discharge of Spanish Fork near Mapleton, Utah.

[Drainage area, 670 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
June	188	75	132	7,855	0.20	0.22
July	75	54	56	3,443	.08	.09
August	54	45	53	3,259	.08	.09
September	86	54	61	3,630	.09	.10
October	75	54	63	3,874	.09	.10
November	86	54	74	4,403	.11	.12
December	86	36	58	3,566	.09	.10
1901.						
January	200	15	41	2,521	.06	.07
February	372	15	91	5,054	.14	.15
March	141	75	97	5,964	.14	.16
April	224	86	131	7,795	.20	.22
May	385	176	271	16,663	.40	.46
June	188	86	133	7,914	.20	.22
July	86	64	77	4,735	.10	.12
August	164	64	99	6,087	.15	.17
September	86	75	75	4,463	.10	.11
October	119	75	82	5,042	.12	.14
November	97	75	82	4,879	.12	.13

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 123; rating table on page 176 of same paper.

Estimated monthly discharge of Provo River near Provo, Utah.

[Drainage area, 640 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	353	279	314	19,307	0.49	0.56
February	1,658	258	471	26,158	.74	.77
March	411	302	333	20,475	.52	.60
April	788	302	392	23,326	.61	.68
May	2,093	587	1,181	72,617	1.85	2.13
June	875	224	399	23,742	.62	.69
July	240	224	239	14,696	.37	.43
August	240	224	238	14,634	.37	.43
September	240	240	240	14,281	.38	.42
October	302	240	257	15,802	.40	.46
November 1–16	279	279	279	8,854	.44	.26

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 123; rating table on page 176 of same paper.

Estimated monthly discharge of American Fork near American Fork, Utah.

[Drainage area, 66 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
June	213	54	111	6,016	1.68	1.87
July	67	34	45	2,767	.68	.78
August	27	23	26	1,599	.39	.45
September	43	23	26	1,547	.39	.44
October	34	27	30	1,845	.45	.52
November	34	27	29	1,726	.44	.49
December	34	27	33	2,029	.50	.58
1901.						
January	34	34	34	2,091	.52	.60
February	43	27	36	1,999	.55	.57
March	43	34	36	2,213	.55	.59
April 10–30	------	------	125	5,206	1.89	1.48
May 1–18	------	------	582	20,779	8.82	5.90

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 124; rating table on page 176 of same paper.

SEVIER RIVER.

Estimated monthly discharge of Salina Creek near Salina, Utah.

[Drainage area, 255 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
January	27.0	15.0	19.6	1,205	0.077	0.089
February	24.7	15.0	19.4	1,088	.076	.079
March	21.0	13.5	14.6	898	.057	.066
April	33.7	15.0	22.9	1,363	.090	.100

NOTE.—Gage heights for 1901 are given in Water-Supply Paper No. 66, page 125.

Estimated monthly discharge of San Pitch River near Gunnison, Utah.

[Drainage area, 836 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	15	9	12	738	0.014	0.016
February	37	9	16	889	.019	.020
March	21	9	13	774	.016	.018
April 7–30			35	2,083	.042	.047
May	125	51	92	5,657	.110	.127
June	95	65	77	4,582	.092	.103
July	71	15	45	2,767	.054	.062
August	25	15	18	1,107	.022	.025
September	15	10	14	833	.017	.019
October	19	14	14	861	.017	.020
November	14	10	13	774	.016	.018
December	13	12	12	738	.014	.016
The year	125	9	30	21,803	.036	.491

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 125; rating table on page 176 of same paper.

Estimated monthly discharge of Sevier River near Gunnison, Utah.

[Drainage area, 3,986 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			118	7,255	0.029	0.033
February	164	94	125	6,942	.031	.032
March	81	29	56	3,443	.014	.016
April	74	19	45	2,678	.011	.012
May	239	51	122	7,501	.031	.036
June	129	8	41	2,440	.010	.011
July	21	5	9	553	.002	.002
August	59	14	24	1,476	.006	.006
September	17	9	12	714	.003	.003
October	12	7	8	476	.002	.002
November	41	17	34	2,023	.009	.009
December	154	41	81	4,980	.020	.023
The year	239	5	56	40,481	.014	.185

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 126; rating table on page 176 of same paper.

COLUMBIA RIVER DRAINAGE.

Next to the Colorado, Columbia River is the largest river in the arid region, its drainage basin including parts of Washington, Oregon, Idaho, and Montana and a large area in Canada. The Columbia and its numerous tributaries are of great importance, offering good sites for water-power development and an abundance of water for irrigation, while the main river is navigable for a considerable distance. But little has been accomplished at the present time in developing either of these resources.

In the following pages is published a report on the irrigation development in the valley of Snake River, the most important tributary of the Columbia, by D. W. Ross, State engineer of Idaho.

During 1901 gaging stations were maintained on the following tributaries of the Columbia: On Missoula, Blackfoot, and Bitterroot rivers near Missoula, Mont.; on Snake River at Montgomery Ferry, near Minidoka, Idaho; on Boise River, near Boise, Idaho; on Weiser River near Weiser, Idaho; on Spokane River at Spokane, Wash.; on Naches River near North Yakima, Wash.; on Yakima River at Union Gap and at Kiona, Wash.; on Palouse River, near Hooper,

Wash.; and on Umatilla River at Gibbon, Oreg., the results of measurements of which are given in the following pages.

MISSOULA RIVER.

Estimated monthly discharge of Blackfoot River near Bonner, Mont.

[Drainage area, 2,465 square miles.]

Month.	Discharge in second-feet.			Total in acre feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,060	550	673	41,381	0.27	0.31
February	1,310	450	580	32,212	.24	.25
March	3,988	550	1,017	62,533	.41	.47
April	2,950	585	1,186	70,572	.48	.54
May	12,302	3,899	8,552	525,842	3.47	4.00
June	7,676	2,650	3,698	220,046	1.50	1.67

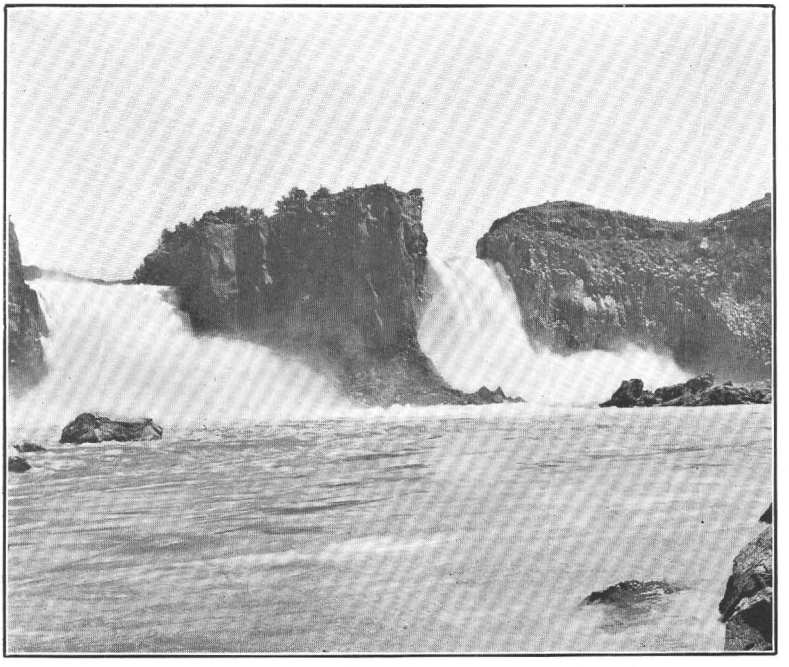
NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 130; rating table on page 177 of same paper.

Estimated monthly discharge of Missoula River at Missoula, Mont.

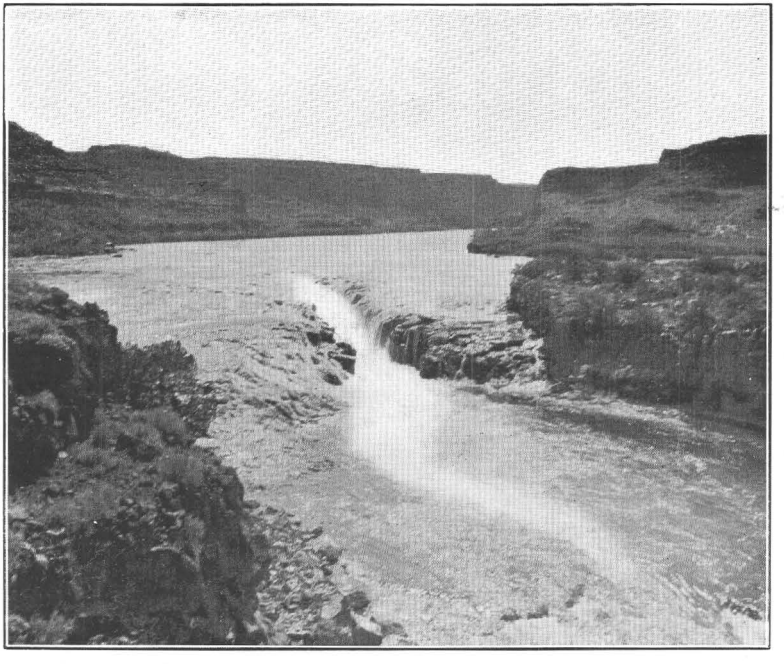
[Drainage area, 5,960 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
March	------	------	2,090	128,509	0.35	0.40
April 1–10, 13–30	------	------	2,601	154,770	.44	.47
May	20,200	7,300	15,156	931,906	2.54	2.93
June	14,450	5,150	7,458	443,782	1.25	1.39
July	4,650	1,690	2,815	173,026	.47	.54
August	1,625	980	1,300	79,933	.22	.25
September	1,625	980	1,415	84,198	.24	.27
October	1,625	1,430	1,472	90,510	.25	.29
November	1,625	1,365	1,478	87,947	.25	.28
December 1–10	------	------	1,413	27,794	.24	.09

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 131; rating table on page 177 of same paper.



A. TWIN FALLS OF SNAKE RIVER, IDAHO.



B. LOCATION OF DAM SITE NEAR TWIN FALLS, IDAHO.

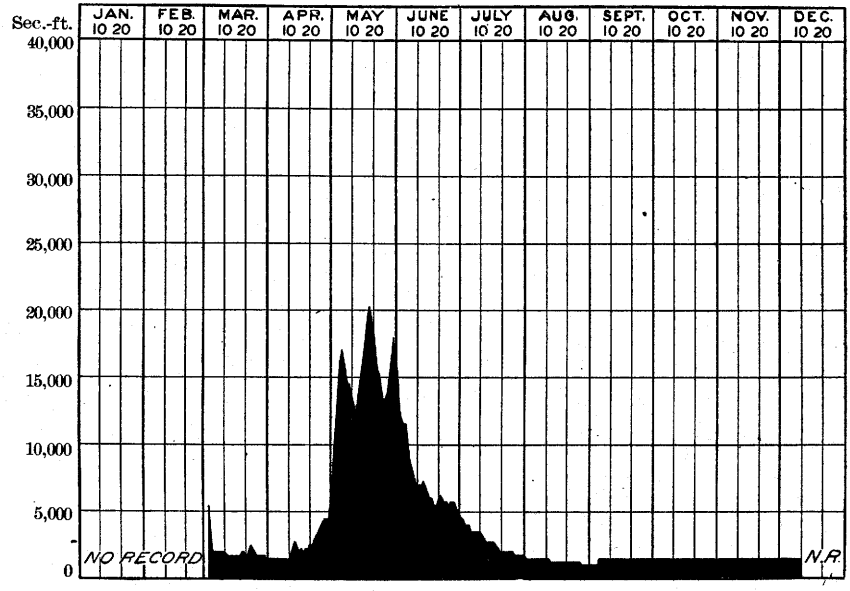


FIG. 61.—Discharge of Missoula River at Missoula, Mont., 1901.

Estimated monthly discharge of Bitterroot River at Missoula, Mont.

[Drainage area, 3,260 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January			1,360	83,623	0.42	0.49
February			1,401	77,808	.43	.45
March	2,750	1,390	1,691	103,976	.52	.60
April (twenty-one days)			1,866	81,425	.57	.51
May	18,375	7,210	11,025	67,790	3.38	3.90
June	11,700	3,050	5,020	298,711	1.54	1.72
July	3,650	1,225	2,667	163,980	.82	.95
August	1,200	940	995	61,180	.31	.36
September	1,320	940	1,130	67,507	.35	.39
October	1,250	1,080	1,157	71,141	.36	.42
November	1,175	1,100	1,149	68,370	.35	.39

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 132.

SPOKANE RIVER.

Estimated monthly discharge of Spokane River at Spokane, Wash.

[Drainage area, 4,005 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	11,824	7,738	9,887	607,928	2.47	2.85
February	9,838	5,172	7,289	404,811	1.82	1.89
March	19,706	10,815	14,843	912,660	3.71	4.28
April	13,019	9,565	11,143	663,054	2.79	3.11
May	22,711	13,324	19,901	1,223,665	4.97	5.74
June	20,054	9,565	13,513	804,079	3.38	3.77
July	9,295	4,241	6,441	396,042	1.61	1.86
August	4,141	2,767	3,263	200,634	.82	.95
September	2,682	2,517	2,564	152,569	.64	.71
October	2,600	2,278	2,461	151,321	.62	.71
November	4,141	2,356	2,806	166,969	.70	.78
December	5,389	3,946	4,593	282,413	1.15	1.33
The year	22,711	2,278	8,225	5,966,145	2.06	27.98

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 133; rating table on page 177 of same paper.

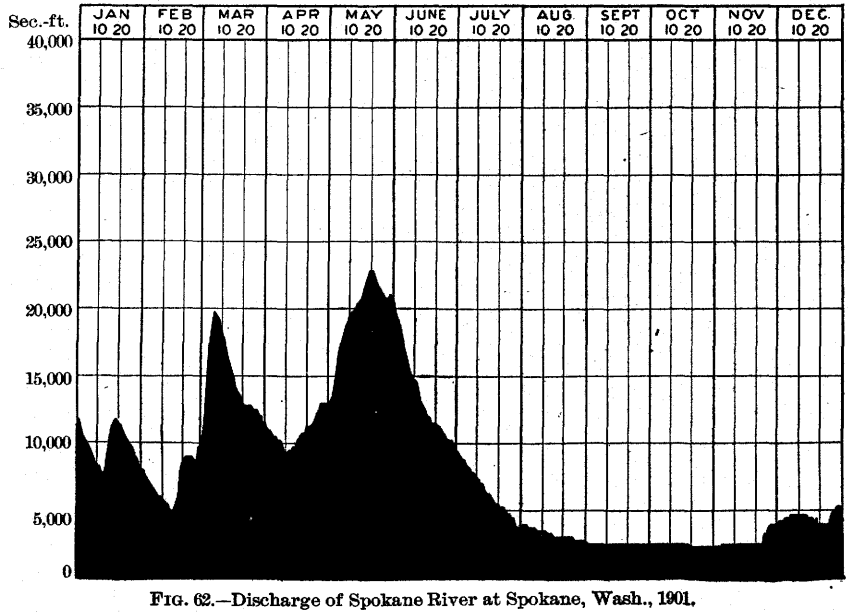
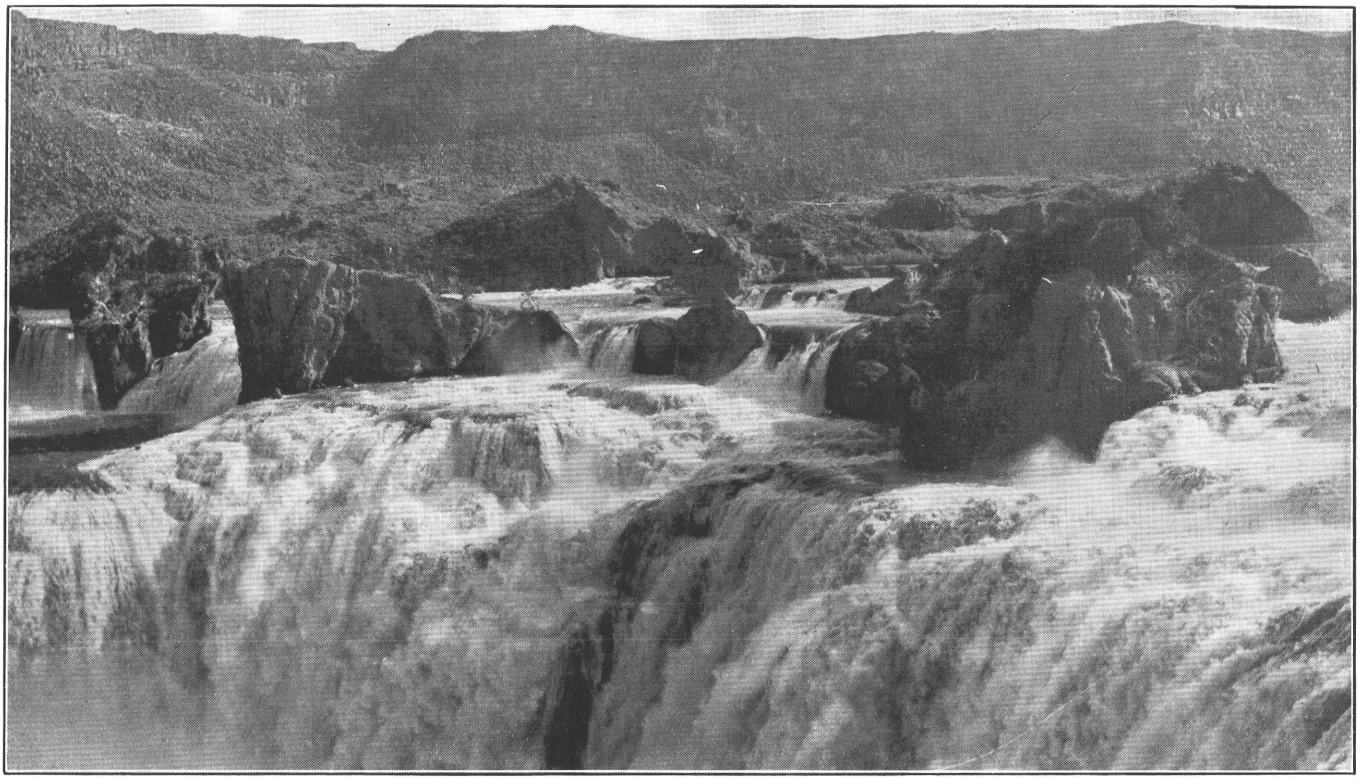


FIG. 62.—Discharge of Spokane River at Spokane, Wash., 1901.



SHOSHONE FALLS ON SNAKE RIVER, IDAHO.

SNAKE RIVER.

Estimated monthly discharge of Boise River near Boise, Idaho.

[Drainage area, 2,450 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,430	1,130	1,280	78,704	0.52	0.60
February	4,380	1,095	1,756	97,523	.72	.75
March	4,604	2,180	2,892	177,822	1.18	1.36
April	8,636	2,070	5,056	300,853	2.06	2.30
May	12,668	7,516	10,106	621,394	4.13	4.76
June	7,740	2,720	4,789	284,965	1.95	2.18
July	2,880	1,060	1,878	115,474	.77	.89
August	1,060	740	846	52,141	.35	.40
September	990	770	833	49,567	.34	.38
October	1,095	860	910	55,954	.37	.43
November	1,200	860	933	55,517	.38	.42
December	2,180	830	1,233	75,814	.50	.58
The year	12,668	740	2,708	1,965,728	.11	15.05

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 128; rating table on page 176 of same paper.

Estimated monthly discharge of Weiser River near Weiser, Idaho.

[Drainage area, 1,670 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	3,800	375	945	58,106	0.57	0.66
February	7,137	470	1,921	106,678	1.15	1.20
March	6,230	1,425	2,964	182,249	1.77	2.04
April	3,530	1,330	2,523	150,129	1.51	1.68
May	5,150	2,585	3,935	241,958	2.36	2.73
June	2,585	585	1,304	77,593	.78	.87
July	585	250	363	22,320	.22	.25
August	215	39	67	4,120	.04	.05
September	87	47	71	4,225	.04	.04
October	137	96	115	70,712	.07	.08
November	330	137	191	11,365	.11	.12
December	1,330	250	525	32,281	.31	.36
The year	7,137	39	1,244	961,736	.74	10.08

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 129; rating table on page 176 of same paper.

YAKIMA RIVER.

Estimated monthly discharge of Naches River near North Yakima, Wash.

[Drainage area, 1,000 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	4,030	910	1,559	95,859	1.56	1.80
February	4,600	830	1,621	90,026	1.62	1.69
March	9,100	1,690	3,427	210,718	3.43	3.96
April	2,780	1,550	2,199	130,850	2.20	2.46
May	8,800	3,250	5,628	346,052	5.63	6.49
June	6,700	2,570	4,026	239,564	4.03	4.50
July	2,780	1,090	1,937	119,101	1.94	2.24
August	1,090	430	683	41,996	.68	.78
September	470	390	405	24,099	.41	.46
October	430	370	380	23,365	.38	.44
November	6,400	430	1,101	65,514	1.10	1.23
December	4,030	750	1,600	98,380	1.60	1.84
The year	9,100	370	2,047	1,485,524	2.05	27.89

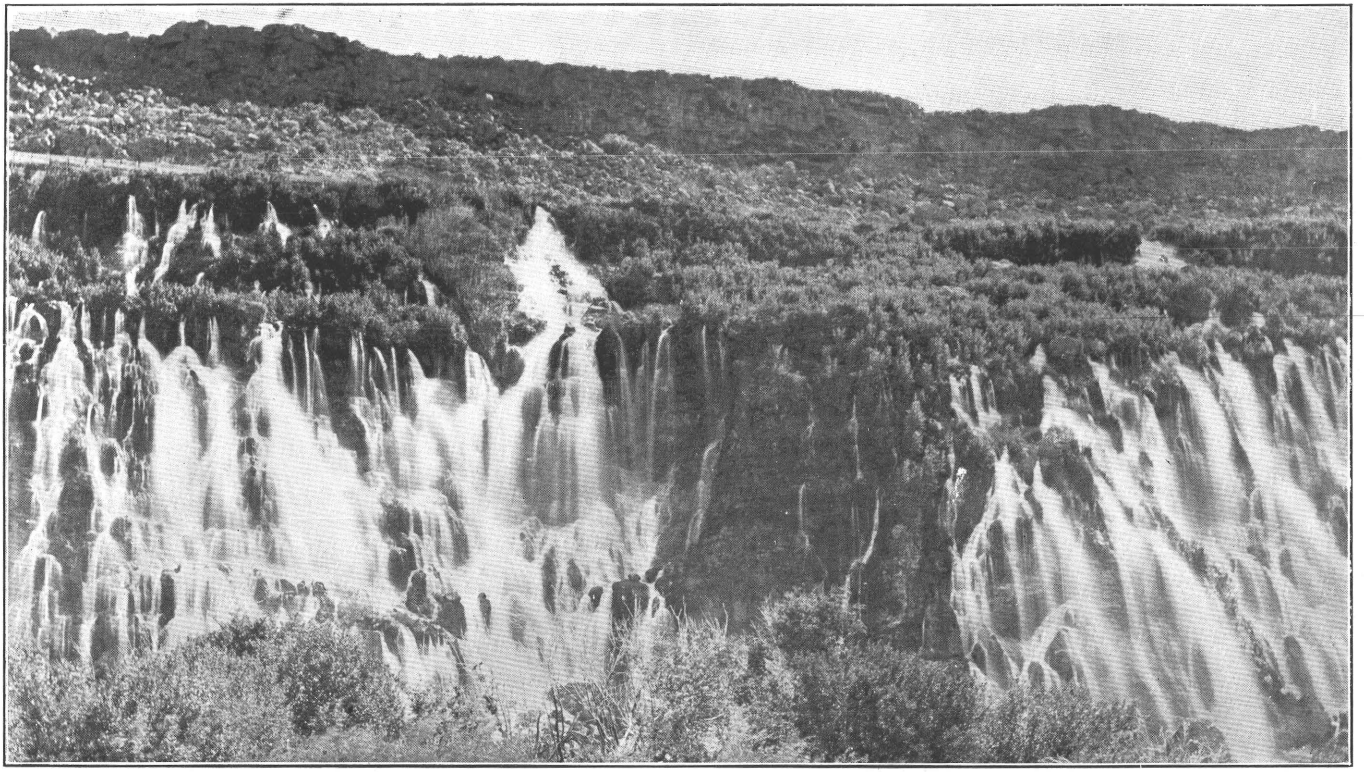
NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 134; rating table on page 177 of same paper.

Estimated monthly discharge of Yakima River at Union Gap, Wash.

[Drainage area, 3,300 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	8,650	2,600	4,371	268,762	1.32	1.52
February	10,750	1,950	3,720	206,598	1.13	1.18
March	20,900	4,250	8,356	513,790	2.53	2.92
April	6,300	4,000	5,272	313,706	1.60	1.79
May	18,100	6,900	11,482	706,001	3.48	4.05
June	13,200	6,300	8,713	518,460	2.64	2.95
July	6,300	2,600	4,508	277,186	1.37	1.58
August	2,425	1,050	1,544	94,937	.47	.54
September	1,250	850	1,023	60,873	.31	.35
October	1,050	750	895	55,031	.27	.31
November	5,100	850	2,710	161,256	.82	.92
December	12,500	2,600	5,800	356,628	1.76	1.96
The year	20,900	750	4,866	3,533,228	1.48	20.07

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 135; rating table on page 177 of same paper.



THOUSAND SPRINGS ON SNAKE RIVER, IDAHO.

Estimated monthly discharge of Yakima River at Kiona, Wash.

[Drainage area, 5,230 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	13,545	4,935	6,886	423,404	1.32	1.52
February	14,745	3,592	6,299	349,828	1.20	1.25
March	24,045	6,995	11,779	724,263	2.26	2.61
April	8,782	5,833	7,420	441,521	1.42	1.58
May	20,745	8,472	14,037	863,101	2.68	3.09
June	15,345	5,228	8,773	522,030	1.68	1.87
July	5,150	1,832	3,476	213,731	.66	.76
August	1,769	525	1,053	64,746	.20	.23
September	519	465	481	28,620	.09	.10
October	917	525	643	39,537	.12	.14
November	6,248	940	3,202	190,532	.61	.68
December	9,570	1,769	4,316	265,381	.83	.96
The year	24,045	465	5,697	4,126,694	1.09	14.79

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 136; rating table on pape 177 of same paper.

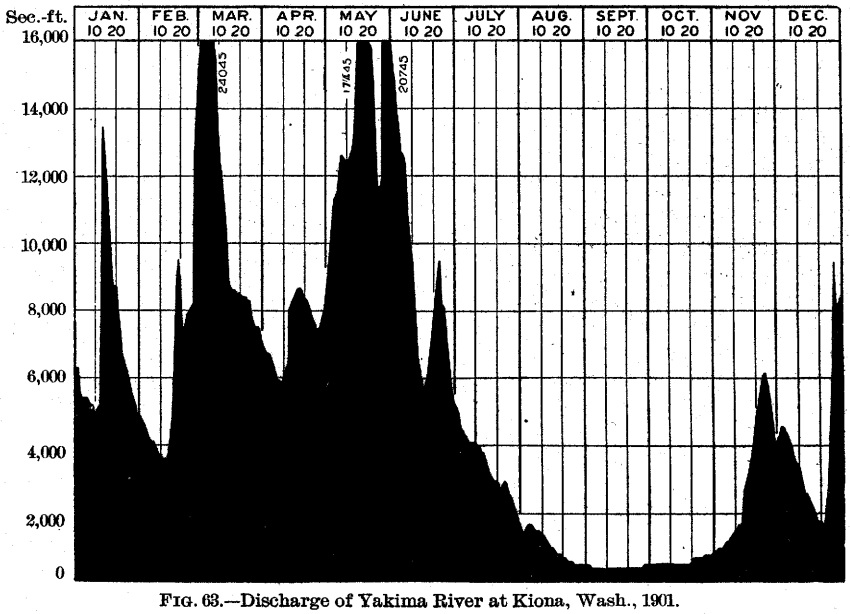


FIG. 63.—Discharge of Yakima River at Kiona, Wash., 1901.

DISCHARGE MEASUREMENTS OF ARTESIAN WELLS IN MOXEE VALLEY NEAR NORTH YAKIMA, WASH.[a]

No. 1.—Clarke's No. 1 (Pecks), sec. 6, T. 12, R. 20. Weir measurement, April 20, 1899; discharge, 1,435 second-feet.

This well was closed in December, 1900, and partly opened in April. Approximate measurement, with Price meter in flume, April 11, 1901, discharge, 1.34 second-feet. Barom. el., 1,049.

No. 2.—Clarke's No. 2, NE. ¼ SW. ¼ sec. 31, T. 13, R. 20. Weir measurement, March 3, 1899, 1,046 second-feet.

This well remained open during the winter. A measurement over an 18-inch weir, April 11, 1901, gave a discharge of 0.52 second-foot. Barom. el., 1,085.

No. 2a.—Clarke's No. 2a, NE. ¼ SW. ¼ sec. 31, T. 13, R. 20. Weir measurement, March 3, 1899, 0.469 second-foot.

This well remained open during the winter. A weir measurement, April 11, 1901, gave a discharge of 0.15 second-foot. Barom. el., 1,076.

No. 3.—Meigs, NW. ¼, SE. ¼, sec. 32, T. 13, R. 20. Discharge 18 cubic feet per minute.

This well has ceased to flow and is now abandoned.

No. 4.—Yakima Land Company, No. 4, sec. 4, T. 12, R. 20. No flow.

Well abandoned.

No. 5.—Yakima Land Company, No. 1, sec. 3, T. 12, R. 20. No flow.

Well abandoned.

No. 6.—Yakima Land Company, No. 3, sec. 3, T. 12, R. 20. Original yield estimated at 30 cubic feet per minute. No flow.

Well abandoned.

No. 7.—Bradford (now Hill), sec. 9, T. 12, R. 20. Measurement over 2-foot weir, March 19, 1901, gave a discharge of 0.904 second-foot.

No. 8.—Dickson, sec. 8, T. 12, R. 20. Yield unknown.

Abandoned since December 1, 1900.

No. 9.—Gano, sec. 8, T. 12, R. 20. No measurement obtainable. Partly shut down from December 1, 1900. April 1. 1901, still partly closed.

No. 10.—Ellens, SE. ¼ NE. ¼ sec. 7. T. 12, R. 20. Measurement made March 23, 1901, showed a discharge of 0.13 second-foot.

This well has been closed down since the summer of 1900. Barom. el., 995 feet. Cased 300 feet.

No. 11.—Longevin, sec. 8, T. 12, R. 20. Measurement on April 9, 1901, gave a discharge of 0.4 second-foot. Barom. el., 995.

No. 12.—Haines (Patterson), sec. 8, T. 12, R. 20. Measurement on March 22, 1901, gave a discharge of 0.984 second-foot.

No. 13.—Spratt (Sauvé), sec. 8, T. 12, R. 20. Weir measurement made March 22, 1901, gave discharge of 0.475 second-foot.

There is said to be 65 feet of sandstone below the first flow. The well was closed September 15, 1900, to be opened April 1, 1901.

No. 14.—Steinweg No. 1, SE. ¼ SE. ¼ sec. 10, T. 12, R. 20. A weir measurement on July 21, 1899, gave a discharge of 0.312 second-foot.

The well has ceased to flow and is abandoned.

No. 15.—Steinweg No. 2, sec. 10, T. 12, R. 20. A weir measurement, July 21, 1899, gave a discharge of 0.104 second-foot.

The well has ceased to flow and is abandoned. (Water rises to within 2 feet of the surface.)

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[a] As reported by Sydney Arnold, April 18, 1901. (See also Water-Supply Paper No. 55 on the Geology and Water Resources of Yakima County, Wash., by George Otis Smith.)

No. 16.—Steinweg No. 3, sec. 10, T. 12, R. 20. A weir measurement, July 21, 1899, gave a discharge of 0.1312 second-foot.

The well is now abandoned, having ceased to flow.

No. 17.—Yakima Land Company, sec. 14, T. 12, R. 20. No flow; well is abandoned. Seventy-five feet of the bore is in rock.

No. 18.—Ellens, SW. ¼ SE. ¼ sec. 5, T. 12, R. 20. Discharge, August, 1898, by weir measurement, 1.9 second-feet; March 26, 1891, approximate measurement by current meter, 2 second-feet. This is the largest in the valley. The well was closed down during the winter of 1900–1901.

No. 19.—Regimbau, SW. ¼ SE. ¼ sec. 5, T. 12, R. 20. Approximate measurement, with Price current meter, April 10, 1901, gave a discharge of 1.09 second-feet.

No. 20.—Buwalda, NE. ¼ SW. ¼ sec. 32, T. 13, R. 20. A weir measurement on March 3, 1899, gave a discharge of 0.8 second-foot; and on April 10, 1901, a discharge of 0.05 second-foot. The water has fallen below surface level, but is raised to an elevation of 20 feet by a small centrifugal pump and 6-horsepower gasoline engine.

No. 21.—Clarke's No. 4, NW. ¼ SE. ¼ sec. 31, T. 13, R. 20. A weir measurement on April 10, 1901, gave a discharge of 0.197 second-foot.

No. 22.—Alwardt, SE. ¼ SW. ¼ sec. 9, T. 12, R. 20. Weir measurement, March 21, 1890, gave a discharge of 0.64 second-foot.

No. 23.—Talent, H. H., NW. ¼ SW. ¼ sec. 5, T. 12, R. 20. Measurement made March 26, 1891, gave a discharge of 0.35 second-foot.

No. 24.—Clarke's No. 5, NE. ¼ sec. 31, T. 13, R. 20. No flow. Abandoned. Lost drill.

No. 25.—Conrad, sec. 5, T. 12, R. 20. Commenced December 20, 1900. In progress. Depth, 347 feet, March, 1891.

No. 26.—Longevin, sec. 8, T. 12, R. 20. Weir measurement, April 10, 1901, showed a discharge of 0.807 second-foot.

No. 27.—Buwalda No. 2, NW. ¼ NW. ¼ sec. 5, T. 12, R. 20. Measurement, April 10, 1901, with Price current meter, gave an approximate discharge of 0.566 second-foot.

No. 28.—Peck, J. W., NW. ¼ NE. ¼ sec. 6, T. 12, R. 20. Measurement with current meter on April 11, 1901, gave an approximate discharge of 1.10 second-feet.

No. 29.—Ryan, Robert, SW. ¼ SW. ¼ sec. 10, T. 12, R. 20. A weir measurement on March 21, 1891, gave a discharge of 0.485 second-foot.

No. 30.—Patterson, NW. ¼ SW. ¼ sec. 8, T. 12, R. 20. Commenced January 12, 1901. In progress. Depth, 640 feet March 21, 1901.

No. 31.—Gano, NE. ¼ SW. ¼ sec. 30, T. 13, R. 20. Measurement, March 29, 1891, gave a discharge of 632 second-feet.

No. 32.—Ellens, SE. ¼ NE. ¼ sec. 8, T. 12, R. 20. Depth, 676 feet. Some water. Well abandoned.

No. 33.—Hill, SW. ¼ SW. ¼ sec. 4, T. 12, R. 20. A trifling flow.

Wide Hollow.—Wilson, SW. ¼ SE. ¼ sec. 29, T. 13, R. 18. Discharge estimated at 0.75 second-foot. Well closed during winter of 1900–1901. Still closed.

Mabton.—Terrill and Hoover, SE. ¼ SE. ¼ sec. 7, T. 8, R. 23. Abandoned.

Sunnyside.—Turner, NE. ¼ NW. ¼ sec. 8, T. 10, R. 23. Abandoned.

Selah Valley.—Parker, sec. 23, T. 14, R. 20. Work temporarily discontinued.

Wenas Valley.—Arlington and Stoffer. Abandoned.

Warm Springs (10 miles east of Ellensburg).—John P. Clerf. Work in progress.

PALOUSE RIVER.

Estimated monthly discharge of Palouse River near Hooper, Wash.

[Drainage area, 2,210 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	3,770	320	1,082	66,530	0.490	0.565
February	4,892	166	1,526	84,750	.690	.719
March	4,859	735	2,097	128,939	.949	1.094
April	1,328	446	861	51,233	.390	.435
May	410	166	248	15,249	.112	.129
June	484	100	176	10,473	.080	.089
July	131	16	73	4,489	.033	.038
August	16	2	9	553	.004	.005
September	10	2	7	417	.003	.003
October	10	7	8	492	.004	.005
November	86	10	23	1,369	.010	.011
December	347	19	74	4,550	.033	.038
The year	4,892	2	515	369,044	.233	3.131

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 137; rating table on page 177 of same paper.

UMATILLA RIVER.

Estimated monthly discharge of Umatilla River at Gibbon, Oreg.

[Drainage area, 353 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,735	334	811	49,866	2.30	2.65
February	4,155	264	1,201	66,700	3.40	3.54
March	3,556	1,114	1,655	101,762	4.69	5.41
April	2,017	1,081	1,472	87,590	4.17	4.65
May	1,884	544	1,266	77,843	3.59	4.14
June	498	249	350	20,826	.99	1.10
July	233	124	181	11,129	.51	.59
August	124	88	98	6,026	.28	.32
September	159	88	125	7,438	.35	.39
October	188	159	166	10,207	.47	.54
November	203	172	181	10,771	.51	.57
December	617	203	398	24,472	1.13	1.30
The year	4,155	88	659	474,630	1.87	25.20

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 137; rating table on page 177 of same paper.

NORTHERN PACIFIC COAST DRAINAGE.

The measurement of four streams in that part of the State of Washington located between Puget Sound and the Pacific Ocean and known as the Olympic Peninsula has been continued during the year. The streams measured are Dungeness, Elwha, Kalawa, and Soleduck rivers, all of which head in the Olympic Mountains, the first two flowing northwardly into the Strait of San Juan de Fuca, and the last two flowing westwardly into the Pacific Ocean. The work of stream gaging at these stations was brought to a close at the end of 1901, several years' records having been obtained which give a fair indication of the regimen of these streams, and for the further reason that owing to the turbulent character of the streams much difficulty has been experienced in making accurate measurements.

The station on White River, at Buckley, Wash., was also maintained during 1901. This stream rises in central Washington and flows into Admiralty Sound.

ELWHA RIVER.

Estimated monthly discharge of Elwha River at McDonald, Wash.

[Drainage area, 188 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	11,440	985	1,935	118,978	10.29	11.86
February	11,212	645	1,807	100,354	9.61	10.01
March	7,000	685	1,561	95,982	8.30	9.57
April	1,300	625	957	56,944	5.09	5.68
May	8,053	1.071	2,445	150,337	13.00	14.99
June	5,947	1.226	2,380	141,620	12.66	14.13
July	2,100	1,340	1,641	100,901	8.73	10.06
August	1,420	873	1,173	72,125	6.24	7.20
September	929	605	690	41,059	3.67	4.10
October	1,900	460	664	40,838	3.53	4.07
November	23,848	795	4,036	240,159	21.47	23.95
December	7,468	1,071	2,306	141,790	12.26	14.14
The year	23,848	460	1,800	1,301,087	9.57	129.76

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 139; rating table on page 177 of same paper.

KALAWA RIVER.

Estimated monthly discharge of Kalawa River near Forks, Wash.

[Drainage area, 213 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	11,710	314	1,723	105,943	8.09	9.33
February	5,212	300	1,151	65,034	5.40	5.62
March	5,212	620	1,372	84,361	6.44	7.42
April	2,438	566	997	59,325	4.68	5.22
May	5,022	314	949	58,352	4.46	5.14
June	909	314	478	28,443	2.24	2.50
July	300	147	180	11,067	.84	.97
August	158	0	48	2,951	.23	.27
September	170	0	41	2,440	.19	.21
October	2,704	0	199	12,236	.93	1.07
November	8,708	762	2,449	145,726	11.50	12.83
December	6,542	566	2,086	128,263	9.79	11.29
The year	11,710	0	973	704,141	4.57	61.87

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 140; rating table on page 177 of same paper.

SOLEDUCK RIVER.

Estimated monthly discharge of Soleduck River near Quillayute, Wash.

[Drainage area, 272 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	11,365	1,180	3,089	189,935	11.36	13.10
February	8,125	730	2,071	115,017	7.61	7.92
March	8,665	1,060	2,116	130,108	7.78	8.97
April	4,075	1,263	2,146	125,911	7.89	8.80
May	4,750	986	1,810	111,293	6.65	7.67
June	2,185	861	1,262	75,094	4.64	5.27
July	833	530	671	41,258	2.47	2.85
August	506	276	374	23,006	1.38	1.59
September	276	201	236	14,043	.87	.97
October	3,535	155	368	22,527	1.35	1.56
November	12,715	1,915	4,286	255,035	15.76	17.59
December	8,800	1,180	3,587	220,556	13.19	15.21
The year	12,715	155	1,835	1,323,783	6.75	91.50

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 141; rating table on page 177 of same paper.

SAN FRANCISCO BAY DRAINAGE.

Sacramento River, rising in northern California and flowing south, and the San Joaquin, rising in the southern sierras and flowing northeast, drain the western slope of the Sierra Nevada, traverse what is often called the Valley of California, and meet near Suisun Bay, finally discharging their waters into the Pacific Ocean through San Francisco Bay. Systematic measurements of discharge were made during 1901 of Sacramento River at Jellys Ferry, and of two of its tributaries, Stony Creek at Julian's ranch, near Fruto, and Cache Creek near the town of Lower Lake.

Stations were maintained during 1901 in the San Joaquin River drainage as follows: On Mokelumne River at Electra, on Stanislaus River near Oakdale, on Tuolumne River at Lagrange and at several points on its headwaters, on Merced River above Merced Falls, on San Joaquin River at Herndon, on King River near Red Mountain and near Kingsburg. Stations were maintained also on Tule River near Portersville and on Kern River at first point of measurement, near Bakersfield, both these streams belonging strictly to the above drainage.

SACRAMENTO RIVER.

Estimated monthly discharge of Sacramento River at Jellys Ferry, Cal.

[Drainage area, 9,134 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	74,240	8,915	20,983	1,290,194	2.30	2.66
February	101,880	9,800	34,138	1,895,928	3.74	3.89
March	46,100	12,200	20,628	1,268,366	2.26	2.61
April	16,700	9,200	10,870	646,810	1.19	1.33
May	13,700	7,530	9,804	602,824	1.07	1.23
June	7,265	4,965	5,596	332,985	.61	.68
July	4,760	3,980	4,365	268,393	.48	.55
August	3,980	3,805	3,850	236,727	.42	.48
September	5,380	3,630	3,922	233,375	.43	.48
October	5,380	3,980	4,194	257,879	.46	.53
November	44,100	4,360	7,745	460,859	.85	.94
December	61,800	5,380	12,149	747,013	1.33	1.53
The year	101,880	3,630	11,520	8,241,353	1.26	16.91

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 143; rating table on page 177 of same paper.

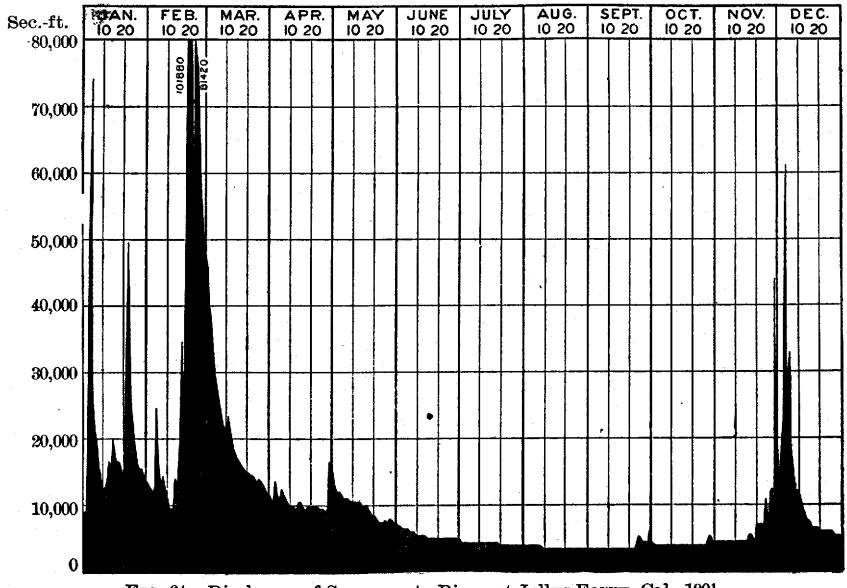

FIG. 64.—Discharge of Sacramento River at Jellys Ferry, Cal., 1901.

Estimated monthly discharge of Stony Creek near Fruto, Cal.

[Drainage area, 760 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January						
February	10,385	725	2,707	150,339	3.56	3.71
March	2,215	435	893	54,908	1.18	1.36
April	630	225	361	21,481	.48	.54
May	555	225	349	21,459	.46	.53
June	195	5	66	3,927	.09	.10
July	15	0	7	430	.01	.01
August	10	2	4	246	.01	.01
September	725	5	85	2,083	.05	.06
October	340	0	130	7,993	.17	.20
November	1,125	35	161	9,580	.21	.23
December	3,875	77	425	26,132	.56	.64
The year	10,385	0	428	298,578	.57	7.39

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 143; rating table on page 178 of same paper.

Estimated monthly discharge of Cache Creek near Lower Lake, California.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,020	155	535	32,896	1.07	1.23
February	2,520	615	909	50,483	1.82	1.89
March	1,330	805	1,079	66,345	2.16	2.49
April	805	530	654	38,916	1.31	1.46
May	570	380	481	29,576	.96	1.10
June	415	255	327	19,458	.65	.72
July	255	155	199	12,236	.40	.46
August	155	86	114	7,010	.23	.26
September	86	40	55	3,273	.11	.12
October	50	16	31	1,906	.06	.07
November	62	16	26	1,547	.05	.06
December	74	40	62	3,812	.12	.14
The year	2,520	16	373	267,458	.75	10.00

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 144; rating table on page 178 of same paper.

MOKELUMNE RIVER.

Estimated monthly discharge of Mokelumne River at Electra, Cal.

[Drainage area, 537 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	4,600	330	1,000	61,488	1.86	2.14
February	13,210	610	3,302	183,384	6.15	6.42
March	4,020	1,130	2,004	123,221	3.73	4.30
April	3,160	950	2,040	121,388	3.80	4.24
May	9,980	1,960	4,627	284,503	8.62	9.93
June	6,790	1,350	3,833	228,145	7.14	7.97
July	------	------	[a] 260	[a] 15,987	[a] .49	[a] .56
August	------	------	[a] 190	[a] 11,683	[a] .36	[a] .42
September	------	------	[a] 60	[a] 3,570	[a] .11	[a] .12
October	------	------	[a] 76	[a] 4,673	[a] .14	[a] .16
November	------	------	[a] 210	[a] 12,496	[a] .39	[a] .44
December	------	------	[a] 1,467	[a] 45,467	[a] 2.73	[a] 3.15
The year	------	------	[a] 1,589	[a] 1,096,005	[a] 2.96	[a] 39.85

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 145; rating table on page 178 of same paper.

SAN JOAQUIN RIVER.

Estimated monthly discharge of Tuolumne River at Hetch Hetchy Valley dam site, California.

[Drainage area, 400 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
June	7,620	1,550	3,476	206,836	8.69	9.70
July	3,650	1,200	2,159	132,752	5.40	6.21
August	1,122	127	427	26,255	1.07	1.23
September	147	86	109	6,486	.27	.30

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 147.

Estimated monthly discharge of Eleanor Creek at Eleanor Trail Crossing, California.

[Drainage area, 81 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
June	1,834	374	824	49,031	10.10	11.35
July	510	138	275	16,909	3.40	3.92
August	122	18	52	3,197	.64	.74
September	18	5	8	476	.01	.01

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 147.

Estimated monthly discharge of Cherry River at Eleanor Trail Crossing, California.

[Drainage area, 130 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
June	[a] 1,950	750	1,202	71,525	9.25	10.32
July	1,630	218	653	40,145	5.02	5.78
August	206	17	93	5,718	.72	.83
September	145	4	32	1,904	.25	.28

[a] Approximate.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 148.

Estimated monthly discharge of Tuolumne River at Lagrange, Cal.

[Drainage area, 1,501 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	18,280	560	3,351	206,145	2.23	2.58
February	19,240	1,440	7,203	400,090	4.80	5.00
March	7,080	2,080	3,719	228,733	2.48	2.86
April	7,080	1,740	3,960	235,696	2.64	2.94
May	13,160	4,075	8,035	494,114	5.36	6.18
June	13,160	4,900	9,387	558,566	6.26	6.98
July	9,960	1,440	3,700	227,566	2.47	2.85
August	2,080	200	784	48,206	.52	.60
September	350	55	175	10,413	.12	.13
October	1,590	0	211	12,974	.14	.16
November	1,300	300	574	34,155	.38	.43
December	5,800	200	1,339	82,332	.89	1.02
The year	19,240	0	3,537	2,538,990	2.36	31.73

Mining Company's canal flows 10 second-feet continuously from January 1 to March 31, 1901, and 7 second-feet continuously from April 1 to July 28, 1901.

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 149; rating table on page 178 of same paper.

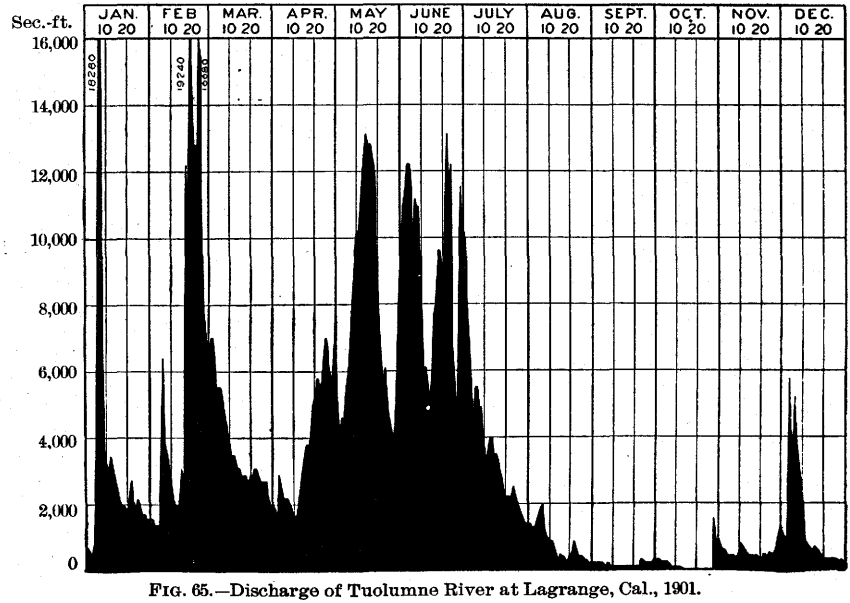

FIG. 65.—Discharge of Tuolumne River at Lagrange, Cal., 1901.

Estimated monthly discharge of Merced River above Merced Falls, Cal.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	5,000	1,090	2,687	133,240	1.55	1.44
May	9,450	2,700	5,419	333,201	4.97	5.73
June	8,220	3,380	5,390	320,678	4.94	5.50
July	4,560	1,090	2,096	128,878	1.92	2.21
August	2,090	220	704	43,287	.65	.75
September	250	130	183	10,889	.17	.19
October	990	150	265	16,294	.24	.28
November	730	0	399	23,742	.37	.41
December	2,090	220	577	35,478	.53	.61

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 150; rating table on page 178 of same paper.

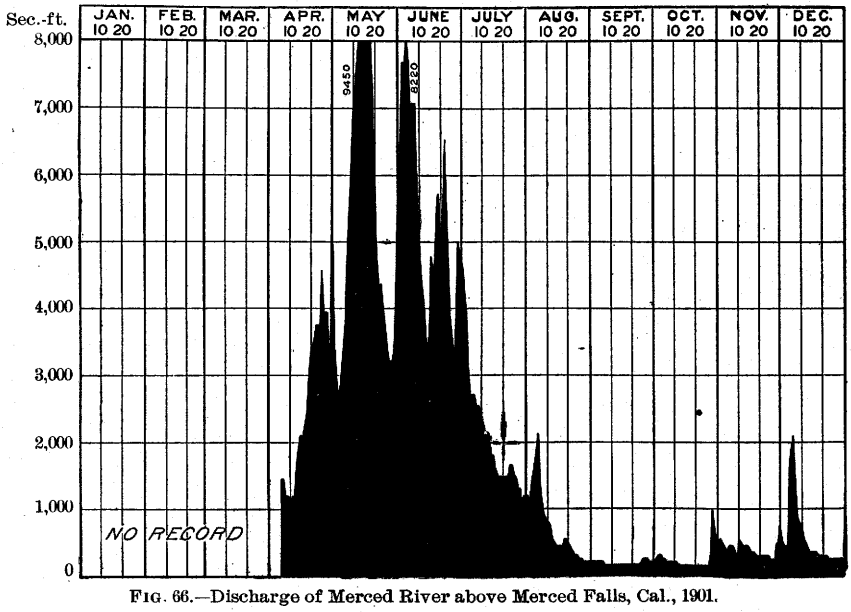

FIG. 66.—Discharge of Merced River above Merced Falls, Cal., 1901.

Estimated monthly discharge of San Joaquin River at Herndon, Cal.

[Drainage area, 1,637 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	21,372	810	3,506	215,576	2.14	2.47
February	12,940	1,550	4,983	276,742	3.04	3.17
March	6,830	2,480	4,191	257,695	2.56	2.95
April	12,400	1,930	4,680	278,479	2.86	3.18
May	17,870	4,775	10,935	672,367	6.68	7.71
June	15,662	7,882	11,998	713,930	7.33	8.17
July	14,294	3,110	3,466	213,116	2.12	2.45
August	5,850	500	2,373	145,910	1.45	1.67
September	500	360	399	23,742	.24	.27
October	2,480	340	489	30,067	.30	.35
November	1,550	500	702	41,772	.43	.48
December	2,060	460	872	53,617	.53	.61
The year	21,372	340	4,050	2,923,013	2.47	33.48

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 151; rating table on page 178 of same paper.

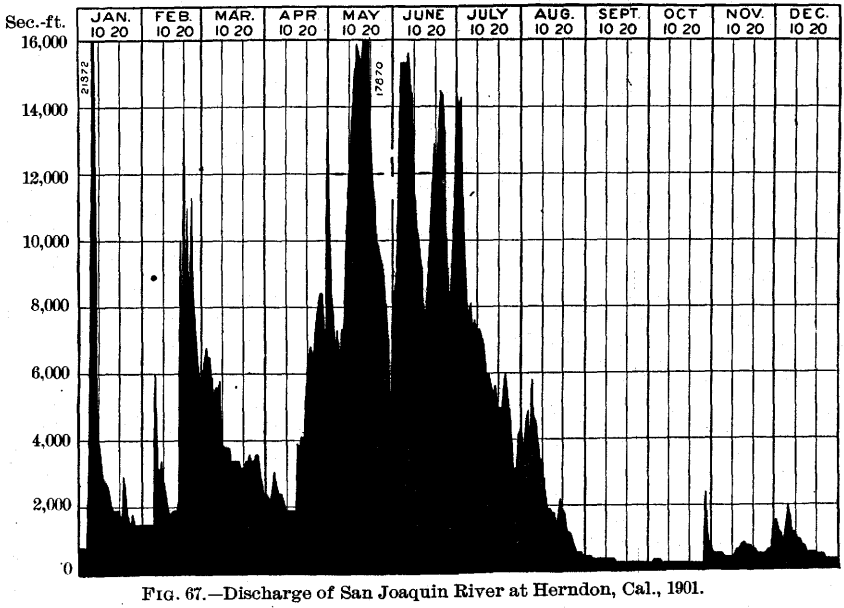

FIG. 67.—Discharge of San Joaquin River at Herndon, Cal., 1901.

Estimated monthly discharge of King River near Red Mountain, California.

[Drainage area, 1,742 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	43,930	520	4,337	266,672	2.49	2.87
February	7,040	1,040	3,318	190,392	1.90	2.00
March	4,490	2,034	2,965	182,311	1.70	1.96
April	10,840	1,642	4,492	267,293	2.58	2.87
May	21,830	5,548	11,093	682,082	6.37	7.36
June	21,180	7,040	14,363	854,658	8.25	9.20
July	13,240	3,280	6,258	384,789	3.59	4.14
August	6,260	728	2,292	140,930	1.32	1.52
September	780	440	534	31,775	.31	.35
October	2,034	360	535	32,896	.31	.36
November	1,450	480	694	41,296	.40	.45
December	1,170	440	667	41,073	.38	.44
The year	43,930	360	4,296	3,116,167	2.47	33.52

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 152; rating table on page 178 of same paper.

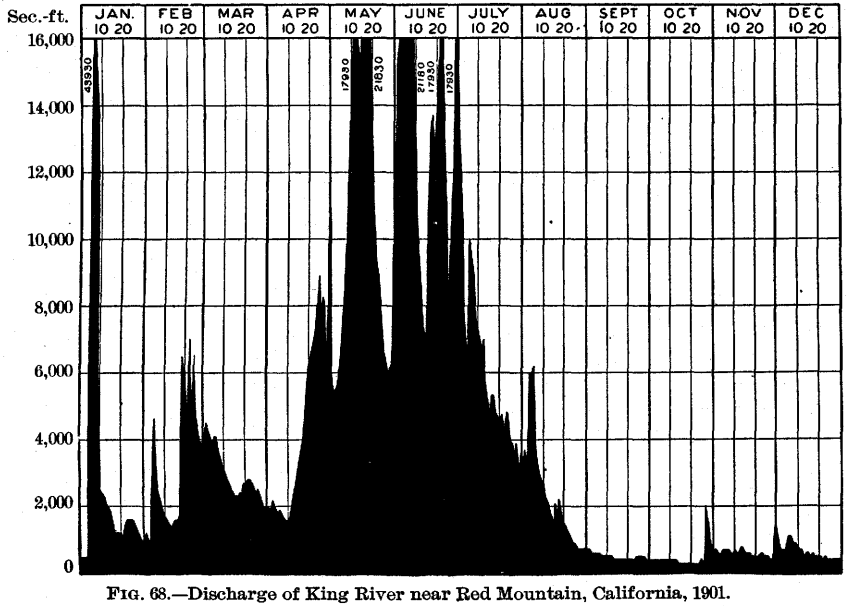

FIG. 68.—Discharge of King River near Red Mountain, California, 1901.

TULE RIVER.

Estimated monthly discharge of Tule River near Portersville, Cal.

[Drainage area, 437 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	875	298	418	25,702	0.96	1.10
June	408	126	240	14,281	.55	.61
July	126	30	61	3,751	.14	.16
August	30	18	19	1,168	.04	.04
September	23	10	17	1,012	.04	.04
October	109	18	29	1,783	.07	.08
November	71	35	43	2,559	.10	.11
December	64	39	50	3,074	.11	.13

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 157; rating table on page 178 of same paper.

KERN RIVER.

Estimated monthly discharge of Kern River near Bakersfield, Cal.

[Drainage area, 2,345 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,049	226	493	30,313	0.21	0.24
February	1,963	342	860	47,762	.37	.39
March	1,658	901	1,270	78,089	.54	.62
April	2,632	637	1,398	83,187	.60	.67
May	4,295	2,091	3,032	186,430	1.29	1.49
June	4,212	2,455	3,324	197,792	1.42	1.58
July	3,856	1,120	1,864	114,613	.80	.92
August	1,804	505	968	59,520	.41	.47
September	526	249	345	20,529	.15	.17
October	756	259	317	19,492	.14	.16
November	421	343	377	22,433	.16	.18
December	457	268	323	19,860	.14	.16
The year	4,295	226	1,216	880,020	.52	7.05

NOTE.—Daily discharge for 1901 is given in Water-Supply Paper No. 66, page 159.

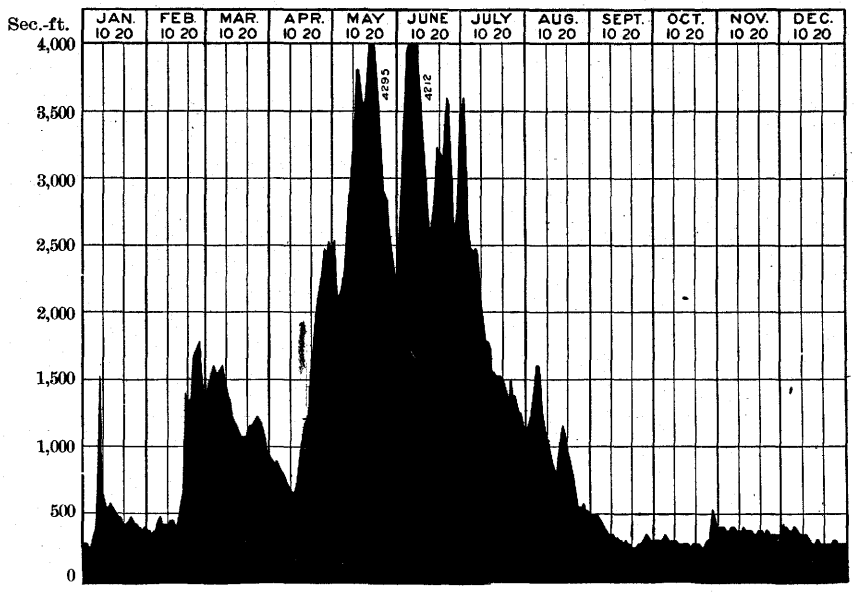

FIG. 69.—Discharge of Kern River near Bakersfield, Cal., 1901.

SOUTHERN CALIFORNIA DRAINAGE.

Under this head have been grouped all of the streams of southern California which do not drain directly or indirectly into San Francisco Bay. The measurements made on Salinas River and tributaries were brought to a close during 1901, the object for which the stations had been established, that is, furnishing the necessary data for computing the water supply available for the reservoir sites surveyed in the Salinas basin, having been accomplished. Measurements were continued on Mohave River at Victorville, on Santa Ana River below Warmsprings, and on San Gabriel River near Azusa. Records were also obtained of the flow of Lytle Creek, and of Mill Creek at Crafton headworks. Results for 1901 are given in the following pages.

SALINAS RIVER.

Estimated monthly discharge of Nacimiento Creek near Bryson, Cal.

[Drainage area, 171 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
March	365	110	184	11,314	1.08	1.25
April	670	87	99	5,891	.58	.64

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 154.

Estimated monthly discharge of San Antonio Creek near Jolon, Cal.

[Drainage area, 161 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	3,700	64	523	32,158	3.25	3.75
February	1,700	110	509	28,268	3.17	3.30
March	400	84	171	10,514	1.06	1.22
April	740	39	83	4,939	.52	.58

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 154; rating table on page 178 of same paper.

Estimated monthly discharge of San Lorenzo Creek near King City, Cal.

[Drainage area, 235 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	2,540	9	171	10,514	0.73	0.84
February	9,200	9	725	40,264	3.09	3.21
March	27	9	17	1,045	.07	.08
April	27	6	8	476	.03	.03

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 155; rating table on page 178 of same paper.

Estimated monthly discharge of Arroyo Seco near Piney, Cal.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	4,500	105	888	54,601	4.13	4.77
February	2,860	160	931	51,705	4.33	4.51
March	610	105	246	15,126	1.14	1.31
April	2,500	95	195	11,603	.91	.91

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 156; rating table on page 178 of same paper.

Estimated monthly discharge of Salinas River near Salinas, Cal.

[Drainage area, 4,084 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	35,162	380	4,921	302,580	1.20	1.38
February	20,927	540	4,131	231,701	1.01	1.05
March	1,772	430	1,063	65,361	.26	.30
April	405	160	270	16,066	.07	.08
May	2,012	160	533	32,773	.13	.15
June	160	30	56	3,332	.01	.01
July	30	25	27	1,660	.01	.01

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 156; rating table on page 178 of same paper.

MOHAVE RIVER.

Estimated monthly discharge of Mohave River at Victorville, Cal.

[Drainage area, 400 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
January	44	44	44	2,705	0.11	0.13
February	60	44	49	2,721	.12	.12
March	80	44	57	3,505	.14	.16
April	44	33	35	2,083	.09	.10
May	33	33	33	2,029	.08	.09
June	33	25	30	1,785	.08	.09
July	29	25	26	1,599	.06	.07
August	29	29	29	1,783	.07	.08
September	29	29	29	1,726	.07	.08
October	33	29	32	1,968	.08	.09
November	3,200	33	139	8,271	.35	.39
December	33	33	33	2,029	.08	.09
The year	3,200	25	45	32,204	.11	1.49
1901.						
January	4,180	50	183	11,252	.46	.53
February	4,820	50	925	51,372	2.31	2.41
March	660	50	178	10,945	.45	.52

Estimated monthly discharge of Mohave River at Victorville, Cal.—Continued.

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
April	44	44	44	2,618	.11	.12
May	49	49	49	3,013	.12	.14
June	42	42	42	2,499	.11	.12
July	40	40	40	2,460	.10	.12
August	50	50	50	3,074	.13	.15
September	55	55	55	3,273	.14	.16
October	69	69	69	4,243	.17	.20
November	77	77	77	4,582	.19	.21
December	73	73	73	4,489	.18	.21
The year	4,820	40	.149	103,820	.37	4.89

NOTE.—Gage heights and discharge measurements for 1901 are given in Water-Supply Paper No. 66, page 160.

SAN GABRIEL RIVER.

Estimated monthly discharge of San Gabriel River and canals above Azusa, Cal.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1900.						
January	89	22	32	1,968	0.14	0.16
February	23	18	20	1,111	.09	.09
March	30	16	20	1,230	.09	.10
April	26	13	17	1,012	.08	.09
May	86	16	37	2,275	.17	.20
June	22	8	15	893	.07	.08
July	10	4	6	369	.03	.03
August	5	4	4	246	.02	.02
September	6	3	4	238	.02	.02
October	6	4	5	307	.02	.02
November	.....	.....	[a] 186	11,068	.84	.93
December	.....	.....	[a] 40	1,269	.18	.11
The year	.....	.....	[a] 32	21,986	.15	1.85

[a] Approximate.

IRRIGATING A FIELD OF SUGAR BEETS IN PECOS VALLEY, NEW MEXICO.

Estimated monthly discharge of San Gabriel River and canals near Azusa, Cal.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	1,450	28	169	10,391	0.76	0.87
February	2,605	137	680	37,765	3.06	3.19
March	440	135	221	13,589	1.00	1.15
April	130	95	110	6,545	.50	.56
May	272	83	121	7,440	.55	.63
June	93	41	63	3,749	.28	.31
July	41	24	30	1,845	.14	.16
August	27	15	20	1,240	.09	.10
September	20	15	17	1,012	.08	.09
October	122	0	24	1,476	.11	.13
November	50	29	32	1,904	.14	.16
December	30	26	27	1,660	.12	.14
The year	2,605	0	126	88,606	.57	7.49

NOTE.—Gage heights of San Gabriel River for 1901 are given in Water-Supply Paper No. 66, page 161; daily discharge of canals on page 162 of same paper.

LYTLE CREEK.

Estimated monthly discharge of Lytle Creek at head gates Rialto canals, California.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
May	21.7	12.1	15.8	971	0.30	0.35
June	15.2	10.5	12.6	750	.24	.27
July 1–23	------	------	10.0	456	.19	.16
August	11.3	9.7	10.4	639	.20	.23
September	11.5	8.7	9.8	583	.19	.21
October 1–25 and 29–31	------	------	12.7	705	.24	.25

SANTA ANA RIVER.

Estimated monthly discharge of Santa Ana River and canals near Warm-springs, Cal.

[Drainage area, 188 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
January	600	31	78	4,796	0.41	0.47
February	540	48	194	10,774	1.03	1.07
March	114	45	68	4,181	.36	.41
April	107	39	43	2,559	.23	.26
May	68	35	42	2,582	.22	.25
June	44	30	37	2,202	.20	.22
July	42	34	38	2,337	.20	.23
August	200	31	50	3,074	.27	.31
September	60	42	49	2,916	.26	.29
October	96	24	48	2,951	.26	.30
November	36	22	26	1,547	.14	.16
December	25	21	24	1,476	.13	.15
The year	600	21	58	41,395	.31	4.12

NOTE.—Daily discharge of river and canals for 1901 is given in Water-Supply Paper No. 66, pages 164–165.

MILL CREEK.

Estimated monthly discharge of Mill Creek canals at Crafton head works, California.

[Drainage area, 47 square miles.]

Month.	Discharge in second-feet.			Total in acre-feet.	Run-off.	
	Maximum.	Minimum.	Mean.		Second-feet per square mile.	Depth in inches.
1901.						
July	19.12	13.94	15.86	975	0.34	0.39
August	------	------	[a] 19.07	867	.41	[a].35
September	16.58	11.42	14.04	833	.30	.33
October	13.18	12.30	12.58	774	.27	.31
November	12.30	11.60	12.28	732	.26	.29
December	12.28	10.26	12.00	738	.26	.30

[a] Partial month.

NOTE.—Daily discharge in second-feet for 1901 is given in Water-Supply Paper No. 66, page 166.

RELATION OF RAINFALL TO RUN-OFF IN CALIFORNIA.

A study of the available rainfall and run-off data for California watersheds has been undertaken, and the accompanying diagrams and tables are here presented as the results of the work.

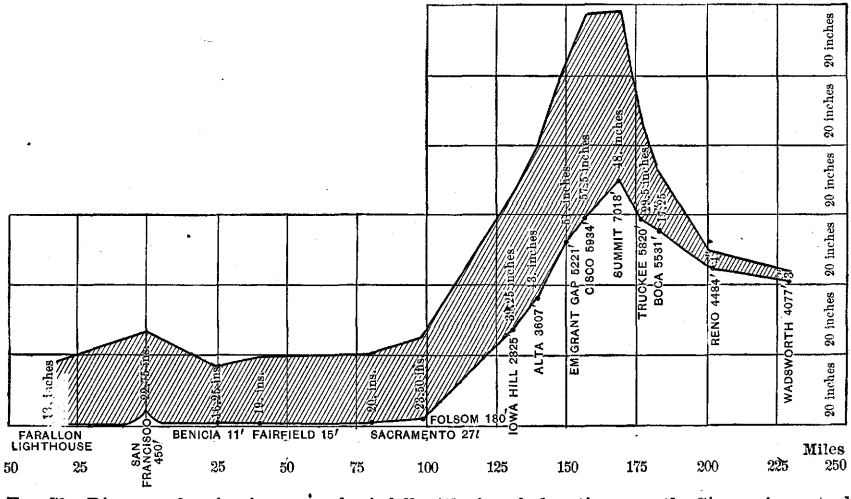

FIG. 70.—Diagram showing increase of rainfall with rise of elevation over the Sierras in central California.

As the run-off diagram was to be used in estimating the water supply available for various storage reservoirs for irrigation, it was thought best to represent the run-off in acre-feet per square mile. The majority of the discharge reports give the depth of run-off in inches. The accompanying table has been made for converting depth of run-off in inches to run-off in acre-feet per square mile, using the following formula: Depth of run-off in inches, x (0.0833 x 640)= run-off in acre-feet per square mile.

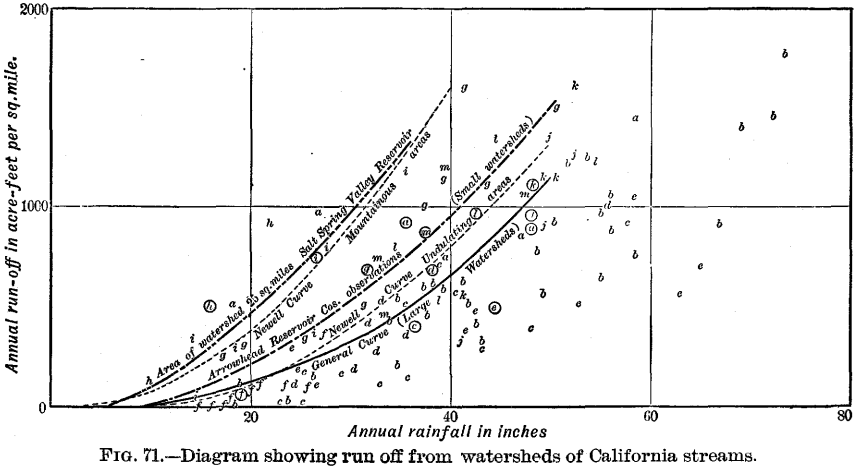

FIG. 71.—Diagram showing run off from watersheds of California streams.

Table for converting depth of run-off in inches into acre-feet per square mile.

Depth of run-off.	Acre-feet per square mile.	Depth of run-off.	Acre-feet per square mile.	Depth of run-off.	Acre-feet per square mile.
Inches.		*Inches.*		*Inches.*	
0.01	0.533	0.35	18.667	0.69	36.800
.02	1.067	.36	19.200	.70	37.333
.03	1.600	.37	19.733	.71	37.867
.04	2.133	.38	20.267	.72	38.400
.05	2.667	.39	20.800	.73	38.933
.06	3.200	.40	21.333	.74	39.467
.07	3.733	.41	21.867	.75	40.000
.08	4.267	.42	22.400	.76	40.533
.09	4.800	.43	22.933	77	41.067
.10	5.333	.44	23.467	.78	41.600
.11	5.867	.45	24.000	.79	42.133
.12	6.400	.46	24.533	.80	42.667
.13	6.933	.47	25.067	.81	43.200
.14	7.467	.48	25.600	.82	43.733
.15	8.000	.49	26.133	.83	44.267
.16	8.533	.50	26.667	.84	44.800
.17	9.067	.51	27.200	.85	45.333
.18	9.600	.52	27.733	.86	45.867
.19	10.133	.53	28.267	.87	46.400
.20	10.667	.54	28.800	.88	46.933
.21	11.200	.55	29.333	.89	47.467
.22	11.733	.56	29.867	.90	48.000
.23	12.267	.57	30.400	.91	48.533
.24	12.800	.58	30.933	.92	49.067
.25	13.333	.59	31.467	.93	49.600
.26	13.867	.60	32.000	.94	50.133
.27	14.400	.61	32.533	.95	50.667
.28	14.933	.62	33.067	.95	51.200
.29	15.467	.63	33.600	.97	51.733
.30	16.000	.64	34.133	.98	52.267
.31	16.533	.65	34.667	.99	52.800
.32	17.067	.66	35.200	1.00	53.333
.33	17.600	.67	35.733		
.34	18.133	.68	36.267		

At the outset many difficulties began to present themselves. The most serious one was that of obtaining measurements of rainfall at the higher elevations. The streams most productive of run-off, and upon which discharge records had been kept, have their sources on the western slopes of the high Sierra Nevada Mountains, where there

are few or no inhabitants above 7,000 feet, and consequently no observers of rainfall, but the valuable rainfall records of the Pacific Railway system along the line of railway from Sacramento to the summit of the Sierra Nevada at Railroad Pass offered a clew to the solution of this difficulty. In fig. 70 the mean rainfall and the elevation of the station are plotted as ordinates and the distance inland of the station as abscissas.

The rate of increase of precipitation from Sacramento to Cisco, at the elevation of 6,000 feet, the point of maximum rainfall, seems to be 0.6 inch per 100 feet of rise. The precipitation above the 6,000-foot point decreases with the elevation approximately at the rate of 0.4 inch per 100 feet of rise.

Fortunately in the Tuolumne River Basin, about midway between the American and King River basins, there is another series of rainfall stations, beginning with Lagrange, elevation 293 feet above sea level; Sonora, elevation 1,824 feet; Second Garrote, elevation 2,900 feet, and Crockers, elevation 4,453 feet. The mean rainfall at these stations, plotted as in the above diagram, indicates the rate of increase from Lagrange to Crockers to be 0.84 inch per 100 feet rise. This rate of increase has been taken to hold good up to an elevation of 6,000 feet, and above this the rate of decrease of rise to be 0.4 inch per 100 feet to an elevation of 9,000 feet. Probably the rate of increase and decrease would be more correctly represented by a curved line, but the data are not sufficient to warrant this.

Using these rates of increase and decrease, the mean precipitation for the years 1896–1899 at an elevation of 9,000 feet in the Tuolumne River Basin would be 49.8 inches. If snow converts into water at the ratio of 8 to 1, the snowfall would be 33.2 feet at this elevation.

It was found impossible to use the run-off data of the Kern River Basin, though it is without doubt the most closely watched stream in the State, because of the exposure of the watershed and because of the scarcity of rainfall data. This watershed is bounded on the west for almost its entire length by a high mountain range. Concerning the precipitation on the east slope of this range there is little known beyond the fact that it is very much less than on the western slope.

In 1896 the total run-off from the King River Basin of 1,775 square miles was 1,871,005 acre-feet. For the same year the run-off from the Kern River Basin was 619,630 acre-feet. The ratio of the area of the King River Basin to the Kern is 1 to 1.32, the ratio of run-off 1 to 0.33, though the higher drainage areas of the streams are contiguous. It was also thought best not to use the run-off and rainfall data for Piru Creek Basin, furnished by the Antelope Valley Water Company, because the ratio of discharge in acre-feet per square mile was greater than any other record. There is little doubt about the accuracy of both the run-off and precipitation records, the explanation being that the rainfall observation stations were necessarily situated at so low an

elevation that the record did not represent the mean rainfall for the higher portions of the basin.

The run-off and rainfall data of the streams which were used to make the discharge diagram, fig. 71, will be mentioned in the order from north to south in which their watersheds occur.

Sacramento River Basin.—The rainfall stations used in determining the mean annual precipitation for the Sacramento River Basin were the following: Red Bluff, Rosewood, Redding, Delta, Dunsmuir, Shasta, Sissons, and Fort Bidwell.

There were absolutely no records for the great interior mountainous and lava country in Siskiyou, Modoc, and Lassen counties, comprising more than 5,334 square miles of the watershed.

Fort Bidwell is situated outside of the watershed, on the eastern slope of the mountains that form the boundary, and would probably have a less rainfall than Modoc County. The record was kept there for a period of twenty-two years, and the mean rainfall is 20.8 inches.

The average rainfall at Red Bluff for a period of twenty-three years was 23.9 inches; at Rosewood, for a period of six years, 25.63; at Redding, for twenty-four years, 35.69. The precipitation at these three latter stations was taken to get the average for the Sacramento Valley for the years 1896–1899, during which time run-off measurements have been made at Jellys Ferry. The mean rainfall of the Pitt River drainage area of 5,334 square miles, which has an average elevation of 5,000 feet, was taken to be the same as that of the Sacramento Basin above Red Bluff.

The average rainfall at Delta for a period of fourteen years was 62.39 inches; at Dunsmuir, for ten years, 57.16 inches; at Shasta, for six years, 53.26 inches; at Sissons, for ten years, 32.75 inches. The rainfall at these four stations was taken to obtain the mean rainfall for the mountainous area of the watershed for the years 1896–1899.

San Mateo Creek.—The Spring Valley Water Company's record of rainfall and run-off from the watershed of San Mateo Creek is without doubt the oldest record in the State, having been kept for thirty years. In the table given on page 390 of Water-Supply and Irrigation Paper No. 38, of the United States Geological Survey, no allowance has been made for evaporation from the surface of the reservoir; 20 per cent has here been added to the run-off as calculated from those tables to cover evaporation. The drainage basin of San Mateo Creek ranges in elevation from 250 to 1,800 feet, with an average of about 750 feet. The hills are undulating. There is a limited growth of timber on the northern slopes near the summit, but a large amount of brush covers other portions of the basin. On the southern slopes and crest the hills are frequently bare of brush, but covered with grasses.

Salt Springs Valley watershed.—The basin of the Salt Springs

Valley is largely of red clay, which scantily covers a bed rock of granite and slate. The topography is undulating rather than mountainous, about 20 per cent of the total drainage area being valley land. There is little brush or timber in the valley and only a scattering growth of oak and scrubby pine on the hills. To obtain the mean for the basin 10 per cent has been added to the rainfall for North Hill, 6 miles northwest of the dam. To obtain the total run-off for the basin 4,132 acre-feet have been added to the amounts as given in the table on page 337, Part IV, of the Eighteenth Annual Report of the United States Geological Survey to compensate for evaporation from the reservoir surface.

The methods of measurement of discharge from the reservoir are very crude, which may partly account for the very high percentage of run-off from this basin, which contains 25 square miles.

Stanislaus River Basin.—There were no rainfall data obtainable for this basin, but, since it joins the Tuolumne and is in most respects similar, the rainfall for the Tuolumne Basin has been taken to apply to both.

Tuolumne River Basin.—To obtain the mean rainfall for this basin the average elevation and area of the various portions were taken from the topographic maps of the United States Geological Survey. The areas were obtained by the use of a planimeter. Lagrange was taken as the base station and the percentage of increase for the various elevations, as shown by the diagram, fig. 1. The following example for the year 1896 will illustrate more particularly the method:

Average elevation.	Number of square miles.	Estimated rainfall, 1896.	Mile-inches.
1,200	75	26.4	1,980
1,500	88	29.0	2,552
2,500	182	37.4	6,807
3,500	46	45.8	2,107
4,000	105	50.0	5,252
4,500	147	54.2	7,967
5,500	90	60.9	5,481
6,000	143	63.3	9,052
6,500	105	61.3	6,437
7,500	189	57.3	10,830
9,000	330	51.3	16,927
----------	1,500	----------	75,692

$\frac{75692}{1500} = 50.3$ inches mean for basin, 1896.

Tabulation of general curve.

Estimated mean rainfall in inches.	Estimated run-off in acre-feet per square mile.	Estimated depth of run-off in inches.	Estimated mean rainfall in inches.	Estimated run-off in acre-feet per square mile.	Estimated depth of run-off in inches.
8	0	.00	30	330	6.20
10	10	.19	32	380	7.13
12	15	.28	34	430	8.06
14	35	.66	36	500	9.38
16	55	1.03	38	580	10.87
18	85	1.60	40	660	12.38
20	120	2.25	42	750	14.06
22	160	3.00	44	840	15.75
24	200	3.75	46	940	17.62
26	240	4.50	48	1,040	19.50
28	280	5.25	50	1,160	21.75

San Joaquin and King River basins.—There were practically no rainfall data for either of these basins.

The estimated mean rainfall for the Tuolumne River Basin for the years 1896–1899 is 48.2 inches; the depth of mean run-off for the same period is 20.8 inches; the depth of mean run-off for the San Joaquin River for this period is 18.4 inches. Since the topography, exposure, etc., in the two basins are similar, the rainfall will probably be proportional to the run-off.

Example: 20.8:18.4::48.2:42.7. Similarly the mean rainfall for the King River Basin will be 37.8 inches.

Mohave River.—The meteorological and hydrographic work of the Arrowhead Water Company has been carried on for a number of years at the head of the Mohave River. Twenty-eight rain gages, carefully located at elevations of from 2,100 to 7,200 feet, have been maintained. The measurements of run-off from several tributaries have been made over weirs. The area of the basins are all less than 50 square miles. The watershed is covered with a thick growth of timber on the crest. The growth of timber diminishes as the desert is approached, the northern part of the watershed being covered with brush only. The mean elevation of the watershed observed upon is about 5,250 feet above sea level.

Cuyamaca reservoir watershed.—The area of this watershed is 11 square miles and the mean elevation above sea level is probably 5,500 feet.

The run-off is carefully measured. There is only one rain gage maintained, and that is at the dam. The resident engineer, Mr. F. S. Hyde, says that as this rain gage is located between two high wooded

peaks, which act as condensers of the moisture-laden clouds, the recorded precipitation is undoubtedly heavier than the average of the watershed. This probably explains why the mean annual run-off is so far below the general curve.

Sweetwater reservoir basin.—The evaporation and run-off records from this basin date from 1888, and have been very carefully kept.

There is no doubt that many of the points on the curves (fig. 71), would be changed if we had more definite information as to the rainfall, but the curves are the best that could be made from the information at hand. The mean discharge for the period of observation on each stream is used, together with the mean rainfall for the same years. These means are considered the more satisfactory, as they tend to eliminate erratic stream and rainfall records.

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