DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 270

# SURFACE WATER SUPPLY OF THE UNITED STATES

## 1909

## PART X. THE GREAT BASIN

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

E. C. LA RUE AND F. F. HENSHAW

WASHINGTON
GOVERNMENT PRINTING OFFICE
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# SURFACE WATER SUPPLY OF THE GREAT BASIN, 1909.

By E. C. La Rue and F. F. Henshaw.

## INTRODUCTION.

### AUTHORITY FOR INVESTIGATIONS.

This volume contains results of flow measurements made on certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with organizations mentioned herein. These investigations are authorized by the organic law of the Geological Survey (Stat. L., vol. 20, p. 394), which provides, among other things, as follows:

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

Inasmuch as water is the most abundant and most valuable mineral in nature, the investigation of water resources is included under the above provision for investigating mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

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

The various appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

| | |
|---|---|
| 1895 | $12,500 |
| 1896 | 20,000 |
| 1897 to 1900, inclusive | 50,000 |
| 1901 to 1902, inclusive | 100,000 |
| 1903 to 1906, inclusive | 200,000 |
| 1907 | 150,000 |
| 1908 to 1910, inclusive | 100,000 |
| 1911 | 150,000 |

## SCOPE OF INVESTIGATIONS.

These investigations of stream flow are not complete nor do they include all the river systems or parts thereof that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover from five to ten years, and for other streams twenty years or even more, the limit being determined by the relative importance of the stream and the interdependence of the results with other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at more than 1,550 different points in the United States, and in addition the surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, has been investigated. During 1909 regular gaging stations were maintained by the Survey and cooperating organizations at about 850 points in the United States, and many miscellaneous measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

## PURPOSES OF THE WORK.

The results contained in this volume are requisite to meet the immediate demands of many public interests, including navigation, irrigation, domestic water supply, water power, swamp and overflow land drainage, and flood prevention.

*Navigation.*—The Federal Government has expended more than $250,000,000 for the improvement of inland navigation, and prospective expenditures will approximate several times this amount. It is obvious that the determination of stream flow is necessary to the intelligent solution of the many problems involved.

*Irrigation.*—The United States is now expending $51,000,000 on federal irrigation systems, and this amount is far exceeded by the private expenditures of this nature in the arid West. The integrity of any irrigation system depends absolutely on the amount of water available. Therefore investigations of stream flow in that portion of the country are not only of first importance in the redemption of the lands, but constitute an insurance of federal and private investments.

*Domestic water supply.*—The highest use of water is for domestic supply, and although this branch of the subject is of less direct federal interest than the branches already named, it nevertheless has so broad a significance with respect to the general welfare that the Federal Government is ultimately and intimately concerned.

*Water power.*—The development of the water power of the country is an economic necessity. Our stock of coal is being rapidly depleted and the cost of steam power is increasing accordingly. Industrial growth and, as a consequence, the progress of the United States as a nation will cease if cheap power is not available. Water power affords the only avenue now open. When the electric transmission of power was accomplished the relation of our water powers to national economy changed entirely. Before the day of electric transmission, water power was important only at the locality at which it was generated, but it has now become a public utility in which the individual citizen is vitally interested. Inasmuch as the amount of water power that may be made available depends on the flow of rivers, the investigation of flow becomes a prerequisite in the judicious management of this source of energy.

*Drainage of swamp and overflowed lands.*—More than 70,000,000 acres of the richest land in this country are now practically worthless or of precarious value by reason of overflow and swamp conditions. When this land is drained it becomes exceedingly productive and its value increases many fold. Such reclamation would add to the national assets at least $700,000,000. The study of run-off is the first consideration in connection with drainage projects. If by the drainage of a large area into any particular channel that channel becomes

so gorged with water which it had not hitherto been called upon to convey that overflow conditions are created in places where previously the land was not subject to inundation, then drainage results merely in an exchange of land values. This is not the purpose of drainage improvement.

*Flood prevention.*—The damage from floods in the United States probably exceeds on the average $100,000,000 annually, and in the year 1908, according to estimates based on reliable data, the aggregate damage approximated $250,000,000. Such an annual tax on the property of great regions should be reduced in the orderly progress of government. It goes without saying that any consideration of flood prevention must be based on a thorough knowledge of stream flow, both in the contributing areas which furnish the water and along the great lowland rivers.

## PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey since its inception have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications has varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into twelve parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1909. The dividing line between the North Atlantic and South Atlantic drainage areas lies between York and James rivers.

*Papers on surface water supply of the United States, 1909.*

| Part. | No. | Title. | Part. | No. | Title. |
|---|---|---|---|---|---|
| I | 261 | North Atlantic coast. | VI | 266 | Missouri River basin. |
| II | 262 | South Atlantic coast and eastern Gulf of Mexico. | VII | 267 | Lower Mississippi River basin. |
| | | | VIII | 268 | Western Gulf of Mexico. |
| III | 263 | Ohio River basin. | IX | 269 | Colorado River basin. |
| IV | 264 | St. Lawrence River basin. | X | 270 | Great Basin. |
| V | 265 | Upper Mississippi River and Hudson Bay basin. | XI | 271 | California. |
| | | | XII | 272 | North Pacific coast. |

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey exclusive of all special papers. Numbers of reports are inclusive and dates also are inclusive so far as the data are available.

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

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

| Report. | Character of data. | Year. |
|---|---|---|
| 10th Ann., pt. 2 | Descriptive information only | |
| 11th Ann., pt. 2 | Monthly discharge | 1884 to Sept., 1890. |
| 12th Ann., pt. 2 | ....do | 1884 to June 30, 1891. |
| 13th Ann., pt. 3 | Mean discharge in second-feet | 1884 to Dec. 31, 1892. |
| 14th Ann., pt. 2 | Monthly discharge (long-time records, 1871 to 1893) | 1888 to Dec. 31, 1893. |
| B. 131 | Descriptions, measurements, gage heights, and ratings | 1893 and 1894. |
| 16th Ann., pt. 2 | Descriptive information only | |
| B. 140 | Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years). | 1895. |
| W. S. 11 | Gage heights (also gage heights for earlier years) | 1896. |
| 18th Ann., pt. 4 | Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years). | 1895 and 1896. |
| W. S. 15 | Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas. | 1897. |
| W. S. 16 | Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States. | 1897. |
| 19th Ann., pt. 4 | Descriptions, measurements, ratings, and monthly discharge (also some long-time records). | 1897. |
| W. S. 27 | Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River. | 1898. |
| W. S. 28 | Measurements, ratings, and gage heights, Arkansas River and western United States. | 1898. |
| 20th Ann., pt. 4 | Monthly discharge (also for many earlier years) | 1898. |
| W. S. 35 to 39 | Descriptions, measurements, gage heights, and ratings | 1899. |
| 21st Ann., pt. 4 | Monthly discharge | 1899. |
| W. S. 47 to 52 | Descriptions, measurements, gage heights, and ratings | 1900. |
| 22d Ann., pt. 4 | Monthly discharge | 1900. |
| W. S. 65, 66 | Descriptions, measurements, gage heights, and ratings | 1901. |
| W. S. 75 | Monthly discharge | 1901. |
| W. S. 82 to 85 | Complete data | 1902. |
| W. S. 97 to 100 | ....do | 1903. |
| W. S. 124 to 135 | ....do | 1904. |
| W. S. 165 to 178 | ....do | 1905. |
| W. S. 201 to 214 | Complete data, except descriptions | 1906. |
| W. S. 241 to 252 | Complete data | 1907–8. |
| W. S. 261 to 272 | ....do | 1909. |

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

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119. The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1909. Wherever the data for a drainage basin appear in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

*Numbers of water-supply papers containing results of stream measurements, 1899–1909.*

| | 1899.[a] | 1900.[b] | 1901. | 1902. | 1903. | 1904. | 1905. | 1906. | 1907–8. | 1909. |
|---|---|---|---|---|---|---|---|---|---|---|
| Atlantic coast and eastern Gulf of Mexico: | | | | | | | | | | |
| New England rivers.. | 35 | 47 | 65,75 | 82 | 97 | 124 | 165 | 201 | 241 | 261 |
| Hudson River to Delaware River, inclusive..... | 35 | 47,(48) | 65,75 | 82 | 97 | 125 | 166 | 202 | 241 | 261 |
| Susquehanna River to York River, inclusive..... | 35 | 48 | 65,75 | 82 | 97 | 126 | 167 | 203 | 241 | 261 |
| James River to Yadkin River, inclusive..... | (35),36 | 48 | 65,75 | (82),83 | (97),98 | 126 | 167 | 203 | 242 | 262 |
| Santee River to Pearl River, inclusive.... | 36 | 48 | 65,75 | 83 | 98 | 127 | 168 | 204 | 242 | 262 |
| St. Lawrence River..... | 36 | 49 | 65,75 | (82),83 | 97 | 129 | 170 | 206 | 244 | 264 |
| Hudson Bay..... | ..... | ..... | 66,75 | 85 | 100 | 130 | 171 | 207 | 245 | 265 |
| Mississippi River: | | | | | | | | | | |
| Ohio River..... | 36 | 48,(49) | 65,75 | 83 | 98 | 128 | 169 | 205 | 243 | 263 |
| Upper Mississippi River..... | 36 | 49 | 65,75 | 83 | 98,(99) | 128, (130) | 171 | 207 | 245 | 265 |
| Missouri River..... | (36),37 | 49,(50) | 66,75 | 84 | 99 | 130, (131) | 172 | 208 | 246 | 266 |
| Lower Mississippi River..... | 37 | 50 | (65), 65,75 | (83),84 | (98),99 | (128), 131 | (169), 173 | (205), 209 | 247 | 267 |
| Western Gulf of Mexico... | 37 | 50 | 66,75 | 84 | 99 | 132 | 174 | 210 | 248 | 268 |
| Pacific coast and Great Basin: | | | | | | | | | | |
| Colorado River..... | (37),38 | 50 | 66,75 | 85 | 100 | 133, (134) | 175, (177) | 211, (213) | 249, (251) | 269, (271) |
| Great Basin..... | 38,(39) | 51 | 66,75 | 85 | 100 | 133, (134) | 176, (177) | 212, (213) | 250, (251) | 270, (271) |
| South Pacific coast to Klamath River, inclusive..... | (38),39 | 51 | 66,75 | 85 | 100 | 134 | 177 | 213 | 251 | 271 |
| North Pacific coast... | 38 | 51 | 66,75 | 85 | 100 | 135 | (177), 178 | 214 | 252 | 272 |

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

*Numbers of water-supply papers containing data covering portions of drainage basins.*

| No. | River basin. | Tributaries included. |
|---|---|---|
| 35 | James..... | |
| 36 | Missouri..... | Gallatin. |
| 37 | Colorado..... | Green, Gunnison, Grand above junction with Gunnison. |
| 38 | Sacramento..... | Except Kings and Kern. |
| 39 | Great Basin..... | Mohave. |
| 48 | Delaware..... | Wissahickon and Schuylkill. |
| 49 | Ohio..... | Scioto. |
| 50 | Missouri..... | Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte. |
| 65 | Lower Mississippi..... | Yazoo. |
| 82 | James..... | |
| | St. Lawrence..... | Lake Ontario, tributaries to St. Lawrence River proper. |
| 83 | Lower Mississippi..... | Yazoo. |
| 97 | James..... | |
| 98 | Lower Mississippi..... | Do. |
| 99 | Upper Mississippi..... | Tributaries from the west. |
| 128 | Lower Mississippi..... | Yazoo. |
| 130 | Upper Mississippi..... | Tributaries from the west. |
| 131 | Missouri..... | Platte, Kansas. |
| 134 | Colorado..... | Data near Yuma, Ariz., repeated. |
| | Great Basin..... | Susan, Owens, Mohave. |
| 169 | Lower Mississippi..... | Yazoo. |
| 177 | Colorado..... | Below junction with Gila. |
| | Great Basin..... | Susan repeated, Owens, Mohave. |
| | North Pacific coast..... | Rogue, Umpqua, Siletz. |
| 205 | Lower Mississippi..... | Yazoo, Homochitto. |
| 213 | Colorado..... | Data at Hardyville repeated; at Yuma, Salton Sea. |
| | Great Basin..... | Owens, Mohave. |
| 251 | Colorado..... | Yuma and Salton Sea stations repeated. |
| 271 | Great Basin..... | Owens River basin. |

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined on the basis of drainage area, local changes in name and lake surface being disregarded. After all stations from the source to the mouth of the main stem of the river have been given, the tributaries are taken up in regular order from source to mouth. The tributaries are treated the same as the main stream, all stations in each tributary basin being given before taking up the next one below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is often clearer to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

## DEFINITION OF TERMS.

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

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents.

"Gallons per minute" is generally used in connection with pumping and city water supply.

The "miner's inch" is the rate of discharge of water that passes through an orifice 1 inch square under a head which varies locally. It is commonly used by miners and irrigators throughout the West, and is defined by statute in each State in which it is used.

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

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

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

## CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of March 23, 1901).
1 second foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,272 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.572 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.
1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96.0 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76.0 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

## EXPLANATION OF TABLES.

For each drainage basin there is given a brief description of general conditions covering such features as area, source, tributaries, topography, geology, conditions of forestation, rainfall, ice conditions, irrigation, storage, power possibilities, and other special features of importance or interest.

For each regular current-meter gaging station are given in general, and so far as available, the following data: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges, table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting conditions of flow, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights gives the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights during ice conditions, backwater from obstructions, etc., are published as recorded, with suitable footnotes. The rating is not applicable for such periods unless the proper correction to the gage heights is known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report but can be determined from the daily gage heights and daily discharges for the purposes of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper with gage heights in feet as ordinates

and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height. These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the period when the water surface was at crest height and the corresponding discharge consequently larger than given in this column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 13, are based.

## FIELD METHODS OF MEASURING STREAM FLOW.

There are three distinct methods of determining the flow of open-channel streams: (1) By measurements of slope and cross section and the use of Chezy's and Kutter's formulas; (2) by means of a weir or dam; (3) by measurements of the velocity of the current and of the area of the cross section. The method chosen depends on the local physical conditions, the degree of accuracy desired, the funds available, and the length of time that the record is to be continued.

*Slope method.*—Much information has been collected relative to the coefficients to be used in the Chezy formula, $v=c\sqrt{Rs}$. This has been utilized by Kutter, both in developing his formula for $c$ and in determining the values of the coefficient $n$ which appears therein. The results obtained by the slope method are in general only roughly approximate, owing to the difficulty in obtaining accurate data and the uncertainty of the value for $n$ to be used in Kutter's formula. The most common use of this method is in estimating the flood discharge of a stream when the only data available are the cross section, the slope as shown by marks along the bank, and a knowledge of

the general conditions. It is seldom used by the United States Geological Survey.[a]

*Weir method.*—Relatively few stations are maintained at weirs or dams by the United States Geological Survey. Standard types of sharp-crested and broad-crested weirs within the limits for which accurate coefficients have been experimentally obtained give very accurate records of discharge if properly maintained. At practically all broad-crested weirs, however, there is a diversion of water either through or around the dam, usually for the purpose of development of water power. The flow is often complicated and the records are subject to errors from such sources as leakage through the dam, backwater at high stages, uncertainty regarding coefficient, crest which is not level, obstructions from logs or ice, use of flashboards, old turbines with imperfect ratings, and many others depending on the type of development and the uses of the diverted water.

In general records of discharge at dams are usually accurate enough for practical use if no others are available. It has been the general experience of the United States Geological Survey, however, that records at current-meter gaging stations under unobstructed channel conditions are more accurate than those collected at dams, and where the conditions are reasonably favorable are practically as good as those obtained at sharp-crested weirs.[b]

*Velocity method.*—Streams in general present throughout their courses to a greater or less extent all conditions of permanent, semi-permanent, and varying conditions of flow. In accordance with the location of the measuring section with respect to these physical conditions, current-meter gaging stations may in general be divided into four classes—(1) those with permanent conditions of flow; (2) those with beds which change only during extreme high water; (3) those with beds which change frequently, but which do not cause a variation of more than about 5 per cent of the discharge curves from year to year; and (4) those with constantly shifting beds. In determining the daily flow different office methods are necessary for each class. The field data on which the determinations are based and the methods of collecting them are, however, in general the same.

Great care is taken in the selection and equipment of gaging stations for determining discharge by velocity measurements, in order that the data may have the required degree of accuracy.

[a] Full information regarding this method is given in the various text-books on hydraulics.

[b] The determination of discharge over the different types of weirs and dams is treated fully in "Weir experiments, coefficients, and formulas" (Water-Supply Paper 200) and in the various text-books on hydraulics. "Turbine water-wheel tests and power tables" (Water-Supply Paper 180) treats of the discharge through turbines when used as meters. The edition of the latter water-supply paper is nearly exhausted. It can, however, be consulted at most of the larger libraries of the country or it can be obtained from the superintendent of documents, Washington, D. C., at a cost of 20 cents.

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They are located, as far as possible, at such points that the relation between gage height and discharge will always remain constant for any given stage. The experience of engineers of the Geological Survey has been that permanency of conditions of flow is the prime requisite of any current-meter gaging station when maintained for several years unless funds are available to cover all changes in conditions of flow. A straight, smooth section without cross currents, backwater, boils, etc., at any stage is highly desirable, but on most streams is not attainable except at the cost of a cable equipment. Rough, permanent sections, if measurements are properly made by experienced engineers, taking measuring points at a distance apart of 2 to 5 per cent or less of the total width, will, within reasonable limits, yield better results for a given outlay of money than semi-permanent or shifting sections with smooth, uniform current. So far as possible stations are located where the banks are high and not subject to overflow at high stages and out of the influence of tributary streams, dams, or other artificial obstructions which might affect the relation between gage height and discharge.

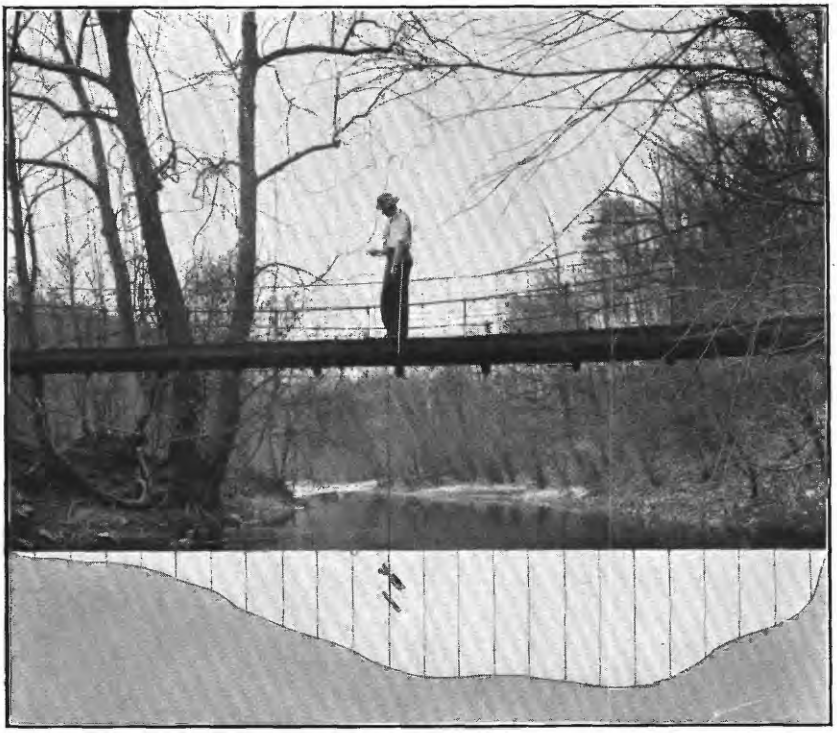
A gaging station consists esentially of a gage for determining the daily fluctuations of stage of the river and some structure or apparatus from which discharge measurements are made, usually a bridge or cable.

The two factors required to determine the discharge of a stream past a section perpendicular to the mean direction of the current are the area of the cross section and the mean velocity of flow normal to that section.

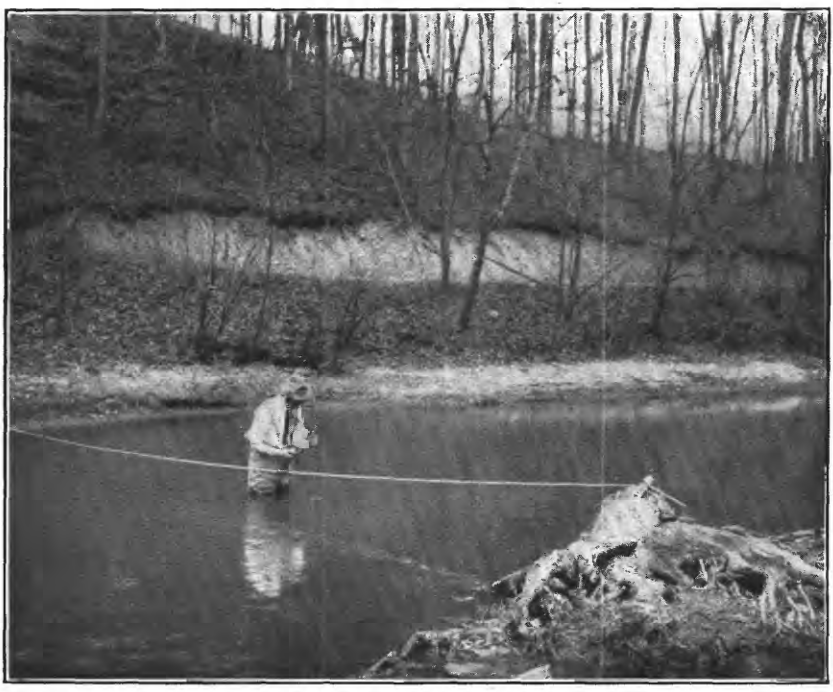
In making a measurement with a current meter a number of points, called measuring points, are measured off above and in the plane of the measuring section at which observations of depth and velocity are taken. (See Pl. I, *A*.) These points are spaced equally for those parts of the section where the flow is uniform and smooth and are spaced unequally for other parts according to the discretion and judgment of the engineer. In general the points should not be spaced farther apart than 5 per cent of the distance between piers, nor farther apart than the approximate mean depth of the section at the time of measurement.

The measuring points divide the total cross section into elementary strips at each end of which observations of depth and velocity are made. The discharge of any elementary strip is the product of the average of the depths at the two ends times the width of the strip times the average of the mean velocities at the two ends of the strip. The sum of the discharges of the elementary strips is the total discharge of the stream.[a]

[a] For a discussion of methods of computing the discharge of a stream see Engineering News, June 25, 1908.



*A*. FOR BRIDGE MEASUREMENT.



*B*. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.

Depths for the determination of the area are usually obtained by sounding with the current meter and cable. In rough sections or swift current an ordinary weight and cable are used, particular care being taken that all observations shall be in the plane of the cross section.

Two methods of determining the velocity of flow of a stream are in general use—the float method and the current-meter method.

The float method, with its various modifications of surface, subsurface, and tube or rod floats, is now considered obsolete in the ordinary practice of the United States Geological Survey. The use of this method is limited to special conditions where it is impracticable to use the current meter, such as in places where large quantities of ice or débris which may damage the meter are flowing with the current, and for miscellaneous measurements or other work where a high degree of accuracy is not necessary. Tube floats are very satisfactory for use in canals with regular bottoms and even flow of current. Measurements by the float method are made as follows: The velocity of flow of the stream is obtained by observing the time which it takes floats set free at different points across the stream to pass between two range lines about 200 feet apart. The area used is the mean value obtained from several cross sections measured between the two range lines. The chief disadvantages of this method are difficulty in obtaining the correct value of mean area for the course used and uncertainty regarding the proper coefficient to apply to the observed velocity.[a]

The Price current meter is now used almost to the exclusion of other types of meters by the United States Geological Survey in the determination of the velocity of flow of water in open channels, a use for which it is adapted under practically all conditions.[b]

Plate II shows in the center the new type of penta-recording current meter equipped for measurements at bridge and cable stations; on the left the same type of meter is shown equipped for wading measurements, to record by the acoustic method; on the right the meter is shown equipped to record electrically. (See Pl. I, *B*.) Briefly, the meter consists of six cups attached to a vertical shaft which revolves on a conical hardened steel point when immersed in moving water. The revolutions are indicated electrically. The rating, or relation between the velocity of moving water and the revolutions of the wheel, is determined for each meter by drawing it through still water for a given distance at different speeds and noting the number of revolutions for each run. From these data a rating table is prepared which gives the velocity per second of moving water for any

[a] Further information regarding the float method is given in Water-Supply Paper 95 and the various text-books on stream flow.

[b] See Hoyt, J. C., and others, Use and care of the current meter as practiced by the U. S. Geological Survey: Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

number of revolutions in a given time interval. The ratio of revolutions per second to velocity of flow in feet per second is very nearly a constant for all speeds and is approximately 0.45.

Three classes of methods of measuring velocity with current meters are in general use—multiple-point, single-point, and integration.

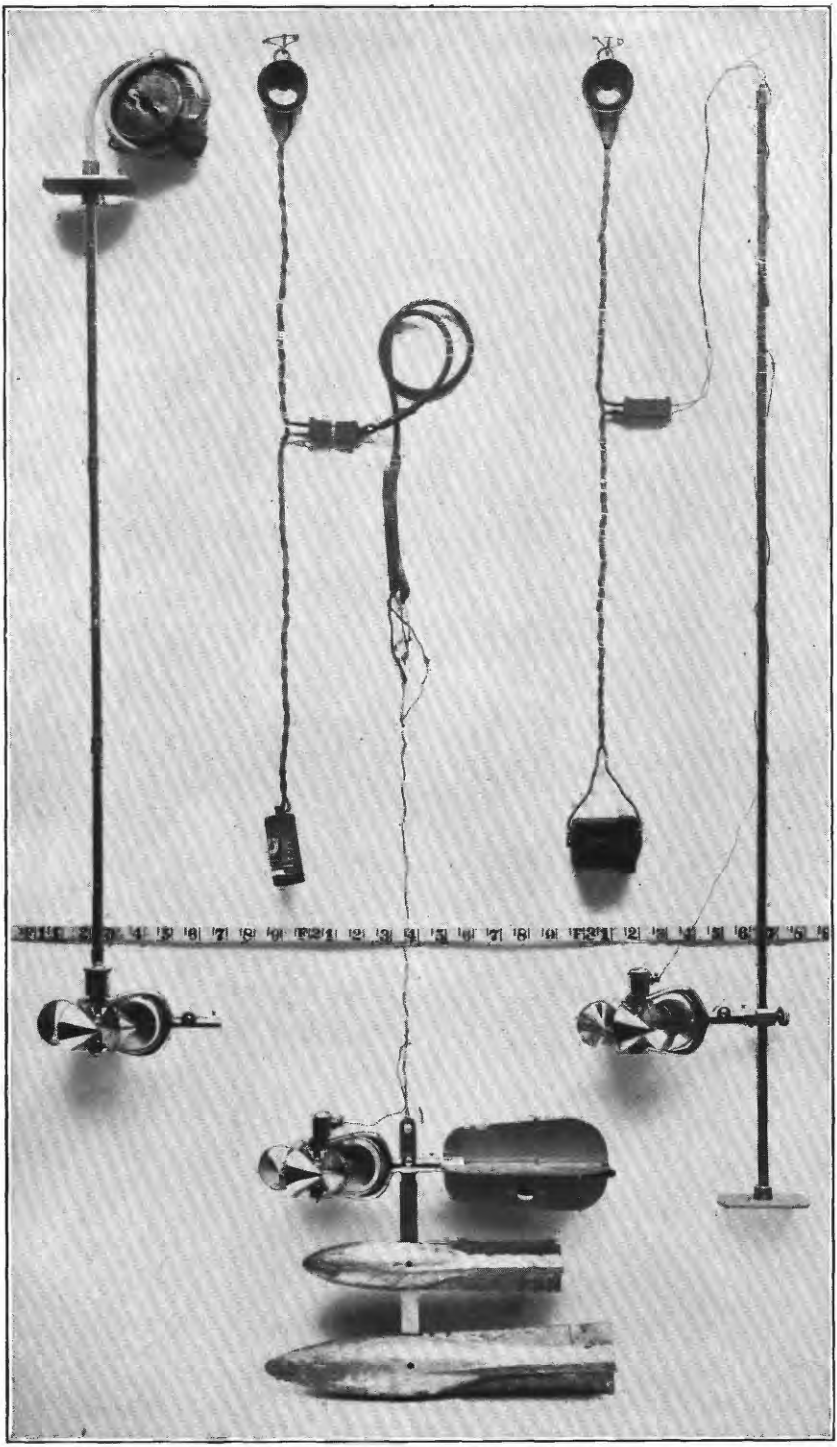
The two principal multiple-point methods in general use are the vertical velocity curve and 0.2 and 0.8 depth.

In the vertical velocity curve method a series of velocity determinations are made in each vertical at regular intervals, usually about 10 to 20 per cent of the depth apart. By plotting these velocities as abscissas and their depths as ordinates and drawing a smooth curve among the resulting points, the vertical velocity curve is developed. This curve shows graphically the magnitude and changes in velocity from the surface to the bottom of the stream. The mean velocity in the vertical is then obtained by dividing the area bounded by this velocity curve and its axis by the depth. This method of obtaining the mean velocity in the vertical is probably the best known, but on account of the length of time required to make a complete measurement its use is largely limited to the determination of coefficients for purposes of comparison and to measurements under ice.

In the second multiple-point method the meter is held successively at 0.2 and 0.8 depth, and the mean of the velocities at these two points is taken as the mean velocity for that vertical. (See Pl. I, *A*.) On the assumption that the vertical velocity curve is a common parabola with horizontal axis, the mean of the velocities at 0.22 and 0.79 depth will give (closely) the mean velocity in the vertical. Actual observations under a wide range of conditions show that this multiple-point method gives the mean velocity very closely for open-water conditions and that in a completed measurement it seldom varies as much as 1 per cent from the value given by the vertical velocity curve method. Moreover, the indications are that it holds nearly as well for ice-covered rivers. It is very extensively used in the regular practice of the United States Geological Survey.

The single-point method consists in holding the meter either at the depth of the thread of mean velocity or at an arbitrary depth for which the coefficient for reducing to mean velocity has been determined or must be assumed.

Extensive experiments by means of vertical velocity curves show that the thread of mean velocity generally occurs between 0.5 and 0.7 total depth. In general practice the thread of mean velocity is considered to be at 0.6 depth, and at this point the meter is held in most of the measurements made by the single-point method. A large number of vertical velocity curve measurements, taken on many streams and under varying conditions, show that the average coefficient for reducing the velocity obtained at 0.6 depth to mean



SMALL PRICE CURRENT METERS.

velocity is practically unity. The variation of the coefficient from unity in individual cases is, however, greater than in the 0.2 and 0.8 method and the general results are not as satisfactory.

In the other principal single-point method the meter is held near the surface, usually 1 foot below, or low enough to be out of the effect of the wind or other disturbing influences. This is known as the subsurface method. The coefficient for reducing the velocity taken at the subsurface to the mean has been found to be in general from about 0.85 to 0.95, depending on the stage, velocity, and channel conditions. The higher the stage the larger the coefficient. This method is especially adapted for flood measurements, or when the velocity is so great that the meter can not be kept in the correct position for the other methods.

The vertical integration method consists in moving the meter at a slow, uniform speed from the surface to the bottom and back again to the surface and noting the number of revolutions and the time taken in the operation. This method has the advantage that the velocity at each point of the vertical is measured twice. It is useful as a check on the point methods. In using the Price meter great care should be taken that the vertical movement of the meter is not rapid enough to vitiate the accuracy of the resulting velocity.

The determination of the flow of an ice-covered stream is difficult, owing to diversity and instability of conditions during the winter period and also to lack of definite information in regard to the laws of flow of water under ice. The method now employed is to make frequent discharge measurements during the frozen periods by the 0.2 and 0.8 and the vertical velocity curve methods, and to keep an accurate record of the conditions, such as the gage height to the surface of the water as it rises in a hole cut in the ice, and the thickness and character of the ice. From these data an approximate estimate of the daily flow can be made by constructing a rating curve (really a series of curves) similar to that used for open channels, but considering, in addition to gage heights and discharge, the varying thickness of ice.[a]

### OFFICE METHODS OF COMPUTING AND STUDYING DISCHARGE AND RUN-OFF.

At the end of each year the field or base data for current-meter gaging stations, consisting of daily gage heights, discharge measurements, and full notes, are assembled. The measurements are plotted on cross-section paper and rating curves are drawn wherever feasible. The rating tables prepared from these curves are then applied to the tables of daily gage heights to obtain the daily discharges, and

[a] For information in regard to flow under ice cover see Water-Supply Paper U. S. Geol. Survey No. 187.

from these applications the tables of monthly discharge and run-off are computed.

Rating curves are drawn and studied with special reference to the class of channel conditions which they represent. (See p. 17.) The discharge measurements for all classes of stations when plotted with gage heights in feet as ordinates and discharges in second-feet as abscissas define rating curves which are more or less generally parabolic in form. In many cases curves of area in square feet and mean velocity in feet per second are also constructed to the same scale of ordinates as the discharge curve. These are used mainly to extend the discharge curves beyond the limits of the plotted discharge measurements, and for checking purposes to avoid errors in the form of the discharge curve and to determine and eliminate erroneous measurements.

For every rating table the following assumptions are made for the period of application of the table: (*a*) That the discharge is a function of and increases gradually with the stage; (*b*) that the discharge is the same whenever the stream is at a given stage, and hence such changes in conditions of flow as may have occurred during the period of application are either compensating or negligible, except that the rating is not applicable for known conditions of ice, log jams, or other similar obstructions; (*c*) that the increased and decreased discharge due to change of slope on rising and falling stages is either negligible or compensating.

As already stated, the gaging stations may be divided into several classes, as indicated in the following paragraphs:

The stations of class 1 represent the most favorable conditions for an accurate rating and are also the most economical to maintain. The bed of the stream is usually composed of rock, and is not subject to the deposit of sediment and loose material. This class includes also many stations located in a pool below which is a permanent rocky riffle that controls the flow like a weir. Provided the control is sufficiently high and close to the gage to prevent cut and fill at the gaging point from materially affecting the slope of the water surface, the gage height will for all practical purposes be a true index of the discharge. Discharge measurements made at such stations usually plot within 2 or 3 per cent of the mean-discharge curve, and the rating developed from that curve represents a very high degree of accuracy. For illustrative example of a station of this type see figure 1 and stations of the north Atlantic coast drainage basins.

Class 2 is confined mainly to stations on rough, mountainous streams with steep slopes. The beds of such streams are as a rule comparatively permanent during low and medium stages and when the flow is sufficiently well defined by an adequate number of discharge measurements before and after each flood the stations of this class

give nearly as good results as those of class 1. As it is seldom possible to make measurements covering the time of change at flood stage, the assumption is often made that the curves before and after the flood converged to a common point at the highest gage height recorded during the flood. Hence the only uncertain period occurs during the few days of highest gage heights covering the period of actual change in conditions of flow. For illustrative examples of stations of this type see stations of the upper Missouri River basin.

Class 3 includes most of the current-meter gaging stations maintained by the United States Geological Survey. If sufficient measurements could be made at stations of this class, results would be obtained nearly equaling those of class 1, but owing to the limited funds at the disposal of the Survey this is manifestly impossible, nor is it necessary for the uses to which discharge data are applied. The critical points are, as a rule, at relatively high or low stages. The percentage error, however, is greater at low stages. No absolute rule can be laid down for stations of this class. Each rating curve must be constructed mainly on the basis of the measurements of the current year, the engineer being guided largely by the past history of the station and the following general law: If all measurements ever made at a station of this class are plotted on cross-section paper they will define a mean curve which may be called a standard curve. It has been found in practice that if after a change caused by high stage a relatively constant condition of flow occurs at medium and low stages, all measurements made after the change will plot on a smooth curve which is practically parallel to the standard curve with respect to their ordinates or gage heights. This law of the parallelism of ratings is the fundamental basis of all ratings and estimates at stations with semipermanent and shifting channels. It is not absolutely correct but, with few exceptions, answers all the practical requirements of estimates made at low and medium stages after a change at a high stage. This law appears to hold equally true whether the change occurs at the measuring section or at some controlling point below. The change is, of course, fundamentally due to change in the channel caused by cut, or fill, or both, at and near the measuring section. For all except small streams the changes in section usually occur at the bottom. The following simple but typical examples illustrate this law:

(*a*) If 0.5 foot of planking were to be nailed on the bottom of a well-rated wooden flume of rectangular section there would result, other conditions of flow being equal, new curves of discharge, area, and velocity, each plotting 0.5 foot above the original curves when referred to the original gage. In other words, this condition would be analogous to a uniform fill or cut in a river channel which either reduces or increases all three values of discharge, area, and velocity

for any gage height. In practice, however, such ideal conditions rarely exist.

(*b*) In the case of a cut or fill at the measuring section there is a marked tendency toward decrease or increase, respectively, of the velocity. In other words, the velocity has a compensating effect and if the compensation is exact at all stages the discharge at a given stage will be the same under both the new and the old conditions.

(*c*) In the case of uniform change along the crest of a weir or rocky controlling point, the area curve will remain the same as before the change, and it can be shown that here again the change in velocity curve is such that it will produce a new discharge curve essentially parallel to the original discharge curve with respect to their ordinates.

Of course in actual practice such simple changes of section do not occur. The changes are complicated and lack uniformity, a cut at one place being largely offset by a fill at another and vice versa. If these changes are very radical and involve large percentages of the total area—as, for example, on small streams—there may result a wide departure from the law of parallelism of ratings. In complicated changes of section the corresponding changes in velocity which tend to produce a new parallel discharge curve may interfere with each other materially, causing eddies, boils, backwater, and radical changes in slope. In such extreme conditions, however, the measuring section would more properly fall under class 4 and would require very frequent measurements of discharge. Special stress is laid on the fact that in the lack of other data to the contrary the utilization of this law will yield the most probable results.

Slight changes at low or medium stages of an oscillating character are usually averaged by a mean curve drawn among them parallel to the standard curve, and if the individual measurements do not vary more than 5 per cent from the rating curve the results are considered good for stations of this class.

For illustrative example of a station of this type see stations of the south Atlantic coast drainage basins.

Class 4 comprises stations that have soft, muddy, or sandy beds. Good results can be obtained from such sections only by frequent discharge measurements, the frequency varying from a measurement every two or three weeks to a measurement every day, according to the rate of diurnal change in conditions of flow. These measurements are plotted and a mean or standard curve drawn among them. It is assumed that there is a different rating curve for every day of the year and that this rating is parallel to the standard curve with respect to their ordinates. On the day of a measurement the rating curve for that day passes through that measurement. For days between successive measurements it is

assumed that the rate of change is uniform, and hence the ratings for the intervening days are equally spaced between the ratings passing through the two measurements. This method must be modified or abandoned altogether under special conditions. Personal judgment and a knowledge of the conditions involved can alone dictate the course to pursue in such cases. For examples of stations of this type see stations in the Platte, Arkansas, Rio Grande, and lower Colorado drainage basins.

The computations have, as a rule, been carried to three significant figures. Computation machines, Crelle's tables, and the 20-inch slide rule have been generally used. All computations are carefully checked.

After the computations have been completed they are entered in tables and carefully studied and intercompared to eliminate or account for all gross errors so far as possible. Missing periods are filled in, so far as feasible, by means of comparison with adjacent streams. The attempt is made to complete years or periods of discharge, thus eliminating fragmentary and disjointed records. Full notes accompanying such estimates follow the daily and monthly discharge tables.

For most of the northern stations estimates have been made of the monthly discharge during frozen periods. These are based on measurements under ice conditions wherever available, daily records of temperature and precipitation obtained from the United States Weather Bureau climate and crop reports, observers' notes of conditions, and a careful and thorough intercomparison of results with adjacent streams. Although every care possible is used in making these estimates they are often very rough, the data for some of them being so poor that the estimates are liable to as much as 25 to 50 per cent error. It is believed, however, that estimates of this character are better than none at all, and serve the purpose of indicating in a relative way the proportionate amount of flow during the frozen period. These estimates are, as a rule, included in the annual discharge. The large error of the individual months has a relatively small effect on the annual total, and it is for many purposes desirable to have the yearly discharge computed even though some error is involved in doing so.

### ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much

more accurate than the individual measurements. Numerous tests and experiments have been made to test the accuracy of current-meter work. These show that it compares very favorably with the results from standard weirs, and, owing to simplicity of methods, usually gives results that are much more reliable than those from stations at dams, where uncertainty regarding the coefficient and complicated conditions of flow prevail.

The work is, of course, dependent on the reliability of the observers. With relatively few exceptions, the observers perform their work honestly. Care is taken, however, to watch them closely and to inquire into any discrepancies. It is, of course, obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

The effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made during the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes, some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish values of discharge on the basis of the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly discharge table. For the rating tables "well defined" indicates in general that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In

this column, A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

### USE OF THE DATA.

In general the policy is followed of making available for the public the base data which are collected in the field each year by the Survey engineers. This is done to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes serious use of the data given in these papers will verify all ratings and make such adjustments in earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for five or ten year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The values in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates. The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

### COOPERATIVE DATA.

Cooperative data of various kinds and also data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are supplied by responsible parties and appear to be reasonably accurate they are verified, so far as possible, and estimated values of accuracy are given. Records clearly known to be worthless or misleading are not published. As it is, however, impossible to completely verify all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as

they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good.

## COOPERATION AND ACKNOWLEDGMENTS.

The work in Utah in 1909 has been done in cooperation with the State. House bill No. 157, chapter 98, of the General Laws of Utah for 1909, approved March 22, 1909, contain the following:

Be it enacted by the legislature of the State of Utah:

SECTION 1.—The state engineer shall make hydrographic surveys of each stream system and source of water supply in the State, beginning with those most used, obtaining and recording all available data pertaining to the water supply of the State. He is hereby authorized to cooperate with the agencies of the United States Government engaged in similar surveys and investigations. For the purpose of making hydrographic surveys, there is hereby appropriated from the general revenues of the State the sum of two thousand dollars ($2,000) annually, such appropriation being contingent upon the United States making a like appropriation for such purpose, to be expended within the State.

An agreement was entered into July 1, 1909, between the Director of the United States Geological Survey and the state engineer of Utah for cooperative work under the provision of this act, whereby each party should contribute two thousand dollars ($2,000) for a survey to determine the amount of flowing water in the streams.

The principal provisions were substantially as follows:

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

2. All the material collected—field notes, maps, etc.—are open at any time to the inspection of the state engineer, and if they are not entirely satisfactory the agreement can be terminated at any time.

3. Salaries of gage observers are paid from the state funds; the salaries and traveling and field expenses of the engineers are divided between the two parties in some manner agreed upon, accounts being rendered monthly in accordance with the regulations of the Geological Survey.

4. The streams and localities in which investigation shall be made are determined by conference between the state engineer and the representative of the Geological Survey.

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

Special acknowledgment is due to Mr. Caleb Tanner, state engineer of Utah, who was constituted the agent of the State in carrying out the provisions of the act.

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### DIVISION OF WORK.

The field data in the Great Basin drainage area in Utah, Nevada, and Idaho, were collected under the direction of E. C. LaRue, district engineer, assisted by E. S. Fuller, E. A. Porter, W. M. O'Neil, and L. J. Towne. The work in Nevada was carried on by the Reclamation Service after August 1 by F. C. Schafer, under the direction of the project engineer.

The field data in Oregon were collected under the direction of J. C. Stevens, district engineer, assisted by R. B. Post.

The ratings, special estimates, and studies of the completed data were made by F. F. Henshaw, E. C. LaRue, and J. C. Stevens.

The computation and preparation of the completed data were done under the direction of F. F. Henshaw, assisted by E. S. Fuller, G. C. Stevens, H. D. Padgett, R. C. Rice, J. G. Mathers, G. L. Parker, and M. I. Walters.

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## GENERAL DESCRIPTION OF THE GREAT BASIN.

In the interior of the North American Continent, west of the Rocky Mountains, is an immense area known as the Great Basin, the streams of which do not discharge to the ocean. The area is not one single drainage basin, but consists rather of a number of basins, some of which are connected and others closed; the outer rim of all, however, is at such an elevation that the region as a whole has no surface outlet.

In outline the Great Basin is rudely triangular. It is bordered on the west by the Sierra Nevada, on the north by the Columbia plateaus, on the east by the Rocky Mountains and the Colorado plateaus, and the southern extremity extends almost to the Gulf of California. This inclosed area is approximately 800 miles long from north to south, 500 miles broad at its widest part, and has been estimated to include 208,000 square miles. It comprises the western part of Utah, almost all of Nevada, and contiguous parts of Idaho, Oregon, and California.

Topographically this interior drainage area is characterized by isolated, narrow mountain ranges, trending north and south and separated by broad valleys varying considerably in altitude. In the southern part the valleys are low, Death Valley being below sea level;

in the north the valleys have a general elevation of 4,000 to 5,000 feet. Many of the intervening highlands rise several thousand feet above their bases, and some of the peaks of the bordering ranges attain elevations of 13,000 feet above sea level.

Upper branches of the intermontane valleys extend into the interior ranges as narrow drainage ways that are dry during most of the year; but the drainage from the high mountains on the east and west borders of the basin passes through deep canyons into the broad valleys, where the perennial streams maintain lakes. Among these are Great Salt, Utah, and Sevier lakes in the eastern part, and Pyramid, Winnemucca, Honey, Walker, Mono, and Owens lakes in the western part of the Great Basin. Except Utah Lake, which discharges by Jordan River into Great Salt Lake, these lakes are saline in character, as a consequence of the concentration of salts due to evaporation. Bear Lake, in the mountains of the eastern border, and Lake Tahoe, in the Sierra, are large bodies of fresh water that drain, respectively, to Great Salt and Pyramid lakes. Shallow, temporary bodies of water accumulate in some of the broad intermontane valleys during the wet season but completely evaporate during the summer, leaving muddy plains called playas.

Geologically the Great Basin is well known as the type region of the "basin-range structure." Many of the isolated narrow mountain ranges that trend north and south are steep on one side, exposing cross sections of the rocks, and sloping on the other, conforming with the dip of the strata. These ranges have been uplifted by movements of the earth's crust which have broken it into tilted blocks. The greatest displacements of the Great Basin are associated with the eastern and western borders, the Wasatch Mountains and the Sierra Nevada having been uplifted many thousand feet. The mountains of the Great Basin are commonly composed of Paleozoic strata, often modified by volcanism, and the products of weathering and disintegration of these rocks have accumulated in the broad intervening valleys which are strewn to great depths with unconsolidated débris.

The climate of the Great Basin is extremely arid, and except in a few favored spots where irrigation is practiced the region in general is a desert. Over the larger part of the area the precipitation is less than 10 inches, but it is greater on the bordering highlands, especially on the Sierra Nevada, where it is over 40 inches. The temperature varies widely, owing to the large extent of the area and to differences in elevation. Over most of the region the heat of the summer days is intense, but the diurnal variation is considerable. Evaporation is enormous. From the surface of the water in the vicinity of Salt Lake City it amounts to about 60 inches in a year, and over the major part of the Great Basin it is much greater, amounting in places to possibly 150 inches.

An arid climate, however, has not always prevailed in this region. In late geologic time (early Quaternary) the bordering high mountains supported glaciers and enormous lakes, the old shore lines of which are now plainly marked on the sides of many valleys, accumulated in the Great Basin. The two largest of these lakes have been named after early explorers. Lake Bonneville occupied a considerable part of western Utah, its shrunken remnants being represented by Sevier, Utah, and Great Salt lakes; and Lake Lahontan covered an immense area in western Nevada.

The chief rivers of the Great Basin rise in the mountains which form its eastern and western borders and receive their principal supply from melting snow. The nature of the stream discharge is characteristic; the maximum commonly occurs in late spring or early summer, after which the flow decreases, reaching a minimum during the winter months. After leaving the mountains the streams receive little or no increment; in the broad, waste-filled valleys evaporation and seepage cause diminution in size, and often they entirely cease to flow.

For convenience of treatment the drainage of the Great Basin has been divided into four areas, viz, Wasatch Mountains, Humboldt Sink, Sierra Nevada, and Great Basin drainage in Oregon. The data collected in these areas during 1909 are given in the following pages.

## WASATCH MOUNTAINS DRAINAGE AREA.

### PRINCIPAL STREAMS.

The Wasatch Mountains drainage area includes the western half of Utah and small portions of Idaho and Wyoming. The various streams head either in the Wasatch Mountains or in the plateaus to the south, and discharge into Great Salt Lake or Sevier Lake. The following are the principal rivers of the area:

Bear and Weber rivers, discharging into Great Salt Lake.

City, Red Butte, Parleys, Emigration, Mill, and Big and Little Cottonwood creeks, tributary to Jordan River and thus to Great Salt Lake. These creeks have small drainage areas, but in their mountain courses maintain perennial flows. On reaching the main valley they are extensively used for irrigation, and City, Parleys, and Emigration creeks furnish the chief water supply for Salt Lake City.

American Fork, Hobble Creek, Spanish Fork, and Provo River, discharging into Utah Lake.

Sevier River, with its tributary San Pitch River, draining into Sevier Lake, and Beaver River, nominally a part of the Sevier Lake drainage, but only a small portion of its highest floods ever reach the lake.

## BEAR RIVER BASIN.

### DESCRIPTION.

Bear River rises on the northern slope of the Uinta Mountains, in the northeastern part of Utah, and after a circuitous course—in which it leaves Utah and enters Wyoming, reenters Utah, appears again in Wyoming, and makes a long detour in Idaho—it returns to Utah and finally discharges its waters into Great Salt Lake. The maximum elevation of the upper rim of the basin is 13,000 feet.

In the upper part of its course, above the Dingle gaging station, the country is rough and broken, the rocks of the extreme headwater regions being principally sandstone and quartzite covered with a thin layer of soil, which supports scattered groves of fir and aspen. Farther down the prevailing formation is a compact limestone covered with a clayey soil, generally dry and with a rank growth of sagebrush. The tributary streams are numerous and well distributed, but most of them are short and confined to steep, narrow canyons. The basin contains no marshes, extensive meadows, or forests, but a few small lakes lie near the head of the river. The greater part of the precipitation is in the form of snow. Numerous small springs and the melting snow are the chief sources of supply of the streams. The annual high-water period occurs during May and June, and the stream is not subject to quick floods or freshets.

Just below Dingle the main stream passes through the north end of Bear Lake valley in a well-defined channel with no overflow, and from this point to Preston it is confined largely to a steep-walled canyon, interrupted by occasional short, narrow valleys containing irrigated farms. The tributaries in this portion of the basin are few, the principal ones being Mink and Cottonwood creeks. About 10 miles below Dingle the outlet to Bear Lake joins the river. This is a small, crooked, sluggish stream that discharges but little water at any time, though it is the only visible outlet to Bear Lake, which has an area of about 144 square miles.

The total unappropriated flow between Dingle and Preston is used for irrigation. There is no storage on the main stream, but on Mink Creek a number of small storage reservoirs are contemplated or in process of construction, the water to be diverted for the irrigation of lands in the northwest end of Cache Valley.

Between Preston and the lower end of Cache Valley the Bear flows sluggishly along the west side in a well-defined channel, and during extreme floods overflows slightly and covers a very narrow strip immediately along the river. The principal tributary streams in this portion of the course are Cub Creek and Logan River. Cub Creek rises in the Bear River Range and drains a rough limestone country with but little overlying soil. The creek is confined to a steep, narrow canyon until it reaches Cache Valley, where it flows sluggishly

for about 15 miles through a winding, but well-defined, channel into Bear River. It discharges considerable water into the main stream during flood and winter seasons, but its entire summer flow is used for irrigation in the north end of Cache Valley. A gaging station was maintained during a part of 1900 and 1901 on Cub Creek about 4 miles northeast of Franklin, at the mouth of the canyon, but owing to unfavorable conditions it was discontinued.

Logan River enters the Bear about 7 miles above the gaging station at Collinston, a short distance above the point where it leaves Cache Valley and enters the canyon.

Practically the only inflow to the Bear in Cache Valley is from seepage and springs. The lower portions of the valley form an artesian basin containing numerous small, flowing wells. The water table lies very near the surface, and during the early spring the lower lands are largely swamp.

The Bear River Canal Company diverts the entire summer flow of the stream above Collinston onto agricultural lands lying on both sides of the river below Bear River canyon. This system has a capacity of 1,000 second-feet, and during the winter and flood seasons a part of the water is used to develop electric power at a point about one-fourth mile above the Collinston station and is returned to the river at Collinston. From 10 to 30 second-feet reaches the stream through leaks and as seepage from the diversion canals.

Owing to the complete control of the stream by irrigation works the discharge is liable to extreme variation at any period.

Within the periods for which records are available the wettest year was 1907, the run-off at Collinston in the year being 2,680,000 acre-feet; in 1890, 1894, 1897, 1899, and 1909 the run-off was also high, the total for each of these years exceeding 2,000,000 acre-feet. The driest year was 1905, when the run-off at Collinston, Utah, was only 701,000 acre-feet.

Gaging stations have been maintained in this basin as follows:

Bear River at Dingle, Idaho, 1903–1909.
Bear River near Preston, Idaho, 1889–1909.
Bear River near Collinston, Utah, 1889–1909.
Bear Lake at Fishhaven, Idaho, 1904–1906.
Cub Creek near Franklin, Idaho, 1900–1901.
Logan River near Logan, Utah, 1896–1909.
Logan, Hyde Park, and Smithfield canal, 1904, 1906–7, 1909.
Blacksmith Fork near Hyrum, Utah, 1900–1909.
Blacksmith Fork power plant race near Hyrum, Utah, 1904–1909.
Box Elder Creek at Brigham, Utah, 1909.

### BEAR RIVER AT DINGLE, IDAHO.

This station, which was established May 9, 1903, to determine the run-off available for storage in Bear Lake, is located in a cut-off built by the Oregon Short Line Railroad Company one-fourth mile

east of Dingle railroad station, about 10 miles above the outlet of Bear Lake, below the proposed intake of the diversion canal to the lake. There is some diversion for irrigation above this point.

Measurements are made from a car and cable. The inclined staff gage is located near the cable and its datum has remained unchanged since the station was established.

The records at this station are not affected by artificial control above or below, but the river is usually frozen over during the period from December 1 to March 31, the ice reaching a thickness of 14 or 15 inches, this, however being a smooth cover, no anchor or needle ice ever having been known to form.

The conditions during the open-water season at this station are excellent, and fairly accurate estimates of the flow under ice have been made, so that, on the whole, the records at this station may be considered excellent.

The following discharge measurement was made at this station by W. M. O'Neill:

May 6, 1909: Width, 121 feet; area, 556 square feet; gage height, 6.94 feet; discharge, 2,110 second-feet.

*Daily gage height, in feet, of Bear River at Dingle, Idaho, for 1909.*

[M. K. Hopkins, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 5.4 | ..... | 6.1 | 7.1 | 8.45 | 7.7 | 5.0 | 4.5 | ..... | 4.2 | 5.0 |
| 2 | 4.7 | ..... | 4.9 | 6.2 | 7.2 | 8.4 | 7.6 | 4.9 | 4.65 | 4.35 | 4.2 | 4.35 |
| 3 | 4.7 | ..... | ..... | 6.9 | 7.2 | 8.3 | 7.5 | 4.8 | 4.7 | 4.35 | 4.2 | 4.45 |
| 4 | ..... | 5.2 | 5.1 | 6.95 | 7.2 | 8.3 | 7.45 | 4.75 | 4.65 | ..... | 4.2 | 4.1 |
| 5 | 4.7 | 5.1 | 5.0 | 6.95 | 7.0 | 8.4 | 7.35 | ..... | 4.6 | ..... | ..... | ..... |
| 6 | ..... | 5.1 | ..... | ..... | 6.95 | 8.4 | 7.3 | 4.65 | ..... | 4.35 | 4.2 | 4.1 |
| 7 | ..... | ..... | 4.95 | 7.0 | 6.9 | 8.5 | 7.2 | 4.65 | 4.7 | 4.35 | 4.2 | 4.3 |
| 8 | 4.9 | 5.0 | ..... | 7.0 | 7.0 | 8.6 | 7.2 | 4.7 | 4.7 | 4.35 | 4.2 | 4.35 |
| 9 | 4.9 | ..... | 5.0 | 6.45 | 7.1 | 8.6 | 7.2 | 4.6 | 4.65 | 4.35 | ..... | 4.4 |
| 10 | ..... | 5.0 | ..... | 6.05 | 7.25 | 8.6 | 7.0 | 4.6 | ..... | 4.35 | ..... | 4.5 |
| 11 | 5.0 | ..... | 4.9 | 5.8 | 7.35 | 8.6 | 6.85 | 4.6 | 4.65 | 4.35 | 4.2 | ..... |
| 12 | 5.0 | 5.05 | ..... | 5.7 | 7.4 | 8.5 | 6.6 | 4.6 | 4.65 | 4.35 | ..... | 4.4 |
| 13 | ..... | 5.05 | 4.8 | 5.7 | 7.4 | 8.5 | 6.2 | ..... | 4.65 | ..... | 4.1 | ..... |
| 14 | ..... | ..... | ..... | 5.7 | 7.4 | 8.7 | 6.0 | 4.6 | ..... | 4.3 | 4.0 | 4.4 |
| 15 | ..... | ..... | 4.8 | 5.65 | 7.4 | 8.7 | 5.85 | 4.6 | 4.65 | 4.3 | ..... | ..... |
| 16 | 4.95 | 5.05 | ..... | 5.8 | 7.4 | ..... | 5.7 | 4.6 | 4.6 | 4.3 | ..... | 4.4 |
| 17 | ..... | ..... | 4.75 | 6.1 | 7.5 | 8.6 | 5.65 | 4.6 | 4.6 | 4.3 | 4.2 | ..... |
| 18 | 5.1 | 5.1 | ..... | 6.4 | 7.65 | 8.5 | 5.5 | 4.6 | 4.6 | ..... | ..... | 4.5 |
| 19 | ..... | ..... | ..... | 6.65 | 7.35 | 8.4 | 5.4 | 4.5 | ..... | 4.25 | 4.3 | 4.95 |
| 20 | 6.0 | 5.1 | 5.0 | 6.9 | 7.2 | 8.35 | ..... | 4.5 | 4.6 | 4.25 | ..... | ..... |
| 21 | 6.3 | 5.15 | ..... | 7.1 | 7.2 | 8.3 | 5.4 | 4.5 | 4.5 | ..... | 4.4 | 4.7 |
| 22 | 6.75 | 5.05 | 5.75 | 7.2 | 7.3 | 8.2 | 5.2 | 4.5 | ..... | ..... | 4.5 | ..... |
| 23 | 6.7 | ..... | 5.7 | 7.2 | 7.4 | 8.2 | 5.1 | ..... | 4.5 | 4.25 | 4.65 | 4.7 |
| 24 | ..... | 5.0 | ..... | 7.2 | 7.65 | 8.1 | 5.1 | 4.4 | 4.4 | 4.2 | ..... | ..... |
| 25 | 7.1 | ..... | 5.3 | 7.2 | 7.9 | 8.0 | 5.1 | 4.4 | 4.4 | 4.2 | 4.75 | 4.8 |
| 26 | 6.7 | 5.0 | ..... | 7.0 | 8.05 | 8.0 | 5.1 | 4.4 | 4.4 | ..... | 4.75 | ..... |
| 27 | 6.2 | ..... | 5.35 | 6.8 | 8.1 | 8.0 | 5.2 | 4.45 | 4.4 | 4.2 | ..... | 4.7 |
| 28 | 5.8 | 4.85 | 5.1 | 6.9 | 8.2 | 8.0 | 5.2 | 4.45 | ..... | ..... | 4.70 | ..... |
| 29 | ..... | ..... | 5.3 | 6.9 | 8.35 | 7.9 | 5.2 | 4.4 | 4.4 | 4.2 | 4.45 | 4.7 |
| 30 | 5.5 | ..... | 5.6 | 7.1 | 8.5 | 7.8 | ..... | ..... | 4.4 | 4.2 | 4.5 | ..... |
| 31 | 5.4 | ..... | 5.8 | ..... | 8.55 | ..... | 5.05 | 4.45 | ..... | 4.2 | ..... | 4.8 |

NOTE.—Varying ice conditions existed during January, February, March, and December. Maximum thickness of ice was 1.4 feet.

*Daily discharge, in second-feet, of Bear River at Dingle, Idaho, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 260 | 440 | 220 | 1,330 | 2,220 | 3,690 | 2,850 | 590 | 350 | 303 | 242 | 320 |
| 2 | 260 | 400 | 260 | 1,410 | 2,320 | 3,630 | 2,740 | 534 | 412 | 294 | 242 | 294 |
| 3 | 260 | 360 | 300 | 2,020 | 2,320 | 3,510 | 2,630 | 482 | 434 | 294 | 242 | 331 |
| 4 | 260 | 320 | 330 | 2,070 | 2,320 | 3,510 | 2,580 | 458 | 412 | 294 | 242 | 210 |
| 5 | 260 | 280 | 300 | 2,070 | 2,120 | 3,630 | 2,470 | 435 | 390 | 294 | 242 | 210 |
| 6 | 280 | 260 | 290 | 2,100 | 2,070 | 3,630 | 2,420 | 412 | 412 | 294 | 242 | 210 |
| 7 | 280 | 240 | 280 | 2,120 | 2,020 | 3,750 | 2,320 | 412 | 434 | 294 | 242 | 220 |
| 8 | 300 | 230 | 290 | 2,120 | 2,120 | 3,870 | 2,320 | 434 | 434 | 294 | 242 | 230 |
| 9 | 300 | 230 | 300 | 1,620 | 2,220 | 3,870 | 2,320 | 390 | 412 | 294 | 242 | 260 |
| 10 | 300 | 230 | 280 | 1,290 | 2,370 | 3,870 | 2,120 | 390 | 412 | 294 | 242 | 300 |
| 11 | 300 | 240 | 260 | 1,110 | 2,470 | 3,870 | 1,980 | 390 | 412 | 294 | 242 | 250 |
| 12 | 300 | 240 | 260 | 1,040 | 2,520 | 3,750 | 1,750 | 390 | 412 | 294 | 226 | 200 |
| 13 | 300 | 240 | 260 | 1,040 | 2,520 | 3,750 | 1,410 | 390 | 412 | 285 | 210 | 200 |
| 14 | 280 | 240 | 270 | 1,040 | 2,520 | 3,990 | 1,250 | 390 | 412 | 276 | 180 | 200 |
| 15 | 260 | 240 | 280 | 1,000 | 2,520 | 3,990 | 1,140 | 390 | 412 | 276 | 200 | 190 |
| 16 | 260 | 240 | 270 | 1,110 | 2,520 | 3,930 | 1,040 | 390 | 390 | 276 | 220 | 180 |
| 17 | 290 | 230 | 260 | 1,330 | 2,630 | 3,870 | 1,000 | 390 | 390 | 276 | 242 | 200 |
| 18 | 320 | 220 | 280 | 1,570 | 2,800 | 3,750 | 900 | 390 | 390 | 267 | 259 | 220 |
| 19 | 500 | 220 | 310 | 1,800 | 2,470 | 3,630 | 830 | 350 | 390 | 259 | 276 | 320 |
| 20 | 700 | 220 | 340 | 2,020 | 2,320 | 3,570 | 830 | 350 | 390 | 259 | 294 | 280 |
| 21 | 850 | 230 | 500 | 2,220 | 2,320 | 3,510 | 830 | 350 | 350 | 259 | 312 | 240 |
| 22 | 1,150 | 210 | 700 | 2,320 | 2,420 | 3,400 | 710 | 350 | 350 | 259 | 350 | 220 |
| 23 | 1,100 | 200 | 750 | 2,320 | 2,520 | 3,400 | 650 | 332 | 350 | 259 | 412 | 210 |
| 24 | 1,100 | 200 | 760 | 2,320 | 2,800 | 3,290 | 650 | 312 | 312 | 242 | 435 | 220 |
| 25 | 1,100 | 200 | 770 | 2,320 | 3,070 | 3,180 | 650 | 312 | 312 | 242 | 458 | 240 |
| 26 | 1,100 | 200 | 785 | 2,120 | 3,240 | 3,180 | 650 | 312 | 312 | 242 | 458 | 230 |
| 27 | 760 | 200 | 800 | 1,930 | 3,290 | 3,180 | 710 | 331 | 312 | 242 | 446 | 210 |
| 28 | 620 | 200 | 650 | 2,020 | 3,400 | 3,180 | 710 | 331 | 312 | 242 | 434 | 210 |
| 29 | 560 | ..... | 770 | 2,020 | 3,570 | 3,070 | 710 | 312 | 312 | 242 | 331 | 210 |
| 30 | 500 | ..... | 970 | 2,220 | 3,750 | 2,960 | 665 | 322 | 312 | 242 | 350 | 220 |
| 31 | 460 | ..... | 1,110 | ..... | 3,810 | ..... | 620 | 331 | ..... | 242 | ..... | 220 |

NOTE.—The daily discharges from April to November are based on a rating curve well defined between 390 and 3,180 second-feet. Discharges interpolated for days of missing gage heights during this period. During the periods of ice conditions the discharges were estimated from the 1908 ice curve and the observer's notes on ice conditions.

*Monthly discharge of Bear River at Dingle, Idaho, for 1909.*

[Drainage area, 2,890 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 1,150 | 260 | 502 | 0.174 | 0.20 | 30,900 | C. |
| February | 440 | 200 | 249 | .086 | .09 | 13,800 | C. |
| March | 1,110 | 220 | 458 | .158 | .18 | 28,200 | C. |
| April | 2,320 | 1,000 | 1,770 | .612 | .68 | 105,000 | A. |
| May | 3,810 | 2,020 | 2,630 | .910 | 1.05 | 162,000 | A. |
| June | 3,990 | 2,960 | 3,580 | 1.24 | 1.38 | 213,000 | A. |
| July | 2,850 | 620 | 1,430 | .495 | .57 | 87,900 | A. |
| August | 590 | 312 | 386 | .134 | .15 | 23,700 | A. |
| September | 434 | 312 | 378 | .131 | .15 | 22,500 | A. |
| October | 303 | 242 | 272 | .094 | .11 | 16,700 | A. |
| November | 458 | 180 | 292 | .101 | .11 | 17,400 | A. |
| December | 331 | 180 | 234 | .081 | .09 | 14,400 | C. |
| The year | 3,990 | 180 | 1,020 | .351 | 4.76 | 736,000 | |

## BEAR RIVER NEAR PRESTON, IDAHO.

This station, which was established October 11, 1889, and has since been continuously maintained, is located just below the wagon bridge on the road from Preston to Battle Creek, at a point about 4½ miles northwest of Preston, Idaho, and about 10 miles north of the Idaho-Utah state line. The records show practically the amount of water passing from Idaho into Utah and will be of value in the final adjudication of water rights.

No important tributaries enter above the station; those coming in below are Battle Creek, entering a few hundred feet below the station, and Cub Creek and Logan River, entering in Cache Valley, about 18 and 40 miles, respectively, below the station. There are at present no important diversions above the station, although the river passes through large areas of irrigable land.

The river seldom freezes over at the station; but the flow is sometimes slightly affected by the presence of slush ice. The channel shifts slightly during floods; but the conditions for measurement are always good.

Discharge measurements are made from a cable and car, about 300 feet below the bridge. A new gage was installed, April 3, 1909, below the cable at a point about 200 feet below the old gage and reads 0.05 foot lower than the old gage. The new curve was found to be parallel to the old curve, and the gage heights taken during 1909, previous to the establishment of the new gage, have been referred to the new gage datum. The estimates of flow at this station may be considered excellent.

*Discharge measurements of Bear River near Preston, Idaho, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. feet.* | *Feet.* | *Sec.-ft.* |
| April 3 | E. A. Porter | 198 | 666 | 3.25 | 2,420 |
| May 5 | E. S. Fuller | 205 | 910 | 4.45 | 4,460 |
| June 11 | do | 212 | 996 | 5.35 | 5,870 |
| July 16 | do | 202 | 639 | 3.30 | 2,660 |

*Daily gage height, in feet, of Bear River near Preston, Idaho, for 1909.*

[O. M. Seamons, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.45 | 1.9 | 1.55 | 2.6 | 4.3 | 5.1 | 4.2 | 2.4 | 2.25 | 2.3 | 2.25 | 2.6 |
| 2 | 1.45 | 1.9 | 1.6 | 2.95 | 4.3 | 5.15 | 4.1 | 2.4 | 2.3 | 2.3 | 2.25 | 2.6 |
| 3 | 1.45 | 1.75 | 1.65 | 3.3 | 4.3 | 5.3 | 4.1 | 2.4 | 2.3 | 2.3 | 2.25 | 2.5 |
| 4 | 1.45 | 1.75 | 1.65 | 3.4 | 4.3 | 5.4 | 4.0 | 2.3 | 2.3 | 2.3 | 2.25 | 2.4 |
| 5 | 1.5 | 1.75 | 1.75 | 3.55 | 4.3 | 5.4 | 4.0 | 2.2 | 2.3 | 2.3 | 2.25 | 2.05 |
| 6 | 1.65 | 1.6 | 1.75 | 3.65 | 4.4 | 5.4 | 3.9 | 2.2 | 2.35 | 2.3 | 2.25 | 2.15 |
| 7 | 1.65 | 1.65 | 1.7 | 3.6 | 4.4 | 5.4 | 3.8 | 2.2 | 2.4 | 2.3 | 2.25 | 2.15 |
| 8 | 1.65 | 1.75 | 1.65 | 3.6 | 4.4 | 5.4 | 3.7 | 2.2 | 2.45 | 2.3 | 2.3 | 2.15 |
| 9 | 1.55 | 1.65 | 1.65 | 3.7 | 4.4 | 5.4 | 3.6 | 2.15 | 2.45 | 2.3 | 2.3 | 2.3 |
| 10 | 1.6 | 1.65 | 1.7 | 3.9 | 4.4 | 5.4 | 3.6 | 2.15 | 2.45 | 2.3 | 2.25 | 1.95 |

*Daily gage height, in feet, of Bear River near Preston, Idaho, for 1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 1.5 | 1.65 | 1.55 | 3.9 | 4.4 | 5.35 | 3.5 | 2.1 | 2.45 | 2.3 | 2.25 | 2.2 |
| 12 | 1.4 | 1.65 | 1.45 | 3.9 | 4.35 | 5.35 | 3.5 | 2.1 | 2.45 | 2.3 | 2.25 | 2.2 |
| 13 | 1.6 | 1.75 | 1.65 | 3.8 | 4.35 | 5.3 | 3.5 | 2.1 | 2.45 | 2.25 | 2.25 | 2.3 |
| 14 | 1.85 | 1.65 | 1.7 | 3.7 | 4.35 | 5.3 | 3.4 | 2.1 | 2.45 | 2.25 | 2.25 | 2.4 |
| 15 | 2.5 | 1.65 | 1.75 | 3.8 | 4.35 | 5.3 | 3.3 | 2.05 | 2.45 | 2.25 | 2.15 | 2.2 |
| 16 | 2.45 | 1.75 | 1.75 | 3.9 | 4.5 | 5.15 | 3.3 | 2.05 | 2.45 | 2.25 | 2.05 | 2.0 |
| 17 | 2.55 | 1.75 | 1.75 | 4.05 | 4.45 | 5.1 | 3.2 | 2.05 | 2.4 | 2.25 | 1.9 | 2.0 |
| 18 | 2.55 | 1.8 | 1.85 | 4.2 | 4.4 | 5.1 | 3.15 | 2.05 | 2.4 | 2.25 | 2.0 | 2.15 |
| 19 | 2.75 | 1.75 | 1.75 | 4.3 | 4.4 | 5.1 | 2.95 | 2.05 | 2.4 | 2.25 | 2.2 | 2.5 |
| 20 | 2.5 | 1.7 | 1.75 | 4.3 | 4.4 | 5.1 | 2.9 | 2.1 | 2.4 | 2.25 | 2.3 | 2.6 |
| 21 | 2.4 | 1.65 | 1.75 | 4.3 | 4.4 | 5.1 | 2.8 | 2.1 | 2.4 | 2.25 | 2.5 | 2.6 |
| 22 | 2.45 | 1.55 | 1.8 | 4.2 | 4.5 | 5.1 | 2.7 | 2.1 | 2.35 | 2.25 | 2.6 | 2.4 |
| 23 | 2.3 | 1.5 | 1.95 | 4.15 | 4.5 | 5.0 | 2.7 | 2.05 | 2.35 | 2.25 | 2.65 | 2.5 |
| 24 | 2.25 | 1.5 | 2.05 | 4.1 | 4.4 | 5.0 | 2.6 | 2.0 | 2.3 | 2.25 | 2.75 | 2.6 |
| 25 | 2.25 | 1.55 | 2.25 | 4.25 | 4.45 | 4.9 | 2.5 | 2.0 | 2.35 | 2.2 | 2.95 | 2.7 |
| 26 | 2.25 | 1.5 | 2.3 | 4.3 | 4.6 | 4.75 | 2.5 | 2.0 | 2.4 | 2.2 | 3.0 | 2.8 |
| 27 | 2.25 | 1.5 | 2.45 | 4.4 | 4.75 | 4.6 | 2.5 | 2.0 | 2.3 | 2.2 | 2.9 | 2.9 |
| 28 | 2.25 | 1.5 | 2.55 | 4.5 | 5.0 | 4.5 | 2.5 | 2.0 | 2.3 | 2.2 | 2.8 | 2.9 |
| 29 | 2.05 | ..... | 2.45 | 4.5 | 5.1 | 4.45 | 2.5 | 2.0 | 2.3 | 2.2 | 2.7 | 3.0 |
| 30 | 1.95 | ..... | 2.45 | 4.4 | 5.1 | 4.4 | 2.5 | 2.0 | 2.3 | 2.2 | 2.6 | 3.0 |
| 31 | 2.0 | ..... | 2.45 | ..... | 5.1 | ..... | 2.4 | 2.1 | ..... | 2.2 | ..... | 3.05 |

NOTE.—These gage heights all refer to the new gage installed April 3, 1909.

*Daily discharge, in second-feet, of Bear River near Preston, Idaho, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 720 | 1,040 | 785 | 1,670 | 4,140 | 5,550 | 3,970 | 1,470 | 1,340 | 1,380 | 1,340 | 1,670 |
| 2 | 720 | 1,040 | 820 | 2,080 | 4,140 | 5,640 | 3,800 | 1,470 | 1,380 | 1,380 | 1,340 | 1,670 |
| 3 | 720 | 925 | 855 | 2,550 | 4,140 | 5,910 | 3,800 | 1,470 | 1,380 | 1,380 | 1,340 | 1,570 |
| 4 | 720 | 925 | 855 | 2,690 | 4,140 | 6,090 | 3,640 | 1,380 | 1,380 | 1,380 | 1,340 | 1,470 |
| 5 | 750 | 925 | 925 | 2,920 | 4,140 | 6,090 | 3,640 | 1,290 | 1,380 | 1,380 | 1,340 | 1,160 |
| 6 | 855 | 820 | 925 | 3,080 | 4,310 | 6,090 | 3,480 | 1,290 | 1,420 | 1,380 | 1,340 | 1,240 |
| 7 | 855 | 855 | 890 | 3,000 | 4,310 | 6,090 | 3,320 | 1,290 | 1,470 | 1,380 | 1,340 | 1,240 |
| 8 | 855 | 925 | 855 | 3,000 | 4,310 | 6,090 | 3,160 | 1,290 | 1,520 | 1,380 | 1,380 | 1,240 |
| 9 | 785 | 855 | 855 | 3,160 | 4,310 | 6,090 | 3,000 | 1,240 | 1,520 | 1,380 | 1,380 | 1,380 |
| 10 | 820 | 855 | 890 | 3,480 | 4,310 | 6,090 | 3,000 | 1,240 | 1,520 | 1,380 | 1,340 | 1,080 |
| 11 | 750 | 855 | 785 | 3,480 | 4,310 | 6,000 | 2,840 | 1,200 | 1,520 | 1,380 | 1,340 | 1,290 |
| 12 | 690 | 855 | 720 | 3,480 | 4,220 | 6,000 | 2,840 | 1,200 | 1,520 | 1,380 | 1,340 | 1,290 |
| 13 | 820 | 925 | 855 | 3,320 | 4,220 | 5,910 | 2,840 | 1,200 | 1,520 | 1,340 | 1,340 | 1,380 |
| 14 | 1,000 | 855 | 890 | 3,160 | 4,220 | 5,910 | 2,690 | 1,200 | 1,520 | 1,340 | 1,340 | 1,470 |
| 15 | 1,570 | 855 | 925 | 3,320 | 4,220 | 5,910 | 2,550 | 1,160 | 1,520 | 1,340 | 1,240 | 1,290 |
| 16 | 1,520 | 925 | 925 | 3,480 | 4,480 | 5,640 | 2,550 | 1,160 | 1,520 | 1,340 | 1,160 | 1,120 |
| 17 | 1,620 | 925 | 925 | 3,720 | 4,400 | 5,550 | 2,410 | 1,160 | 1,470 | 1,340 | 1,040 | 1,120 |
| 18 | 1,620 | 960 | 1,000 | 3,970 | 4,310 | 5,550 | 2,340 | 1,160 | 1,470 | 1,340 | 1,120 | 1,240 |
| 19 | 1,840 | 925 | 925 | 4,140 | 4,310 | 5,550 | 2,080 | 1,160 | 1,470 | 1,340 | 1,290 | 1,570 |
| 20 | 1,570 | 890 | 925 | 4,140 | 4,310 | 5,550 | 2,010 | 1,200 | 1,470 | 1,340 | 1,380 | 1,670 |
| 21 | 1,470 | 855 | 925 | 4,140 | 4,310 | 5,550 | 1,890 | 1,200 | 1,470 | 1,340 | 1,570 | 1,670 |
| 22 | 1,520 | 785 | 960 | 3,970 | 4,480 | 5,550 | 1,780 | 1,200 | 1,420 | 1,340 | 1,670 | 1,470 |
| 23 | 1,380 | 750 | 1,080 | 3,880 | 4,480 | 5,370 | 1,780 | 1,160 | 1,420 | 1,340 | 1,720 | 1,570 |
| 24 | 1,340 | 750 | 1,160 | 3,800 | 4,310 | 5,370 | 1,670 | 1,120 | 1,380 | 1,340 | 1,840 | 1,670 |
| 25 | 1,340 | 785 | 1,340 | 4,060 | 4,400 | 5,190 | 1,570 | 1,120 | 1,420 | 1,290 | 2,080 | 1,780 |
| 26 | 1,340 | 750 | 1,380 | 4,140 | 4,650 | 4,920 | 1,570 | 1,120 | 1,470 | 1,290 | 2,140 | 1,890 |
| 27 | 1,340 | 750 | 1,520 | 4,310 | 4,920 | 4,650 | 1,570 | 1,120 | 1,380 | 1,290 | 2,010 | 2,010 |
| 28 | 1,340 | 750 | 1,620 | 4,480 | 5,370 | 4,480 | 1,570 | 1,120 | 1,380 | 1,290 | 1,890 | 2,010 |
| 29 | 1,160 | ..... | 1,520 | 4,480 | 5,550 | 4,400 | 1,570 | 1,120 | 1,380 | 1,290 | 1,780 | 2,140 |
| 30 | 1,080 | ..... | 1,520 | 4,310 | 5,550 | 4,310 | 1,570 | 1,120 | 1,380 | 1,290 | 1,670 | 2,140 |
| 31 | 1,120 | ..... | 1,520 | ..... | 5,550 | ..... | 1,470 | 1,200 | ..... | 1,290 | ..... | 2,200 |

NOTE.—The daily discharges are based on a rating curve well defined between 570 and 8,200 second-feet.

*Monthly discharge of Bear River near Preston, Idaho, for 1909.*

[Drainage area, 4,500 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 1,840 | 720 | 1,140 | 0.253 | 0.29 | 70,100 | B. |
| February | 1,040 | 750 | 868 | .193 | .20 | 48,200 | B. |
| March | 1,620 | 720 | 1,030 | .229 | .26 | 63,300 | A. |
| April | 4,480 | 1,670 | 3,510 | .780 | .87 | 209,000 | A. |
| May | 5,550 | 4,140 | 4,480 | .996 | 1.15 | 275,000 | A. |
| June | 6,090 | 4,310 | 5,570 | 1.24 | 1.38 | 331,000 | A. |
| July | 3,970 | 1,470 | 2,520 | .560 | .65 | 155,000 | A. |
| August | 1,470 | 1,120 | 1,220 | .271 | .31 | 75,000 | A. |
| September | 1,520 | 1,340 | 1,450 | .322 | .36 | 86,300 | A. |
| October | 1,380 | 1,290 | 1,340 | .298 | .34 | 82,400 | A. |
| November | 2,140 | 1,040 | 1,480 | .329 | .37 | 88,100 | A. |
| December | 2,200 | 1,080 | 1,540 | .342 | .39 | 94,700 | C. |
| The year | 6,090 | 720 | 2,180 | .484 | 6.57 | 1,580,000 | |

## BEAR RIVER NEAR COLLINSTON, UTAH.

This station, which was established July 1, 1889, and has been continuously maintained since, is located in the lower end of the Bear River canyon, about 6 miles north of the Collinston railroad station and about one-fourth mile below the Telluride power plant. The records show practically the amount of unappropriated water below all diversions.

The principal tributaries above are Cub Creek and Logan River; the only tributary below is Malade River, which enters 18 or 20 miles below the station. Most of the normal low-water flow of the river at this point is appropriated by the Bear River Canal Company, which diverts water at a point about 2 miles above the station. The Telluride Power Company also diverts water about 2 miles above the station for power development, but returns it to the river above the station.

Measurements are made from a car and cable.

The records are not affected by artificial control below, but some variations in daily flow may be caused by manipulation of gates on the dam 2 miles above the station. A little shore ice occasionally forms at the station, but the effect on the discharge is very slight.

The channel is fairly permanent, the measuring conditions are good, and the records may be considered excellent. The datum of the inclined staff gage has remained unchanged.

*Discharge measurements of Bear River near Collinston, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 5 | E. A. Porter | 287 | 1,240 | 4.40 | 4,620 |
| May 6 | E. S. Fuller | 295 | 1,520 | 5.80 | 6,980 |
| June 13 | do | 298 | 1,850 | 6.70 | 9,020 |
| July 18 | do | 277 | 923 | 3.25 | 2,850 |

*Daily gage height, in feet, of Bear River near Collinston, Utah, for 1909.*

[R. A. Johnson, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.2 | 2.3 | 2.1 | 3.5 | 6.5 | 7.1 | 5.0 | 2.4 | 1.6 | 2.6 | 2.8 | 3.5 |
| 2 | 2.3 | 2.3 | 2.3 | 3.7 | 6.3 | 7.1 | 4.9 | 2.3 | 1.7 | 2.6 | 2.7 | 3.4 |
| 3 | 2.2 | 2.8 | 2.6 | 4.0 | 6.0 | 7.1 | 4.8 | 2.2 | 1.8 | 2.7 | 2.7 | 3.3 |
| 4 | 2.3 | 3.2 | 3.0 | 4.1 | 5.3 | 7.1 | 4.7 | 2.2 | 2.4 | 2.7 | 2.6 | 3.0 |
| 5 | 2.3 | 3.2 | 4.0 | 4.2 | 5.4 | 7.1 | 4.6 | 2.2 | 3.0 | 2.8 | 2.6 | 3.0 |
| 6 | 3.4 | 3.5 | 4.1 | 4.3 | 5.6 | 7.5 | 4.5 | 2.2 | 2.7 | 2.8 | 2.6 | 2.9 |
| 7 | 3.4 | 3.3 | 4.2 | 4.3 | 5.7 | 7.7 | 4.4 | 2.2 | 2.8 | 2.7 | 2.6 | 2.7 |
| 8 | 3.2 | 3.1 | 3.9 | 4.5 | 5.5 | 7.7 | 4.3 | 2.05 | 2.9 | 2.7 | 2.6 | 2.7 |
| 9 | 3.0 | 1.0 | 3.3 | 4.4 | 5.6 | 7.7 | 4.2 | 2.05 | 2.8 | 2.6 | 2.6 | 2.7 |
| 10 | 2.7 | 1.2 | 3.0 | 4.0 | 5.7 | 7.7 | 4.1 | 2.0 | 2.8 | 2.6 | 2.7 | 2.8 |
| 11 | 2.4 | 1.8 | 2.9 | 4.0 | 5.8 | 7.5 | 4.1 | 1.9 | 2.8 | 2.6 | 2.8 | 3.1 |
| 12 | 2.3 | 1.8 | 2.3 | 4.1 | 5.8 | 7.0 | 4.0 | 1.8 | 2.7 | 2.7 | 2.8 | 2.9 |
| 13 | 2.3 | 2.8 | 2.0 | 4.2 | 5.8 | 7.0 | 3.9 | 1.8 | 2.6 | 2.7 | 2.8 | 2.9 |
| 14 | 3.4 | 2.9 | 2.1 | 4.3 | 5.8 | 7.0 | 3.8 | 1.8 | 2.5 | 2.6 | 2.7 | 2.9 |
| 15 | 3.9 | 3.0 | 2.4 | 4.1 | 5.7 | 6.9 | 3.7 | 1.7 | 2.4 | 2.6 | 2.7 | 2.8 |
| 16 | 4.0 | 3.1 | 2.7 | 4.0 | 5.6 | 7.0 | 3.8 | 1.7 | 2.4 | 2.6 | 2.6 | 2.8 |
| 17 | 4.4 | 3.5 | 2.9 | 4.5 | 5.6 | 7.0 | 3.2 | 1.6 | 2.4 | 2.6 | 2.5 | 2.7 |
| 18 | 4.0 | 4.0 | 3.1 | 4.7 | 5.8 | 6.9 | 3.1 | 1.6 | 2.4 | 2.6 | 2.4 | 2.6 |
| 19 | 3.8 | 3.7 | 3.7 | 5.2 | 5.7 | 6.8 | 2.9 | 1.6 | 2.5 | 2.6 | 2.4 | 2.5 |
| 20 | 3.4 | 3.0 | 4.0 | 5.3 | 5.7 | 6.7 | 2.7 | 1.6 | 2.5 | 2.6 | 2.7 | 2.5 |
| 21 | 4.0 | 2.9 | 3.9 | 5.4 | 5.8 | 6.6 | 2.5 | 1.5 | 2.6 | 2.6 | 3.0 | 2.6 |
| 22 | 4.3 | 2.2 | 3.7 | 5.5 | 5.8 | 6.4 | 2.4 | 1.5 | 2.6 | 2.6 | 3.4 | 2.6 |
| 23 | 4.2 | 2.4 | 3.7 | 5.5 | 5.8 | 6.3 | 2.3 | 1.5 | 2.6 | 2.6 | 3.6 | 2.6 |
| 24 | 4.0 | 2.4 | 3.7 | 5.3 | 5.8 | 6.2 | 2.0 | 1.5 | 2.6 | 2.6 | 3.8 | 2.6 |
| 25 | 3.8 | 2.3 | 3.5 | 5.7 | 6.0 | 6.0 | 2.6 | 1.7 | 2.6 | 2.6 | 3.8 | 2.9 |
| 26 | 3.2 | 2.3 | 3.3 | 6.1 | 6.3 | 6.0 | 2.6 | 1.6 | 2.6 | 2.6 | 4.0 | 2.8 |
| 27 | 3.1 | 2.3 | 3.2 | 6.3 | 6.4 | 5.8 | 2.5 | 1.5 | 2.6 | 2.6 | 4.3 | 2.9 |
| 28 | 3.2 | 2.1 | 3.9 | 6.3 | 6.5 | 5.6 | 2.4 | 1.5 | 2.7 | 2.6 | 4.1 | 2.7 |
| 29 | 3.0 | ..... | 4.0 | 6.3 | 6.6 | 5.4 | 2.6 | 1.4 | 2.7 | 2.6 | 3.7 | 2.7 |
| 30 | 2.1 | ..... | 4.3 | 6.6 | 6.7 | 5.4 | 2.3 | 1.4 | 2.7 | 2.6 | 3.5 | 2.9 |
| 31 | 2.0 | ..... | 4.2 | ..... | 7.0 | ..... | 2.3 | 1.4 | ..... | 2.6 | ..... | 3.1 |

*Daily discharge, in second-feet, of Bear River near Collinston, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1,640 | 1,750 | 1,530 | 3,250 | 8,440 | 9,900 | 5,640 | 1,860 | 1,000 | 2,080 | 2,300 | 3,250 |
| 2 | 1,750 | 1,750 | 1,750 | 3,530 | 8,000 | 9,900 | 5,470 | 1,750 | 1,100 | 2,080 | 2,190 | 3,110 |
| 3 | 1,640 | 2,300 | 2,080 | 3,980 | 7,400 | 9,900 | 5,300 | 1,640 | 1,200 | 2,190 | 2,190 | 2,970 |
| 4 | 1,750 | 2,830 | 2,550 | 4,140 | 6,150 | 9,900 | 5,130 | 1,640 | 1,860 | 2,190 | 2,080 | 2,550 |
| 5 | 1,750 | 2,830 | 3,980 | 4,300 | 6,320 | 9,900 | 4,960 | 1,640 | 2,550 | 2,300 | 2,080 | 2,550 |
| 6 | 3,110 | 3,250 | 4,140 | 4,460 | 6,680 | 11,000 | 4,790 | 1,640 | 2,190 | 2,300 | 2,080 | 2,420 |
| 7 | 3,110 | 2,970 | 4,300 | 4,460 | 6,860 | 11,600 | 4,620 | 1,640 | 2,300 | 2,190 | 2,080 | 2,190 |
| 8 | 2,830 | 2,690 | 3,820 | 4,790 | 6,500 | 11,600 | 4,460 | 1,480 | 2,420 | 2,190 | 2,080 | 2,190 |
| 9 | 2,550 | 500 | 2,970 | 4,620 | 6,680 | 11,600 | 4,300 | 1,480 | 2,300 | 2,080 | 2,080 | 2,190 |
| 10 | 2,190 | 645 | 2,550 | 3,980 | 6,860 | 11,600 | 4,140 | 1,420 | 2,300 | 2,080 | 2,190 | 2,300 |
| 11 | 1,860 | 1,200 | 2,420 | 3,980 | 7,040 | 11,000 | 4,140 | 1,310 | 2,300 | 2,080 | 2,300 | 2,690 |
| 12 | 1,750 | 1,200 | 1,750 | 4,140 | 7,040 | 9,640 | 3,980 | 1,200 | 2,190 | 2,190 | 2,300 | 2,420 |
| 13 | 1,750 | 2,300 | 1,420 | 4,300 | 7,040 | 9,640 | 3,820 | 1,200 | 2,080 | 2,190 | 2,300 | 2,420 |
| 14 | 3,110 | 2,420 | 1,530 | 4,460 | 7,040 | 9,640 | 3,670 | 1,200 | 1,970 | 2,080 | 2,190 | 2,420 |
| 15 | 3,820 | 2,550 | 1,860 | 4,140 | 6,860 | 9,380 | 3,530 | 1,100 | 1,860 | 2,080 | 2,190 | 2,300 |
| 16 | 3,980 | 2,690 | 2,190 | 3,980 | 6,680 | 9,640 | 3,670 | 1,100 | 1,860 | 2,080 | 2,080 | 2,300 |
| 17 | 4,620 | 3,250 | 2,420 | 4,790 | 6,680 | 9,640 | 2,830 | 1,000 | 1,860 | 2,080 | 1,970 | 2,190 |
| 18 | 3,980 | 3,980 | 2,690 | 5,130 | 7,040 | 9,380 | 2,690 | 1,000 | 1,860 | 2,080 | 1,860 | 2,080 |
| 19 | 3,670 | 3,530 | 3,530 | 5,980 | 6,860 | 9,140 | 2,420 | 1,000 | 1,970 | 2,080 | 1,860 | 1,970 |
| 20 | 3,110 | 2,550 | 3,980 | 6,150 | 6,860 | 8,900 | 2,190 | 1,000 | 1,970 | 2,080 | 2,190 | 1,970 |
| 21 | 3,980 | 2,420 | 3,820 | 6,320 | 7,040 | 8,660 | 1,970 | 900 | 2,080 | 2,080 | 2,550 | 2,080 |
| 22 | 4,460 | 1,640 | 3,530 | 6,500 | 7,040 | 8,220 | 1,860 | 900 | 2,080 | 2,080 | 3,110 | 2,080 |
| 23 | 4,300 | 1,860 | 3,530 | 6,500 | 7,040 | 8,000 | 1,750 | 900 | 2,080 | 2,080 | 3,390 | 2,080 |
| 24 | 3,980 | 1,860 | 3,530 | 6,150 | 7,040 | 7,800 | 1,420 | 900 | 2,080 | 2,080 | 3,670 | 2,080 |
| 25 | 3,670 | 1,750 | 3,250 | 6,860 | 7,400 | 7,400 | 2,080 | 1,100 | 2,080 | 2,080 | 3,670 | 2,420 |
| 26 | 2,830 | 1,750 | 2,970 | 7,600 | 8,000 | 7,400 | 2,080 | 1,000 | 2,080 | 2,080 | 3,980 | 2,300 |
| 27 | 2,690 | 1,750 | 2,830 | 8,000 | 8,220 | 7,040 | 1,970 | 900 | 2,080 | 2,080 | 4,460 | 2,420 |
| 28 | 2,830 | 1,530 | 3,820 | 8,000 | 8,440 | 6,680 | 1,860 | 900 | 2,190 | 2,080 | 4,140 | 2,190 |
| 29 | 2,550 | ..... | 3,980 | 8,000 | 8,660 | 6,320 | 2,080 | 810 | 2,190 | 2,080 | 3,530 | 2,190 |
| 30 | 1,530 | ..... | 4,460 | 8,660 | 8,900 | 6,320 | 1,750 | 810 | 2,190 | 2,080 | 3,250 | 2,420 |
| 31 | 1,420 | ..... | 4,300 | ..... | 9,640 | ..... | 1,750 | 810 | ..... | 2,080 | ..... | 2,690 |

NOTE.—These daily discharges are based on a rating curve well defined between 30 and 9,640 second-feet.

*Monthly discharge of Bear River near Collinston, Utah, for 1909.*

[Drainage area, 6,000 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 4,620 | 1,420 | 2,850 | 0.475 | 0.55 | 175,000 | A. |
| February | 3,980 | 500 | 2,210 | .368 | .38 | 123,000 | A. |
| March | 4,460 | 1,420 | 3,020 | .503 | .58 | 186,000 | A. |
| April | 8,660 | 3,250 | 5,370 | .895 | 1.00 | 320,000 | A. |
| May | 9,640 | 6,150 | 7,300 | 1.22 | 1.41 | 449,000 | A. |
| June | 11,600 | 6,320 | 9,220 | 1.54 | 1.72 | 549,000 | A. |
| July | 5,640 | 1,420 | 3,300 | .550 | .63 | 203,000 | A. |
| August | 1,860 | 810 | 1,200 | .200 | .23 | 73,800 | A. |
| September | 2,550 | 1,000 | 2,010 | .335 | .37 | 120,000 | A. |
| October | 2,300 | 2,080 | 2,120 | .353 | .41 | 130,000 | A. |
| November | 4,460 | 1,860 | 2,610 | .435 | .49 | 155,000 | A. |
| December | 3,250 | 1,970 | 2,370 | .395 | .46 | 146,000 | A. |
| The year | 11,600 | 500 | 3,630 | .606 | 8.23 | 2,630,000 | |

## LOGAN RIVER BASIN.

### DESCRIPTION.

Logan River rises on the west slope of the Bear River Range, flows southwest, then northwest, and unites with Bear River near Benson, Utah. The entire basin is rough and rugged, the elevations ranging from 4,500 to 9,000 feet, and the stream being confined largely to a steep and rough channel in a comparatively narrow canyon. The principal rock is a compact limestone with little or no soil covering except near the summit of the range, where a thin layer supports large groves of fir and aspen. The lower reaches of the stream are practically barren of timber except for a few scattered pines and a growth of underbrush. A large amount of timber has been cut and the area has been overgrazed by sheep and cattle.

Probably three-fourths of the precipitation in the basin is snow, the melting of which forms the chief source of supply for the spring and early summer flow; the late summer and winter flow is derived chiefly from springs, which are well distributed over the basin.

In its upper course the Logan receives many short, swift tributaries. Temple Fork and South Fork, which enter, respectively, about 10 and 15 miles above Logan, are perennial streams and furnish one-third to one-fourth of the total flow. Blacksmith Fork comes in below the Logan gaging station. None of the run-off is stored at present. The entire flow of the river, after being used to develop power at two electric plants near the mouth of the canyon, is diverted for irrigation.

### LOGAN RIVER NEAR LOGAN, UTAH.

This station, which was established June 1, 1896, discontinued July 18, 1903, and reestablished April 13, 1904, is located about 2 miles east of Logan, Utah, about one-fourth mile below the Hercules power house, near the mouth of the canyon. The records show the total amount of water available for irrigation in the valley below.

The station is below all tributaries except Blacksmith Fork and Cache River, which enter about 5 and 10 miles, respectively, below the station. Water is diverted above the station to develop power, but is returned to the river above the station. The Logan, Hyde Park, and Smithfield canal diverts above the station, and records have been kept on this canal in order that the total flow from the drainage area might be determined. Practically all the normal low water flow is diverted for irrigation below the station.

The equipment consists of a car and cable and an inclined staff gage.

The records are not affected by artificial control nor by ice conditions, but the high velocity at the station causes shifting of the bed of the stream and makes the measuring conditions rather unfavorable. The results are therefore liable to some error, but may be considered fairly good. The gage datum has remained unchanged since January 1, 1906.

*Discharge measurements of Logan River near Logan, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 4 | E. A. Porter | 45 | 79 | 2.35 | 222 |
| May 5 | E. S. Fuller | 50 | 134 | 3.40 | 862 |
| June 12 | do | 62 | 229 | 4.35 | 1,690 |
| July 17 | do | 54 | 144 | 3.20 | 594 |

*Daily gage height, in feet, of Logan River near Logan, Utah, for 1909.*

[Alma Johnson, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.9 | 2.15 | 1.85 | 2.15 | 3.15 | 4.2 | 4.0 | 3.1 | 2.6 | 2.4 | 2.35 | 2.4 |
| 2 | 1.95 | 2.15 | 1.9 | 2.25 | 2.95 | ..... | 3.95 | 3.1 | 2.6 | 2.35 | 2.35 | 2.45 |
| 3 | 1.95 | 2.0 | 1.85 | 2.4 | 3.45 | ..... | 3.9 | 3.0 | 2.55 | 2.35 | 2.35 | 2.45 |
| 4 | 1.95 | 2.05 | 2.0 | 2.45 | 3.45 | ..... | 3.85 | 3.05 | 2.55 | 2.35 | 2.35 | 2.35 |
| 5 | 2.05 | 2.0 | 2.0 | 2.4 | 3.35 | ..... | 3.85 | 3.05 | 2.6 | 2.4 | 2.35 | 2.3 |
| 6 | 2.35 | 1.9 | 2.0 | 2.35 | 3.4 | ..... | 3.75 | 3.15 | 2.6 | 2.4 | 2.35 | 2.35 |
| 7 | 2.1 | 2.0 | 1.95 | 2.4 | 3.45 | ..... | 3.7 | 3.15 | 2.55 | 2.35 | 2.3 | 2.35 |
| 8 | 2.0 | 2.15 | 1.95 | 2.25 | 3.5 | ..... | 3.65 | 3.1 | 2.55 | 2.35 | 2.3 | 2.35 |
| 9 | 1.95 | 2.0 | 1.95 | 2.3 | 3.55 | ..... | 3.55 | 3.15 | 2.5 | 2.4 | 2.3 | 2.3 |
| 10 | 1.95 | 2.0 | 1.9 | 2.35 | 3.5 | ..... | 3.55 | 3.2 | 2.5 | 2.35 | 2.35 | 2.3 |
| 11 | 1.9 | 2.0 | 1.85 | 2.35 | 3.45 | ..... | 3.55 | 3.2 | 2.55 | 2.35 | 2.25 | 2.35 |
| 12 | 1.95 | 2.0 | 1.85 | 2.35 | 3.4 | 4.35 | 3.5 | 3.2 | 2.65 | 2.35 | 2.3 | 2.35 |
| 13 | 1.95 | 2.1 | 1.9 | 2.35 | 3.3 | ..... | 3.4 | 3.1 | 2.6 | 2.3 | 2.3 | 2.35 |
| 14 | 1.95 | 2.0 | 1.95 | 2.35 | 3.35 | ..... | 3.35 | 3.05 | 2.55 | 2.3 | 2.3 | 2.3 |
| 15 | 2.15 | 2.0 | 1.95 | 2.45 | 3.35 | ..... | 3.35 | 3.05 | 2.5 | 2.3 | 2.25 | 2.35 |

*Daily gage height, in feet, of Logan River near Logan, Utah, for 1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 2.35 | 2.05 | 1.95 | 2.55 | 3.45 | ..... | 3.3 | 3.0 | 2.55 | 2.3 | 2.25 | 2.25 |
| 17 | 2.2 | 2.0 | 2.1 | 2.75 | 3.45 | ..... | 3.3 | 2.9 | 2.55 | 2.3 | 2.15 | 2.2 |
| 18 | 2.05 | 2.0 | 2.05 | 3.0 | 3.35 | ..... | 3.25 | 2.75 | 2.55 | 2.35 | 2.15 | 2.2 |
| 19 | 2.2 | 2.05 | 2.1 | 2.95 | 3.4 | ..... | 3.2 | 2.6 | 2.5 | 2.35 | 2.45 | 2.2 |
| 20 | 2.4 | 1.95 | 2.1 | 2.95 | 3.45 | ..... | 3.2 | 2.55 | 2.45 | 2.45 | 2.8 | 2.2 |
| 21 | 2.4 | 2.0 | 2.05 | 2.85 | 3.5 | 4.3 | 3.15 | 2.55 | 2.4 | 2.45 | 2.65 | 2.2 |
| 22 | 2.2 | 1.95 | 2.0 | 2.75 | 3.75 | 4.35 | 3.15 | 2.55 | 2.4 | 2.3 | 2.5 | 2.2 |
| 23 | 2.05 | 1.85 | 2.05 | 2.9 | 3.70 | 4.0 | 3.1 | 2.55 | 2.4 | 2.25 | 2.6 | 2.2 |
| 24 | 1.9 | 1.8 | 2.05 | 3.0 | 3.75 | 4.3 | 3.05 | 2.55 | 2.45 | 2.25 | 2.65 | 2.2 |
| 25 | 1.95 | 1.85 | 2.05 | 3.0 | 3.70 | 4.25 | 3.05 | 2.55 | 2.45 | 2.35 | 2.7 | 2.2 |
| 26 | 2.1 | 1.9 | 2.05 | 3.15 | 3.75 | 4.25 | 3.05 | 2.55 | 2.45 | 2.35 | 2.8 | 2.2 |
| 27 | 2.05 | 1.85 | 2.2 | 3.3 | 3.95 | 4.15 | 3.15 | 2.55 | 2.4 | 2.3 | 2.7 | 2.2 |
| 28 | 2.15 | 1.85 | 2.25 | 3.45 | 4.05 | 4.1 | 3.0 | 2.55 | 2.4 | 2.3 | 2.55 | 2.2 |
| 29 | 2.0 | ..... | 2.2 | 3.2 | 4.2 | 4.0 | 3.05 | 2.55 | 2.45 | 2.3 | 2.45 | 2.2 |
| 30 | 2.05 | ..... | 2.2 | 3.1 | 4.0 | 4.0 | 3.05 | 2.55 | 2.45 | 2.3 | 2.45 | 2.2 |
| 31 | 2.0 | ..... | 2.2 | ..... | 3.85 | ..... | 3.1 | 2.6 | ..... | 2.35 | ..... | 2.2 |

*Daily discharge, in second-feet, of Logan River near Logan, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 75 | 148 | 65 | 148 | 690 | 1,550 | 1,260 | 520 | 250 | 170 | 153 | 170 |
| 2 | 88 | 148 | 75 | 185 | 552 | 1,600 | 1,210 | 520 | 250 | 153 | 153 | 189 |
| 3 | 88 | 100 | 65 | 245 | 912 | 1,600 | 1,160 | 458 | 229 | 153 | 153 | 189 |
| 4 | 88 | 115 | 100 | 268 | 912 | 1,600 | 1,110 | 489 | 229 | 153 | 153 | 153 |
| 5 | 115 | 100 | 100 | 245 | 838 | 1,600 | 1,110 | 489 | 250 | 170 | 153 | 136 |
| 6 | 225 | 75 | 100 | 225 | 875 | 1,640 | 1,020 | 553 | 250 | 170 | 153 | 153 |
| 7 | 130 | 100 | 88 | 245 | 912 | 1,640 | 970 | 553 | 229 | 153 | 136 | 153 |
| 8 | 100 | 148 | 88 | 185 | 950 | 1,640 | 928 | 520 | 229 | 153 | 136 | 153 |
| 9 | 88 | 100 | 88 | 205 | 990 | 1,680 | 844 | 553 | 208 | 170 | 136 | 136 |
| 10 | 88 | 100 | 75 | 225 | 950 | 1,680 | 844 | 586 | 208 | 153 | 153 | 136 |
| 11 | 75 | 100 | 65 | 225 | 912 | 1,680 | 844 | 586 | 229 | 153 | 121 | 153 |
| 12 | 88 | 100 | 65 | 225 | 875 | 1,680 | 803 | 586 | 273 | 153 | 136 | 153 |
| 13 | 88 | 130 | 75 | 225 | 800 | 1,680 | 727 | 520 | 250 | 136 | 136 | 153 |
| 14 | 88 | 100 | 88 | 225 | 838 | 1,680 | 691 | 489 | 229 | 136 | 136 | 136 |
| 15 | 148 | 100 | 88 | 268 | 838 | 1,680 | 691 | 489 | 208 | 136 | 121 | 153 |
| 16 | 225 | 115 | 88 | 315 | 912 | 1,680 | 655 | 458 | 229 | 136 | 121 | 121 |
| 17 | 165 | 100 | 130 | 425 | 912 | 1,610 | 655 | 400 | 229 | 136 | 92 | 106 |
| 18 | 115 | 100 | 115 | 585 | 838 | 1,610 | 620 | 321 | 229 | 153 | 92 | 106 |
| 19 | 165 | 115 | 130 | 552 | 875 | 1,610 | 586 | 250 | 208 | 153 | 189 | 106 |
| 20 | 245 | 88 | 130 | 552 | 912 | 1,610 | 586 | 229 | 189 | 189 | 346 | 106 |
| 21 | 245 | 100 | 115 | 488 | 950 | 1,610 | 553 | 229 | 170 | 189 | 273 | 106 |
| 22 | 165 | 88 | 100 | 425 | 1,160 | 1,680 | 553 | 229 | 170 | 136 | 208 | 106 |
| 23 | 115 | 65 | 115 | 520 | 1,120 | 1,260 | 520 | 229 | 170 | 121 | 250 | 106 |
| 24 | 75 | 55 | 115 | 585 | 1,160 | 1,610 | 489 | 229 | 189 | 121 | 273 | 106 |
| 25 | 88 | 65 | 115 | 585 | 1,120 | 1,550 | 489 | 229 | 189 | 153 | 296 | 106 |
| 26 | 130 | 75 | 115 | 690 | 1,160 | 1,550 | 489 | 229 | 189 | 153 | 346 | 106 |
| 27 | 115 | 65 | 165 | 800 | 1,330 | 1,430 | 553 | 229 | 170 | 136 | 296 | 106 |
| 28 | 148 | 65 | 185 | 912 | 1,420 | 1,370 | 458 | 229 | 170 | 136 | 229 | 106 |
| 29 | 100 | ..... | 165 | 725 | 1,550 | 1,260 | 489 | 229 | 189 | 136 | 189 | 106 |
| 30 | 115 | ..... | 165 | 655 | 1,370 | 1,260 | 489 | 229 | 189 | 136 | 189 | 106 |
| 31 | 100 | ..... | 165 | ..... | 1,240 | ..... | 520 | 250 | ..... | 153 | ..... | 106 |

NOTE.—The daily discharges for January 1 to June 21 are based on a fairly well defined rating. Discharges June 22 to December 31 based on a rating curve well defined between 586 and 1,750 second-feet and fairly well defined below 586 second-feet. Days of missing gage heights in June have been interpolated.

*Monthly discharge of Logan River near Logan, Utah, for 1909.*

[Drainage area, 218 square miles.]

| Month. | Discharge in second-feet. | | | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|---|---|
| | River. | | | Canal (mean). | Total (mean). | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| | Maximum. | Minimum. | Mean. | | | | | | |
| January | 245 | 75 | 125 | 19.4 | 144 | 0.661 | 0.76 | 8,850 | C. |
| February | 148 | 55 | 98.6 | 8.85 | 107 | .491 | .51 | 5,940 | B. |
| March | 185 | 65 | 108 | 12.2 | 120 | .550 | .63 | 7,380 | B. |
| April | 912 | 148 | 405 | 10.7 | 416 | 1.91 | 2.13 | 24,800 | B. |
| May | 1,550 | 552 | 996 | 39.1 | 1,040 | 4.77 | 5.50 | 64,000 | B. |
| June | 1,680 | 1,260 | 1,580 | 72.0 | 1,650 | 7.57 | 8.45 | 98,200 | C. |
| July | 1,260 | 458 | 739 | 83.2 | 822 | 3.77 | 4.35 | 50,500 | B. |
| August | 586 | 229 | 391 | 79.5 | 470 | 2.16 | 2.49 | 28,900 | B. |
| September | 273 | 170 | 213 | 40.8 | 254 | 1.17 | 1.30 | 15,100 | B. |
| October | 189 | 121 | 150 | 27.8 | 178 | .817 | .94 | 10,900 | B. |
| November | 346 | 92 | 184 | 20.0 | 204 | .936 | 1.04 | 12,100 | B. |
| December | 189 | 106 | 130 | 20.0 | 150 | .688 | .79 | 9,220 | C. |
| The year | 1,680 | 55 | 427 | 36.1 | 463 | 2.12 | 28.89 | 336,000 | |

NOTE.—The monthly mean for the canal for November and December was estimated. All computations based on total mean, except maximum and minimum, which apply to the Logan River station only.

### LOGAN, HYDE PARK, AND SMITHFIELD CANAL NEAR LOGAN, UTAH.

This canal diverts water for irrigation and domestic use in Logan, Hyde Park, and Smithfield. Records are fragmentary. Gage heights are available for parts of 1904 and 1905, for the entire year 1906, and for parts of 1907 and 1909.

The channel is permanent, and a rating curve has been developed from measurements made in 1909. These discharges, so far as are available, have been added to those at the station on Logan River at the mouth of the canyon in order to determine the total flow of the river. The total amount diverted by the canal during 1909 was 26,300 acre-feet.

The gage in the canal is above a spillway which discharges into the river above the station. No record was kept of the amount spilled in 1909, but it probably ranged from 2 to 5 second-feet, and the discharges of the canal as given are too large by this amount.

*Discharge measurements of Logan, Hyde Park, and Smithfield canal near Logan, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 5 | E. S. Fuller | 9.5 | 6.0 | 3.90 | 10.4 |
| June 12 | do | 10.8 | 18.2 | 5.10 | 60.0 |
| July 17 | do | 10.5 | 22.8 | 5.55 | 87.4 |

*Daily gage height, in feet, of Logan, Hyde Park, and Smithfield canal near Logan, Utah, for 1909.*

[J. H. Ebaugh, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | | | | | 3.9 | | | | | | | |
| 3 | | | | | | | | | | 4.45 | | |
| 4 | | | | 3.84 | | | | | | | | |
| 5 | | | | | | | 5.45 | 5.45 | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | 3.85 | 3.8 | | | | | | 5.5 | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | 3.8 | | | | | | | |
| 10 | 4.5 | | | | | | | | | 4.45 | | |
| 11 | | | | | | 5.15 | | | | | | |
| 12 | | | | | | | | | 4.3 | | | |
| 13 | | | | 3.9 | | 5.15 | | | | | | |
| 14 | | 3.85 | 3.75 | | | | 5.5 | | | | | |
| 15 | | | | | | | | 5.4 | | | | |
| 16 | | | | | 5.1 | | | | | | | |
| 17 | 4.3 | | | | | | | | | | | |
| 18 | | | | 3.95 | | | | | | 4.45 | | |
| 19 | | | | | | | | | | | | |
| 20 | | | | | | | | | 4.45 | | | |
| 21 | | 3.9 | 3.9 | | | 5.5 | 5.5 | | | | | |
| 22 | | | | | | | | 5.4 | | | | |
| 23 | | | | | | | | | | | | |
| 24 | 3.9 | | | | 5.15 | | | | | | | |
| 25 | | | | 3.95 | | | | | | 4.45 | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | 5.4 | 5.5 | | 4.4 | | | |
| 28 | | 3.7 | 4.3 | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | 5.0 | | | | | | | |
| 31 | 4.0 | | | | | | | 5.45 | | 4.3 | | |

*Daily discharge, in second-feet, of Logan, Hyde Park, and Smithfield canal near Logan, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | | | | | 10.4 | | | | | | | |
| 3 | | | | | | | | | | 29 | | |
| 4 | | | | 9.1 | | | | | | | | |
| 5 | | | | | | | 81 | 81 | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | 9.3 | 8.2 | | | | | | 84 | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | 8.2 | | | | | | | |
| 10 | 31 | | | | | | | | | 29 | | |
| 11 | | | | | | 63 | | | | | | |
| 12 | | | | | | | | | 23 | | | |
| 13 | | | | 10.4 | | 63 | | | | | | |
| 14 | | 9.3 | 7.3 | | | | 84 | | | | | |
| 15 | | | | | | | | 78 | | | | |
| 16 | | | | | 6.0 | | | | | | | |
| 17 | 23 | | | | | | | | | | | |
| 18 | | | | 11.7 | | | | | | 29 | | |
| 19 | | | | | | | | | | | | |
| 20 | | | | | | | | | 29 | | | |
| 21 | | 10.4 | 10.4 | | | 84 | 84 | | | | | |
| 22 | | | | | | | | 78 | | | | |
| 23 | | | | | | | | | | | | |
| 24 | 10.4 | | | | 6.3 | | | | | | | |
| 25 | | | | 11.7 | | | | | | 29 | | |
| 26 | | | | | | | | | | | | |
| 27 | | | | | | 78 | 84 | | 27 | | | |
| 28 | | 6.4 | 23 | | | | | | | | | |
| 29 | | | | | | | | | | | | |
| 30 | | | | | 5.4 | | | | | | | |
| 31 | 13 | | | | | | | 81 | | 23 | | |

NOTE.—These daily discharges are based on a well-defined rating curve. For monthly means, see p. 43.

### BLACKSMITH FORK AND POWER-PLANT RACE NEAR HYRUM, UTAH.

Blacksmith Fork rises on the western slope of the Bear River Range and flows southwest and then northwest into Logan River. The drainage basin of the tributary is in every way similar to that of the main stream. Only the flood and winter discharge, however, reaches the Logan, the entire spring and summer flow being used for irrigation on the tillable lands below the gaging station.

The station, which was established July 19, 1900, discontinued December 31, 1902, and reestablished May 16, 1904, is located at the mouth of the canyon, about 10 miles southeast of Logan and about 5 miles from Hyrum, the nearest railway and post-office point. It is about 800 feet above the Hyrum city power plant and about 500 feet below the intake of the power canal. A station was established on the power-plant race on May 16, 1904, and the total flow from the drainage area since that date is given by the sum of discharges at these two stations. The original station was above the intake of the power canal. The records show the total amount of water available for irrigation in the valley below.

The equipment consists of a car and cable and a vertical staff gage. The flow is not affected by artificial control above or below the station or by ice at either gage. The velocity at the river station is very high, and a slight shifting of channel during high water makes the records somewhat liable to error. The results, however, may be considered fairly good. Gage heights on the power-plant race for 1909 are very uncertain and have not been published. The gage datum has remained unchanged since the new stations were established in 1904.

*Discharge measurements of Blacksmith Fork and power-plant race near Hyrum, Utah, in 1909.*

BLACKSMITH FORK.

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 4 | E. A. Porter | 54 | 66 | 4.30 | 251 |
| May 6 | E. S. Fuller | 56 | 132 | 5.40 | 793 |
| June 12 | do | 51 | 84 | 5.10 | 439 |
| July 17 | do | 46 | 64 | 4.30 | 238 |

POWER-PLANT RACE.

| | | | | | |
|---|---|---|---|---|---|
| April 4 | E. A. Porter | 15.5 | 32.1 | 4.90 | 105 |
| May 6 | E. S. Fuller | 14.0 | 27.0 | 5.10 | 95.6 |
| June 12 | do | 14.0 | 25.4 | 5.00 | 85.6 |
| July 17 | do | 14.5 | 28.1 | 5.00 | 89.4 |

*Daily gage height, in feet, of Blacksmith Fork near Hyrum, Utah, for 1909.*

[Uriah Benson, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.3 | 3.6 | 3.8 | 3.8 | 4.9 | 5.6 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 4.1 |
| 2 | 3.3 | 3.6 | 3.8 | 3.9 | 4.9 | 5.8 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 4.1 |
| 3 | 3.3 | 3.6 | 3.8 | 4.2 | 4.9 | 5.8 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.9 |
| 4 | 3.4 | 3.6 | 3.8 | 4.4 | 5.2 | 5.8 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.9 |
| 5 | 3.6 | 3.6 | 3.8 | 4.1 | 5.3 | 5.8 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.9 |
| 6 | 3.8 | 3.6 | 3.8 | 3.9 | 5.4 | 5.8 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 7 | 4.1 | 3.6 | 3.8 | 3.9 | 5.5 | 5.6 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 8 | 4.1 | 3.6 | 3.7 | 3.8 | 5.6 | 5.6 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 9 | 4.1 | 3.6 | 3.7 | 3.8 | 5.4 | 5.5 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 10 | 3.3 | 3.6 | 3.7 | 3.8 | 5.2 | 5.4 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 11 | 3.3 | 3.6 | 3.7 | 3.9 | 5.1 | 5.2 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 12 | 3.2 | 3.6 | 3.7 | 4.1 | 5.1 | 5.2 | 4.5 | 4.2 | 4.2 | 4.1 | 3.8 | 3.8 |
| 13 | 3.3 | 3.6 | 3.7 | 4.2 | 5.1 | 5.1 | 4.4 | 4.2 | 4.2 | 4.0 | 3.8 | 3.8 |
| 14 | 3.3 | 3.6 | 3.7 | 4.3 | 4.9 | 5.1 | 4.4 | 4.2 | 4.1 | 3.9 | 3.8 | 3.8 |
| 15 | 3.3 | 3.6 | 3.7 | 4.3 | 4.9 | 5.1 | 4.4 | 4.2 | 4.1 | 3.9 | 3.8 | 3.8 |
| 16 | 3.3 | 3.6 | 3.7 | 4.3 | 4.9 | 4.9 | 4.4 | 4.2 | 4.1 | 3.9 | 3.8 | 3.8 |
| 17 | 4.1 | 3.8 | 3.7 | 4.3 | 4.8 | 4.9 | 4.3 | 4.1 | 4.1 | 3.9 | 3.8 | 3.8 |
| 18 | 3.8 | 3.8 | 3.7 | 4.3 | 4.7 | 4.8 | 4.3 | 4.1 | 4.1 | 3.9 | 3.8 | 3.8 |
| 19 | 4.2 | 3.8 | 3.7 | 4.3 | 4.8 | 4.8 | 4.3 | 4.1 | 4.1 | 3.9 | 3.8 | 3.8 |
| 20 | 4.3 | 3.8 | 3.7 | 4.2 | 4.8 | 4.8 | 4.3 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 21 | 4.4 | 3.8 | 3.7 | 4.1 | 4.9 | 4.8 | 4.3 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 22 | 4.2 | 3.8 | 3.7 | 4.1 | 5.1 | 4.8 | 4.2 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 23 | 4.1 | 3.8 | 3.7 | 4.3 | 5.3 | 4.8 | 4.2 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 24 | 3.9 | 3.8 | 3.7 | 4.4 | 5.4 | 4.8 | 4.2 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 25 | 3.9 | 3.8 | 3.7 | 4.4 | 5.6 | 4.8 | 4.2 | 4.1 | 4.1 | 3.9 | 4.2 | 3.8 |
| 26 | 3.8 | 3.8 | 3.7 | 4.4 | 5.7 | 4.7 | 4.2 | 4.1 | 4.1 | 3.8 | 4.2 | 3.8 |
| 27 | 3.8 | 3.8 | 3.7 | 4.8 | 5.8 | 4.6 | 4.2 | 4.1 | 4.1 | 3.8 | 4.2 | 3.8 |
| 28 | 3.7 | 3.8 | 3.7 | 4.9 | 5.8 | 4.5 | 4.2 | 4.1 | 4.1 | 3.8 | 4.2 | 3.8 |
| 29 | 3.6 | ..... | 3.7 | 4.9 | 5.8 | 4.5 | 4.2 | 4.1 | 4.1 | 3.8 | 4.1 | 3.8 |
| 30 | 3.5 | ..... | 3.7 | 4.9 | 5.5 | 4.5 | 4.2 | 4.1 | 4.1 | 3.8 | 4.1 | 3.8 |
| 31 | 3.5 | ..... | 3.7 | ..... | 5.5 | ..... | 4.2 | 4.1 | ..... | 3.8 | ..... | 3.8 |

*Daily discharge, in second-feet, of Blacksmith Fork near Hyrum, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 31 | 67 | 107 | 107 | 471 | 844 | 310 | 214 | 214 | 184 | 107 | 184 |
| 2 | 31 | 67 | 107 | 130 | 471 | 956 | 310 | 214 | 214 | 184 | 107 | 184 |
| 3 | 31 | 67 | 107 | 214 | 471 | 956 | 310 | 214 | 214 | 184 | 107 | 130 |
| 4 | 42 | 67 | 107 | 276 | 620 | 956 | 310 | 214 | 214 | 184 | 107 | 130 |
| 5 | 67 | 67 | 107 | 184 | 676 | 956 | 310 | 214 | 214 | 184 | 107 | 130 |
| 6 | 107 | 67 | 107 | 130 | 732 | 956 | 310 | 214 | 214 | 184 | 107 | 107 |
| 7 | 184 | 67 | 107 | 130 | 788 | 844 | 310 | 214 | 214 | 184 | 107 | 107 |
| 8 | 184 | 67 | 86 | 107 | 844 | 844 | 310 | 214 | 214 | 184 | 107 | 107 |
| 9 | 184 | 67 | 86 | 107 | 732 | 788 | 310 | 214 | 214 | 184 | 107 | 107 |
| 10 | 31 | 67 | 86 | 107 | 620 | 732 | 310 | 214 | 214 | 184 | 107 | 107 |
| 11 | 31 | 67 | 86 | 130 | 566 | 620 | 310 | 214 | 214 | 184 | 107 | 107 |
| 12 | 23 | 67 | 86 | 184 | 566 | 620 | 310 | 214 | 214 | 184 | 107 | 107 |
| 13 | 31 | 67 | 86 | 214 | 566 | 566 | 276 | 214 | 214 | 156 | 107 | 107 |
| 14 | 31 | 67 | 86 | 244 | 471 | 566 | 276 | 214 | 184 | 130 | 107 | 107 |
| 15 | 31 | 67 | 86 | 244 | 471 | 566 | 276 | 214 | 184 | 130 | 107 | 107 |
| 16 | 31 | 67 | 86 | 244 | 471 | 471 | 276 | 214 | 184 | 130 | 107 | 107 |
| 17 | 184 | 107 | 86 | 244 | 427 | 471 | 244 | 184 | 184 | 130 | 107 | 107 |
| 18 | 107 | 107 | 86 | 244 | 385 | 427 | 244 | 184 | 184 | 130 | 107 | 107 |
| 19 | 214 | 107 | 86 | 244 | 427 | 427 | 244 | 184 | 184 | 130 | 107 | 107 |
| 20 | 244 | 107 | 86 | 214 | 427 | 427 | 244 | 184 | 184 | 130 | 214 | 107 |
| 21 | 276 | 107 | 86 | 184 | 471 | 427 | 244 | 184 | 184 | 130 | 214 | 107 |
| 22 | 214 | 107 | 86 | 184 | 566 | 427 | 214 | 184 | 184 | 130 | 214 | 107 |
| 23 | 184 | 107 | 86 | 244 | 676 | 427 | 214 | 184 | 184 | 130 | 214 | 107 |
| 24 | 130 | 107 | 86 | 276 | 732 | 427 | 214 | 184 | 184 | 130 | 214 | 107 |
| 25 | 130 | 107 | 86 | 276 | 844 | 427 | 214 | 184 | 184 | 130 | 214 | 107 |
| 26 | 107 | 107 | 86 | 276 | 900 | 385 | 214 | 184 | 184 | 107 | 214 | 107 |
| 27 | 107 | 107 | 86 | 427 | 956 | 346 | 214 | 184 | 184 | 107 | 214 | 107 |
| 28 | 86 | 107 | 86 | 471 | 956 | 310 | 214 | 184 | 184 | 107 | 214 | 107 |
| 29 | 67 | ..... | 86 | 471 | 956 | 310 | 214 | 184 | 184 | 107 | 184 | 107 |
| 30 | 53 | ..... | 86 | 471 | 788 | 310 | 214 | 184 | 184 | 107 | 184 | 107 |
| 31 | 53 | ..... | 86 | ..... | 788 | ..... | 214 | 184 | ..... | 107 | ..... | 107 |

NOTE.—These discharges are based on a rating curve that is well defined between 31 and 732 second-feet.

*Monthly discharge of Blacksmith Fork near Hyrum, Utah, for 1909.*

[Drainage area, 286 square miles.]

| Month. | Discharge in second-feet. | | | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Blacksmith Fork—Mean. | Power-plant race—Mean. | Total mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 276 | 23 | 104 | 90 | 194 | 0.678 | 0.78 | 11,900 | B. |
| February | 107 | 67 | 84.1 | 95 | 179 | .626 | .65 | 9,940 | C. |
| March | 107 | 86 | 90.7 | 95 | 186 | .650 | .75 | 11,400 | C. |
| April | 471 | 107 | 233 | 100 | 333 | 1.16 | 1.29 | 19,800 | B. |
| May | 956 | 385 | 640 | 90 | 730 | 2.55 | 2.94 | 44,900 | B. |
| June | 956 | 310 | 593 | 88 | 681 | 2.38 | 2.66 | 40,500 | B. |
| July | 310 | 214 | 264 | 89 | 353 | 1.23 | 1.42 | 21,700 | B. |
| August | 214 | 184 | 199 | 89 | 288 | 1.01 | 1.16 | 17,700 | B. |
| September | 214 | 184 | 197 | 89 | 286 | 1.00 | 1.12 | 17,000 | B. |
| October | 184 | 107 | 147 | 85 | 232 | .811 | .94 | 14,300 | B. |
| November | 214 | 107 | 144 | 85 | 229 | .801 | .89 | 13,600 | B. |
| December | 184 | 107 | 114 | 80 | 194 | .678 | .78 | 11,900 | C. |
| The year | 956 | 23 | 238 | 89.6 | 324 | 1.13 | 15.38 | 235,000 | |

NOTE.—All computations based on total mean, except maximum and minimum, which applies to Blacksmith Fork only. The monthly mean discharge for the power race was estimated from the discharge measurements, giving some weight to the observed gage heights.

## BOX ELDER CREEK AT BRIGHAM, UTAH.

Box Elder Creek is tributary to Box Elder Lake, about 3 miles northwest of Brigham, Utah. At high stages the water may reach Bear River. The gaging station, which was established May 20, 1909, to determine the amount of unappropriated water passing this point, is located about three-fourths of a mile northwest of Brigham City, Utah, on the Third West Street Bridge, and about one-half mile above the Oregon Short Line Railroad crossing. The gage is of the vertical type and is located on the northwest corner of the bridge.

The records are not affected by ice conditions or by artificial control above or below the station. The gage heights observed at this station are believed to be unreliable and no records can be worked up from 1909 measurements.

*Discharge measurements of Box Elder Creek at Brigham, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 20 | E. A. Porter | 15.9 | 14.9 | 1.95 | 57.9 |
| June 10 | E. S. Fuller | 15.9 | 9.2 | 1.45 | 21.7 |
| November 2 | E. A. Porter | 15.9 | 10.5 | 1.42 | 21.1 |

## WEBER RIVER BASIN.

### DESCRIPTION.

Weber River rises on the northern slope of the Uinta Mountains and flows in a tortuous course northwestward into Great Salt Lake.

The upper portion of the basin is very rough. The highest peaks, reaching an elevation of about 13,000 feet, are masses of sandstone and quartzite, barren of vegetation and covered with snow for almost the entire year. Farther down the prevailing formation is limestone overlain with sandstone and conglomerate. A thin layer of soil covers the basin in patches and supports small groves of fir and aspen. The basin contains no extensive forests, meadows, or marshes. The greater part of the precipitation is in the form of snow, the melting of which is the chief source of the spring flood and early summer flow. A large part of the normal flow is derived from springs, which are well distributed over the area. Many tributaries, all short and confined to steep, narrow canyons, enter all along the course.

Between Oakley and Croyden the river traverses a very narrow valley comprising irrigated farms. The principal rock formation over this area is of conglomerate and sandstone, with but little loose and porous overlying soil except near the stream bed, where the deposit of bowlders and soil varies from 10 to 20 feet in depth. The chief tributaries in this stretch of the river are Beaver Creek, which enters from the south about 6 miles below Oakley and drains a rough country about 71 square miles in extent; Chalk Creek, from the east, which drains a rough, dry country about 428 miles in area and enters the Weber 15 miles above Croyden; and Lost Creek, which comes in from the east at a point about one-half mile above the Devils Slide gaging station and has a drainage area of 205 square miles.

Between Croyden and Plain City the stream flows in a well-defined channel through a comparatively narrow, steep canyon, with occasional stretches of valley containing irrigated farming lands. The rock is a porous and badly fissured sandstone and conglomerate, with but very little overlying soil. Near the mouth of the canyon the material is a very rough but compact limestone. East Creek, which enters near Morgan, discharges but little water into the river, as its flow is completely controlled by a storage reservoir about 5 miles above its mouth, the water being used for irrigation in Morgan Valley, through which the Weber flows. After leaving the Wasatch Range the Weber enters Great Salt Lake valley, through which it flows in a well-defined channel with no overflow.

Ogden River joins the Weber about 8 miles above Plain City. It drains a rough and rugged limestone area, 363 square miles in extent, in the western slopes of the Wasatch Range. The main stream and its numerous small tributaries are confined to steep, narrow canyons. The entire normal flow of the stream is diverted for irrigation near

the foot of the canyon about 3 miles above the mouth of the river, after being used for the development of power by the Utah Light and Railway Company. The flood and winter flow, therefore, is all that reaches the Weber, except for a small amount of seepage from the irrigated district. The city of Ogden also derives its water supply from Ogden River.

At present no storage reservoirs are used on the Weber, but a number of sites are available.

The wettest year since records have been kept was 1909, when 1,290,000 acre-feet wasted into Great Salt Lake from the Weber basin, as shown by the records at the Plain City station. The year 1905 was by far the driest year, when only 298,000 acre-feet wasted into Great Salt Lake.

The gaging stations maintained in this basin are as follows:

Weber River near Oakley, Utah, 1904–1909.
Weber River at Devils Slide (Croydon), Utah, 1905–1909.
Weber River near Uinta, Utah, 1889–1901, 1903.
Weber River near Plain City, Utah, 1903–1909.
Lost Creek near Croydon, Utah, 1905.
Chalk Creek at Coalville, Utah, 1904–5.
Ogden River at Ogden, Utah, 1895–1901.

### WEBER RIVER NEAR OAKLEY, UTAH.

This station, which was established October 22, 1904, is located near the mouth of the canyon above Kamas Prairie, about 3 miles above Oakley, Utah, the nearest post-office. The records show the total amount of water available for diversion through Kamas Pass into Provo River in connection with the proposed Weber River project.

The station is below South Fork and above Kamas Creek and is above all diversions to the Kamas Prairie region.

Measurements are made from a cable and car.

The river freezes over at the station at times during the winter season, but as the winter flow is fairly constant good results are obtained by interpolating between periods when the river is known to be open.

The bed of the stream is fairly permanent and the results may be considered good. The datum of the inclined staff gage has remained unchanged since the station was established.

*Discharge measurements of Weber River near Oakley, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 6 | E. A. Porter | 44 | 59 | 4.20 | 92 |
| May 8 | E. S. Fuller | 53 | 125 | 5.75 | 650 |
| June 14 | do | 55 | 194 | 6.90 | [a]1,840 |
| July 19 | do | 48 | 111 | 5.00 | 407 |

[a] Surface velocity measured, not reduced.

*Daily gage height, in feet, of Weber River near Oakley, Utah, for 1909.*

[John Franson, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | 4.1 | 4.9 | 6.3 | 7.0 | 4.6 | 4.7 | 4.2 | 4.1 | 4.05 |
| 2 | ..... | ..... | ..... | 4.1 | 4.9 | 6.9 | 6.9 | 4.7 | 4.5 | 4.15 | 4.1 | 4.05 |
| 3 | ..... | ..... | ..... | 4.15 | 5.1 | 7.5 | 6.8 | 4.6 | 4.45 | 4.15 | 4.1 | 4.35 |
| 4 | ..... | 4.5 | 4.05 | 4.2 | 5.3 | 8.0 | 6.6 | 4.6 | 4.45 | 4.15 | 4.05 | 4.4 |
| 5 | ..... | ..... | ..... | 4.2 | 5.6 | 8.5 | 6.4 | 4.6 | 4.45 | 4.2 | 4.05 | 4.7 |
| 6 | ..... | ..... | ..... | ..... | 5.65 | 8.5 | 6.2 | 4.65 | 4.4 | 4.2 | 4.05 | 4.7 |
| 7 | ..... | ..... | ..... | 4.2 | 5.7 | 8.5 | 5.8 | 4.6 | 4.4 | 4.2 | 4.05 | 4.8 |
| 8 | 4.15 | ..... | ..... | 4.2 | 5.8 | 7.8 | 5.8 | 4.6 | 4.4 | 4.2 | 4.05 | 5.0 |
| 9 | ..... | ..... | ..... | 4.2 | 5.9 | 7.3 | 5.7 | 4.55 | 4.35 | 4.2 | 4.05 | 4.7 |
| 10 | ..... | ..... | ..... | 4.25 | 6.2 | 6.9 | 5.6 | 4.5 | 4.35 | 4.15 | 4.05 | 4.5 |
| 11 | ..... | 4.95 | 4.35 | 4.25 | 6.0 | 6.8 | 5.5 | 4.5 | 4.35 | 4.15 | 4.05 | 4.3 |
| 12 | ..... | ..... | ..... | 4.25 | 5.8 | 6.9 | 5.4 | 4.45 | 4.35 | ..... | 4.05 | 4.3 |
| 13 | ..... | ..... | ..... | 4.3 | 5.8 | 6.9 | 5.35 | 4.45 | 4.35 | 4.15 | 4.05 | 4.25 |
| 14 | ..... | ..... | ..... | 4.4 | 5.8 | 7.1 | 5.3 | 4.4 | 4.35 | 4.15 | 4.1 | 4.25 |
| 15 | 4.35 | ..... | ..... | 4.45 | 5.9 | 7.0 | 5.2 | 4.4 | 4.3 | 4.1 | 4.1 | 4.3 |
| 16 | ..... | ..... | ..... | 4.5 | 5.9 | 7.1 | 5.2 | 4.5 | 4.3 | 4.1 | 4.1 | ..... |
| 17 | ..... | ..... | ..... | ..... | 5.7 | 7.9 | 5.15 | 4.5 | 4.25 | 4.1 | 4.1 | 5.8 |
| 18 | ..... | 4.05 | 4.15 | 4.65 | 5.8 | 8.0 | 5.1 | 4.5 | 4.25 | 4.1 | 4.15 | 6.1 |
| 19 | ..... | ..... | ..... | 4.65 | 5.8 | 7.5 | 5.1 | 4.45 | 4.25 | ..... | 4.2 | 6.1 |
| 20 | ..... | ..... | ..... | 4.7 | 5.9 | 7.3 | 5.0 | 4.45 | 4.25 | 4.1 | 4.25 | 6.2 |
| 21 | 4.15 | ..... | ..... | 4.75 | 6.0 | 7.1 | 4.9 | ..... | 4.25 | 4.1 | 4.3 | 6.2 |
| 22 | ..... | ..... | ..... | 4.8 | 6.2 | 7.0 | 4.85 | 5.0 | 4.25 | 4.1 | 4.25 | 6.0 |
| 23 | ..... | ..... | ..... | 4.8 | 6.3 | 7.3 | 4.8 | 4.6 | 4.25 | 4.1 | 4.25 | 6.0 |
| 24 | ..... | ..... | ..... | 4.85 | 6.2 | 7.5 | ..... | 4.5 | 4.25 | 4.1 | 4.25 | 6.1 |
| 25 | ..... | 4.25 | 4.1 | 4.85 | 6.0 | 7.5 | 4.75 | 4.45 | 4.2 | 4.1 | 4.2 | 6.0 |
| 26 | ..... | ..... | ..... | 4.9 | 6.2 | 7.3 | 4.7 | 4.4 | 4.2 | ..... | 4.15 | 5.5 |
| 27 | ..... | ..... | ..... | 5.0 | 6.4 | 7.4 | 4.65 | 4.4 | 4.2 | 4.1 | 4.15 | 5.0 |
| 28 | ..... | ..... | ..... | 5.1 | 6.8 | 7.3 | 4.65 | 4.4 | 4.2 | 4.1 | 4.05 | 4.85 |
| 29 | 5.4 | ..... | ..... | 5.1 | 6.5 | 7.2 | 4.6 | 4.35 | 4.2 | 4.1 | 4.05 | 4.8 |
| 30 | ..... | ..... | ..... | 5.05 | 6.2 | 7.1 | 4.6 | 5.0 | 4.2 | 4.05 | ..... | 4.6 |
| 31 | ..... | ..... | 4.1 | ..... | 6.3 | .... | 4.6 | 4.8 | ..... | 4.05 | ..... | 4.5 |

NOTE.—Ice conditions existed January to March and during December.

*Daily discharge, in second-feet, of Weber River near Oakley, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | 58 | 241 | 1,110 | 1,890 | 243 | 279 | 129 | 108 | ..... |
| 2 | ..... | ..... | ..... | 58 | 241 | 1,730 | 1,790 | 279 | 210 | 118 | 108 | ..... |
| 3 | ..... | ..... | ..... | 66 | 315 | 2,490 | 1,690 | 243 | 195 | 118 | 108 | ..... |
| 4 | ..... | ..... | ..... | 73 | 410 | 3,220 | 1,510 | 243 | 195 | 118 | 99 | ..... |
| 5 | ..... | ..... | ..... | 73 | 570 | 4,010 | 1,330 | 243 | 195 | 129 | 99 | ..... |
| 6 | ..... | ..... | ..... | 73 | 600 | 4,010 | 1,170 | 261 | 180 | 129 | 99 | ..... |
| 7 | ..... | ..... | ..... | 73 | 630 | 4,010 | 878 | 243 | 180 | 129 | 99 | ..... |
| 8 | ..... | ..... | ..... | 73 | 690 | 2,920 | 878 | 243 | 180 | 129 | 99 | ..... |
| 9 | ..... | ..... | ..... | 73 | 760 | 2,230 | 811 | 226 | 166 | 129 | 99 | ..... |
| 10 | ..... | ..... | ..... | 82 | 1,020 | 1,730 | 747 | 210 | 166 | 118 | 99 | ..... |
| 11 | ..... | ..... | ..... | 82 | 840 | 1,620 | 685 | 210 | 166 | 118 | 99 | ..... |
| 12 | ..... | ..... | ..... | 82 | 690 | 1,730 | 624 | 195 | 166 | 118 | 99 | ..... |
| 13 | ..... | ..... | ..... | 90 | 690 | 1,730 | 595 | 195 | 166 | 118 | 99 | ..... |
| 14 | ..... | ..... | ..... | 109 | 690 | 1,970 | 566 | 180 | 166 | 118 | 108 | ..... |
| 15 | ..... | ..... | ..... | 120 | 760 | 1,850 | 510 | 180 | 153 | 108 | 108 | ..... |
| 16 | ..... | ..... | ..... | 130 | 760 | 1,970 | 510 | 210 | 153 | 108 | 108 | ..... |
| 17 | ..... | ..... | ..... | 148 | 630 | 3,070 | 484 | 210 | 141 | 108 | 108 | ..... |
| 18 | ..... | ..... | ..... | 167 | 690 | 3,220 | 457 | 210 | 141 | 108 | 118 | ..... |
| 19 | ..... | ..... | ..... | 167 | 690 | 2,490 | 457 | 195 | 141 | 108 | 129 | ..... |
| 20 | ..... | ..... | ..... | 180 | 760 | 2,220 | 407 | 195 | 141 | 108 | 141 | ..... |
| 21 | ..... | ..... | ..... | 194 | 840 | 1,990 | 360 | 301 | 141 | 108 | 153 | ..... |
| 22 | ..... | ..... | ..... | 209 | 1,020 | 1,890 | 339 | 407 | 141 | 108 | 141 | ..... |
| 23 | ..... | ..... | ..... | 209 | 1,110 | 2,220 | 318 | 243 | 141 | 108 | 141 | ..... |
| 24 | ..... | ..... | ..... | 225 | 1,020 | 2,490 | 308 | 210 | 141 | 108 | 141 | ..... |
| 25 | ..... | ..... | ..... | 225 | 840 | 2,490 | 298 | 195 | 129 | 108 | 129 | ..... |
| 26 | ..... | ..... | ..... | 241 | 1,020 | 2,220 | 279 | 180 | 129 | 108 | 118 | ..... |
| 27 | ..... | ..... | ..... | 275 | 1,210 | 2,350 | 261 | 180 | 129 | 108 | 118 | ..... |
| 28 | ..... | ..... | ..... | 315 | 1,620 | 2,220 | 261 | 180 | 129 | 108 | 99 | ..... |
| 29 | ..... | ..... | ..... | 315 | 1,310 | 2,100 | 243 | 166 | 129 | 108 | 99 | ..... |
| 30 | ..... | ..... | ..... | 295 | 1,020 | 1,990 | 243 | 407 | 129 | 99 | 99 | ..... |
| 31 | ..... | ..... | ..... | ..... | 1,110 | ..... | 243 | 318 | ..... | 99 | ..... | ..... |

NOTE.—The discharges from April 1 to June 17 are based on a rating curve fairly well defined between 58 and 1,850 second-feet; from June 18 to November 30 on a rating not well defined. Discharges for days of missing gage heights between April 1 and November 30 have been interpolated.

*Monthly discharge of Weber River near Oakley, Utah, for 1909.*

[Drainage area, 163 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | | | 66 | 0.405 | 0.47 | 4,060 | C. |
| February | | | 58 | .356 | .37 | 3,220 | C. |
| March | | | 58 | .356 | .41 | 3,570 | C. |
| April | 315 | 58 | 149 | .914 | 1.02 | 8,870 | B. |
| May | 1,620 | 241 | 800 | 4.91 | 5.66 | 49,200 | B. |
| June | 4,010 | 1,110 | 2,380 | 14.6 | 16.29 | 142,000 | B. |
| July | 1,890 | 243 | 682 | 4.18 | 4.82 | 41,900 | B. |
| August | 407 | 166 | 232 | 1.42 | 1.64 | 14,300 | B. |
| September | 279 | 129 | 161 | .988 | 1.10 | 9,580 | B. |
| October | 129 | 99 | 114 | .699 | .81 | 7,010 | B. |
| November | 153 | 99 | 112 | .687 | .77 | 6,660 | B. |
| December | | | 95 | .583 | .67 | 5.840 | C. |
| The year | 4,010 | | 409 | 2.51 | 34.03 | 296,000 | |

NOTE.—Monthly mean discharges for January to March and December were estimated by interpolating the discharge between days when the gage was unaffected by ice. The discharge during the winter seems to decrease gradually, reaching a minimum in February or March.

## WEBER RIVER AT DEVILS SLIDE, UTAH.

This station, which has formerly been called Weber River near Croydon, was established February 1, 1905, to determine the amount of water available for storage in the Henefer basin, about 2 miles above the station, in connection with the proposed Weber River project. It is located at the new town of Devils Slide, about 1½ miles west of Croydon and 10 miles below Echo.

Lost Creek is tributary about one-fourth mile above the station and Chalk Creek enters about 15 miles above. The only diversions above are those for irrigation in Kamas Prairie and in the narrow valleys above the station.

Measurements are made from a cable and car.

The river never freezes over at the station although slush ice runs at times. This ice, however, does not seriously affect the discharge. The channel is fairly permanent and the measuring conditions are good. The records are not affected by artificial control above or below the station and may be considered excellent. The datum of the staff gage has remained unchanged since the station was established.

*Discharge measurements of Weber River at Devils Slide, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec. ft.* |
| April 8 | E. A. Porter | 99 | 160 | 2.82 | 552 |
| May 8 | E. S. Fuller | 110 | 490 | 5.85 | 3,330 |
| June 14 | do | 113 | 456 | 5.70 | 2,720 |
| July 19 | do | 98 | 165 | 2.85 | 562 |

*Daily gage height, in feet, of Weber River at Devils Slide, Utah, for 1909.*

[E. T. Crouch, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.1 | 2.3 | 2.3 | 3.1 | 4.4 | 5.6 | 5.0 | 2.6 | 2.6 | 2.5 | 2.3 | 2.3 |
| 2 | 2.1 | 2.2 | 2.4 | 3.4 | 4.4 | 6.05 | 4.8 | 2.6 | 2.9 | 2.5 | 2.3 | 2.3 |
| 3 | 2.1 | 2.2 | 2.5 | 3.8 | 4.8 | 7.0 | 4.8 | 2.5 | 2.8 | 2.5 | 2.3 | 2.3 |
| 4 | 2.1 | 2.2 | 2.5 | 3.8 | 5.2 | 7.0 | 4.8 | 2.5 | 2.7 | 2.5 | 2.3 | 2.3 |
| 5 | 2.3 | 2.2 | 2.5 | 3.4 | 5.8 | 7.0 | 4.7 | 2.4 | 3.0 | 2.5 | 2.3 | 2.3 |
| 6 | 3.0 | 2.2 | 2.5 | 3.2 | 5.4 | 7.0 | 4.5 | 2.4 | 2.9 | 2.5 | 2.3 | 2.3 |
| 7 | 3.0 | 2.2 | 2.4 | 3.0 | 5.6 | 7.0 | 4.2 | 2.4 | 2.8 | 2.5 | 2.3 | 2.3 |
| 8 | 2.9 | 2.2 | 2.4 | 3.0 | 5.9 | 7.0 | 3.9 | 2.4 | 2.7 | 2.5 | 2.3 | 2.3 |
| 9 | 2.6 | 2.3 | 2.4 | 3.0 | 6.0 | 6.7 | 3.6 | 2.4 | 2.7 | 2.5 | 2.3 | 2.3 |
| 10 | 2.7 | 2.4 | 2.4 | 3.2 | 6.0 | 6.0 | 3.5 | 2.6 | 2.7 | 2.5 | 2.3 | 2.3 |
| 11 | 2.8 | 2.5 | 2.4 | 3.2 | 6.6 | 5.5 | 3.4 | 2.5 | 2.7 | 2.5 | 2.3 | 2.3 |
| 12 | 2.9 | 2.5 | 2.4 | 3.1 | 5.8 | 5.4 | 3.4 | 2.4 | 2.9 | 2.5 | 2.3 | 2.3 |
| 13 | 3.0 | 2.5 | 2.4 | 3.1 | 5.5 | 5.6 | 3.3 | 2.4 | 2.8 | 2.5 | 2.3 | 2.3 |
| 14 | 3.4 | 2.5 | 2.5 | 3.5 | 5.5 | 5.6 | 3.2 | 2.4 | 2.8 | 2.5 | 2.3 | 2.3 |
| 15 | 3.6 | 2.4 | 2.5 | 3.9 | 5.8 | 5.5 | 3.1 | 2.4 | 2.8 | 2.5 | 2.3 | 2.3 |
| 16 | 3.8 | 2.4 | 2.5 | 4.3 | 5.6 | 5.4 | 3.1 | 2.4 | 2.7 | 2.5 | 2.3 | 2.3 |
| 17 | 3.8 | 2.4 | 2.5 | 4.8 | 5.6 | 5.4 | 3.0 | 2.4 | 2.7 | 2.4 | 2.3 | 2.3 |
| 18 | 3.7 | 2.4 | 2.6 | 4.9 | 5.5 | 6.0 | 2.9 | 2.6 | 2.7 | 2.4 | 2.3 | 2.3 |
| 19 | 3.6 | 2.3 | 2.6 | 4.9 | 5.7 | 6.0 | 2.9 | 2.7 | 2.7 | 2.4 | 2.3 | 2.3 |
| 20 | 3.4 | 2.3 | 2.6 | 4.9 | 5.8 | 5.7 | 2.8 | 2.6 | 2.6 | 2.4 | 3.0 | 2.3 |
| 21 | 3.4 | 2.3 | 2.5 | 4.5 | 6.0 | 5.2 | 2.9 | 2.5 | 2.6 | 2.4 | 3.3 | 2.3 |
| 22 | 3.4 | 2.3 | 2.6 | 4.3 | 6.1 | 5.5 | 2.9 | 2.9 | 2.6 | 2.4 | 3.2 | 2.3 |
| 23 | 3.4 | 2.3 | 2.6 | 4.3 | 6.2 | 5.3 | 2.8 | 2.8 | 2.6 | 2.4 | 3.1 | 2.3 |
| 24 | 3.3 | 2.2 | 2.6 | 4.5 | 5.7 | 5.3 | 2.7 | 2.8 | 2.6 | 2.4 | 2.9 | 2.3 |
| 25 | 3.2 | 2.2 | 2.5 | 4.4 | 5.5 | 5.4 | 2.7 | 2.7 | 2.6 | 2.4 | 2.8 | 2.3 |
| 26 | 3.0 | 2.2 | 2.6 | 4.9 | 5.7 | 5.4 | 2.7 | 2.6 | 2.6 | 2.4 | 2.7 | 2.3 |
| 27 | 2.9 | 2.2 | 2.7 | 5.4 | 6.0 | 5.4 | 2.7 | 2.6 | 2.6 | 2.4 | 2.5 | 2.3 |
| 28 | 2.8 | 2.2 | 2.9 | 5.6 | 7.0 | 5.4 | 2.6 | 2.6 | 2.6 | 2.4 | 2.4 | 2.3 |
| 29 | 2.7 | ..... | 3.0 | 5.2 | 6.05 | 5.3 | 2.6 | 2.6 | 2.5 | 2.4 | 2.4 | 2.3 |
| 30 | 2.6 | ..... | 3.0 | 4.5 | 6.05 | 5.3 | 2.6 | 2.6 | 2.5 | 2.3 | 2.3 | 2.3 |
| 31 | 2.4 | ..... | 3.0 | ..... | 6.05 | ..... | 2.6 | 2.6 | ..... | 2.3 | ..... | 2.3 |

*Daily discharge, in second-feet, of Weber River at Devils Slide, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 217 | 305 | 305 | 713 | 1,730 | 3,060 | 2,320 | 443 | 443 | 395 | 305 | 305 |
| 2 | 217 | 261 | 349 | 905 | 1,730 | 3,690 | 2,110 | 443 | 599 | 395 | 305 | 305 |
| 3 | 217 | 261 | 395 | 1,210 | 2,110 | 5,120 | 2,110 | 395 | 545 | 395 | 305 | 305 |
| 4 | 217 | 261 | 395 | 1,210 | 2,550 | 5,120 | 2,110 | 395 | 493 | 395 | 305 | 305 |
| 5 | 305 | 261 | 395 | 905 | 3,340 | 5,120 | 2,020 | 349 | 655 | 395 | 305 | 305 |
| 6 | 655 | 261 | 395 | 773 | 2,800 | 5,120 | 1,830 | 349 | 599 | 395 | 305 | 305 |
| 7 | 655 | 261 | 349 | 655 | 3,060 | 5,120 | 1,550 | 349 | 545 | 395 | 305 | 305 |
| 8 | 599 | 261 | 349 | 655 | 3,480 | 5,120 | 1,300 | 349 | 493 | 395 | 305 | 305 |
| 9 | 443 | 305 | 349 | 655 | 3,620 | 4,640 | 1,050 | 349 | 493 | 395 | 305 | 305 |
| 10 | 493 | 349 | 349 | 773 | 3,620 | 3,620 | 977 | 443 | 493 | 395 | 305 | 305 |
| 11 | 545 | 395 | 349 | 773 | 4,490 | 2,930 | 905 | 395 | 493 | 395 | 305 | 305 |
| 12 | 599 | 395 | 349 | 713 | 3,340 | 2,800 | 905 | 349 | 599 | 395 | 305 | 305 |
| 13 | 655 | 395 | 349 | 713 | 2,930 | 3,060 | 837 | 349 | 545 | 395 | 305 | 305 |
| 14 | 905 | 395 | 395 | 977 | 2,930 | 3,060 | 773 | 349 | 545 | 395 | 305 | 305 |
| 15 | 1,050 | 349 | 395 | 1,300 | 3,340 | 2,930 | 713 | 349 | 545 | 395 | 305 | 305 |
| 16 | 1,210 | 349 | 395 | 1,640 | 3,060 | 2,800 | 713 | 349 | 493 | 395 | 305 | 305 |
| 17 | 1,210 | 349 | 395 | 2,110 | 3,060 | 2,800 | 655 | 349 | 493 | 349 | 305 | 305 |
| 18 | 1,130 | 349 | 443 | 2,220 | 2,930 | 3,620 | 599 | 443 | 493 | 349 | 305 | 305 |
| 19 | 1,050 | 305 | 443 | 2,220 | 3,200 | 3,620 | 599 | 493 | 493 | 349 | 305 | 305 |
| 20 | 905 | 305 | 443 | 2,220 | 3,340 | 3,200 | 545 | 443 | 443 | 349 | 655 | 305 |
| 21 | 905 | 305 | 395 | 1,830 | 3,620 | 2,550 | 599 | 395 | 443 | 349 | 837 | 305 |
| 22 | 905 | 305 | 443 | 1,640 | 3,760 | 2,930 | 599 | 599 | 443 | 349 | 773 | 305 |
| 23 | 905 | 305 | 443 | 1,640 | 3,900 | 2,670 | 545 | 545 | 443 | 349 | 713 | 305 |
| 24 | 837 | 261 | 443 | 1,830 | 3,200 | 2,670 | 493 | 545 | 443 | 349 | 599 | 305 |
| 25 | 773 | 261 | 395 | 1,730 | 2,930 | 2,800 | 493 | 493 | 443 | 349 | 545 | 305 |
| 26 | 655 | 261 | 443 | 2,220 | 3,200 | 2,800 | 493 | 443 | 443 | 349 | 493 | 305 |
| 27 | 599 | 261 | 493 | 2,800 | 3,620 | 2,800 | 493 | 443 | 443 | 349 | 395 | 305 |
| 28 | 545 | 261 | 599 | 3,060 | 5,120 | 2,800 | 443 | 443 | 443 | 349 | 349 | 305 |
| 29 | 493 | ..... | 655 | 2,550 | 3,690 | 2,670 | 443 | 443 | 395 | 349 | 349 | 305 |
| 30 | 443 | ..... | 655 | 1,830 | 3,690 | 2,670 | 443 | 443 | 395 | 305 | 305 | 305 |
| 31 | 349 | ..... | 655 | ..... | 3,690 | ..... | 443 | 443 | ..... | 305 | ..... | 305 |

NOTE.—These discharges are based on a rating curve that is well defined between 261 and 3,620 second-feet.

*Monthly discharge of Weber River at Devils Slide, Utah, for 1909.*

[Drainage area, 1,090 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 1,210 | 217 | 667 | 0.612 | 0.71 | 41,000 | B. |
| February | 395 | 261 | 307 | .282 | .29 | 17,000 | B. |
| March | 655 | 305 | 426 | .391 | .45 | 26,200 | A. |
| April | 3,060 | 655 | 1,480 | 1.36 | 1.52 | 88,100 | A. |
| May | 5,120 | 1,730 | 3,260 | 2.99 | 3.45 | 200,000 | B. |
| June | 5,120 | 2,550 | 3,460 | 3.17 | 3.54 | 206,000 | B. |
| July | 2,320 | 443 | 971 | .891 | 1.03 | 59,700 | A. |
| August | 599 | 349 | 418 | .383 | .44 | 25,700 | A. |
| September | 655 | 395 | 494 | .453 | .51 | 29,400 | A. |
| October | 395 | 305 | 370 | .339 | .39 | 22,800 | A. |
| November | 837 | 305 | 394 | .361 | .40 | 23,400 | A. |
| December | 305 | 305 | 305 | .280 | .32 | 18,800 | B. |
| The year | 5,120 | 217 | 1,050 | .959 | 13.05 | 758,000 | |

## WEBER RIVER NEAR PLAIN CITY, UTAH.

This station was established in 1903 under the direction of the state engineer and was maintained by the State of Utah until May 14, 1905, when it was taken up by the United States Geological Survey, by whom it has since been maintained in cooperation with the State. It is located at the highway bridge on the main road to Plain City and West Weber, about 10 miles northwest of Ogden, Utah, and about 6 miles above the mouth of the river.

The station is below all tributaries and diversions, Ogden River entering about 8 miles above the station. The records show the total amount of water discharged into Great Salt Lake and will be valuable in the adjudication of water rights on the Ogden and Weber rivers.

Discharge measurements are made from the bridge. The upstream face of the center bridge pier is graduated, marked with white paint, and forms the gage.

The records are very little affected by ice, although the river freezes at times near the station. There is no effect from artificial control above or below the station, and as the bed of the stream changes only very slightly the records may be considered excellent.

*Discharge measurements of Weber River near Plain City, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 7 | E. A. Porter | 130 | 866 | 10.30 | 2,110 |
| May 7 | E. S. Fuller | 132 | 1,920 | 18.20 | 6,740 |
| June 13 | do | 138 | 1,840 | 15.40 | 4,200 |
| July 18 | do | 115 | 316 | 4.40 | 252 |

*Daily gage height, in feet, of Weber River near Plain City, Utah, for 1909.*

[D. O. Wadman, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.8 | 8.3 | 6.4 | 10.1 | 16.9 | 17.7 | 11.6 | 3.9 | 4.1 | 4.6 | 4.9 | 6.8 |
| 2 | 5.8 | 7.0 | 6.4 | 11.7 | 16.5 | 17.9 | 11.3 | 3.7 | 4.7 | 4.6 | 4.9 | 7.9 |
| 3 | 5.8 | 6.9 | 6.4 | 12.2 | 16.4 | 17.9 | 10.9 | 3.5 | 5.2 | 4.8 | 4.9 | 7.8 |
| 4 | 5.9 | 7.0 | 6.5 | 11.9 | 16.1 | 18.7 | 10.3 | 3.3 | 5.7 | 4.8 | 4.9 | 7.6 |
| 5 | 7.1 | 7.0 | 6.9 | 11.2 | 16.8 | 19.0 | 9.7 | 3.2 | 5.5 | 4.9 | 4.9 | 7.3 |
| 6 | 10.3 | 7.0 | 7.5 | 10.8 | 17.9 | 19.1 | 9.2 | 3.2 | 5.4 | 4.9 | 4.9 | 7.4 |
| 7 | 12.2 | 7.1 | 7.2 | 10.2 | 17.8 | 19.0 | 8.6 | 3.3 | 5.4 | 4.9 | 4.9 | 7.2 |
| 8 | 9.4 | 7.1 | 7.0 | 9.9 | 17.6 | 18.8 | 7.9 | 3.3 | 5.2 | 4.9 | 4.8 | 7.0 |
| 9 | 8.0 | 6.8 | 7.0 | 9.8 | 17.8 | 17.9 | 7.3 | 3.2 | 5.2 | 4.9 | 4.8 | 7.0 |
| 10 | 7.4 | 6.8 | 6.8 | 10.1 | 18.2 | 17.8 | 6.8 | 3.1 | 5.2 | 4.9 | 4.8 | 6.9 |
| 11 | 7.0 | 7.0 | 6.6 | 10.6 | 18.5 | 17.1 | 6.1 | 3.2 | 5.1 | 4.9 | 4.8 | 6.9 |
| 12 | 6.9 | 7.6 | 6.3 | 10.5 | 18.5 | 16.3 | 5.9 | 3.3 | 5.1 | 4.9 | 4.7 | 6.8 |
| 13 | 9.1 | 8.5 | 6.2 | 10.4 | 18.0 | 15.4 | 5.6 | 3.4 | 5.0 | 4.9 | 4.8 | 6.8 |
| 14 | 10.8 | 7.6 | 6.2 | 10.9 | 17.8 | 15.0 | 5.5 | 3.4 | 5.0 | 4.9 | 4.8 | 6.8 |
| 15 | 15.8 | 7.2 | 6.4 | 12.1 | 17.4 | 14.9 | 5.3 | 3.3 | 5.0 | 4.9 | 4.9 | 6.7 |
| 16 | 13.5 | 7.1 | 6.5 | 14.0 | 17.5 | 14.7 | 5.0 | 3.3 | 5.0 | 4.9 | 4.9 | 6.6 |
| 17 | 12.1 | 7.0 | 6.7 | 15.6 | 17.2 | 14.6 | 4.8 | 3.3 | 4.9 | 4.9 | 4.9 | 6.6 |
| 18 | 10.8 | 7.0 | 7.3 | 15.8 | 17.2 | 14.4 | 4.4 | 3.2 | 4.9 | 4.9 | 4.9 | 6.6 |
| 19 | 9.9 | 6.8 | 9.2 | 16.2 | 17.3 | 14.3 | 4.3 | 3.1 | 5.1 | 4.9 | 5.4 | 6.5 |
| 20 | 12.7 | 6.8 | 8.4 | 16.9 | 17.5 | 14.0 | 4.3 | 3.1 | 5.2 | 4.9 | 5.9 | 6.5 |
| 21 | 12.5 | 6.6 | 8.0 | 17.1 | 17.9 | 13.8 | 4.1 | 3.2 | 5.2 | 4.9 | 12.4 | 6.5 |
| 22 | 13.0 | 6.6 | 8.0 | 16.7 | 18.2 | 13.5 | 4.0 | 3.2 | 5.0 | 4.9 | 9.5 | 6.4 |
| 23 | 10.7 | 6.6 | 8.0 | 16.3 | 18.5 | 13.1 | 3.9 | 3.3 | 5.0 | 4.9 | 9.4 | 6.4 |
| 24 | 9.3 | 6.6 | 8.5 | 16.0 | 18.8 | 12.8 | 3.8 | 3.3 | 4.9 | 4.9 | 9.5 | 6.4 |
| 25 | 8.2 | 6.6 | 8.9 | 15.6 | 18.6 | 12.5 | 3.8 | 3.3 | 4.9 | 4.9 | 9.2 | 6.4 |
| 26 | 8.0 | 6.5 | 9.8 | 16.2 | 18.1 | 12.4 | 4.0 | 3.3 | 4.8 | 4.9 | 10.0 | 6.4 |
| 27 | 8.0 | 6.5 | 11.2 | 17.0 | 18.4 | 12.1 | 4.2 | 3.4 | 4.8 | 4.9 | 9.3 | 6.4 |
| 28 | 8.2 | 6.5 | 12.6 | 18.1 | 19.0 | 12.0 | 4.6 | 3.6 | 4.6 | 4.9 | 8.5 | 6.3 |
| 29 | 7.8 | ..... | 12.1 | 18.5 | 18.6 | 11.9 | 4.3 | 3.7 | 4.6 | 4.9 | 7.4 | 6.3 |
| 30 | 8.0 | ..... | 11.4 | 17.8 | 18.4 | 11.7 | 4.0 | 3.6 | 4.6 | 4.9 | 6.7 | 6.3 |
| 31 | 9.2 | ..... | 9.9 | ..... | 17.6 | ..... | 3.9 | 3.6 | ..... | 4.9 | ..... | 6.4 |

*Daily discharge, in second-feet, of Weber River near Plain City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 498 | 1,320 | 672 | 2,020 | 5,130 | 5,840 | 2,620 | 175 | 205 | 289 | 355 | 850 |
| 2 | 498 | 860 | 672 | 2,660 | 4,850 | 6,050 | 2,500 | 145 | 311 | 289 | 355 | 1,210 |
| 3 | 498 | 828 | 672 | 2,870 | 4,780 | 6,050 | 2,340 | 116 | 427 | 333 | 355 | 1,170 |
| 4 | 526 | 860 | 702 | 2,750 | 4,600 | 7,010 | 2,100 | 90 | 550 | 333 | 355 | 1,100 |
| 5 | 892 | 860 | 828 | 2,460 | 5,060 | 7,430 | 1,860 | 78 | 500 | 355 | 355 | 1,010 |
| 6 | 2,100 | 860 | 1,030 | 2,300 | 6,050 | 7,580 | 1,670 | 78 | 475 | 355 | 355 | 1,040 |
| 7 | 2,870 | 892 | 926 | 2,060 | 5,940 | 7,430 | 1,460 | 90 | 475 | 355 | 355 | 974 |
| 8 | 1,740 | 892 | 860 | 1,940 | 5,740 | 7,150 | 1,210 | 90 | 427 | 355 | 333 | 910 |
| 9 | 1,210 | 796 | 860 | 1,900 | 5,940 | 6,050 | 1,010 | 78 | 427 | 355 | 333 | 910 |
| 10 | 994 | 796 | 796 | 2,020 | 6,380 | 5,940 | 850 | 68 | 427 | 355 | 333 | 880 |
| 11 | 860 | 860 | 732 | 2,220 | 6,750 | 5,280 | 654 | 78 | 403 | 355 | 333 | 880 |
| 12 | 828 | 1,060 | 642 | 2,180 | 6,750 | 4,720 | 602 | 90 | 403 | 355 | 311 | 850 |
| 13 | 1,630 | 1,400 | 612 | 2,140 | 6,160 | 4,270 | 525 | 102 | 379 | 355 | 333 | 850 |
| 14 | 2,300 | 1,060 | 612 | 2,340 | 5,940 | 4,090 | 500 | 102 | 379 | 355 | 333 | 850 |
| 15 | 4,450 | 926 | 672 | 2,830 | 5,540 | 4,050 | 451 | 90 | 379 | 355 | 355 | 820 |
| 16 | 3,430 | 892 | 702 | 3,650 | 5,640 | 3,960 | 379 | 90 | 379 | 355 | 355 | 790 |
| 17 | 2,830 | 860 | 764 | 4,360 | 5,360 | 3,910 | 333 | 90 | 355 | 355 | 355 | 790 |
| 18 | 2,300 | 860 | 960 | 4,450 | 5,360 | 3,830 | 251 | 78 | 355 | 355 | 355 | 790 |
| 19 | 1,940 | 796 | 1,670 | 4,660 | 5,450 | 3,780 | 235 | 68 | 403 | 355 | 475 | 762 |
| 20 | 3,080 | 796 | 1,360 | 5,130 | 5,640 | 3,650 | 235 | 68 | 427 | 355 | 602 | 762 |
| 21 | 3,000 | 732 | 1,210 | 5,280 | 6,050 | 3,560 | 205 | 78 | 427 | 355 | 2,960 | 762 |
| 22 | 3,210 | 732 | 1,210 | 4,990 | 6,380 | 3,430 | 190 | 78 | 379 | 355 | 1,780 | 734 |
| 23 | 2,260 | 732 | 1,210 | 4,720 | 6,750 | 3,250 | 175 | 90 | 379 | 355 | 1,740 | 734 |
| 24 | 1,700 | 732 | 1,400 | 4,550 | 7,150 | 3,130 | 160 | 90 | 355 | 355 | 1,780 | 734 |
| 25 | 1,290 | 732 | 1,550 | 4,360 | 6,880 | 3,000 | 160 | 90 | 355 | 355 | 1,670 | 734 |
| 26 | 1,210 | 702 | 1,900 | 4,660 | 6,270 | 2,960 | 190 | 90 | 333 | 355 | 1,980 | 734 |
| 27 | 1,210 | 702 | 2,460 | 5,200 | 6,620 | 2,830 | 220 | 102 | 333 | 355 | 1,710 | 734 |
| 28 | 1,290 | 702 | 3,040 | 6,270 | 7,430 | 2,790 | 289 | 130 | 289 | 355 | 1,420 | 707 |
| 29 | 1,140 | ..... | 2,830 | 6,750 | 6,880 | 2,750 | 235 | 145 | 289 | 355 | 1,040 | 707 |
| 30 | 1,210 | ..... | 2,540 | 5,940 | 6,620 | 2,660 | 190 | 130 | 289 | 355 | 820 | 707 |
| 31 | 1,670 | ..... | 1,940 | ..... | 5,740 | ..... | 175 | 130 | ..... | 355 | ..... | 734 |

NOTE.—Daily discharges January 1 to May 31 are based on a fairly well defined rating curve. From June 1 to December 31 they are based on a rating curve well defined between 190 and 5,200 second-feet.

*Monthly discharge of Weber River near Plain City, Utah, for 1909.*

[Drainage area, 2,060 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 4,450 | 498 | 1,760 | 0.854 | 0.98 | 108,000 | B. |
| February | 1,400 | 702 | 866 | .420 | .44 | 48,100 | B. |
| March | 3,040 | 612 | 1,230 | .597 | .69 | 75,600 | B. |
| April | 6,750 | 1,900 | 3,660 | 1.78 | 1.99 | 218,000 | B. |
| May | 7,430 | 4,600 | 5,990 | 2.91 | 3.36 | 368,000 | B. |
| June | 7,580 | 2,660 | 4,610 | 2.24 | 2.50 | 274,000 | B. |
| July | 2,620 | 160 | 773 | .375 | .43 | 47,500 | A. |
| August | 175 | 68 | 97.3 | .047 | .05 | 5,980 | B. |
| September | 550 | 205 | 384 | .186 | .21 | 22,800 | A. |
| October | 355 | 289 | 349 | .169 | .19 | 21,500 | A. |
| November | 2,960 | 311 | 806 | .391 | .44 | 48,000 | A. |
| December | 1,210 | 707 | 846 | .411 | .47 | 52,000 | B. |
| The year | 7,580 | 68 | 1,780 | .865 | 11.75 | 1,290,000 | |

## JORDAN RIVER BASIN.

### DESCRIPTION.

Jordan River rises in Utah Lake and discharges into Great Salt Lake about 5 miles northwest of Salt Lake City. The discharge of the river is entirely controlled, and most of the water is diverted into canals for irrigation in Salt Lake County.

The principal tributaries of Jordan River are from the Wasatch Mountains to the east, and in order from south to north they are Little Cottonwood, Big Cottonwood, Mill, Parleys, Emigration, Red Butte, and City creeks. Measurements of all these streams except Red Butte Creek were begun by F. C. Kelsey, the city engineer of Salt Lake City, in the fall of 1898. The discharges have been measured by weirs near the lower end of the canyon, thus giving the total flow of the creek, available for irrigation or city water supply. The records are incomplete for some of the stations, but otherwise are excellent.

The daily discharges for these stations for 1909 and the monthly discharge for the entire period covered by the records are published below through the courtesy of G. F. McGonagle, city engineer of Salt Lake City.

### LITTLE COTTONWOOD CREEK NEAR SALT LAKE CITY, UTAH.

Little Cottonwood Creek is the most southern of the streams tributary to Jordan River on which records have been obtained. The flow is measured over two 15-foot Cippoletti weirs, located near the mouth of the canyon.

*Daily discharge, in second-feet, of Little Cottonwood Creek near Salt Lake City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|
| 1 | 15.9 | 17.6 | 15.0 | 25.2 | ..... | 19.9 | 25.2 |
| 2 | 15.9 | 21.3 | 15.9 | 23.2 | ..... | 20.4 | 23.2 |
| 3 | 14.3 | 21.3 | 15.9 | 23.2 | ..... | 20.4 | 21.3 |
| 4 | 15.9 | 19.4 | 15.9 | 27.2 | ..... | 21.3 | 20.4 |
| 5 | 15.9 | 19.4 | 17.6 | 27.2 | ..... | 21.3 | 22.3 |
| 6 | 20.4 | 17.6 | 15.9 | 27.2 | ..... | 21.3 | 24.1 |
| 7 | 19.4 | 14.3 | 16.8 | 27.2 | ..... | 20.4 | 27.2 |
| 8 | 19.4 | 14.3 | 17.6 | 27.7 | ..... | 21.3 | 27.2 |
| 9 | 17.6 | 17.6 | 17.6 | 27.2 | ..... | 20.4 | 27.2 |
| 10 | 12.6 | 17.6 | 15.9 | 29.2 | ..... | 19.4 | 28.3 |
| 11 | 11.0 | 18.5 | 16.8 | 29.2 | ..... | 17.6 | 29.2 |
| 12 | 9.58 | 19.4 | 15.9 | 27.2 | ..... | 16.8 | 27.2 |
| 13 | 11.0 | 19.4 | 16.8 | 27.2 | ..... | 15.9 | 27.2 |
| 14 | 15.9 | 18.5 | 17.6 | 29.2 | 27.2 | 15.9 | 25.2 |
| 15 | 21.3 | 18.5 | 18.5 | 33.5 | 27.2 | 17.6 | 25.2 |
| 16 | 21.3 | 18.5 | 18.5 | 40.3 | 27.2 | 18.5 | 23.2 |
| 17 | 19.4 | 15.9 | 19.4 | 60.2 | 27.2 | 19.4 | 21.3 |
| 18 | 19.4 | 14.3 | 19.9 | 65.6 | 26.1 | 21.3 | 19.4 |
| 19 | 19.4 | 17.6 | 19.4 | 68.4 | 25.2 | 22.3 | 19.4 |
| 20 | 20.4 | 18.5 | 19.4 | 71.2 | 26.1 | 25.2 | 19.4 |
| 21 | 21.3 | 18.5 | 19.9 | 73.9 | 25.2 | 29.2 | 14.3 |
| 22 | 19.4 | 17.6 | 19.4 | 73.9 | 25.2 | 23.2 | 17.6 |
| 23 | 15.9 | 14.3 | 19.4 | 71.2 | 25.2 | 25.2 | 19.4 |
| 24 | 15.9 | 15.9 | 19.9 | 65.6 | 25.2 | 29.2 | 21.3 |
| 25 | 15.9 | 15.9 | 19.4 | 68.4 | 25.2 | 27.2 | 21.3 |
| 26 | 14.3 | 15.9 | 20.4 | 73.9 | 23.2 | 27.2 | 21.3 |
| 27 | 15.9 | 16.8 | 20.4 | 76.8 | 23.2 | 23.2 | 20.4 |
| 28 | 17.6 | 15.9 | 21.3 | 79.7 | 19.4 | 27.2 | 19.4 |
| 29 | 15.9 | ..... | 19.9 | 82.7 | 19.4 | 26.1 | 20.4 |
| 30 | 17.6 | ..... | 21.3 | 88.7 | 19.9 | 25.2 | 24.1 |
| 31 | 19.4 | ..... | 24.1 | ..... | 19.4 | ..... | 23.2 |

NOTE.—Weir raised during high water.

*Monthly discharge of Little Cottonwood Creek near Salt Lake City, Utah, for 1898–99; 1904–1909.*

[Drainage area, 12.7 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1898. | | | | | | |
| November[a] | 15.37 | 9.22 | 11.89 | 0.936 | 1.04 | 708 |
| December | 13.93 | 9.71 | 11.96 | .942 | 1.09 | 735 |
| 1899. | | | | | | |
| January | 13.53 | 10.35 | 12.12 | .954 | 1.10 | 745 |
| February | 13.09 | 8.50 | 11.34 | .893 | .93 | 630 |
| March | 13.92 | 10.09 | 12.41 | .977 | 1.13 | 763 |
| April | 64.27 | 13.09 | 38.95 | 3.07 | 3.42 | 2,330 |
| May | 170.58 | 44.18 | 105.32 | 8.29 | 9.56 | 6,480 |
| 1904. | | | | | | |
| August | ..... | ..... | 27.18 | 2.14 | 2.47 | 1,670 |
| September | ..... | ..... | 17.20 | 1.35 | 1.51 | 1,020 |
| October | ..... | ..... | 17.47 | 1.38 | 1.59 | 1,070 |
| November | ..... | ..... | 15.06 | 1.19 | 1.33 | 896 |
| 1905. | | | | | | |
| October[a] | 18.55 | 14.20 | 16.42 | 1.29 | 1.49 | 1,010 |
| November | 14.21 | 7.82 | 11.41 | .898 | 1.00 | 679 |
| December | 11.53 | 8.14 | 9.76 | .769 | .89 | 600 |

[a] Partial month; mean estimated for full month.

HEADWATERS OF BIG COTTONWOOD CREEK, NEAR SALT LAKE CITY, UTAH.

*Monthly discharge of Little Cottonwood Creek near Salt Lake City, Utah, for 1898–99; 1904–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1906. | | | | | | |
| January | 11.90 | 7.09 | 10.17 | 0.801 | 0.92 | 625 |
| February | 13.51 | 8.65 | 11.53 | .908 | .95 | 640 |
| March | 18.88 | 9.42 | 14.05 | 1.11 | 1.28 | 684 |
| April 1–18 | 51.81 | 19.40 | 27.89 | 2.20 | 1.47 | 996 |
| 1907. | | | | | | |
| January | 12.62 | 9.58 | 11.49 | .905 | 1.04 | 706 |
| February | 16.76 | 11.07 | 14.58 | 1.15 | 1.20 | 810 |
| March | 71.19 | 15.94 | 29.07 | 2.29 | 2.64 | 1,790 |
| April 1–12 | 82.62 | 37.98 | 51.10 | 4.02 | 1.79 | 1,220 |
| November | 24.13 | 15.04 | 18.06 | 1.42 | 1.58 | 1,070 |
| December | 16.76 | 12.62 | 14.99 | 1.18 | 1.36 | 922 |
| 1908. | | | | | | |
| January | 16.76 | 11.07 | 13.29 | 1.05 | 1.21 | 817 |
| February | 17.60 | 9.24 | 11.85 | .933 | 1.01 | 682 |
| March | 18.54 | 10.35 | 15.12 | 1.19 | 1.37 | 930 |
| April 1–20 | 110.54 | 17.60 | 45.47 | 3.58 | 2.66 | 1,800 |
| December [a] | 23.19 | 5.63 | 16.93 | 1.33 | 1.53 | 1,040 |
| 1909. | | | | | | |
| January | 21.3 | 9.58 | 16.9 | 1.33 | 1.53 | 1,040 |
| February | 21.3 | 14.3 | 17.5 | 1.38 | 1.44 | 972 |
| March | 24.1 | 15.0 | 18.4 | 1.45 | 1.67 | 1,130 |
| April | 88.7 | 23.2 | 49.0 | 3.86 | 4.31 | 2,920 |
| October 14–31 | 27.2 | 19.4 | 24.3 | 1.91 | 1.28 | 868 |
| November | 29.2 | 15.9 | 22.0 | 1.73 | 1.93 | 1,310 |
| December | 29.2 | 14.3 | 22.8 | 1.80 | 2.08 | 1,400 |

[a] Partial month; mean estimated for full month.

## BIG COTTONWOOD CREEK NEAR SALT LAKE CITY, UTAH.

Big Cottonwood Creek, the largest tributary of Jordan River, rises near Clayton Peak, which reaches an elevation of over 12,000 feet. Its headwaters are very mountainous (see Pl. III) and heavily timbered. The discharge is measured near the mouth of the canyon by means of a compound weir (see Pl. IV), which serves not only to measure the water, but to distribute it among the various claimants. The weir is just below the power plant of the Utah Power Company, the operation of which causes a diurnal fluctuation in the discharge.

*Daily discharge, in second-feet, of Big Cottonwood Creek near Salt Lake City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 34.6 | 37.9 | 34.6 | 46.9 | 143 | 162 | 433 | 112 | 139 | 77.8 | 68.2 | 75.0 |
| 2 | 36.8 | 40.1 | 34.6 | 49.3 | 136 | 468 | 430 | 125 | 126 | 76.4 | 63.0 | 79.2 |
| 3 | 36.8 | 39.0 | 36.8 | 56.6 | 155 | 570 | 428 | 112 | 101 | 72.2 | 67.0 | 72.3 |
| 4 | 31.5 | 43.5 | 37.9 | 55.4 | 180 | 677 | 480 | 109 | 103 | 73.6 | 63.0 | 73.6 |
| 5 | 32.5 | 41.2 | 40.1 | 68.2 | 216 | 775 | 379 | 104 | 115 | 77.8 | 63.0 | 64.3 |
| 6 | 44.6 | 37.9 | 47.0 | 64.2 | 203 | 835 | 358 | 117 | 117 | 69.6 | 63.0 | 66.9 |
| 7 | 40.1 | 39.0 | 43.5 | 61.7 | 212 | 821 | 310 | 107 | 104 | 90.6 | 51.7 | 68.2 |
| 8 | 40.1 | 36.8 | 42.3 | 56.6 | 226 | 627 | 299 | 106 | 110 | 77.8 | 59.2 | 65.6 |
| 9 | 38.9 | 37.9 | 42.3 | 55.4 | 248 | 514 | 271 | 112 | 95.0 | 69.6 | 52.9 | 65.6 |
| 10 | 39.0 | 42.3 | 39.0 | 57.9 | 265 | 472 | 248 | 115 | 99.5 | 70.9 | 56.6 | 65.6 |
| 11 | 34.6 | 39.0 | 40.0 | 55.4 | 265 | 455 | 242 | 109 | 95.0 | 77.8 | 57.9 | 63.0 |
| 12 | 37.9 | 39.0 | 34.6 | 61.7 | 234 | 485 | 238 | 107 | 93.5 | 69.6 | 61.7 | 60.4 |
| 13 | 39.0 | 40.1 | 37.9 | 60.4 | 210 | 535 | 222 | 90.6 | 99.5 | 77.8 | 59.2 | 63.0 |
| 14 | 42.3 | 37.9 | 36.8 | 61.7 | 212 | 524 | 210 | 87.7 | 92.0 | 75.0 | 69.6 | 63.0 |
| 15 | 44.6 | 39.0 | 40.0 | 70.9 | 228 | 566 | 204 | 87.7 | 86.2 | 59.1 | 64.3 | 61.7 |
| 16 | 42.3 | 39.0 | 42.3 | 77.8 | 234 | 591 | 203 | 112 | 79.1 | 73.6 | 50.5 | 61.7 |
| 17 | 42.3 | 41.2 | 50.5 | 116 | 212 | 627 | 195 | 99.5 | 77.8 | 54.2 | 57.9 | 60.4 |
| 18 | 42.3 | 41.2 | 51.7 | 157 | 210 | 603 | 186 | 86.2 | 73.6 | 60.4 | 59.1 | 51.7 |
| 19 | 42.3 | 36.8 | 52.9 | 169 | 232 | 524 | 195 | 104 | 86.2 | 73.6 | 60.4 | 48.1 |
| 20 | 44.6 | 37.9 | 49.3 | 167 | 275 | 467 | 180 | 104 | 77.8 | 70.9 | 63.0 | 61.7 |
| 21 | 42.3 | 39.0 | 46.9 | 146 | 303 | 428 | 175 | 95.0 | 80.6 | 69.6 | 68.2 | 61.7 |
| 22 | 46.9 | 37.9 | 45.8 | 126 | 321 | 444 | 158 | 141 | 79.2 | 64.3 | 84.8 | 61.7 |
| 23 | 44.6 | 34.6 | 43.5 | 120 | 350 | 471 | 162 | 106 | 79.2 | 70.9 | 82.0 | 59.2 |
| 24 | 40.1 | 33.6 | 45.8 | 123 | 321 | 490 | 146 | 109 | 75.0 | 50.5 | 79.1 | 60.4 |
| 25 | 45.8 | 35.7 | 42.3 | 115 | 262 | 487 | 139 | 86.2 | 73.6 | 66.9 | 84.8 | 61.7 |
| 26 | 43.5 | 37.9 | 45.8 | 126 | 275 | 443 | 143 | 95.0 | 61.7 | 68.2 | 77.8 | 63.0 |
| 27 | 41.2 | 32.5 | 46.9 | 150 | 327 | 480 | 145 | 90.6 | 77.8 | 70.9 | 84.8 | 59.2 |
| 28 | 37.9 | 33.6 | 44.6 | 171 | 411 | 455 | 138 | 82.0 | 79.1 | 66.9 | 69.6 | 54.2 |
| 29 | 41.2 | ..... | 46.9 | 167 | 387 | 455 | 129 | 83.4 | 76.4 | 69.6 | 79.1 | 56.6 |
| 30 | 42.3 | ..... | 45.8 | 145 | 323 | 424 | 118 | 79.2 | 72.3 | 68.2 | 72.3 | 59.2 |
| 31 | 42.3 | ..... | 46.9 | ..... | 323 | ..... | 123 | 81.1 | ..... | 49.3 | ..... | 55.4 |

*Monthly discharge of Big Cottonwood Creek near Salt Lake City, Utah, for 1898–1909.*

[Drainage area, 48.5 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1898. | | | | | | |
| November | 37.06 | 26.70 | 33.19 | 0.684 | 0.76 | 1,970 |
| December[a] | 36.45 | 16.24 | 24.52 | .506 | .58 | 1,510 |
| 1899. | | | | | | |
| January[a] | 29.55 | 21.25 | 24.04 | .496 | .57 | 1,480 |
| February | 33.68 | 9.19 | 24.29 | .501 | .52 | 1,350 |
| March | 43.73 | 24.89 | 32.12 | .662 | .76 | 1,980 |
| April | 149.91 | 35.11 | 94.91 | 1.96 | 2.19 | 5,650 |
| May | 266.20 | 67.67 | 180.68 | 3.73 | 4.30 | 11,100 |
| June | 633.22 | 211.55 | 379.37 | 7.82 | 8.72 | 22,600 |
| July | 260.83 | 97.27 | 162.11 | 3.34 | 3.85 | 9,970 |
| August, 1–15 | 109.80 | 77.32 | 89.8 | 1.85 | 1.03 | 2,670 |
| The period | ..... | ..... | ..... | ..... | ..... | 56,800 |
| 1900. | | | | | | |
| May 14–31 | 301.04 | 126.92 | 219 | 4.52 | 3.03 | 7,820 |
| June | 281.74 | 88.81 | 170.48 | 3.52 | 3.93 | 10,100 |
| July[a] | 83.75 | 37.99 | 58.03 | 1.20 | 1.38 | 3,570 |
| August | 38.53 | 27.94 | 33.73 | .695 | .80 | 2,070 |
| September | 28.40 | 22.65 | 25.34 | .522 | .58 | 1,510 |
| October | 31.07 | 24.61 | 27.26 | .562 | .65 | 1,680 |
| November | 32.81 | 25.90 | 29.07 | .599 | .67 | 1,730 |
| December | 28.94 | 13.60 | 25.12 | .518 | .60 | 1,540 |
| The period | ..... | ..... | ..... | ..... | ..... | 30,000 |

[a] Partial month; mean estimated for full month.

WEIR ON BIG COTTONWOOD CREEK NEAR SALT LAKE CITY, UTAH.

*Monthly discharge of Big Cottonwood Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1901. | | | | | | |
| January | 26.08 | 11.33 | 22.10 | .456 | .53 | 1,360 |
| February | 28.15 | 17.41 | 23.73 | .489 | .51 | 1,320 |
| March | 34.60 | 23.00 | 29.26 | .603 | .70 | 1,800 |
| April | 155.97 | 22.16 | 69.59 | 1.43 | 1.60 | 4,140 |
| May | 407.32 | 179.19 | 269.92 | 5.57 | 6.42 | 16,600 |
| June | 240.97 | 123.75 | 171.50 | 3.54 | 3.95 | 10.200 |
| July[a] | 129.30 | 38.00 | 71.86 | 1.48 | 1.71 | 4,420 |
| August | 45.61 | 29.26 | 39.00 | .804 | .93 | 2,400 |
| September | 36.93 | 25.23 | 29.76 | .614 | .68 | 1,770 |
| October | 33.48 | 25.89 | 29.05 | .599 | .69 | 1,790 |
| November | 31.19 | 24.85 | 27.80 | .573 | .64 | 1,650 |
| December | 34.08 | 21.78 | 27.19 | .561 | .65 | 1.670 |
| The year | 407.32 | 11.33 | 67.6 | 1.39 | 19.01 | 49,100 |
| 1902. | | | | | | |
| January | 27.17 | 13.63 | 23.14 | .477 | .55 | 1,420 |
| February | 28.44 | 17.23 | 24.24 | .500 | .52 | 1,350 |
| March | 27.72 | 20.41 | 24.55 | .506 | .58 | 1,510 |
| April | 142.94 | 26.96 | 70.40 | 1.45 | 1.62 | 4,190 |
| May | 369.69 | 108.93 | 210.21 | 4.33 | 4.99 | 12,900 |
| June | 309.50 | 91.74 | 194.47 | 4.01 | 4.47 | 11.600 |
| July | 92.33 | 40.87 | 62.16 | 1.28 | 1.48 | 3,820 |
| August | 38.87 | 28.44 | 32.97 | .680 | .78 | 2,030 |
| September | 30.81 | 25.17 | 27.89 | .575 | .64 | 1,660 |
| October | 28.99 | 21.37 | 26.32 | .543 | .63 | 1,620 |
| November | 28.78 | 21.83 | 24.84 | .512 | .57 | 1,480 |
| December | 23.26 | 16.06 | 22.80 | .470 | .54 | 1,400 |
| The year | 369.69 | 13.63 | 62.0 | 1.28 | 17.37 | 45.000 |
| 1903. | | | | | | |
| January | 25.60 | 15.79 | 21.30 | .439 | .51 | 1,310 |
| February | 24.19 | 13.56 | 19.50 | .402 | .42 | 1,080 |
| March | 45.55 | 18.76 | 24.12 | .497 | .57 | 1,480 |
| April | 144.57 | 30.30 | 57.66 | 1.19 | 1.33 | 3.430 |
| May 1–26 | 266.37 | 77.21 | 155 | 3.20 | 3.09 | 7,990 |
| June | | | | | | |
| July[a] | 74.93 | 39.14 | 56.94 | 1.17 | 1.35 | 3,500 |
| August | 53.66 | 6.09 | 23.64 | .487 | .56 | 1,450 |
| September | 13.49 | 3.29 | 9.15 | .189 | .21 | 544 |
| October 1–10 | 14.45 | 9.98 | 12.1 | .249 | .09 | 240 |
| The period | | | | | | 21,000 |
| 1904. | | | | | | |
| September 23–30 | 38.70 | 30.42 | 35.9 | .740 | .22 | 570 |
| October | 46.45 | 30.78 | 36.95 | .762 | .88 | 2,270 |
| November | 36.48 | 26.52 | 31.77 | .655 | .73 | 1,890 |
| December | 31.18 | 21.12 | 25.58 | .527 | .61 | 1.570 |
| 1905. | | | | | | |
| January | 28.47 | 22.37 | 25.77 | .531 | .61 | 1,580 |
| February | 29.65 | 17.43 | 25.07 | .517 | .54 | 1,390 |
| March | 33.24 | 25.76 | 29.18 | .602 | .69 | 1,790 |
| April | 109.14 | 32.76 | 60.20 | 1.24 | 1.38 | 3,580 |
| May | 222.89 | 70.25 | 138.32 | 2.85 | 3.29 | 8,500 |
| June | 265.35 | 109.47 | 188.12 | 3.88 | 4.33 | 11.200 |
| July | 106.36 | 38.70 | 63.82 | 1.32 | 1.52 | 3,920 |
| August | 45.49 | 27.49 | 35.95 | .741 | .85 | 2,210 |
| September | 44.62 | 25.79 | 31.69 | .653 | .73 | 1,890 |
| October | 38 15 | 25.55 | 32.01 | .660 | .76 | 1,970 |
| November | 32.80 | 16.08 | 28.18 | .581 | .65 | 1,680 |
| December | 30.75 | 17.65 | 26.42 | .545 | .63 | 1,620 |
| The year | 265.35 | 16.08 | 57.1 | 1.18 | 15.98 | 41,300 |

[a] Partial month; mean estimated for full month.

*Monthly discharge of Big Cottonwood Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1906. | | | | | | |
| January | 29.73 | 18.93 | 25.89 | .534 | .62 | 1,590 |
| February | 28.23 | 25.55 | 26.86 | .554 | .58 | 1,490 |
| March | 42.93 | 23.23 | 31.47 | .649 | .75 | 1,940 |
| April | 130.29 | 37.33 | 73.36 | 1.51 | 1.68 | 4,370 |
| May [a] | 287.82 | 77.41 | 205.52 | 4.24 | 4.89 | 12,600 |
| June | ..... | ..... | [b] 200. | 4.12 | 4.60 | 11,900 |
| July | 216.03 | 80.24 | 144.38 | 2.98 | 3.44 | 8,880 |
| August | 114.55 | 60.44 | 74.57 | 1.54 | 1.78 | 4,590 |
| September [a] | 89.86 | 49.61 | 57.46 | 1.18 | 1.32 | 3,420 |
| October [a] | 50.31 | 36.63 | 43.17 | .890 | 1.03 | 2,650 |
| November | 43.90 | 28.34 | 39.45 | .813 | .91 | 2,350 |
| December | 54.41 | 39.03 | 48.77 | .101 | .12 | 3,000 |
| The year | ..... | 18.93 | 80.8 | 1.59 | 21.72 | 58,900 |
| 1907. | | | | | | |
| January | 50.88 | 45.12 | 47.55 | .980 | 1.13 | 2,920 |
| February | 82.22 | 29.73 | 42.98 | .886 | .92 | 2,390 |
| March | 146.27 | 29.48 | 54.59 | 1.13 | 1.30 | 3,360 |
| April | ..... | ..... | [b] 85. | 1.75 | 1.95 | 5,060 |
| May | 392.09 | 102.53 | 207.52 | 4.28 | 4.93 | 12,800 |
| June | 792.85 | 216.05 | 432.01 | 8.91 | 9.94 | 25,700 |
| July | 730.85 | 149.70 | 391.43 | 8.07 | 9.30 | 24,100 |
| August | 147.98 | 70.92 | 97.60 | 2.01 | 2.32 | 6,000 |
| September | 69.58 | 49.91 | 58.03 | 1.20 | 1.34 | 3,450 |
| October | 60.42 | 41.20 | 51.59 | 1.06 | 1.22 | 3,170 |
| November | 56.63 | 37.87 | 44.46 | .917 | 1.02 | 2,650 |
| December | 42.33 | 35.71 | 37.01 | .763 | .88 | 2,280 |
| The year | ..... | ..... | 129. | 2.66 | 36.25 | 93,900 |
| 1908. | | | | | | |
| January | 35.71 | 28.48 | 32.83 | .677 | .78 | 2,020 |
| February | 35.71 | 27.49 | 31.10 | .641 | .69 | 1,790 |
| March | 42.32 | 26.52 | 34.07 | .702 | .81 | 2,090 |
| April | 215.92 | 32.54 | 84.55 | 1.74 | 1.94 | 5,030 |
| May [b] | ..... | ..... | 192.96 | 3.98 | 4.59 | 11,900 |
| June | 519.57 | 158.42 | 291.85 | 6.02 | 6.72 | 17,400 |
| July | 268.70 | 92.05 | 164.17 | 3.38 | 3.90 | 10,100 |
| August | 89.13 | 51.71 | 63.67 | 1.31 | 1.51 | 3,910 |
| September | 87.68 | 42.33 | 53.92 | 1.11 | 1.24 | 3,210 |
| October | 66.92 | 45.77 | 57.23 | 1.18 | 1.36 | 3,520 |
| November | 60.42 | 37.87 | 46.86 | .966 | 1.08 | 2,790 |
| December | 38.97 | 24.60 | 36.19 | .746 | .86 | 2,230 |
| The year | 519.57 | 24.60 | 90.8 | 1.87 | 25.48 | 66,000 |
| 1909. | | | | | | |
| January | 46.9 | 31.5 | 40.5 | .835 | .96 | 2,490 |
| February | 43.5 | 32.5 | 38.3 | .790 | .82 | 2,130 |
| March | 52.9 | 34.6 | 43.0 | .887 | 1.02 | 2,640 |
| April | 171 | 46.9 | 98.6 | 2.03 | 2.26 | 5,870 |
| May | 411 | 136 | 255 | 5.26 | 6.06 | 15,700 |
| June | 835 | 162 | 529 | 10.9 | 12.16 | 31,500 |
| July | 480 | 118 | 235 | 4.85 | 5.59 | 14,400 |
| August | 141 | 79.2 | 102 | 2.10 | 2.42 | 6,270 |
| September | 139 | 61.7 | 90.8 | 1.87 | 2.09 | 5,400 |
| October | 90.6 | 49.3 | 69.8 | 1.44 | 1.66 | 4,290 |
| November | 84.8 | 50.5 | 66.5 | 1.37 | 1.53 | 3,960 |
| December | 79.2 | 48.1 | 62.7 | 1.29 | 1.49 | 3,860 |
| The year | 835 | 31.5 | 136 | 2.80 | 38.06 | 98,500 |

[a] Partial month; mean estimated for full month. [b] Monthly mean estimated.

## MILL CREEK NEAR SALT LAKE CITY, UTAH.

Mill Creek drains a narrow basin extending to the crest of the Wasatch Range. Measurements are made by means of a 12.5-foot Cippoletti weir, located near the mouth of the canyon.

*Daily discharge, in second-feet, of Mill Creek near Salt Lake City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14.9 | 14.9 | 16.8 | 22.9 | 32.0 | 64.8 | 83.8 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 |
| 2 | 14.9 | 14.9 | 16.8 | 22.9 | 32.0 | 90.6 | 83.8 | 25.1 | 27.3 | 20.3 | 20.8 | 20.3 |
| 3 | 14.9 | 14.9 | 16.8 | 29.6 | 32.0 | 90.6 | 64.8 | 25.1 | 27.3 | 20.3 | 18.7 | 20.8 |
| 4 | 14.9 | 14.9 | 16.8 | 27.3 | 50.2 | 104 | 64.8 | 25.1 | 27.3 | 20.3 | 18.7 | 20.8 |
| 5 | 14.9 | 14.9 | 16.8 | 27.3 | 50.2 | 104 | 64.8 | 25.1 | 27.3 | 20.3 | 18.7 | 18.7 |
| 6 | 14.9 | 14.9 | 18.7 | 25.1 | 47.4 | 104 | 47.4 | 25.1 | 27.3 | 20.8 | 18.7 | 14.9 |
| 7 | 14.9 | 14.9 | 18.7 | 25.1 | 53.1 | 77.3 | 47.4 | 29.7 | 27.3 | 20.8 | 18.7 | 14.9 |
| 8 | 14.9 | 14.9 | 18.7 | 25.1 | 53.1 | 77.3 | 47.4 | 29.7 | 27.3 | 20.8 | 18.7 | 14.9 |
| 9 | 14.9 | 14.9 | 18.7 | 25.1 | 58.8 | 77.3 | 47.4 | 29.7 | 27.3 | 20.8 | 18.7 | 14.9 |
| 10 | 14.9 | 14.9 | 18.7 | 25.1 | 37.0 | 64.8 | 27.3 | 29.7 | 27.3 | 20.8 | 18.7 | 14.9 |
| 11 | 8.09 | 14.9 | 18.7 | 25.1 | 37.0 | 64.8 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 14.9 |
| 12 | 8.09 | 14.9 | 18.7 | 27.3 | 37.0 | 64.8 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 16.8 |
| 13 | 14.9 | 16.8 | 16.3 | 27.3 | 37.0 | 64.8 | 27.3 | 29.7 | 25.1 | 20.8 | 10.7 | 16.8 |
| 14 | 14.9 | 16.8 | 16.3 | 29.7 | 39.5 | 64.8 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 16.8 |
| 15 | 14.9 | 16.8 | 16.3 | 29.7 | 37.0 | 77.3 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 18.7 |
| 16 | 14.9 | 16.8 | 16.3 | 32.0 | 39.5 | 77.3 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 18.7 |
| 17 | 14.9 | 16.8 | 20.8 | 39.5 | 39.5 | 112 | 27.3 | 29.7 | 25.1 | 20.8 | 18.7 | 14.9 |
| 18 | 14.9 | 16.8 | 20.8 | 39.5 | 39.5 | 112 | 27.3 | 29.7 | 22.9 | 20.8 | 18.7 | 6.64 |
| 19 | 18.7 | 16.8 | 20.8 | 39.5 | 39.5 | 77.3 | 27.3 | 29.7 | 22.9 | 20.8 | 18.7 | 6.64 |
| 20 | 18.7 | 16.8 | 20.8 | 34.4 | 53.1 | 77.3 | 27.3 | 29.7 | 22.9 | 20.8 | 18.7 | 16.8 |
| 21 | 18.7 | 16.8 | 20.8 | 37.0 | 53.1 | ..... | 27.3 | 29.7 | 22.9 | 20.8 | 25.1 | 16.8 |
| 22 | 18.7 | 16.8 | 20.3 | 27.3 | 77.3 | 77.3 | 27.3 | 29.7 | 22.9 | 20.8 | 20.3 | 16.8 |
| 23 | 18.7 | 20.8 | 20.3 | 27.3 | 77.3 | 77.3 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.8 |
| 24 | 14.9 | 20.8 | 20.3 | 27.3 | 64.8 | 77.3 | 25.7 | 27.3 | 22.9 | 20.8 | 20.3 | 16.8 |
| 25 | 14.9 | 20.8 | 20.3 | 27.3 | 64.8 | 77.3 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.8 |
| 26 | 14.9 | 20.8 | 20.3 | 29.7 | 64.8 | 64.8 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.3 |
| 27 | 14.9 | 16.8 | 20.3 | 29.7 | 83.8 | 83.8 | 25.7 | 27.3 | 22.9 | 20.8 | 20.3 | 16.3 |
| 28 | 14.9 | 16.8 | 22.9 | 32.0 | 83.8 | 83.8 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.3 |
| 29 | 9.66 | ..... | 22.9 | 32.0 | 53.1 | 83.8 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.8 |
| 30 | 9.66 | ..... | 22.9 | 32.0 | 53.1 | 83.8 | 25.1 | 27.3 | 22.9 | 20.8 | 20.3 | 16.8 |
| 31 | 14.9 | ..... | 22.9 | ..... | 53.1 | ..... | 25.1 | 27.3 | ..... | 20.8 | ..... | 16.8 |

*Monthly discharge of Mill Creek near Salt Lake City, Utah, for 1898–1909.*

[Drainage area, 21.3 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1898. | | | | | | |
| November [a] | 15.25 | 10.08 | 12.94 | 0.608 | 0.68 | 770 |
| December | 13.69 | 2.85 | 10.40 | .488 | .56 | 640 |
| 1899. | | | | | | |
| January | 12.74 | 7.92 | 11.65 | .547 | .63 | 716 |
| February | 12.38 | 3.18 | 10.27 | .482 | .50 | 570 |
| March | 14.64 | 11.64 | 12.22 | .574 | .66 | 751 |
| April [a] | 24.52 | 12.38 | 21.06 | .989 | 1.10 | 1,250 |
| May | 45.93 | 23.08 | 34.83 | 1.64 | 1.89 | 2,140 |
| June | 66.01 | 34.15 | 50.35 | 2.36 | 2.63 | 3,000 |
| July | 35.63 | 19.80 | 25.68 | 1.21 | 1.40 | 1,580 |
| August | 19.80 | 16.70 | 17.87 | .839 | .97 | 1,100 |
| September | 16.70 | 14.88 | 15.67 | .736 | .82 | 933 |
| October | 18.35 | 11.66 | 14.60 | .685 | .79 | 898 |
| November | 14.43 | 13.13 | 13.52 | .635 | .71 | 804 |
| December | 13.13 | 2.35 | 11.43 | .537 | .62 | 703 |
| The year | 66.01 | 2.35 | 19.9 | .936 | 12.72 | 14,400 |

[a] Partial month: mean estimated for full month.

*Monthly discharge of Mill Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1900. | | | | | | |
| January | 13.04 | 8.09 | 12.05 | 0.566 | 0.65 | 741 |
| February | 11.33 | 8.09 | 10.39 | .488 | .51 | 577 |
| March | 13.04 | 10.49 | 11.84 | .556 | .64 | 728 |
| April | 13.95 | 11.74 | 12.60 | .592 | .66 | 750 |
| May | 30.79 | 13.95 | 21.63 | 1.02 | 1.18 | 1,330 |
| June | 22.92 | 13.04 | 16.18 | .760 | .85 | 963 |
| July | 13.95 | 8.86 | 10.46 | .491 | .57 | 643 |
| August | 10.49 | 8.83 | 9.48 | .445 | .51 | 583 |
| September | 8.86 | 8.09 | 8.56 | .402 | .45 | 509 |
| October | 8.86 | 8.49 | 8.56 | .402 | .46 | 526 |
| November | 9.66 | 8.49 | 8.74 | .410 | .46 | 520 |
| December | 8.49 | 1.41 | 7.13 | .335 | .39 | 438 |
| The year | 30.79 | 1.41 | 11.5 | .539 | 7.33 | 8,310 |
| 1901. | | | | | | |
| January | 8.86 | 1.41 | 7.17 | .337 | .39 | 441 |
| February | 8.86 | 3.71 | 8.11 | .381 | .40 | 450 |
| March | 8.86 | 8.09 | 8.37 | .393 | .45 | 515 |
| April | 12.16 | 8.49 | 9.94 | .467 | .52 | 591 |
| May | 47.43 | 14.88 | 29.41 | 1.38 | 1.59 | 1,810 |
| June | 28.49 | 15.33 | 19.82 | .931 | 1.04 | 1,180 |
| July | 15.33 | 14.88 | 15.16 | .712 | .82 | 932 |
| August | 14.88 | 12.16 | 12.53 | .588 | .68 | 770 |
| September | 12.16 | 11.33 | 11.58 | .544 | .61 | 689 |
| October | 12.16 | 11.33 | 11.62 | .546 | .63 | 715 |
| November | 12.16 | 11.33 | 11.36 | .533 | .59 | 676 |
| December | 13.04 | 3.99 | 10.20 | .479 | .55 | 627 |
| The year | 47.43 | 1.41 | 12.9 | .608 | 8.27 | 9,400 |
| 1902. | | | | | | |
| January | 13.04 | 3.70 | 9.33 | .438 | .50 | 574 |
| February | 11.33 | 3.70 | 8.88 | .417 | .43 | 493 |
| March | 9.66 | 9.66 | 9.66 | .454 | .52 | 594 |
| April | 15.33 | 9.66 | 12.77 | .600 | .67 | 760 |
| May | 39.46 | 15.33 | 23.62 | 1.11 | 1.28 | 1,450 |
| June | 36.95 | 16.79 | 21.70 | 1.02 | 1.14 | 1,290 |
| July | 16.79 | 11.33 | 13.72 | .644 | .74 | 844 |
| August | 11.33 | 9.28 | 11.00 | .516 | .59 | 676 |
| September | 9.66 | 9.28 | 9.33 | .438 | .49 | 555 |
| October | 9.66 | 9.66 | 9.66 | .454 | .52 | 594 |
| November | 9.66 | 5.26 | 8.54 | .401 | .45 | 508 |
| December | 9.66 | 1.86 | 6.96 | .327 | .38 | 428 |
| The year | 39.46 | 1.86 | 12.1 | .568 | 7.71 | 8,770 |
| 1903. | | | | | | |
| January | 9.66 | 3.99 | 7.84 | .368 | .42 | 482 |
| February | 9.66 | 2.87 | 6.48 | .304 | .32 | 360 |
| March | 9.66 | 5.58 | 8.46 | .397 | .46 | 520 |
| April | 11.74 | 9.28 | 10.21 | .479 | .53 | 607 |
| May | 25.07 | 11.74 | 17.50 | .822 | .95 | 1,080 |
| June | 34.44 | 16.79 | 25.95 | 1.22 | 1.36 | 1,540 |
| July | 16.79 | 14.88 | 15.15 | .711 | .82 | 932 |
| August | 14.88 | 11.74 | 12.85 | .603 | .70 | 790 |
| September | 11.74 | 11.33 | 11.58 | .544 | .61 | 689 |
| October | 11.33 | 11.33 | 11.33 | .532 | .61 | 697 |
| November | 11.74 | 5.58 | 11.02 | .517 | .58 | 656 |
| December | 11.33 | 3.40 | 9.07 | .426 | .49 | 558 |
| The year | 34.44 | 2.87 | 12.3 | .577 | 7.85 | 8,910 |
| 1904. | | | | | | |
| January | 13.04 | 6.64 | 9.85 | .462 | .53 | 606 |
| February | 13.04 | 3.71 | 9.87 | .463 | .50 | 568 |
| March | 13.04 | 9.28 | 11.20 | .526 | .61 | 689 |
| April | 25.07 | 11.33 | 18.92 | .888 | .99 | 1,130 |
| May | 58.81 | 25.07 | 41.42 | 1.94 | 2.24 | 2,550 |
| June | 55.87 | 29.66 | 40.86 | 1.92 | 2.14 | 2,430 |
| July | 29.66 | 20.79 | 25.74 | 1.21 | 1.40 | 1,580 |
| August | 16.79 | 13.04 | 14.89 | .699 | .81 | 916 |
| September | 15.81 | 13.04 | 14.95 | .702 | .78 | 890 |
| October | 13.95 | 13.04 | 13.66 | .641 | .74 | 840 |
| November | 13.04 | 11.33 | 12.36 | .580 | .65 | 736 |
| December | 11.33 | 1.02 | 8.63 | .405 | .47 | 531 |
| The year | 58.81 | 1.02 | 18.5 | .870 | 11.86 | 13,500 |

*Monthly discharge of Mill Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1905. | | | | | | |
| January | 8.86 | 8.86 | 8.86 | .416 | .48 | 545 |
| February | 9.66 | 1.86 | 7.87 | .369 | .38 | 437 |
| March | 11.74 | 8.49 | 10.23 | .480 | .55 | 629 |
| April | 16.79 | 11.33 | 12.26 | .576 | .64 | 730 |
| May | 38.46 | 16.79 | 23.06 | 1.08 | 1.24 | 1,420 |
| June | 36.95 | 20.79 | 26.51 | 1.24 | 1.38 | 1,580 |
| July | 16.79 | 14.88 | 15.37 | .722 | .83 | 945 |
| August | 14.88 | 10.89 | 12.66 | .594 | .68 | 778 |
| September | 13.04 | 10.89 | 11.86 | .557 | .62 | 706 |
| October | 13.04 | 11.33 | 11.61 | .545 | .63 | 714 |
| November | 11.33 | 8.49 | 10.13 | .476 | .53 | 603 |
| December | 11.33 | 1.21 | 7.18 | .337 | .39 | 441 |
| The year | 38.46 | 1.21 | 13.1 | .616 | 8.35 | 9,530 |
| 1906. | | | | | | |
| January | 11.33 | 3.13 | 8.69 | .408 | .47 | 534 |
| February | 9.66 | 9.28 | 9.44 | .443 | .46 | 524 |
| March | 9.66 | 5.26 | 9.52 | .447 | .52 | 585 |
| April | 20.79 | 9.66 | 15.22 | .715 | .80 | 906 |
| May | 55.87 | 16.28 | 31.29 | 1.47 | 1.70 | 1,920 |
| June | 58.81 | 24.54 | 36.89 | 1.73 | 1.93 | 2,200 |
| July | 25.07 | 11.74 | 18.97 | .891 | 1.03 | 1,170 |
| August | 27.33 | 12.62 | 15.53 | .729 | .84 | 955 |
| September | 15.33 | 13.04 | 14.00 | .657 | .73 | 833 |
| October | 13.04 | 13.04 | 13.04 | .612 | .71 | 802 |
| November | 13.04 | 3.99 | 11.41 | .536 | .60 | 679 |
| December | 11.74 | 11.33 | 11.71 | .550 | .63 | 720 |
| The year | 58.81 | 3.13 | 16.3 | .766 | 10.42 | 11,800 |
| 1907. | | | | | | |
| January | 11.74 | 6.64 | 11.13 | .523 | .60 | 684 |
| February | 20.79 | 11.33 | 14.16 | .665 | .69 | 786 |
| March | 34.44 | 14.88 | 19.12 | .898 | 1.04 | 1,180 |
| April | 44.70 | 16.79 | 32.58 | 1.53 | 1.71 | 1,940 |
| May | 64.77 | 36.95 | 47.66 | 2.24 | 2.58 | 2,930 |
| June | 71.72 | 42.08 | 57.94 | 2.72 | 3.04 | 3,450 |
| July | 49.55 | 27.33 | 34.38 | 1.61 | 1.86 | 2,110 |
| August | 29.66 | 22.92 | 25.70 | 1.21 | 1.40 | 1,580 |
| September | 27.33 | 19.72 | 22.71 | 1.07 | 1.19 | 1,350 |
| October | 20.30 | 16.28 | 18.72 | .879 | 1.01 | 1,150 |
| November | 16.79 | 16.28 | 16.60 | .779 | .87 | 988 |
| December | 16.79 | 12.62 | 14.96 | .702 | .81 | 920 |
| The year | 71.72 | 6.64 | 26.3 | 1.24 | 16.80 | 19,100 |
| 1908. | | | | | | |
| January | 13.78 | 12.62 | 12.93 | .607 | .70 | 795 |
| February | 13.95 | 6.98 | 12.88 | .605 | .65 | 741 |
| March | 14.88 | 12.68 | 13.63 | .640 | .74 | 838 |
| April | 17.73 | 12.68 | 15.29 | .718 | .80 | 910 |
| May | 50.22 | 17.73 | 29.63 | 1.39 | 1.60 | 1,820 |
| June | 64.77 | 39.46 | 46.22 | 2.17 | 2.42 | 2,750 |
| July | 39.46 | 27.33 | 30.66 | 1.44 | 1.66 | 1,890 |
| August | 25.07 | 20.79 | 22.90 | 1.08 | 1.24 | 1,410 |
| September | 20.79 | 18.73 | 19.42 | .912 | 1.02 | 1,160 |
| October | 18.73 | 16.28 | 17.07 | .801 | .92 | 1,050 |
| November | 16.79 | 11.33 | 15.93 | .748 | .83 | 948 |
| December | 16.79 | 3.99 | 12.98 | .609 | .70 | 798 |
| The year | 64.77 | 3.99 | 20.8 | .977 | 13.28 | 15,100 |
| 1909. | | | | | | |
| January | 18.7 | 8.09 | 14.7 | .690 | .80 | 904 |
| February | 20.8 | 14.9 | 16.6 | .779 | .81 | 922 |
| March | 22.9 | 16.3 | 19.3 | .906 | 1.04 | 1,190 |
| April | 39.5 | 22.9 | 29.4 | 1.38 | 1.54 | 1,750 |
| May | 83.8 | 32.0 | 50.8 | 2.38 | 2.74 | 3,120 |
| June | 112 | 64.8 | 81.1 | 3.81 | 4.25 | 4,830 |
| July | 83.8 | 25.1 | 36.6 | 1.72 | 1.98 | 2,250 |
| August | 29.7 | 25.1 | 28.1 | 1.32 | 1.52 | 1,730 |
| September | 27.3 | 22.9 | 24.9 | 1.17 | 1.30 | 1,480 |
| October | 22.9 | 20.3 | 20.8 | .977 | 1.13 | 1,280 |
| November | 25.1 | 18.7 | 19.5 | .915 | 1.02 | 1,160 |
| December | 20.8 | 6.64 | 16.3 | .765 | .88 | 1,000 |
| The year | 112 | 6.64 | 29.8 | 1.40 | 19.01 | 21,600 |

## PARLEYS CREEK NEAR SALT LAKE CITY, UTAH.

Parleys Creek is formed by the junction of two forks which together drain nearly 8 miles of the crest of the Wasatch Range, and empties into Jordan River near the southern limits of Salt Lake City. Measurements are made by means of two 10-foot Cippoletti weirs, located above the intakes of the city waterworks.

*Daily discharge, in second-feet, of Parleys Creek near Salt Lake City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 12.2 | 23.1 | 23.1 | 63.3 | 143 | 234 | 63.3 | 27.5 | 24.5 | 18.3 | 18.3 | 20.3 |
| 2 | 12.2 | 23.1 | 26.0 | 72.5 | 151 | 238 | 64.3 | 26.7 | 20.3 | 18.3 | 18.3 | 22.4 |
| 3 | 12.2 | 23.1 | 24.5 | 90.7 | 171 | 238 | 62.3 | 26.0 | 20.3 | 18.3 | 17.7 | 22.4 |
| 4 | 13.4 | 23.1 | 25.3 | 90.7 | 198 | 244 | 60.4 | 25.3 | 20.3 | 19.0 | 17.7 | 21.7 |
| 5 | 21.0 | 23.1 | 30.5 | 86.3 | 251 | 259 | 59.4 | 24.5 | 19.7 | 19.7 | 17.7 | 19.0 |
| 6 | 29.7 | 13.9 | 30.5 | 79.8 | 214 | 274 | 57.5 | 24.5 | 19.7 | 19.7 | 17.0 | 20.3 |
| 7 | 24.5 | 18.3 | 30.5 | 75.6 | 225 | 274 | 54.6 | 25.3 | 19.0 | 19.7 | 17.0 | 20.3 |
| 8 | 21.0 | 15.8 | 30.5 | 73.5 | 243 | 224 | 53.7 | 25.3 | 18.3 | 19.7 | 17.0 | 21.0 |
| 9 | 20.3 | 15.8 | 30.5 | 75.6 | 253 | 207 | 47.3 | 25.3 | 18.3 | 19.7 | 17.0 | 21.0 |
| 10 | 17.7 | 19.0 | 30.5 | 79.8 | 262 | 207 | 46.4 | 39.4 | 17.7 | 19.7 | ..... | 21.7 |
| 11 | 10.5 | 20.3 | 31.3 | 76.6 | 249 | 191 | 45.5 | 32.9 | 18.3 | 19.7 | ..... | 19.7 |
| 12 | 13.9 | 20.3 | 24.5 | 73.5 | 207 | 187 | 44.6 | 29.7 | 19.7 | 19.7 | ..... | 19.7 |
| 13 | 19.0 | 18.3 | 29.7 | 75.6 | 187 | 173 | 42.0 | 28.2 | 19.7 | 19.7 | 17.0 | 20.3 |
| 14 | 26.0 | 17.7 | 30.5 | 85.2 | 182 | 166 | 40.3 | 26.7 | 19.7 | 19.0 | 17.7 | 19.0 |
| 15 | 31.3 | 21.7 | 32.1 | 91.9 | 187 | 176 | 38.6 | 26.7 | 19.0 | 19.0 | 17.0 | 19.0 |
| 16 | 32.9 | 21.7 | 37.8 | 130 | 205 | 182 | 37.8 | 27.5 | 19.0 | 19.0 | 17.0 | 19.0 |
| 17 | 29.7 | 24.5 | 39.4 | 172 | 201 | 163 | 35.3 | 27.5 | 19.0 | 19.0 | 17.0 | 10.5 |
| 18 | 27.5 | 24.5 | 43.7 | 198 | 193 | 140 | 36.1 | 29.0 | 19.0 | 19.0 | 17.7 | 7.92 |
| 19 | 27.5 | 23.1 | 45.5 | 205 | 201 | 133 | 36.1 | 29.0 | 19.7 | 19.0 | 17.7 | 9.45 |
| 20 | 36.9 | 22.4 | 42.9 | 201 | 206 | 129 | 35.3 | 29.0 | 19.7 | 18.3 | 19.0 | 12.2 |
| 21 | 33.7 | 21.7 | 43.7 | 161 | 220 | 129 | 34.5 | 29.0 | 20.3 | 18.3 | 50.9 | 15.2 |
| 22 | 32.1 | 23.1 | 42.0 | 159 | 206 | 123 | 33.7 | 30.5 | 20.3 | 18.3 | 32.1 | 16.4 |
| 23 | 31.3 | 23.8 | 43.7 | 159 | 244 | 119 | 33.7 | 27.5 | 20.3 | 18.3 | 28.2 | 17.0 |
| 24 | 26.7 | 25.3 | 43.7 | 163 | 201 | 118 | 33.7 | 26.0 | 20.3 | 17.0 | 27.5 | 17.7 |
| 25 | 29.7 | 23.1 | 44.6 | 159 | 206 | 104 | 33.7 | 26.0 | 19.7 | 17.0 | 28.2 | 17.7 |
| 26 | 29.7 | 24.5 | 47.3 | 176 | 213 | 76.6 | 33.7 | 24.5 | 19.7 | 16.4 | 30.5 | 17.0 |
| 27 | 29.7 | 24.5 | 54.6 | 205 | 224 | 72.5 | 32.9 | 23.1 | 19.0 | 17.0 | 26.7 | 16.4 |
| 28 | 28.2 | 23.1 | 64.3 | 228 | 214 | 71.4 | 32.9 | 20.3 | 19.0 | 17.0 | 19.7 | 15.8 |
| 29 | 26.0 | ..... | 60.4 | 199 | 216 | 70.4 | 32.1 | 19.0 | 19.0 | 17.0 | 19.0 | 13.9 |
| 30 | 27.5 | ..... | 58.5 | 193 | 202 | 68.4 | 28.2 | 17.6 | 19.0 | 17.0 | 19.0 | 14.5 |
| 31 | 26.0 | ..... | 56.5 | ..... | 191 | ..... | 28.2 | 23.1 | ..... | 18.3 | ..... | 17.7 |

*Monthly discharge of Parleys Creek near Salt Lake City, Utah, for 1898–1909.*

[Drainage area, 50.1 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1898. | | | | | | |
| August [a] | 11.66 | 7.18 | 9.26 | 0.185 | 0.21 | 569 |
| September | 11.78 | 7.44 | 8.90 | .178 | .20 | 530 |
| October | 14.74 | 8.53 | 10.32 | .206 | .24 | 634 |
| November | 13.77 | 6.69 | 9.44 | .188 | .21 | 562 |
| December | 13.69 | 2.90 | 8.30 | .166 | .19 | 510 |
| 1899. | | | | | | |
| January | 13.39 | 6.43 | 8.91 | .178 | .21 | 548 |
| February | 11.30 | 4.00 | 8.21 | .164 | .17 | 456 |
| March [a] | 50.10 | ..... | 12.45 | .249 | .29 | 766 |
| April | 216.00 | 48.30 | 146.66 | 2.93 | 3.27 | 8,730 |
| May | 220.00 | 113.00 | 174.81 | 3.49 | 4.02 | 10,800 |
| June | 227.50 | 125.60 | 108.72 | 2.17 | 2.42 | 6,470 |
| July | 120.80 | 30.68 | 58.40 | 1.17 | 1.35 | 3,590 |
| August | 28.44 | 14.66 | 20.86 | .416 | .48 | 1,280 |
| September | 16.24 | 12.71 | 14.33 | .286 | .32 | 853 |
| October | 21.55 | 14.44 | 16.43 | .328 | .38 | 1,010 |

[a] Partial month; mean estimated for full month.

*Monthly discharge of Parleys Creek near Salt Lake City, Utah, for 1898–1909*—Cont'd.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage. area. | Total in acre-feet. |
| 1899. | | | | | | |
| November | 18.90 | 12.99 | 14.27 | 0.285 | 0.32 | 849 |
| December | 14.79 | 4.21 | 11.30 | .226 | .26 | 695 |
| The year | 227.50 | 4.00 | 49.6 | .991 | 13.49 | 36,000 |
| 1900. | | | | | | |
| January | 15.65 | 8.11 | 11.91 | 0.238 | 0.27 | 732 |
| February | 11.90 | 8.81 | 10.45 | .209 | .22 | 579 |
| March | 20.14 | 10.74 | 16.43 | .328 | .38 | 1.010 |
| April[a] | 31.20 | 14.88 | 20.32 | .406 | .45 | 1,210 |
| May[a] | 38.98 | 22.30 | 29.39 | .587 | .68 | 1,810 |
| June | 24.13 | 9.68 | 15.84 | .316 | .35 | 943 |
| July | 13.56 | 6.19 | 9.46 | .189 | .22 | 582 |
| August | 10.41 | 6.19 | 7.25 | .145 | .17 | 446 |
| September | 10.02 | 4.37 | 6.97 | .139 | .16 | 415 |
| October | 12.17 | 7.34 | 8.93 | .178 | .21 | 549 |
| November | 12.08 | 5.39 | 7.75 | .155 | .17 | 461 |
| December | 9.01 | 2.92 | 7.35 | .147 | .17 | 452 |
| The year | 38.95 | 2.92 | 12.7 | .253 | 3.45 | 9,190 |
| 1901. | | | | | | |
| January | 10.00 | 4.11 | 7.73 | .154 | .18 | 475 |
| February | 16.20 | 4.76 | 9.00 | .180 | .19 | 500 |
| March | 17.34 | 9.34 | 11.13 | .222 | .26 | 684 |
| April | 90.32 | 11.02 | 38.17 | .762 | .85 | 2,270 |
| May | 109.49 | 43.16 | 86.71 | 1.73 | 1.99 | 5,330 |
| June | 47.75 | 18.05 | 28.49 | .569 | .63 | 1,700 |
| July | 20.15 | 9.94 | 13.85 | .276 | .32 | 852 |
| August | 23.82 | 5.85 | 12.23 | .244 | .28 | 752 |
| September | 12.90 | 7.26 | 8.44 | .168 | .19 | 502 |
| October | 9.94 | 8.12 | 8.59 | .171 | .20 | 528 |
| November | 11.39 | 7.51 | 8.19 | .163 | .18 | 487 |
| December | 13.30 | 3.01 | 7.67 | .153 | .18 | 472 |
| The year | 109.49 | 3.01 | 20.0 | .399 | 5.45 | 14,600 |
| 1902. | | | | | | |
| January | 9.33 | 2.15 | 7.08 | .141 | .16 | 435 |
| February | 9.27 | 3.35 | 7.34 | .147 | .15 | 408 |
| March | 10.57 | 5.05 | 7.39 | .148 | .17 | 454 |
| April | 85.71 | 6.68 | 33.38 | .666 | .74 | 1,990 |
| May | 95.26 | 33.46 | 58.47 | 1.17 | 1.35 | 3,600 |
| June | 73.83 | 18.26 | 33.64 | .671 | .75 | 2,000 |
| July | 16.85 | 10.37 | 13.38 | .267 | .31 | 822 |
| August | 13.26 | 5.52 | 10.57 | .211 | .24 | 650 |
| September | 8.84 | 7.02 | 7.59 | .151 | .17 | 452 |
| October | 7.91 | 7.20 | 7.52 | .150 | .17 | 462 |
| November | 9.27 | 4.85 | 7.33 | .146 | .16 | 436 |
| December | 9.78 | 2.89 | 6.73 | .134 | .15 | 414 |
| The year | 95.26 | 2.15 | 16.7 | .334 | 4.52 | 12,100 |
| 1903. | | | | | | |
| January | 15.27 | 4.35 | 7.84 | .156 | .18 | 482 |
| February | 8.00 | 3.35 | 6.69 | .134 | .14 | 372 |
| March | 24.59 | 6.01 | 12.15 | .243 | .28 | 747 |
| April | 88.12 | 13.29 | 29.83 | .595 | .66 | 1,780 |
| May | 124.03 | 51.48 | 73.80 | 1.47 | .17 | 4.540 |
| June | 133.73 | 20.45 | 55.30 | 1.10 | 1.23 | 3.290 |
| July | 36.71 | 13.70 | 16.33 | .326 | .38 | 1,000 |
| August | 14.35 | 8.06 | 11.12 | .222 | .26 | 684 |
| September | 9.97 | 7.72 | 8.73 | .174 | .19 | 519 |
| October | 11.38 | 8.45 | 9.73 | .194 | .22 | 598 |
| November | 13.06 | 2.41 | 8.67 | .173 | .19 | 516 |
| December | 8.28 | 2.06 | 5.93 | .118 | .14 | 365 |
| The year | 133.73 | 2.06 | 20.5 | .409 | 4.04 | 14,900 |
| 1904. | | | | | | |
| January | 9.21 | 4.82 | 7.08 | .141 | .16 | 435 |
| February | 18.07 | 4.20 | 10.29 | .205 | .22 | 592 |
| March | 39.29 | 9.36 | 19.60 | .391 | .45 | 1,210 |
| April | 207.29 | 69.75 | 123.18 | 2.46 | 2.74 | 7,330 |
| May | 208.52 | 88.12 | 168.46 | 3.36 | 3.87 | 10,400 |
| June | 137.50 | 28.48 | 52.63 | 1.05 | 1.17 | 3,130 |
| July | 41.08 | 19.47 | 26.09 | .521 | .60 | 1,600 |
| August | 20.20 | 11.79 | 15.99 | .319 | .37 | 983 |
| September | 13.05 | 9.40 | 11.36 | .227 | .25 | 676 |

[a] Partial month; mean estimated for full month.

*Monthly discharge of Parleys Creek near Salt Lake City, Utah, for 1898–1909*—Cont'd.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1904. | | | | | | |
| October | 13.69 | 11.78 | 12.88 | 0.257 | 0.30 | 793 |
| November | 11.79 | 8.82 | 10.27 | .205 | .23 | 611 |
| December | 10.78 | 2.55 | 8.25 | .165 | .19 | 507 |
| The year | 208.52 | 2.55 | 38.8 | .775 | 10.55 | 28,300 |
| 1905. | | | | | | |
| January | 10.15 | 6.48 | 9.00 | .180 | .21 | 553 |
| February | 12.24 | 1.87 | 8.76 | .175 | .18 | 487 |
| March | 10.17 | 6.90 | 9.28 | .185 | .21 | 571 |
| April | 38.66 | 8.64 | 18.94 | .378 | .42 | 1,130 |
| May | 56.65 | 22.88 | 36.97 | .738 | .85 | 2,270 |
| June | 28.18 | 14.79 | 21.41 | .427 | .48 | 1,270 |
| July | 15.70 | 10.18 | 12.49 | .249 | .29 | 768 |
| August | 13.72 | 6.65 | 8.23 | .164 | .19 | 506 |
| September | 11.37 | 5.84 | 6.72 | .134 | .15 | 400 |
| October | 7.51 | 5.30 | 6.79 | .136 | .16 | 418 |
| November | 7.51 | 5.16 | 6.58 | .131 | .15 | 392 |
| December | 8.29 | 2.75 | 5.86 | .117 | .13 | 360 |
| The year | 56.65 | 1.87 | 12.6 | .251 | 3.42 | 9,120 |
| 1906. | | | | | | |
| January | 11.83 | 3.94 | 7.51 | .150 | .17 | 462 |
| February | 9.60 | 6.20 | 7.71 | .154 | .16 | 428 |
| March | 27.32 | 4.58 | 12.82 | .256 | .30 | 788 |
| April [a] | 38.87 | 21.46 | 48.49 | .968 | 1.08 | 2,890 |
| May | 145.85 | 70.93 | 106.94 | 2.13 | .25 | 6,570 |
| June | 122.03 | 38.66 | 68.98 | 1.38 | 1.54 | 4,100 |
| July | 38.74 | 17.78 | 24.58 | .491 | .57 | 1,510 |
| August [a] | 30.93 | 14.14 | 17.25 | .344 | .40 | 1,060 |
| September [a] | 14.79 | 9.78 | 11.68 | .233 | .26 | 695 |
| October | 10.26 | 9.10 | 9.70 | .194 | .22 | 596 |
| November | 12.79 | 3.34 | 9.12 | .182 | .20 | 543 |
| December | 14.99 | 5.00 | 10.06 | .201 | .23 | 618 |
| The year | 145.85 | 3.34 | 20.4 | .557 | 5.38 | 20,300 |
| 1907. | | | | | | |
| January | 10.62 | 3.18 | 8.14 | .162 | .19 | 501 |
| February, 7 days | 32.06 | 8.63 | 23.12 | .461 | .12 | 321 |
| April | 211.79 | 123.22 | 162.76 | 3.25 | .36 | 9,690 |
| May | 203.64 | 85.22 | 146.89 | 2.93 | .34 | 9,030 |
| June 1–16 | 163.52 | 116.03 | 139.01 | 2.77 | 1.65 | 4,410 |
| November | 15.77 | 10.54 | 13.43 | .268 | .30 | 799 |
| December [a] | 13.65 | 9.28 | 11.23 | .224 | .26 | 691 |
| 1908. | | | | | | |
| January | 15.77 | 6.95 | 11.16 | .223 | .26 | 686 |
| February | 13.94 | 5.14 | 10.15 | .203 | .22 | 584 |
| March | 22.39 | 5.58 | 13.59 | .271 | .31 | 836 |
| April | 41.14 | 15.15 | 27.24 | .544 | .61 | 1,620 |
| May | 81.10 | 18.99 | 49.14 | .981 | 1.13 | 3,020 |
| June | 81.31 | 49.09 | 74.14 | 1.48 | 1.65 | 4,410 |
| July | 49.09 | 25.25 | 34.44 | .687 | .79 | 2,120 |
| August | 29.74 | 16.40 | 22.07 | .441 | .51 | 1,360 |
| September | 28.98 | 11.62 | 15.26 | .305 | .34 | 908 |
| October | 20.33 | 13.94 | 17.11 | .342 | .39 | 1,050 |
| November | 17.68 | 5.14 | 13.59 | .270 | .30 | 809 |
| December | 17.68 | 3.16 | 12.41 | .248 | .29 | 763 |
| The year | 81.31 | 3.16 | 25.0 | .500 | 6.80 | 18,200 |
| 1909. | | | | | | |
| January | 36.9 | 10.5 | 24.5 | .489 | .56 | 1,510 |
| February | 25.3 | 15.8 | 21.5 | .429 | .45 | 1,190 |
| March | 64.3 | 23.1 | 38.7 | .772 | .89 | 2,380 |
| April | 228. | 63.3 | 130. | 2.59 | .29 | 7,740 |
| May | 262. | 143. | 209. | 4.17 | .48 | 12,900 |
| June | 274. | 68.4 | 166. | 3.31 | .37 | 9,880 |
| July | 64.3 | 28.2 | 42.5 | .848 | .98 | 2,610 |
| August | 39.4 | 17.6 | 26.5 | .529 | .61 | 1,630 |
| September | 24.5 | 17.7 | 19.6 | .391 | .44 | 1,170 |
| October | 19.7 | 16.4 | 18.6 | .371 | .43 | 1,140 |
| November | 50.9 | 17.0 | 21.0 | .419 | .47 | 1,250 |
| December | 22.4 | 7.92 | 17.6 | .351 | .40 | 1,080 |
| The year | 274 | 7.92 | 61.3 | 1.22 | 6.37 | 44,500 |

[a] Partial month; mean estimated for full month.

## EMIGRATION CREEK NEAR SALT LAKE CITY, UTAH.

Emigration Creek is tributary to Parleys Creek just below the mountain front. Its waters are used for the water supply of Salt Lake City. Measurements are made by means of a 2-foot rectangular weir.

*Monthly discharge of Emigration Creek near Salt Lake City, Utah, for 1900–1908.*

[Drainage area, 29 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| **1900.** | | | | | | |
| June | 3.46 | 1.27 | 2.41 | 0.083 | 0.09 | 143 |
| July | 1.57 | .51 | .91 | .031 | .04 | 56.0 |
| August | .57 | .50 | .54 | .019 | .02 | 33.2 |
| September | .61 | .48 | .52 | .018 | .02 | 30.9 |
| October | 1.26 | .48 | .68 | .023 | .03 | 41.8 |
| November | 2.76 | .73 | 1.29 | .044 | .05 | 76.8 |
| December | 1.40 | .66 | .87 | .030 | .03 | 53.5 |
| The period | | | | | | 435 |
| **1901.** | | | | | | |
| January | .70 | .57 | .66 | .023 | .03 | 40.6 |
| February | 8.56 | .68 | 1.68 | .058 | .06 | 93.3 |
| March | 5.57 | 1.38 | 3.73 | .129 | .15 | 229 |
| April | 13.72 | 4.14 | 8.27 | .285 | .32 | 492 |
| May[a] | 21.97 | 7.05 | 12.44 | .429 | .49 | 765 |
| June | 7.05 | 2.97 | 4.87 | .168 | .19 | 290 |
| July | 2.76 | .84 | 1.84 | .063 | .07 | 113 |
| August | 3.02 | .76 | 1.13 | .039 | .04 | 69.5 |
| September | 3.13 | .61 | .82 | .028 | .03 | 48.8 |
| October | 1.52 | .82 | 1.01 | .035 | .04 | 62.1 |
| November | 1.45 | .97 | 1.20 | .041 | .05 | 71.4 |
| December | 1.75 | .50 | .94 | .032 | .04 | 57.8 |
| The year | 21.97 | .50 | 3.22 | .111 | 1.51 | 2,330 |
| **1902.** | | | | | | |
| January | .60 | .60 | .60 | .021 | .02 | 36.9 |
| February | 1.29 | .60 | .87 | .030 | .03 | 48.3 |
| March | 2.35 | .70 | 1.46 | .050 | .06 | 89.8 |
| April | 19.33 | 2.20 | 9.69 | .334 | .37 | 577 |
| May | 17.13 | 7.10 | 9.92 | .342 | .39 | 610 |
| June | 8.03 | 2.93 | 4.87 | .168 | .19 | 290 |
| July | 3.12 | .94 | 2.05 | .071 | .08 | 126 |
| August | 1.37 | .57 | .78 | .027 | .03 | 48.0 |
| September | .60 | .50 | .52 | .018 | .02 | 30.9 |
| October | .80 | .61 | .69 | .024 | .03 | 42.4 |
| November | 1.79 | .70 | 1.10 | .038 | .04 | 65.5 |
| December | 1.37 | .73 | .95 | .033 | .04 | 58.4 |
| The year | 19.33 | .50 | 2.79 | .096 | 1.30 | 2,020 |
| **1903.** | | | | | | |
| January | 6.26 | .66 | 1.07 | .037 | .04 | 65.8 |
| February | .85 | .53 | .64 | .022 | .02 | 35.5 |
| March | 11.72 | .73 | 3.05 | .105 | .12 | 188 |
| April | 12.77 | 3.72 | 8.04 | .277 | .31 | 478 |
| May | 19.33 | 5.50 | 9.48 | .327 | .38 | 583 |
| June | 18.07 | 3.99 | 8.62 | .297 | .33 | 513 |
| July | 3.99 | 1.56 | 2.79 | .096 | .11 | 172 |
| August | 1.72 | .60 | .98 | .034 | .04 | 60.3 |
| September | 1.11 | .60 | .83 | .029 | .03 | 49.4 |
| October | 2.04 | 1.11 | 1.23 | .042 | .05 | 75.6 |
| November | 3.15 | .99 | 1.29 | .044 | .05 | 76.8 |
| December | .84 | .61 | .68 | .023 | .03 | 41.8 |
| The year | 19.33 | .53 | 3.22 | .111 | 1.51 | 2,340 |

[a] Partial month; mean estimated for full month.

*Monthly discharge of Emigration Creek near Salt Lake City, Utah, for 1900–1908*—Cont'd.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1904. | | | | | | |
| January | 0.87 | 0.73 | 0.86 | 0.030 | 0.03 | 52.9 |
| February | 3.72 | .87 | 1.72 | .059 | .06 | 98.9 |
| March | 24.21 | 1.01 | 6.82 | .235 | .27 | 419 |
| August[a] | 1.88 | 1.41 | 1.77 | .061 | .07 | 109 |
| September | 1.41 | 1.11 | 1.16 | .040 | .04 | 69.0 |
| October | 2.40 | 1.11 | 1.55 | .053 | .06 | 95.3 |
| November | 1.51 | 1.27 | 1.43 | .049 | .05 | 85.1 |
| December | 3.13 | .77 | .82 | .028 | .03 | 50.4 |
| The period | | | | | | 980 |
| 1905. | | | | | | |
| January | 1.08 | .77 | .93 | .032 | .04 | 57.2 |
| February[a] | 1.34 | .91 | 1.11 | .038 | .04 | 61.6 |
| March | 2.66 | 1.54 | 1.96 | .068 | .08 | 121 |
| April | 7.29 | 2.26 | 5.13 | .177 | .20 | 305 |
| May | 12.19 | 5.74 | 9.22 | .318 | .37 | 567 |
| June | 7.07 | 1.95 | 4.53 | .156 | .17 | 270 |
| July | 2.33 | .50 | 1.32 | .046 | .05 | 81.2 |
| August | .50 | .39 | .43 | .015 | .02 | 26.4 |
| September | .60 | .43 | .44 | .015 | .02 | 26.2 |
| October | .53 | .53 | .53 | .018 | .02 | 32.6 |
| November | .76 | .53 | .65 | .022 | .02 | 38.7 |
| December | .67 | .64 | .64 | .022 | .03 | 39.4 |
| The year | 12.19 | .39 | 2.24 | .077 | 1.06 | 1,630 |
| 1906. | | | | | | |
| January | .64 | .64 | .64 | .022 | .03 | 39.4 |
| February | .64 | .64 | .64 | .022 | .02 | 35.5 |
| March | 15.47 | .64 | 4.24 | .146 | .17 | 261 |
| April | 18.07 | 11.09 | 15.02 | .518 | .58 | 894 |
| May | 17.48 | 12.17 | 14.50 | .500 | .58 | 892 |
| June | 14.02 | 4.28 | 10.59 | .365 | .41 | 630 |
| July | 6.88 | 2.97 | 4.50 | .155 | .18 | 277 |
| August[a] | 3.78 | 1.72 | 2.30 | .079 | .09 | 141 |
| September | 3.15 | 1.41 | 1.87 | .064 | .71 | 111 |
| October | 1.56 | 1.11 | 1.45 | .050 | .06 | 89.2 |
| November | 2.40 | 1.11 | 1.58 | .054 | .06 | 94.0 |
| December | 4.40 | 1.11 | 1.85 | .064 | .07 | 114 |
| The year | 18.07 | .64 | 4.93 | .170 | 2.96 | 3,580 |
| 1907. | | | | | | |
| January[a] | 2.28 | 1.11 | 1.60 | .055 | .06 | 98.4 |
| May 24–31 | 18.75 | 5.01 | 10.4 | .036 | .01 | 165 |
| June[a] | 19.44 | 5.01 | 7.54 | .259 | .29 | 449 |
| July[a] | 5.23 | 4.57 | 5.55 | .191 | .22 | 341 |
| August[a] | 7.62 | 6.39 | 6.77 | .233 | .27 | 416 |
| November[a] | 2.76 | 1.72 | 2.13 | .073 | .08 | 127 |
| December[a] | 3.99 | 1.56 | 2.72 | .094 | .11 | 167 |
| The period | | | | | | 1,760 |
| 1908.[b] | | | | | | |
| January | 1.88 | 1.25 | 1.59 | .055 | .06 | 97.8 |
| February | 3.15 | 1.41 | 1.52 | .052 | .06 | 87.4 |
| March | 3.99 | 1.56 | 2.98 | .103 | .12 | 183 |
| April | 8.93 | 3.56 | 5.72 | .197 | .22 | 340 |
| May | 8.93 | 5.80 | 8.80 | .303 | .35 | 541 |
| June | 12.47 | 2.97 | 7.60 | .262 | .29 | 452 |
| July | 8.93 | 2.40 | 6.39 | .220 | .25 | 393 |
| August | 8.93 | 3.99 | 6.16 | .212 | .24 | 379 |
| September | 6.80 | 3.15 | 4.90 | .169 | .19 | 292 |
| October | 6.80 | 4.85 | 5.76 | .199 | .23 | 354 |
| November | 5.80 | 4.85 | 5.58 | .192 | .21 | 332 |
| December | 4.85 | 2.43 | 3.64 | .126 | .15 | 224 |
| The year | 12.47 | 1.25 | 5.05 | .174 | 2.37 | 3,680 |

[a] Partial month; mean estimated for full month.
[b] All partial months during 1908. Means estimated for full months.

## CITY CREEK NEAR SALT LAKE CITY, UTAH.

City Creek is the northernmost tributary of Jordan River. Its natural channel passes through Salt Lake City and its water is used almost entirely for the city water supply. Its discharge is measured by means of two 5-foot Cippoletti weirs.

*Daily discharge, in second-feet, of City Creek near Salt Lake City, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | Day. | Jan. | Feb. | Mar. | Apr. | May. | June. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.20 | 10.2 | 9.16 | 17.8 | 45.1 | 95.6 | 16 | 12.4 | 9.83 | 13.7 | 29.0 | 66.2 | ..... |
| 2 | 8.04 | 10.2 | 9.00 | 21.2 | 43.0 | 105 | 17 | 11.6 | 9.49 | 16.8 | 34.4 | 66.6 | ..... |
| 3 | 8.06 | 10.8 | 10.3 | 26.2 | 42.9 | 152 | 18 | 11.2 | 9.16 | 17.4 | 37.0 | 65.0 | ..... |
| 4 | 8.04 | 10.2 | 10.3 | 25.5 | 47.3 | 164 | 19 | 11.2 | 9.16 | 15.6 | 39.4 | 65.6 | ..... |
| 5 | 10.2 | 10.2 | 12.3 | 25.5 | 51.3 | ..... | 20 | 13.9 | 9.10 | 15.6 | 38.8 | 69.7 | ..... |
| 6 | 8.71 | 10.2 | 12.4 | 24.1 | 56.1 | ..... | 21 | 13.7 | 9.16 | 15.3 | 39.6 | 76.6 | ..... |
| 7 | 10.3 | 10.2 | 13.4 | 23.2 | 61.2 | ..... | 22 | 14.9 | 9.00 | 14.3 | 37.7 | 87.8 | ..... |
| 8 | 9.66 | 10.2 | 11.9 | 22.3 | 65.3 | ..... | 23 | 13.4 | 9.00 | 14.7 | 37.7 | 98.1 | ..... |
| 9 | 9.16 | 10.2 | 12.3 | 21.6 | 71.0 | ..... | 24 | 12.7 | 9.00 | 14.5 | 38.5 | 93.8 | ..... |
| 10 | 8.36 | 10.2 | 11.6 | 23.4 | 72.0 | ..... | 25 | 12.1 | 9.00 | 14.1 | 37.0 | 85.7 | ..... |
| 11 | 10.7 | 9.83 | 11.7 | 24.3 | 71.0 | ..... | 26 | 11.4 | 8.84 | 15.4 | 38.0 | 80.9 | ..... |
| 12 | 8.68 | 9.83 | 10.7 | 23.3 | 67.5 | ..... | 27 | 11.5 | 9.16 | 16.2 | 44.2 | 84.0 | ..... |
| 13 | 8.68 | 9.83 | 10.5 | 22.5 | 63.0 | ..... | 28 | 10.2 | 9.00 | 18.7 | 47.0 | 98.5 | ..... |
| 14 | 9.33 | 11.0 | 10.9 | 23.2 | 62.5 | ..... | 29 | 10.5 | ..... | 17.8 | 48.2 | 108 | ..... |
| 15 | 10.5 | 9.49 | 11.9 | 26.4 | 62.8 | ..... | 30 | 10.2 | ..... | 17.6 | 46.8 | 104 | ..... |
| | | | | | | | 31 | 10.3 | ..... | 16.6 | ..... | 93.8 | ..... |

NOTE.—Weir out of order after June 4, 1909.

*Monthly discharge of City Creek near Salt Lake City, Utah, for 1898–1909.*

[Drainage area, 19.2 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1898. | | | | | | |
| December 19–31 | 5.84 | 5.27 | 5.42 | 0.282 | 0.14 | 140 |
| 1899. | | | | | | |
| January | 5.54 | 5.12 | 5.24 | .273 | .31 | 322 |
| February | 6.03 | 3.15 | 5.18 | .270 | .28 | 288 |
| March | 10.63 | 5.14 | 6.63 | .345 | .40 | 408 |
| April | 30.38 | 8.91 | 22.71 | 1.18 | 1.32 | 13,500 |
| May | 60.66 | 20.74 | 41.24 | 2.15 | 2.48 | 2,540 |
| June | 121.96 | 48.48 | 78.50 | 4.09 | 4.56 | 4,670 |
| July | 48.26 | 17.63 | 28.76 | 1.50 | 1.73 | 1,770 |
| August | 15.69 | 11.99 | 13.15 | .685 | .79 | 809 |
| September | 12.77 | 9.93 | 11.28 | .588 | .66 | 671 |
| October | 10.91 | 9.43 | 10.13 | .528 | .61 | 623 |
| November | 11.27 | 8.67 | 9.19 | .479 | .53 | 547 |
| December | 8.73 | 7.76 | 8.33 | .434 | .50 | 512 |
| The year | 121.96 | 3.15 | 20.0 | 1.04 | 14.17 | 26,700 |
| 1900. | | | | | | |
| January | 10.04 | 7.75 | 8.01 | .417 | .48 | 493 |
| February | 8.06 | 7.06 | 7.44 | .388 | .40 | 413 |
| March[a] | 11.00 | 7.79 | 9.29 | .484 | .56 | 571 |
| April | 14.49 | 8.86 | 10.95 | .570 | .64 | 652 |
| May | 31.30 | 14.45 | 23.91 | 1.24 | 1.43 | 1,470 |
| June | 24.32 | 11.50 | 16.06 | .836 | .93 | 956 |
| July | 11.90 | 7.74 | 9.84 | .512 | .59 | 605 |
| August | 8.93 | 6.75 | 7.52 | .392 | .45 | 462 |
| September | 7.20 | 6.16 | 6.49 | .338 | .38 | 386 |
| October | 7.05 | 6.31 | 6.51 | .339 | .39 | 400 |
| November | 7.12 | 5.81 | 6.44 | .335 | .37 | 383 |
| December | 6.24 | 5.39 | 5.73 | .298 | .34 | 352 |
| The year | 31.30 | 5.39 | 9.85 | .512 | 6.96 | 7,140 |

[a] Partial month; mean estimated for full month.

*Monthly discharge of City Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1901. | | | | | | |
| January | 5.67 | 5.26 | 5.37 | 0.280 | 0.32 | 330 |
| February | 6.60 | 4.99 | 5.58 | .291 | .30 | 310 |
| March | 7.27 | 6.09 | 6.82 | .355 | .41 | 419 |
| April | 18.05 | 6.67 | 11.00 | .573 | .64 | 655 |
| May | 72.01 | 20.36 | 51.12 | 2.66 | 3.07 | 3,140 |
| June | 35.97 | 15.65 | 23.26 | 1.21 | 1.35 | 1,380 |
| July | 15.45 | 9.83 | 12.64 | .658 | .76 | 777 |
| August | 10.51 | 7.35 | 9.19 | .479 | .55 | 565 |
| September | 8.05 | 6.46 | 6.98 | .364 | .41 | 415 |
| October | 9.58 | 6.53 | 7.32 | .381 | .44 | 450 |
| November | 7.42 | 6.53 | 6.94 | .361 | .40 | 413 |
| December | 6.82 | 5.95 | 6.37 | .332 | .38 | 392 |
| The year | 72.01 | 4.99 | 12.7 | .662 | 9.03 | 9,250 |
| 1902. | | | | | | |
| January | 6.83 | 4.27 | 5.83 | .304 | .35 | 358 |
| February | 5.95 | 3.61 | 5.49 | .286 | .30 | 305 |
| March | 6.17 | 5.53 | 5.75 | .299 | .34 | 354 |
| April | 23.20 | 5.95 | 13.36 | .696 | .78 | 795 |
| May | 58.18 | 19.88 | 38.67 | 2.01 | 2.32 | 2,380 |
| June | 57.58 | 16.63 | 29.40 | 1.53 | 1.71 | 1,750 |
| July | 17.24 | 10.68 | 13.57 | .707 | .82 | 834 |
| August | 10.33 | 7.50 | 9.22 | .480 | .55 | 567 |
| September | 7.73 | 6.67 | 7.11 | .370 | .41 | 423 |
| October | 6.82 | 6.67 | 6.74 | .351 | .40 | 414 |
| November | 6.53 | 6.09 | 5.28 | .275 | .31 | 314 |
| December | 6.53 | 5.53 | 5.90 | .307 | .35 | 363 |
| The year | 58.18 | 3.61 | 12.2 | .635 | 8.64 | 8,860 |
| 1903. | | | | | | |
| January | 6.82 | 5.81 | 6.06 | .316 | .36 | 373 |
| February | 10.87 | 4.32 | 6.14 | .320 | .33 | 341 |
| March | 10.50 | 5.53 | 6.56 | .342 | .39 | 403 |
| April | 16.04 | 7.58 | 10.16 | .529 | .59 | 605 |
| May | 42.88 | 12.62 | 26.33 | 1.37 | 1.58 | 1,620 |
| June | 63.09 | 21.00 | 39.96 | 2.08 | 2.32 | 2,380 |
| July | 21.00 | 13.08 | 16.13 | .840 | .97 | 992 |
| August | 14.85 | 10.16 | 11.62 | .605 | .70 | 714 |
| September | 10.16 | 8.52 | 9.16 | .477 | .53 | 545 |
| October | 11.05 | 8.36 | 9.44 | .492 | .57 | 580 |
| November | 8.36 | 6.97 | 7.86 | .409 | .46 | 468 |
| December | 6.97 | 6.67 | 6.81 | .355 | .41 | 419 |
| The year | 63.09 | 4.32 | 13.0 | .678 | 9.21 | 9,440 |
| 1904. | | | | | | |
| January | 6.67 | 5.95 | 6.24 | .325 | .37 | 384 |
| February | 7.89 | 5.95 | 6.62 | .345 | .37 | 381 |
| March | 11.02 | 7.27 | 8.42 | .439 | .51 | 518 |
| April | 28.75 | 11.02 | 21.59 | 1.12 | 1.25 | 1,280 |
| May | 70.06 | 28.75 | 55.62 | 2.90 | 3.34 | 3,420 |
| June | 56.97 | 26.62 | 39.15 | 2.04 | 2.28 | 2,330 |
| July | 26.50 | 16.24 | 19.74 | 1.03 | 1.19 | 1,210 |
| August | 15.26 | 11.46 | 13.36 | .696 | .80 | 821 |
| September | 11.38 | 9.39 | 10.38 | .541 | .60 | 618 |
| October | 9.34 | 8.72 | 9.09 | .473 | .55 | 559 |
| November | 8.72 | 8.20 | 8.47 | .441 | .49 | 504 |
| December | 9.18 | 7.66 | 8.04 | .419 | .48 | 494 |
| The year | 70.06 | 5.95 | 17.2 | .897 | 12.23 | 12,500 |
| 1905. | | | | | | |
| January | 8.28 | 7.43 | 7.65 | .398 | .46 | 470 |
| February | 9.58 | 6.68 | 7.52 | .392 | .41 | 418 |
| March | 9.00 | 7.58 | 7.94 | .414 | .48 | 488 |
| April | 18.26 | 8.68 | 12.53 | .653 | .73 | 746 |
| May | 44.81 | 19.09 | 30.16 | 1.57 | 1.81 | 1,850 |
| June | 36.61 | 17.75 | 26.78 | 1.40 | 1.56 | 1,590 |
| July | 17.64 | 12.44 | 14.64 | .762 | .88 | 900 |
| August | 12.35 | 9.74 | 10.64 | .554 | .64 | 654 |
| September | 10.13 | 8.27 | 9.13 | .476 | .53 | 543 |
| October | 8.82 | 8.22 | 8.40 | .438 | .50 | 516 |
| November | 8.17 | 7.63 | 7.84 | .408 | .46 | 467 |
| December | 8.28 | 7.58 | 7.82 | .407 | .47 | 481 |
| The year | 44.81 | 6.68 | 12.6 | .656 | 8.93 | 9,120 |

*Monthly discharge of City Creek near Salt Lake City, Utah, for 1898–1909*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| 1906. | | | | | | |
| January | 8.36 | 7.50 | 7.77 | 0.405 | 0.47 | 478 |
| February | 8.76 | 7.50 | 7.84 | .408 | .42 | 435 |
| March | 15.07 | 8.05 | 10.64 | .554 | .64 | 654 |
| April | 32.91 | 13.27 | 22.46 | 1.17 | 1.30 | 1,340 |
| May | 68.78 | 26.27 | 50.61 | 2.64 | 3.04 | 3,110 |
| June | 59.09 | 32.92 | 49.45 | 2.58 | 2.88 | 2,940 |
| July[a] | 26.62 | 18.78 | 24.09 | 1.25 | 1.44 | 1,480 |
| August | 19.09 | 13.27 | 15.31 | .797 | .92 | 941 |
| September | 13.74 | 11.02 | 12.11 | .631 | .70 | 721 |
| October | 10.85 | 10.42 | 10.63 | .554 | .64 | 654 |
| November | 10.68 | 9.49 | 10.17 | .530 | .59 | 605 |
| December | 9.49 | 9.08 | 9.41 | .490 | .56 | 579 |
| The year | 68.78 | 7.50 | 19.2 | 1.00 | 13.60 | 13,900 |
| 1907. | | | | | | |
| January | 9.49 | 8.60 | 8.94 | .466 | .54 | 550 |
| February | 19.51 | 9.16 | 15.28 | .796 | .83 | 849 |
| March | 37.27 | 14.68 | 20.12 | 1.05 | 1.21 | 1,240 |
| April | 59.70 | 20.79 | 40.01 | 2.08 | 2.32 | 2,390 |
| May | 132.09 | 43.29 | 70.22 | 3.66 | 4.22 | 4,320 |
| June | 110.61 | 56.97 | 80.47 | 4.19 | 4.68 | 4,790 |
| July | 56.97 | 28.03 | 41.09 | 2.14 | 2.47 | 2,530 |
| August | 26.85 | 19.30 | 22.25 | 1.16 | 1.34 | 1,370 |
| September | 18.78 | 13.17 | 15.67 | .816 | .91 | 932 |
| October | 13.17 | 11.46 | 12.27 | .639 | .74 | 754 |
| November | 11.72 | 6.40 | 10.33 | .538 | .60 | 614 |
| December | 10.85 | 9.91 | 10.15 | .529 | .61 | 624 |
| The year | 132.09 | 6.40 | 28.9 | 1.51 | 20.47 | 21,000 |
| 1908. | | | | | | |
| January | 10.08 | 8.68 | 9.51 | .495 | .57 | 585 |
| February | 9.66 | 8.84 | 9.25 | .482 | .52 | 532 |
| March | 12.44 | 9.25 | 10.39 | .541 | .62 | 639 |
| April | 21.11 | 9.49 | 15.32 | .798 | .89 | 912 |
| May | 64.34 | 18.46 | 37.18 | 1.94 | 2.24 | 2,290 |
| June | 80.63 | 47.34 | 64.42 | 3.36 | 3.75 | 3,830 |
| July | 46.77 | 22.31 | 31.27 | 1.63 | 1.88 | 1,920 |
| August | 22.53 | 16.24 | 18.99 | .989 | 1.14 | 1,170 |
| September | 16.44 | 13.72 | 14.66 | .764 | .85 | 872 |
| October | 15.46 | 12.62 | 13.24 | .690 | .80 | 814 |
| November | 12.62 | 9.00 | 9.98 | .520 | .58 | 594 |
| December | 9.41 | 8.20 | 8.86 | .461 | .53 | 545 |
| The year | 80.63 | 8.20 | 20.3 | 1.06 | 14.37 | 14,700 |
| 1909. | | | | | | |
| January | 14.9 | 8.04 | 10.6 | .552 | .64 | 652 |
| February | 11.0 | 8.84 | 9.70 | .505 | .53 | 539 |
| March | 18.7 | 9.00 | 13.6 | .708 | .82 | 836 |
| April | 48.8 | 17.8 | 31.5 | 1.64 | 1.83 | 1,870 |
| May | 108.0 | 42.9 | 71.8 | 3.74 | 4.31 | 4,410 |

[a] Partial month; mean estimated for full month.

NOTE.—The weir was out of order after June 4, 1909.

## PROVO RIVER BASIN.

### DESCRIPTION.

Provo River rises in the Uinta Mountains and flows westward in a steep, narrow canyon until it reaches Heber or Provo Valley, through which it winds in a well-defined channel. Leaving the valley it flows southwestward, cutting through the Wasatch Range in another steep, narrow, and extremely rough canyon, and finally discharging its surplus waters into Utah Lake.

In the mountain regions the principal rock is a compact limestone. Except in Heber Valley little soil is found in any part of the basin. Small groves of fir and aspen are, however, scattered over almost the entire area, and there is a light growth of underbrush. No extensive forests, meadows, or marshes exist. In the canyons the stream receives numerous short and swift tributaries which derive their principal supply from springs, but a part also from the melting of the snow that covers portions of the mountains during the entire year. The highest peaks reach elevations of about 13,000 feet above sea level.

Heber Valley, comprising an area of about 20 square miles, is an irrigated farming district. The surface is covered with loose bowlders, gravel, and very porous soil. Most of the water is taken from the main stream, but a part is diverted from small creeks that enter the valley from the south. The most important of these is Daniels Creek, into which some water is diverted from Strawberry River, a tributary of Green River, by three small canals in low passes at the head of the creek.

At the head of the river are a few lakes, but they are so small that they probably have little effect in regulating the flow. No storage is used on the stream at present, but a few favorable sites will doubtless be developed in the future, as the entire flow, after being used by a power plant at the mouth of the canyon, is now utilized in the vicinity of Utah Lake, and the supply is altogether insufficient.

The wettest year since records have been kept in this basin was 1907, when the discharge at the station of the Telluride Power Company's dam was 477,000 acre-feet. The driest year was 1905, when at the same station the discharge was 192,000 acre-feet.

The following stations have been maintained in this basin:

Provo River above Telluride Power Company's dam near Provo, Utah, 1905–1909.
Provo River at mouth of canyon, near Provo, Utah, 1889–1906.
Provo River at Denver and Rio Grande Railroad bridge, near Provo, Utah, 1905.
Provo River at San Pedro, Los Angeles and Salt Lake Railroad bridge, near Provo, Utah, 1903–4.

### PROVO RIVER ABOVE TELLURIDE POWER COMPANY'S DAM NEAR PROVO, UTAH.

This station, which was established February 1, 1905, to determine the amount of water available for irrigation in Utah Valley, is located about 1 mile above the Telluride Power Company's dam and about 4 miles above the mouth of the canyon and about 11 miles from Provo.

The station is below all tributaries, South Fork entering about one-fourth mile above the station. Some water is diverted above the station for irrigation in Heber Valley, and all the normal low-water

flow is diverted for irrigation below the station. The Telluride Power Company diverts water about 1 mile below the station for power development, but returns it to the river at the mouth of the canyon.

The equipment consists of a cable and car and an inclined staff gage. The gage datum was changed July 24, 1908, when the station was established at a point one-fourth mile above the old site.

The records are not affected by ice nor by artificial control above, but there seems to be some backwater effect either from the dam below the station or from some unknown cause, and the records since the dam was raised in July, 1908, have not been satisfactory.

*Discharge measurements of Provo River above Telluride Power Company's dam near Provo, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 10 | W. M. O'Neill | 75 | 166 | 2.89 | 517 |
| May 11 | E. S. Fuller | 73 | 350 | 5.70 | 1,950 |
| May 14 | La Rue and Towne | 82 | 280 | 4.80 | 1,370 |
| June 17 | E. S. Fuller | 106 | 424 | 6.52 | 2,120 |
| June 20 | E. C. La Rue | 101 | 449 | 6.41 | 2,140 |
| October 24 | Henshaw and Porter | 74 | 140 | 2.60 | 370 |

*Daily gage height, in feet, of Provo River above Telluride Power Company's dam near Provo, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.6 | 2.35 | 2.35 | 2.85 | 4.0 | 5.3 | 5.5 | 2.4 | 3.4 | 2.8 | 2.7 | 2.75 |
| 2 | 2.6 | 2.4 | 2.35 | 3.0 | 3.7 | 5.6 | 5.3 | 2.55 | 3.15 | 2.75 | 2.6 | 3.1 |
| 3 | 2.6 | 2.4 | 2.4 | 3.2 | 3.8 | 6.4 | 5.3 | 2.5 | 3.1 | 2.8 | 2.5 | 2.7 |
| 4 | 2.6 | 2.45 | 2.4 | 3.3 | 4.2 | 7.3 | 5.4 | 2.5 | 3.0 | 2.8 | 2.5 | 2.6 |
| 5 | 2.7 | 2.45 | 2.5 | 3.05 | 4.65 | 8.2 | 5.2 | 2.4 | 3.15 | 2.85 | 2.7 | 2.55 |
| 6 | 3.9 | 2.2 | 2.5 | 2.95 | 4.65 | 8.4 | 5.1 | 2.6 | 3.1 | 2.75 | 2.7 | 2.4 |
| 7 | 3.7 | 2.2 | 2.55 | 2.8 | 4.8 | 8.5 | 4.8 | 2.65 | 3.1 | 2.8 | 2.65 | 2.5 |
| 8 | 3.0 | 2.55 | 2.55 | 2.8 | 5.0 | 8.3 | 4.4 | 2.55 | 3.1 | 2.7 | 2.65 | 2.7 |
| 9 | 3.0 | 2.3 | 2.4 | 2.85 | 5.0 | 7.2 | 4.2 | 2.5 | 3.15 | 2.75 | 2.6 | 2.85 |
| 10 | 3.0 | 2.3 | 2.25 | 2.9 | 5.5 | 7.1 | 4.1 | 2.5 | 3.0 | 2.7 | 3.0 | 2.6 |
| 11 | 4.2 | 2.35 | 2.2 | 2.9 | 5.7 | 7.0 | 4.0 | 2.55 | 3.0 | 2.7 | 2.7 | 2.5 |
| 12 | 3.3 | 2.6 | 2.2 | 2.9 | 5.2 | 6.8 | 3.8 | 2.6 | 3.0 | 2.75 | 2.6 | 2.55 |
| 13 | 3.2 | 2.6 | 2.2 | 2.95 | 4.9 | 6.7 | 3.4 | 2.5 | 3.0 | 2.6 | 2.55 | 2.7 |
| 14 | 5.0 | 2.5 | 2.2 | 3.0 | 4.8 | 6.7 | 2.8 | 2.5 | 3.0 | 2.65 | 2.7 | 2.6 |
| 15 | 5.0 | 2.45 | 2.6 | 3.3 | 4.85 | 6.4 | 2.7 | 2.4 | 3.0 | 2.7 | 2.6 | 2.4 |
| 16 | 3.5 | 2.5 | 2.55 | 3.55 | 4.9 | 6.4 | 2.75 | 2.7 | 3.0 | 2.6 | 2.65 | 2.3 |
| 17 | 3.2 | 2.5 | 2.6 | 3.8 | 4.7 | 6.5 | 2.65 | 2.5 | 3.0 | 2.65 | 2.65 | 2.0 |
| 18 | 3.1 | 2.45 | 2.75 | 4.35 | 4.6 | 6.4 | 2.65 | 2.55 | 3.0 | 2.6 | 2.6 | 2.2 |
| 19 | 3.0 | 2.5 | 2.75 | 4.7 | 4.7 | 6.8 | 2.6 | 2.6 | 2.7 | 2.6 | 2.7 | 2.4 |
| 20 | 3.3 | 2.5 | 2.75 | 4.55 | 4.95 | 6.4 | 2.65 | 2.55 | 2.65 | 2.6 | 2.85 | 2.4 |
| 21 | 3.35 | 2.5 | 2.65 | 3.95 | 5.1 | 6.1 | 2.65 | 2.55 | 2.6 | 2.6 | 2.45 | 2.35 |
| 22 | 3.4 | 2.4 | 2.6 | 3.65 | 5.3 | 5.8 | 2.6 | 2.9 | 2.6 | 2.6 | 3.0 | 2.5 |
| 23 | 3.3 | 2.4 | 2.6 | 3.6 | 5.3 | 5.8 | 2.55 | 2.7 | 2.85 | 2.6 | 2.85 | 2.5 |
| 24 | 3.0 | 2.5 | 2.7 | 3.8 | 5.2 | 5.9 | 2.6 | 2.65 | 2.7 | 2.6 | 2.85 | 2.55 |
| 25 | 2.7 | 2.45 | 2.7 | 3.7 | 4.9 | 5.8 | 2.55 | 2.7 | 2.8 | 2.55 | 2.85 | 2.6 |
| 26 | 2.7 | 2.4 | 2.75 | 3.8 | 4.8 | 6.0 | 2.6 | 2.7 | 2.9 | 2.55 | 2.85 | 2.5 |
| 27 | 2.6 | 2.3 | 2.7 | 4.3 | 5.1 | 5.75 | 2.5 | 2.75 | 2.85 | 2.6 | 2.85 | 2.5 |
| 28 | 2.4 | 2.35 | 2.8 | 4.45 | 5.55 | 5.8 | 2.5 | 2.7 | 2.65 | 2.55 | 2.6 | 2.5 |
| 29 | 2.4 | ..... | 2.8 | 4.4 | 5.4 | 5.7 | 2.5 | 2.65 | 2.8 | 2.5 | 2.55 | 2.4 |
| 30 | 2.4 | ..... | 2.85 | 4.0 | 5.35 | 5.6 | 2.45 | 2.85 | 2.9 | 2.5 | 2.7 | 2.5 |
| 31 | 2.5 | ..... | 2.8 | ..... | 5.4 | ..... | 2.5 | 2.8 | ..... | 2.7 | ..... | 2.4 |

## HOBBLE CREEK BASIN.

### DESCRIPTION.

Hobble Creek rises on the western slope of the Wasatch Mountains and flows in a general southwesterly direction to Utah Lake. In the greater part of the basin the soil cover is very thin and supports but a scanty growth of timber and brush. The steep, narrow canyon in which the stream flows is broken here and there by narrow openings or flats, covered with a shallow deposit of bowlders and soil and comprising irrigated farms. As these tracts lie along the banks of the creek, a large part of the water used on them is returned to the stream as seepage. The creek has no important tributaries, but short intermittent streams which flow in steep, narrow canyons enter all along the course. No storage reservoirs, lakes, or marshes control the flood discharge, which occurs in the spring as a result of the melting snow. The entire normal summer flow is used for irrigation below the canyon.

Within the period for which records are available, the year of the greatest run-off was probably 1909, or possibly 1907, but records are not complete for that year. The driest year, according to the record at Springville, was 1905, when the discharge was 21,650 acre-feet.

Only one station has been maintained in this basin, that near Springville, Utah, 1904–1909.

### HOBBLE CREEK NEAR SPRINGVILLE, UTAH.

This station, which was established March 23, 1904, to determine the amount of water available for irrigation in Utah Valley in connection with the Strawberry Valley project of the United States Reclamation Service, is located at a point about 1 mile above the mouth of the canyon, 4 miles southeast of Springville, Utah, and just below the Springville electric power plant. The station is above all diversions and below all tributaries.

Practically no ice forms at the station, the winter flow being largely from springs. In May, 1909, a flood tore out the old gage and changed the section to such an extent that it was found advisable to change the location of the station. A new vertical staff gage was therefore installed at a point about 1,000 feet upstream from the old gage and about 200 feet below the power plant.

Measurements are made from a cable and car or by wading. The bed of the stream at this point is more nearly permanent than at the old station. A good rating curve has been obtained, and the records at the new station may be considered excellent. All gage heights since June 1, 1909, refer to the new gage.

*Discharge measurements of Hobble Creek near Springville, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec. ft.* |
| May 11[a] | E. S. Fuller | 25 | 70 | 6.20 | 558 |
| June 9 | do | 25 | 48 | 5.20 | 299 |
| July 3 | do | 23 | 21 | 4.10 | 102 |
| September 18[b] | do | 13 | 17 | 3.50 | 35 |

[a] Measurement not at regular station. [b] Wading measurement at gage.

*Daily gage height, in feet, of Hobble Creek near Springville, Utah, for 1909.*

[E. P. Noe, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | 2.1 | ..... | 6.0 | 4.2 | ..... | 3.6 | ..... | 3.4 | 3.5 |
| 2 | ..... | 1.4 | 1.4 | 2.3 | ..... | 6.1 | 4.2 | 3.5 | 3.5 | 3.2 | ..... | ..... |
| 3 | ..... | ..... | ..... | 2.5 | ..... | 6.2 | 4.1 | 3.5 | 3.5 | ..... | 3.4 | ..... |
| 4 | 1.35 | ..... | ..... | ..... | ..... | 5.5 | ..... | 3.6 | 3.5 | 3.35 | ..... | 3.5 |
| 5 | ..... | ..... | ..... | 3.0 | ..... | 5.6 | 4.1 | 3.6 | ..... | ..... | ..... | ..... |
| 6 | ..... | ..... | ..... | ..... | ..... | ..... | 4.1 | 3.6 | 3.5 | 3.4 | 3.4 | 3.45 |
| 7 | ..... | ..... | ..... | 2.35 | ..... | 5.5 | 4.1 | 3.6 | 3.5 | ..... | ..... | ..... |
| 8 | ..... | ..... | ..... | 2.4 | ..... | 5.35 | 4.1 | ..... | 3.5 | ..... | 3.45 | 3.45 |
| 9 | 1.4 | 1.4 | ..... | 2.4 | ..... | 5.3 | 4.0 | 3.6 | 3.5 | 3.4 | ..... | ..... |
| 10 | ..... | ..... | 1.4 | 2.5 | ..... | 5.2 | 4.0 | 3.6 | 3.5 | ..... | 3.45 | ..... |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3.5 | 3.5 | 3.4 | ..... | ..... |
| 12 | ..... | ..... | ..... | ..... | ..... | 5.0 | 3.9 | 3.5 | ..... | ..... | ..... | ..... |
| 13 | ..... | ..... | ..... | ..... | 4.2 | ..... | 3.9 | 3.5 | 3.5 | 3.4 | 3.45 | ..... |
| 14 | 2.0 | ..... | ..... | 2.75 | ..... | 4.9 | 3.9 | 3.5 | 3.5 | ..... | ..... | ..... |
| 15 | ..... | ..... | 1.5 | 3.6 | ..... | 4.8 | 3.8 | ..... | 3.5 | ..... | 3.45 | 3.45 |
| 16 | 2.0 | 1.4 | ..... | 4.5 | ..... | 4.8 | 3.8 | 3.5 | 3.5 | 3.4 | ..... | 3.45 |
| 17 | ..... | ..... | 1.55 | ..... | 3.55 | 4.8 | 3.9 | 3.5 | 3.5 | ..... | ..... | ..... |
| 18 | ..... | ..... | 1.65 | ..... | 3.4 | 4.8 | 3.9 | 3.5 | 3.5 | 3.4 | 3.5 | ..... |
| 19 | 1.4 | ..... | ..... | ..... | 4.2 | 4.6 | 3.9 | 3.6 | ..... | ..... | ..... | ..... |
| 20 | ..... | ..... | 1.75 | ..... | 4.4 | ..... | 3.8 | 3.6 | 3.5 | 3.4 | 3.5 | ..... |
| 21 | ..... | ..... | ..... | 5.0 | 4.7 | 4.4 | 3.8 | 3.5 | 3.5 | ..... | ..... | ..... |
| 22 | ..... | ..... | 1.75 | 4.5 | 4.9 | 4.3 | 3.8 | ..... | 3.4 | ..... | ..... | ..... |
| 23 | ..... | 1.4 | 1.8 | 3.75 | ..... | 4.3 | 3.75 | 3.5 | 3.4 | 3.4 | ..... | ..... |
| 24 | ..... | ..... | ..... | 4.0 | 4.1 | 4.3 | 3.75 | 3.5 | 3.3 | ..... | 3.5 | 3.45 |
| 25 | ..... | ..... | ..... | ..... | ..... | 4.3 | ..... | 3.5 | 3.3 | 3.4 | ..... | ..... |
| 26 | 1.4 | ..... | 1.9 | 4.25 | 4.05 | 4.3 | 3.7 | 3.5 | ..... | ..... | ..... | ..... |
| 27 | ..... | ..... | 2.05 | ..... | 4.1 | ..... | 3.7 | 3.5 | 3.3 | 3.4 | 3.5 | 3.45 |
| 28 | ..... | ..... | ..... | ..... | 4.3 | 4.3 | 3.7 | 3.4 | ..... | ..... | ..... | ..... |
| 29 | ..... | ..... | 2.05 | ..... | 4.3 | 4.3 | 3.6 | ..... | 3.3 | ..... | 3.5 | ..... |
| 30 | ..... | ..... | 2.05 | ..... | ..... | 4.3 | 3.6 | 3.4 | 3.3 | 3.4 | 3.5 | ..... |
| 31 | ..... | ..... | 2.1 | ..... | ..... | ..... | 3.6 | 3.4 | ..... | ..... | ..... | ..... |

NOTE.—Gage was washed out about May 1. Gage heights during May obtained from a reference point used by observer. After June 1 records were taken from a new station about 1,000 feet above the old one.

*Daily discharge, in second-feet, of Hobble Creek near Springville, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 36 | 38 | 38 | 97 | 698 | 503 | 115 | 40 | 45 | 14 | 26 | 35 |
| 2 | 36 | 38 | 38 | 127 | 723 | 530 | 115 | 35 | 35 | 11 | 26 | 35 |
| 3 | 36 | 38 | 38 | 162 | 747 | 558 | 101 | 35 | 35 | 16 | 26 | 35 |
| 4 | 36 | 38 | 38 | 214 | 771 | 368 | 101 | 45 | 35 | 22 | 26 | 35 |
| 5 | 36 | 38 | 38 | 266 | 795 | 395 | 101 | 45 | 35 | 24 | 26 | 32 |
| 6 | 37 | 38 | 38 | 201 | 820 | 382 | 101 | 45 | 35 | 26 | 26 | 30 |
| 7 | 37 | 38 | 38 | 136 | 820 | 368 | 101 | 45 | 35 | 26 | 28 | 30 |
| 8 | 38 | 38 | 38 | 144 | 820 | 331 | 101 | 45 | 35 | 26 | 30 | 30 |
| 9 | 38 | 38 | 38 | 144 | 732 | 319 | 88 | 45 | 35 | 26 | 30 | 30 |
| 10 | 47 | 38 | 38 | 162 | 645 | 296 | 88 | 45 | 35 | 26 | 30 | 30 |
| 11 | 56 | 38 | 39 | 174 | 558 | 274 | 82 | 35 | 35 | 26 | 30 | 30 |
| 12 | 65 | 38 | 40 | 186 | 561 | 253 | 76 | 35 | 35 | 26 | 30 | 30 |
| 13 | 74 | 38 | 41 | 200 | 564 | 243 | 76 | 35 | 35 | 26 | 30 | 30 |
| 14 | 84 | 38 | 42 | 212 | 522 | 233 | 76 | 35 | 35 | 26 | 30 | 30 |
| 15 | 84 | 38 | 43 | 407 | 480 | 214 | 65 | 35 | 35 | 26 | 30 | 30 |
| 16 | 84 | 38 | 44 | 647 | 437 | 214 | 65 | 35 | 35 | 26 | 32 | 30 |
| 17 | 69 | 38 | 46 | 675 | 394 | 214 | 76 | 35 | 35 | 26 | 34 | 30 |
| 18 | 54 | 38 | 52 | 704 | 357 | 214 | 76 | 35 | 35 | 26 | 35 | 30 |
| 19 | 38 | 38 | 56 | 732 | 564 | 178 | 76 | 45 | 35 | 26 | 35 | 30 |
| 20 | 38 | 38 | 59 | 760 | 619 | 162 | 65 | 45 | 35 | 26 | 35 | 30 |
| 21 | 38 | 38 | 59 | 788 | 703 | 145 | 65 | 35 | 35 | 26 | 35 | 30 |
| 22 | 38 | 38 | 59 | 647 | 759 | 130 | 65 | 35 | 26 | 26 | 35 | 30 |
| 23 | 38 | 38 | 63 | 445 | 648 | 130 | 60 | 35 | 26 | 26 | 35 | 30 |
| 24 | 38 | 38 | 66 | 510 | 537 | 130 | 60 | 35 | 18 | 26 | 35 | 30 |
| 25 | 38 | 38 | 70 | 544 | 530 | 130 | 58 | 35 | 18 | 26 | 35 | 30 |
| 26 | 38 | 38 | 73 | 578 | 524 | 130 | 55 | 35 | 18 | 26 | 35 | 30 |
| 27 | 38 | 38 | 90 | 602 | 537 | 130 | 55 | 35 | 18 | 26 | 35 | 30 |
| 28 | 38 | 38 | 90 | 626 | 591 | 130 | 55 | 26 | 18 | 26 | 35 | 30 |
| 29 | 38 | ..... | 90 | 650 | 591 | 130 | 45 | 26 | 18 | 26 | 35 | 30 |
| 30 | 38 | ..... | 90 | 674 | 562 | 130 | 45 | 26 | 18 | 26 | 35 | 30 |
| 31 | 38 | ..... | 97 | ..... | 532 | ..... | 45 | 26 | ..... | 26 | ..... | 30 |

NOTE.—The daily discharges from January 1 to May 31 are based on a rating curve which is not well defined for 1909. The rating after June 1 is for the new station and is well defined. Daily discharges for days of missing gage heights were obtained by interpolation and from high-water marks.

*Monthly discharge of Hobble Creek near Springville, Utah, for 1909.*

[Drainage area, 120 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 84 | 36 | 46.5 | 0.388 | 0.45 | 2,860 | D. |
| February | 38 | 38 | 38.0 | .317 | .33 | 2,110 | D. |
| March | 97 | 38 | 54.5 | .454 | .52 | 3,350 | C. |
| April | 788 | 97 | 414 | 3.45 | 3.85 | 24,600 | C. |
| May | 820 | 357 | 611 | 5.09 | 5.87 | 37,600 | D. |
| June | 558 | 130 | 252 | 2.10 | 2.34 | 15,000 | A. |
| July | 115 | 45 | 75.9 | .632 | .73 | 4,670 | A. |
| August | 45 | 26 | 36.9 | .308 | .36 | 2,270 | A. |
| September | 45 | 18 | 30.8 | .257 | .29 | 1,830 | B. |
| October | 26 | 11 | 24.6 | .205 | .24 | 1,510 | B. |
| November | 35 | 26 | 31.5 | .262 | .29 | 1,870 | B. |
| December | 35 | 30 | 30.7 | .256 | .30 | 1,890 | B. |
| The year | 820 | 11 | 137 | 1.14 | 15.57 | 99,600 | |

## SPANISH FORK BASIN.

### DESCRIPTION.

Spanish Fork rises in the Wasatch Mountains and flows northwestward into Utah Lake. The area is generally barren and supports but little timber or brush. The stream flows in a steep, narrow canyon, with a very few small openings in which are irrigated farms. The tributaries are all short and many of them are intermittent. The most important, Diamond Fork and Thistle Creek, enter, respectively, about 8 and 10 miles above the gaging station, near Spanish Fork, and, like the main stream, occupy narrow, steep-walled canyons. The normal flow comes largely from springs scattered over the entire basin; the flood discharge is direct surface run-off from melting snow.

No storage reservoirs are used on the stream. The entire normal low-water flow is diverted at the mouth of the canyon and used for irrigating lands near Utah Lake.

The stream at present is used for power development at one plant installed in 1908 by the United States Reclamation Service, near the mouth of the canyon.

During the period for which records are available the wettest year was 1909, when discharge at the station at the mouth of the canyon near Spanish Fork, including that of the power canal, was 228,000 acre-feet, of which about 160,000 acre-feet wasted into Utah Lake, according to the records at the Lake Shore station, which are not quite complete. The driest year, according to the above records, was 1905, when 65,810 acre-feet were discharged at the mouth of the canyon, of which 19,230 acre-feet wasted into the lake.

The following stations have been maintained in this basin:

Spanish Fork at Thistle, Utah, 1909.
Spanish Fork near Spanish Fork, Utah, 1900–1909.
United States Reclamation Service power canal near Spanish Fork, Utah, 1909.
Spanish Fork near Mapleton, Utah, 1900–1901.
Spanish Fork near Lake Shore, Utah, 1903–1907, 1909.
Diamond Fork near Thistle, Utah, 1908–9.

### SPANISH FORK AT THISTLE, UTAH.

This station, which was established December 3, 1907, to determine the amount of water available for irrigation and power development in connection with the Strawberry Valley project of the United States Reclamation Service, is located half a mile below Thistle station on the Denver and Rio Grande Railroad.

Thistle Creek enters about one-half mile above the station and Diamond Fork comes in about 2 miles below. There are no important diversions above the station.

The river usually freezes over at the station during two or three months in the winter, but as the winter flow is fairly constant good estimates may be made. The records are not affected by artificial control.

Although the section is somewhat shifting, many measurements have been made and the results may be considered excellent. The equipment consists of a vertical staff gage and a cable and car. The gage datum has remained unchanged since the station was established.

*Discharge measurements of Spanish Fork at Thistle, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. feet.* | *Feet.* | *Sec.-ft.* |
| January 7 | E. A. Porter | 36 | 35 | 3.35 | 96 |
| April 9 | W. M. O'Neill | 37 | 50 | 3.50 | 149 |
| April 27 | E. S. Fuller | 42 | 88 | 4.65 | 417 |
| Do | do | 42 | 88 | 4.65 | 405 |
| May 12 | do | 42 | 113 | 4.90 | 745 |
| June 9 | do | 41 | 105 | 4.55 | 571 |
| July 4 | do | 36 | 54 | 3.20 | 154 |
| September 10 | do | 34 | 42 | 2.80 | 81 |

*Daily gage height, in feet, of Spanish Fork at Thistle, Utah, for 1909.*

[E. T. Cluff, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.3 | 3.0 | 3.0 | 3.5 | 4.5 | 4.6 | 3.2 | 2.85 | 3.2 | 2.7 | 2.7 |
| 2 | 3.0 | 3.0 | 3.1 | 3.6 | 4.55 | 4.85 | 3.2 | 2.85 | 2.9 | 2.7 | 2.7 |
| 3 | 3.0 | 3.0 | 3.2 | 3.9 | 4.6 | 5.0 | 3.2 | 2.8 | 3.0 | 2.7 | 2.7 |
| 4 | 3.0 | 3.0 | 3.3 | 3.95 | 4.9 | 5.1 | 3.2 | 2.8 | 2.9 | 2.7 | 2.7 |
| 5 | 3.0 | 3.0 | 3.6 | 3.7 | 5.1 | 5.1 | 3.2 | 2.8 | 2.8 | 2.7 | 2.7 |
| 6 | 3.0 | 3.0 | 3.5 | 3.6 | 5.1 | 5.0 | 3.2 | 2.8 | 2.8 | 2.7 | 2.7 |
| 7 | 3.25 | 3.0 | 3.3 | 3.55 | 5.3 | 4.85 | 3.2 | 2.8 | 2.8 | 2.7 | ..... |
| 8 | 3.3 | 3.0 | 3.2 | 3.6 | 5.1 | 4.5 | 3.15 | 2.8 | 2.8 | 2.75 | 2.7 |
| 9 | 3.25 | 3.0 | 3.25 | 3.6 | 5.1 | 4.4 | 3.1 | 2.8 | 2.7 | 2.7 | 2.7 |
| 10 | 3.2 | 3.0 | 3.25 | 3.6 | 5.0 | 4.3 | 3.0 | 2.9 | 2.8 | 2.7 | 2.8 |
| 11 | 3.2 | 3.0 | 3.1 | 3.6 | 5.0 | 4.1 | 3.0 | 2.85 | 2.8 | 2.7 | 2.8 |
| 12 | 3.0 | 3.05 | 3.1 | 3.6 | 4.9 | 4.05 | 3.0 | 2.85 | 2.8 | 2.7 | 2.7 |
| 13 | 3.0 | 3.1 | 3.2 | 3.6 | 4.7 | 4.0 | 3.0 | 2.85 | 2.8 | 2.7 | 2.7 |
| 14 | 4.0 | 3.0 | 3.2 | 3.8 | 4.6 | 3.9 | 3.0 | 2.85 | 2.8 | 2.7 | 2.7 |
| 15 | 4.6 | 3.0 | 3.35 | 4.0 | 4.6 | 3.9 | 2.95 | 2.85 | 2.8 | 2.7 | 2.7 |
| 16 | 3.4 | 3.0 | 3.45 | 4.2 | 4.5 | 3.8 | 2.95 | 2.85 | 2.8 | 2.7 | 2.7 |
| 17 | 3.2 | 3.0 | 3.6 | 4.4 | 4.5 | 3.7 | 2.95 | 2.9 | 2.8 | 2.7 | 2.7 |
| 18 | 3.1 | 3.0 | 3.8 | 4.6 | 4.55 | 3.7 | 3.05 | 2.95 | 2.8 | 2.7 | 2.7 |
| 19 | 3.1 | 3.0 | 3.6 | 4.7 | 4.7 | 3.7 | 3.1 | 2.9 | ..... | 2.7 | 2.7 |
| 20 | 3.15 | 3.0 | 3.5 | 4.6 | 4.9 | 3.65 | 3.05 | 2.9 | 2.8 | 2.7 | 2.8 |
| 21 | 3.2 | 3.0 | 3.4 | 4.4 | 5.0 | 3.6 | 3.0 | 2.9 | 2.8 | 2.7 | 2.75 |
| 22 | 3.5 | 2.9 | 3.45 | 4.2 | 5.0 | 3.5 | 3.0 | ..... | 2.8 | 2.75 | 2.75 |
| 23 | 3.2 | 3.1 | 3.5 | 4.2 | 5.0 | 3.5 | 2.95 | 2.85 | 2.8 | 2.8 | 2.8 |
| 24 | 3.0 | 2.95 | 3.4 | 4.25 | 4.85 | 3.5 | 2.95 | 2.85 | 2.8 | ..... | 2.8 |
| 25 | 3.1 | 3.0 | 3.4 | 4.2 | 4.7 | 3.4 | 2.95 | 2.8 | 2.8 | 2.7 | ..... |
| 26 | 3.0 | 2.9 | 3.5 | 4.3 | 4.7 | 3.4 | 2.95 | 2.8 | ..... | 2.7 | 2.75 |
| 27 | 2.9 | 2.9 | 3.55 | 4.65 | 4.75 | 3.4 | 2.95 | 2.8 | 2.8 | 2.7 | 2.75 |
| 28 | 3.0 | 2.9 | 3.5 | 5.1 | 4.8 | 3.3 | 2.9 | 2.8 | 2.8 | 2.7 | ..... |
| 29 | 3.0 | ..... | 3.5 | 4.8 | 4.75 | 3.25 | 2.9 | ..... | 2.75 | 2.7 | 2.7 |
| 30 | 3.6 | ..... | 3.5 | 4.65 | 4.6 | 3.25 | 2.9 | 2.8 | 2.7 | 2.7 | 2.7 |
| 31 | 3.4 | ..... | 3.5 | ..... | 4.5 | ..... | 2.9 | 2.9 | ..... | ..... | ..... |

NOTE.—Stream frozen over in December.

*Daily discharge, in second-feet, of Spanish Fork at Thistle, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 89 | 49 | 49 | 123 | 373 | 592 | 149 | 90 | 149 | 69 | 69 |
| 2 | 49 | 49 | 61 | 142 | 408 | 720 | 149 | 90 | 98 | 69 | 69 |
| 3 | 49 | 49 | 74 | 208 | 453 | 805 | 149 | 83 | 114 | 69 | 69 |
| 4 | 49 | 49 | 89 | 220 | 597 | 865 | 149 | 83 | 98 | 69 | 69 |
| 5 | 49 | 49 | 142 | 162 | 720 | 865 | 149 | 83 | 83 | 69 | 69 |
| 6 | 49 | 49 | 123 | 142 | 740 | 805 | 149 | 83 | 83 | 69 | 69 |
| 7 | 82 | 49 | 89 | 132 | 860 | 720 | 149 | 83 | 83 | 69 | 69 |
| 8 | 89 | 49 | 74 | 142 | 777 | 548 | 140 | 83 | 83 | 76 | 69 |
| 9 | 82 | 49 | 82 | 142 | 797 | 506 | 131 | 83 | 69 | 69 | 69 |
| 10 | 74 | 49 | 82 | 142 | 765 | 466 | 114 | 98 | 83 | 69 | 83 |
| 11 | 74 | 49 | 61 | 142 | 785 | 392 | 114 | 90 | 83 | 69 | 83 |
| 12 | 49 | 55 | 61 | 142 | 745 | 374 | 114 | 90 | 83 | 69 | 69 |
| 13 | 49 | 61 | 74 | 142 | 640 | 356 | 114 | 90 | 83 | 69 | 69 |
| 14 | 232 | 49 | 74 | 184 | 592 | 322 | 114 | 90 | 83 | 69 | 69 |
| 15 | 407 | 49 | 97 | 232 | 592 | 322 | 106 | 90 | 83 | 69 | 69 |
| 16 | 105 | 49 | 114 | 283 | 548 | 290 | 106 | 90 | 83 | 69 | 69 |
| 17 | 74 | 49 | 142 | 341 | 548 | 261 | 106 | 98 | 83 | 69 | 69 |
| 18 | 61 | 49 | 184 | 407 | 570 | 261 | 122 | 106 | 83 | 69 | 69 |
| 19 | 61 | 49 | 142 | 445 | 640 | 261 | 131 | 98 | 83 | 69 | 69 |
| 20 | 68 | 49 | 123 | 407 | 747 | 248 | 122 | 98 | 83 | 69 | 83 |
| 21 | 74 | 49 | 105 | 341 | 805 | 235 | 114 | 98 | 83 | 69 | 76 |
| 22 | 123 | 38 | 114 | 283 | 805 | 211 | 114 | 94 | 83 | 76 | 76 |
| 23 | 74 | 61 | 123 | 283 | 805 | 211 | 106 | 90 | 83 | 83 | 83 |
| 24 | 49 | 44 | 105 | 297 | 720 | 211 | 106 | 90 | 83 | 76 | 83 |
| 25 | 61 | 49 | 105 | 283 | 640 | 189 | 106 | 83 | 83 | 69 | 79 |
| 26 | 49 | 38 | 123 | 311 | 640 | 189 | 106 | 83 | 83 | 69 | 76 |
| 27 | 38 | 38 | 132 | 426 | 666 | 189 | 106 | 83 | 83 | 69 | 76 |
| 28 | 49 | 38 | 123 | 621 | 692 | 168 | 98 | 83 | 83 | 69 | 72 |
| 29 | 49 | ..... | 123 | 485 | 666 | 158 | 98 | 83 | 76 | 69 | 69 |
| 30 | 152 | ..... | 123 | 426 | 592 | 158 | 98 | 83 | 69 | 69 | 69 |
| 31 | 105 | ..... | 123 | ..... | 548 | ..... | 98 | 98 | ..... | 69 | ..... |

NOTE.—The daily discharges for January 1 to April 30 are based on a well-defined rating curve below 445 second-feet. Discharges May 1 to 14 were obtained by the indirect method for shifting channels. Discharges May 15 to November 30 are based on a well-defined rating. Discharges have been interpolated for some days of missing gage heights.

*Monthly discharge of Spanish Fork at Thistle, Utah, for 1909.*

[Drainage area, 480 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 407 | 38 | 85.9 | 0.179 | 0.21 | 5,280 | C. |
| February | 61 | 38 | 48.3 | .101 | .11 | 2,680 | B. |
| March | 184 | 49 | 104 | .217 | .25 | 6,400 | B. |
| April | 621 | 123 | 268 | .558 | .62 | 15,900 | B. |
| May | 860 | 373 | 661 | 1.38 | 1.59 | 40,600 | B. |
| June | 865 | 158 | 397 | .827 | .92 | 23,600 | A. |
| July | 149 | 98 | 120 | .250 | .29 | 7,380 | A. |
| August | 106 | 83 | 89.3 | .186 | .21 | 5,490 | A. |
| September | 149 | 69 | 86.1 | .179 | .20 | 5,120 | A. |
| October | 83 | 69 | 70.1 | .146 | .17 | 4,310 | A. |
| November | 83 | 69 | 72.7 | .151 | .17 | 4,330 | A. |
| December | ..... | ..... | 66.0 | .138 | .16 | 4,060 | B. |
| The year | 865 | ..... | 172 | .359 | 4.90 | 125,000 | |

NOTE.—Monthly discharge for December estimated from the total at the mouth of canyon.

## SPANISH FORK NEAR SPANISH FORK, UTAH.

This station, which was established May 23, 1900, discontinued November 30, 1901, and reestablished March 26, 1903, to determine the total water available from Spanish Fork for irrigation near Utah Lake, is located in the mouth of the canyon, 600 feet above the diversion dam of the East Bench Irrigation Company and about 5 miles southeast of Spanish Fork, Utah. The records are of special importance to the United States Reclamation Service in connection with the Strawberry Valley project.

The station is below all tributaries and above all important diversions except the Reclamation Service power canal, which diverts water at a point about one-half mile above the station. The water thus diverted is used to develop power, after which a part of the water is returned to the river, the remainder being turned into the Salem canal and used for irrigation. The entire low-water flow of the river below the station is used for irrigation. The amount of water diverted is measured and added to the discharge of the river.

The records are little affected by ice and show no effect from artificial control below, but variations in daily flow are caused by manipulation of gates on the Reclamation Service diversion dam above.

Measurements are made from a cable and car.

Although the section is somewhat shifting, numerous measurements have been made and the results obtained are excellent. The datum of the staff gage has remained unchanged since the staion was established.

*Discharge measurements of Spanish Fork near Spanish Fork, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. feet.* | *Feet.* | *Sec.-ft.* |
| January 8 | E. A. Porter | 37 | 31 | 0.60 | 88 |
| March 12 | do | 36 | 29 | .50 | 85 |
| April 9 | W. M. O'Neill | 46 | 53 | 1.02 | 215 |
| April 28 | E. S. Fuller | 50 | 163 | 4.45 | 1,040 |
| May 12 | do | 48 | 196 | 4.80 | 1,280 |
| June 2 | do | 45 | 173 | 3.90 | 1,010 |
| Do | do | 45 | 173 | 3.90 | 1,060 |
| June 9 | do | 42 | 152 | 3.30 | 924 |
| July 4 | do | 36 | 56 | .75 | 209 |
| September 17[a] | do | 34 | 19.2 | −.40 | 30.6 |

[a] Wading measurement.

*Daily gage height, in feet, of Spanish Fork near Spanish Fork, Utah, for 1909.*

[G. H. Lewis, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1 | 0.2 | 0.25 | 1.1 | 2.95 | 3.9 | 0.85 | 0.35 | 0.4 | −0.3 | −0.3 | −0.3 |
| 2 | .2 | .0 | .3 | 1.45 | 2.85 | 4.1 | ..8 | .3 | .4 | — .3 | — .3 | — .2 |
| 3 | .2 | .1 | .45 | 1.8 | 3.1 | 4.7 | .8 | .3 | .3 | — .3 | — .3 | — .3 |
| 4 | .3 | .1 | .6 | 1.9 | 3.85 | 4.85 | .9 | .25 | .3 | — .3 | — .3 | — .3 |
| 5 | .4 | .0 | 1.8 | 1.2 | 4.6 | 4.8 | .8 | .25 | .4 | — .3 | — .3 | — .3 |
| 6 | .7 | .0 | .95 | 1.2 | 4.7 | 4.55 | .75 | .3 | .3 | — .3 | — .25 | — .3 |
| 7 | .9 | .05 | 1.15 | 1.1 | 4.6 | 4.2 | .7 | .3 | .3 | — .3 | — .25 | — .3 |
| 8 | .5 | .2 | .8 | 1.0 | 5.05 | 3.7 | .7 | .3 | .25 | — .3 | — .2 | — .3 |
| 9 | .5 | .0 | .75 | 1.05 | 5.15 | 3.3 | .7 | .3 | .0 | — .3 | — .3 | — .3 |
| 10 | .5 | .0 | .65 | 1.25 | 5.35 | 2.9 | .65 | .3 | — .3 | — .3 | — .25 | — .3 |
| 11 | ..... | .1 | .6 | 1.3 | 5.45 | 2.65 | .6 | .35 | — .3 | — .3 | — .25 | — .3 |
| 12 | ..... | .3 | .55 | 1.2 | 4.85 | 2.45 | .6 | .4 | — .3 | — .3 | — .3 | — .3 |
| 13 | ..... | .4 | .7 | 1.5 | 4.6 | 2.3 | .55 | .35 | — .3 | — .3 | — .3 | — .3 |
| 14 | 4.4 | .3 | .7 | 1.6 | 4.35 | 2.15 | .5 | .3 | — .3 | — .3 | — .25 | — .3 |
| 15 | 1.4 | .15 | .6 | 2.05 | 4.4 | 2.05 | .5 | .3 | — .3 | — .3 | — .3 | — .3 |
| 16 | ..... | .25 | .8 | 2.45 | 4.25 | 2.0 | .5 | .35 | — .3 | — .3 | — .3 | — .3 |
| 17 | .6 | .4 | 1.15 | 3.1 | 3.9 | 1.9 | .5 | .35 | — .3 | — .3 | — .3 | — .3 |
| 18 | .6 | .2 | 1.4 | 3.2 | 4.0 | 1.85 | .45 | .4 | — .3 | — .3 | — .3 | — .3 |
| 19 | .5 | .2 | 1.1 | 3.2 | 4.3 | 1.65 | .45 | .4 | — .3 | — .3 | — .3 | — .3 |
| 20 | .6 | .2 | 1.05 | 3.05 | 4.7 | 1.6 | .7 | .35 | — .3 | ..... | — .3 | — .3 |
| 21 | 1.9 | .2 | .95 | 2.55 | 5.05 | 1.45 | .5 | .35 | — .3 | — .2 | — .2 | — .3 |
| 22 | 2.5 | .15 | .85 | 2.3 | 4.95 | 1.35 | .5 | .4 | — .3 | — .2 | — .1 | — .3 |
| 23 | .6 | .1 | 1.05 | 2.2 | 5.1 | 1.3 | .5 | .35 | — .3 | — .2 | — .3 | — .3 |
| 24 | .1 | .05 | .9 | 2.3 | 4.65 | 1.2 | .5 | .3 | — .3 | — .2 | — .2 | — .3 |
| 25 | ..... | .2 | .7 | 2.2 | 4.15 | 1.2 | .45 | .3 | — .3 | — .2 | — .3 | — .3 |
| 26 | ..... | .15 | 1.0 | 2.55 | 4.1 | 1.1 | .45 | .25 | — .3 | — .25 | — .3 | — .3 |
| 27 | .1 | .0 | 1.15 | 3.3 | 3.85 | 1.1 | .4 | .2 | — .25 | — .3 | — .25 | — .25 |
| 28 | .2 | .15 | 1.1 | 4.4 | 4.7 | .95 | .4 | .2 | — .2 | — .3 | — .3 | — .25 |
| 29 | ..... | ..... | 1.1 | 3.85 | 4.55 | .95 | .4 | .2 | — .3 | — .3 | — .3 | — .25 |
| 30 | .1 | ..... | 1.05 | 3.2 | 4.0 | .9 | .35 | .2 | — .3 | — .3 | — .3 | — .3 |
| 31 | .15 | ..... | 1.1 | ..... | 3.65 | ..... | .4 | .2 | ..... | — .3 | ..... | — .2 |

NOTE.—Ice conditions existed January 11 to 15.

*Daily discharge, in second-feet, of Spanish Fork near Spanish Fork, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 34 | 44 | 50 | 183 | 662 | 1,040 | 233 | 132 | 141 | 42 | 42 | 42 |
| 2 | 44 | 25 | 55 | 256 | 632 | 1,100 | 222 | 123 | 141 | 42 | 42 | 53 |
| 3 | 44 | 34 | 74 | 338 | 707 | 1,300 | 222 | 123 | 123 | 42 | 42 | 42 |
| 4 | 55 | 34 | 94 | 363 | 937 | 1,360 | 244 | 115 | 123 | 42 | 42 | 42 |
| 5 | 67 | 25 | 338 | 203 | 1,180 | 1,350 | 222 | 115 | 141 | 42 | 42 | 42 |
| 6 | 109 | 25 | 154 | 203 | 1,210 | 1,290 | 212 | 123 | 123 | 42 | 48 | 42 |
| 7 | 144 | 30 | 193 | 183 | 1,180 | 1,200 | 201 | 123 | 123 | 42 | 48 | 42 |
| 8 | 80 | 44 | 126 | 163 | 1,320 | 1,040 | 201 | 123 | 115 | 42 | 53 | 42 |
| 9 | 80 | 25 | 118 | 173 | 1,350 | 924 | 201 | 123 | 78 | 42 | 42 | 42 |
| 10 | 80 | 25 | 102 | 214 | 1,420 | 801 | 190 | 123 | 42 | 42 | 48 | 42 |
| 11 | 82 | 34 | 94 | 224 | 1,490 | 724 | 180 | 132 | 42 | 42 | 48 | 42 |
| 12 | 84 | 55 | 87 | 203 | 1,300 | 662 | 180 | 141 | 42 | 42 | 42 | 42 |
| 13 | 86 | 67 | 109 | 267 | 1,220 | 617 | 170 | 132 | 42 | 42 | 42 | 42 |
| 14 | 88 | 55 | 109 | 290 | 1,140 | 572 | 160 | 123 | 42 | 42 | 48 | 42 |
| 15 | 90 | 39 | 94 | 401 | 1,150 | 542 | 160 | 123 | 42 | 42 | 42 | 42 |
| 16 | 92 | 50 | 126 | 512 | 1,120 | 528 | 160 | 132 | 42 | 42 | 42 | 42 |
| 17 | 94 | 67 | 193 | 707 | 1,000 | 499 | 160 | 132 | 42 | 42 | 42 | 42 |
| 18 | 94 | 44 | 245 | 737 | 1,030 | 485 | 150 | 141 | 42 | 42 | 42 | 42 |
| 19 | 80 | 44 | 183 | 737 | 1,130 | 429 | 150 | 141 | 42 | 42 | 42 | 42 |
| 20 | 94 | 44 | 173 | 692 | 1,260 | 415 | 201 | 132 | 42 | 0 | 42 | 42 |
| 21 | 363 | 44 | 154 | 542 | 1,390 | 374 | 160 | 132 | 42 | 53 | 53 | 42 |
| 22 | 527 | 39 | 135 | 469 | 1,360 | 348 | 160 | 141 | 42 | 53 | 65 | 42 |
| 23 | 94 | 34 | 173 | 441 | 1,400 | 335 | 160 | 132 | 42 | 53 | 42 | 42 |
| 24 | 34 | 30 | 144 | 469 | 1,260 | 311 | 160 | 123 | 42 | 53 | 53 | 42 |
| 25 | 0 | 44 | 109 | 441 | 1,100 | 311 | 150 | 123 | 42 | 53 | 42 | 42 |
| 26 | 0 | 39 | 163 | 542 | 1,090 | 288 | 150 | 115 | 42 | 48 | 42 | 42 |
| 27 | 34 | 25 | 193 | 767 | 1,010 | 288 | 141 | 107 | 48 | 42 | 48 | 48 |
| 28 | 44 | 39 | 183 | 1,110 | 1,290 | 255 | 141 | 107 | 53 | 42 | 42 | 48 |
| 29 | 39 | ..... | 183 | 937 | 1,240 | 255 | 141 | 107 | 42 | 42 | 42 | 48 |
| 30 | 34 | ..... | 173 | 737 | 1,060 | 244 | 132 | 107 | 42 | 42 | 42 | 42 |
| 31 | 39 | ..... | 183 | ..... | 960 | ..... | 141 | 107 | ..... | 42 | ..... | 53 |

NOTE.—The daily discharges for January 3 to May 10 are based on a fairly well-defined rating curve. Discharges May 11 to June 9 obtained by the indirect method for shifting channels. Discharges June 10 to December 31 based on a well-defined rating curve. Discharges interpolated for period of ice conditions January 11 to 15, 16 and 29. No flow in river January 25 to 26 and October 20.

*Monthly discharge of Spanish Fork near Spanish Fork, Utah, for 1909.*

[Drainage area, 670 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 582 | 54 | 146 | 0.218 | 0.25 | 8,980 | B. |
| February | 127 | 74 | 97.7 | .146 | .15 | 5,430 | B. |
| March | 387 | 87 | 174 | .260 | .30 | 10,700 | B. |
| April | 1,150 | 194 | 482 | .719 | .80 | 28,700 | B. |
| May | 1,530 | 667 | 1,190 | 1.78 | 2.05 | 73,200 | B. |
| June | 1,400 | 288 | 710 | 1.06 | 1.18 | 42,200 | B. |
| July | 288 | 176 | 220 | .328 | .38 | 13,500 | B. |
| August | 190 | 156 | 170 | .254 | .29 | 10,500 | A. |
| September | 204 | 134 | 158 | .236 | .26 | 9,400 | A. |
| October | 160 | 115 | 144 | .215 | .25 | 8,850 | A. |
| November | 180 | 134 | 149 | .222 | .25 | 8,870 | A. |
| December | 168 | 96 | 130 | .194 | .22 | 7,990 | B. |
| The year | 1,530 | 54 | 314 | .469 | 6.38 | 228,000 | |

NOTE.—These discharges are for the combined discharge of the river and power canal.

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

This station, which was established January 1, 1909, to determine the amount of water diverted by the Reclamation Service for power in connection with the Strawberry Valley project, is located in the mouth of the canyon at a point about 1½ miles below the canal head gates and about 5 miles southeast of Spanish Fork, Utah.

The station is located in the middle of a long tangent on the canal, which is smoothly lined with concrete. A good rating curve has been obtained and the records may be considered excellent. The gage datum has remained unchanged since the station was established.

The discharge of this canal has been added to that of the river at the station near Spanish Fork, just below, to give the total discharge of Spanish Fork above the diversions.

*Discharge measurements of U. S. Reclamation Service power canal near Spanish Fork, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 8 | E. A. Porter | 7.4 | 9.69 | 1.70 | 36.8 |
| February 10 | E. C. La Rue | 8.4 | 13.6 | 2.20 | 66.2 |
| April 9 | W. M. O'Neill | 7.1 | 9.07 | 1.58 | 35.7 |
| April 28 | E. S. Fuller | 7.0 | 9.90 | 1.80 | 43.3 |
| May 12 | do | 7.7 | 11.6 | 2.05 | 57.6 |
| June 2 | do | 11.0 | 26.2 | 3.50 | 170 |
| July 4 | do | 7.6 | 10.6 | 1.80 | 46.0 |
| September 17 | do | 9.6 | 19.0 | 2.80 | 107 |
| October 13 | E. C. La Rue | 9.7 | 19.6 | 2.85 | 111 |

*Daily gage height, in feet, of U. S. Reclamation Service power canal near Spanish Fork, Utah, for 1909.*

[G. H. Lewis, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.4 | 2.05 | 2.0 | 1.5 | 1.4 | 1.75 | 1.8 | 1.8 | 2.15 | 2.65 | 2.7 | 2.85 |
| 2 | 2.45 | 2.1 | 2.0 | 1.6 | 1.6 | 3.75 | 1.8 | 1.8 | 2.0 | 2.65 | 2.7 | 2.9 |
| 3 | 2.4 | 2.1 | 1.85 | 1.6 | 1.7 | 1.8 | 1.8 | 1.7 | 1.95 | 2.7 | 2.7 | 2.65 |
| 4 | 2.45 | 2.05 | 1.85 | 1.4 | 1.65 | 1.8 | 1.8 | 1.85 | 1.9 | 2.7 | 2.65 | 2.6 |
| 5 | 2.0 | 2.2 | 1.9 | 1.6 | 1.7 | 1.7 | 1.8 | 1.8 | 2.1 | 2.7 | 2.7 | 2.5 |
| 6 | 2.05 | 2.05 | 1.75 | 1.5 | 1.7 | 1.7 | 1.8 | 1.8 | 2.0 | 2.7 | 2.65 | 2.45 |
| 7 | 1.10 | 2.2 | 1.8 | 1.5 | 1.7 | 1.75 | 1.8 | 1.75 | 2.05 | 2.7 | 2.8 | 2.55 |
| 8 | 1.75 | 2.2 | 0 | 1.5 | 1.8 | 1.7 | 1.8 | 1.8 | 1.9 | 2.75 | 2.6 | 2.7 |
| 9 | 1.75 | 2.0 | 0 | 1.55 | 1.8 | 1.8 | 1.8 | 1.8 | 2.5 | 2.7 | 2.7 | 2.75 |
| 10 | 1.9 | 2.2 | 0 | 1.55 | 1.7 | 1.7 | 1.8 | 1.85 | 3.0 | 2.7 | 2.8 | 2.7 |
| 11 | [a]2.5 | 2.15 | 0 | 1.55 | 1.8 | 1.8 | 1.8 | 1.8 | 2.85 | 2.7 | 2.8 | 2.7 |
| 12 | 1.8 | 2.05 | 0 | 1.6 | 1.8 | 1.7 | 1.8 | 1.9 | 2.9 | 2.7 | 2.8 | 2.55 |
| 13 | 2.0 | 2.1 | 0 | 1.2 | 1.7 | 1.7 | 1.8 | 1.75 | 2.8 | 2.7 | 2.8 | 2.7 |
| 14 | 2.15 | 2.1 | 0 | 1.45 | 1.65 | 1.85 | 1.8 | 1.7 | 2.8 | 2.65 | 2.8 | 2.7 |
| 15 | 2.1 | 2.1 | 2.2 | 1.55 | 1.65 | 1.75 | 1.8 | 1.8 | 2.8 | 2.7 | 2.8 | 2.45 |
| 16 | 2.0 | 2.05 | 2.2 | 1.65 | 1.7 | 1.75 | 1.8 | 1.8 | 2.8 | 2.85 | 2.7 | 2.5 |
| 17 | 2.0 | 2.05 | 1.85 | 1.6 | 1.7 | 1.75 | 1.8 | 1.9 | 2.9 | 2.7 | 2.6 | 2.2 |
| 18 | 2.05 | 2.05 | 1.55 | 1.65 | 1.7 | 1.8 | 1.8 | 1.9 | 2.8 | 2.7 | 2.7 | 2.0 |
| 19 | 1.95 | 2.05 | 1.55 | 1.55 | 1.7 | 1.8 | 1.85 | 1.85 | 2.8 | 2.8 | 2.7 | 2.0 |
| 20 | 1.85 | 1.95 | .75 | 1.6 | 1.7 | 1.7 | 1.75 | 1.8 | 2.75 | 2.9 | 2.8 | 2.3 |
| 21 | 1.05 | 2.05 | 1.5 | 1.55 | 1.7 | 1.7 | 1.8 | 1.9 | 2.7 | 2.8 | 3.0 | 2.35 |
| 22 | 2.0 | 2.1 | 1.45 | 1.3 | 1.7 | 1.8 | 1.8 | 1.9 | 2.7 | 2.65 | 2.9 | 2.45 |
| 23 | 2.0 | 2.0 | 1.4 | 1.35 | 1.7 | 1.8 | 1.8 | 1.8 | 2.7 | 2.7 | 2.8 | 2.45 |
| 24 | 2.0 | 1.85 | 1.35 | 1.4 | 1.7 | 1.8 | 1.8 | 1.8 | 2.7 | 2.7 | 2.9 | 2.5 |
| 25 | 2.0 | 2.2 | 1.55 | 1.5 | 1.7 | 1.8 | 1.8 | 2.0 | 2.7 | 2.7 | 2.8 | 2.3 |
| 26 | 2.25 | 1.95 | 1.4 | 1.5 | 1.6 | 1.8 | 1.8 | 1.9 | 2.8 | 2.7 | 2.9 | 2.55 |
| 27 | 2.1 | 1.9 | 1.4 | 1.5 | 1.7 | 1.8 | 1.8 | 1.9 | 2.7 | 2.75 | 2.9 | 2.5 |
| 28 | 2.2 | 2.0 | 1.5 | 1.75 | 1.5 | 1.8 | 1.8 | 1.9 | 2.7 | 2.75 | 2.7 | 2.5 |
| 29 | 2.05 | ..... | 1.5 | 1.7 | 1.6 | 1.8 | 1.8 | 1.9 | 2.6 | 2.7 | 2.65 | 2.5 |
| 30 | 1.8 | ..... | 1.5 | 1.7 | 1.8 | 1.8 | 1.8 | 1.9 | 2.6 | 2.7 | 2.7 | 2.45 |
| 31 | 2.05 | ..... | 1.6 | ..... | 1.75 | ..... | 1.8 | 1.9 | ..... | 2.7 | ..... | 2.7 |

[a] Backwater due to ice.

*Daily discharge, in second-feet, of U. S. Reclamation Service power canal near Spanish Fork, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 78.7 | 57.3 | 54.5 | 30.8 | 27.0 | 41.6 | 44.0 | 44.0 | 63.0 | 96.1 | 99.7 | 111 |
| 2 | 82.1 | 60.1 | 54.5 | 34.9 | 34.9 | 188 | 44.0 | 44.0 | 54.5 | 96.1 | 99.7 | 115 |
| 3 | 78.7 | 60.1 | 46.6 | 34.9 | 39.3 | 44.0 | 44.0 | 39.3 | 51.8 | 99.7 | 99.7 | 96.1 |
| 4 | 82.1 | 57.3 | 46.6 | 27.0 | 37.1 | 44.0 | 44.0 | 46.6 | 49.1 | 99.7 | 96.1 | 92.5 |
| 5 | 54.5 | 66.0 | 49.1 | 34.9 | 39.3 | 39.3 | 44.0 | 44.0 | 60.1 | 99.7 | 99.7 | 85.5 |
| 6 | 57.3 | 57.3 | 41.6 | 30.8 | 39.3 | 39.3 | 44.0 | 44.0 | 54.5 | 99.7 | 96.1 | 82.1 |
| 7 | 17.2 | 66.0 | 44.0 | 30.8 | 39.3 | 41.6 | 44.0 | 41.6 | 57.3 | 99.7 | 107 | 89.0 |
| 8 | 41.6 | 66.0 | 0 | 30.8 | 44.0 | 39.3 | 44.0 | 44.0 | 49.1 | 103 | 92.5 | 99.7 |
| 9 | 41.6 | 54.5 | 0 | 32.8 | 44.0 | 44.0 | 44.0 | 44.0 | 85.5 | 99.7 | 99.7 | 103 |
| 10 | 49.1 | 66.0 | 0 | 32.8 | 39.3 | 39.3 | 44.0 | 46.6 | 123 | 99.7 | 107 | 99.7 |
| 11 | 46.6 | 63.0 | 0 | 32.8 | 44.0 | 44.0 | 44.0 | 44.0 | 111 | 99.7 | 107 | 99.7 |
| 12 | 44.0 | 57.3 | 0 | 34.9 | 44.0 | 39.3 | 44.0 | 49.1 | 115 | 99.7 | 107 | 89.0 |
| 13 | 54.5 | 60.1 | 0 | 20.2 | 39.3 | 39.3 | 44.0 | 41.6 | 107 | 99.7 | 107 | 99.7 |
| 14 | 63.0 | 60.1 | 0 | 28.9 | 37.1 | 46.6 | 44.0 | 39.3 | 107 | 96.1 | 107 | 99.7 |
| 15 | 60.1 | 60.1 | 66.0 | 32.8 | 37.1 | 41.6 | 44.0 | 44.0 | 107 | 99.7 | 107 | 82.1 |
| 16 | 54.5 | 57.3 | 66.0 | 37.1 | 39.3 | 41.6 | 44.0 | 44.0 | 107 | 111 | 99.7 | 85.5 |
| 17 | 54.5 | 57.3 | 46.6 | 34.9 | 39.3 | 41.6 | 44.0 | 49.1 | 115 | 99.7 | 92.5 | 66.0 |
| 18 | 57.3 | 57.3 | 32.8 | 37.1 | 39.3 | 44.0 | 44.0 | 49.1 | 107 | 99.7 | 99.7 | 54.5 |
| 19 | 51.8 | 57.3 | 32.8 | 32.8 | 39.3 | 44.0 | 46.6 | 46.6 | 107 | 107 | 99.7 | 54.5 |
| 20 | 46.6 | 51.8 | 8.6 | 34.9 | 39.3 | 39.3 | 41.6 | 44.0 | 103 | 115 | 107 | 72.2 |
| 21 | 15.8 | 57.3 | 30.8 | 32.8 | 39.3 | 39.3 | 44.0 | 49.1 | 99.7 | 107 | 123 | 75.4 |
| 22 | 54.5 | 60.1 | 28.9 | 23.5 | 39.3 | 44.0 | 44.0 | 49.1 | 99.7 | 96.1 | 115 | 82.1 |
| 23 | 54.5 | 54.5 | 27.0 | 25.2 | 39.3 | 44.0 | 44.0 | 44.0 | 99.7 | 99.7 | 107 | 82 1 |
| 24 | 54.5 | 46.6 | 25.2 | 27.0 | 39.3 | 44.0 | 44.0 | 44.0 | 99.7 | 99.7 | 115 | 85.5 |
| 25 | 54.5 | 66.0 | 32.8 | 30.8 | 39.3 | 44.0 | 44.0 | 54.5 | 99.7 | 99.7 | 107 | 72.2 |
| 26 | 69.1 | 51.8 | 27.0 | 30.8 | 34.9 | 44.0 | 44.0 | 49.1 | 107 | 99.7 | 115 | 89.0 |
| 27 | 60.1 | 49.1 | 27.0 | 30.8 | 39.3 | 44.0 | 44.0 | 49.1 | 99.7 | 103 | 115 | 85.5 |
| 28 | 66.0 | 54.5 | 30.8 | 41.6 | 30.8 | 44.0 | 44.0 | 49.1 | 99.7 | 103 | 99.7 | 85.5 |
| 29 | 57.3 | ..... | 30.8 | 39.3 | 34.9 | 44.0 | 44.0 | 49.1 | 92.5 | 99.7 | 96.1 | 85.5 |
| 30 | 44.0 | ..... | 30.8 | 39.3 | 44.0 | 44.0 | 44.0 | 49.1 | 92.5 | 99.7 | 99.7 | 82.1 |
| 31 | 57.3 | ..... | 34.9 | ..... | 41.6 | ..... | 44.0 | 49.1 | ..... | 99.7 | ..... | 99.7 |

NOTE.—The daily discharges are based on a well-defined rating curve. Discharge was interpolated for January 11.

*Monthly discharge of U. S. Reclamation Service power canal near Spanish Fork, Utah, for 1909.*

| Month. | Discharge in second-feet. | | | Run-off (total in acre-feet). | Accuracy. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | |
| January | 82.1 | 15.8 | 54.9 | 3,380 | A. |
| February | 66.0 | 46.6 | 58.3 | 3,240 | A. |
| March | 66.0 | 0 | 29.5 | 1,810 | A. |
| April | 41.6 | 20.2 | 32.3 | 1,920 | A. |
| May | 44.0 | 27.0 | 38.8 | 2,390 | A. |
| June | 188 | 39.3 | 47.2 | 2,810 | A. |
| July | 46.6 | 41.6 | 44.0 | 2,710 | A. |
| August | 54.5 | 39.3 | 45.9 | 2,820 | A. |
| September | 123 | 49.1 | 90.8 | 5,400 | A. |
| October | 115 | 96.1 | 101 | 6,210 | A. |
| November | 123 | 92.5 | 104 | 6,190 | A. |
| December | 115 | 54.5 | 87.1 | 5,360 | A. |
| The year | 188 | 0 | 61.2 | 44,200 | |

## SPANISH FORK AT LAKE SHORE, UTAH.

This station, which was established December 10, 1903, discontinued July 10, 1907, and reestablished March 10, 1909, to determine the amount of water wasted into Utah Lake, is located about 3 miles west of Spanish Fork, Utah, 1 mile east of Lake Shore, and about 3 miles above the mouth of the river.

The station is below all tributaries and diversions, all the low-water flow being diverted above. The station was originally located about 800 feet above the wagon bridge on the road from Spanish Fork to Lake Shore, but as the conditions were very unsatisfactory it was relocated at a point about one-half mile farther downstream, where the measuring conditions are excellent.

Measurements are made from a cable and car.

The records are not affected by ice or artificial control below. The bed of the stream is fairly permanent at the new station, a good rating curve has been obtained, and the 1909 records may be considered excellent. The datum of the staff gage has remained unchanged since the new station was established.

*Discharge measurements of Spanish Fork at Lake Shore, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 11 | E. A. Porter | 25 | 56 | 4.00 | 118 |
| April 9 | W. M. O'Neill | 26 | 101 | 5.39 | 234 |
| May 10 | E. S. Fuller | 43 | 390 | 15.35 | 1,310 |
| Do | do | 43 | 390 | 15.35 | 1,330 |
| June 3 | do | 35 | 292 | 12.35 | 893 |
| July 3 | do | 10 | 2.8 | 1.05 | 3.1 |
| September 17 | do | 22 | 28.3 | 2.55 | 39.2 |

*Daily gage height, in feet, of Spanish Fork at Lake Shore, Utah, for 1909.*

[G. J. Hansen, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 5.9 | 11.5 | 11.05 | 1.1 | 1.0 | 5.2 | 1.5 | 2.65 | 3.8 |
| 2 | | | | 6.9 | 11.1 | 11.6 | 1.05 | | | | | |
| 3 | | | | 8.1 | 11.5 | 12.3 | 1.05 | | 1.6 | | 2.5 | 3.6 |
| 4 | | | | 8.5 | 12.1 | 12.75 | | | | 1.7 | | |
| 5 | | | | 6.8 | 13.1 | 12.85 | | | | | 2.25 | |
| 6 | | | | 6.0 | 14.0 | 12.65 | 1.0 | .95 | 1.8 | 1.85 | | 3.56 |
| 7 | | | | 5.75 | 14.0 | 12.0 | | | | | | |
| 8 | | | | 5.5 | 14.5 | 11.3 | | | 2.2 | 2.0 | 2.4 | 3.5 |
| 9 | | | | 5.6 | 14.6 | 10.1 | 1.0 | 1.0 | | | | |
| 10 | | | 4.0 | 6.35 | 14.7 | 9.35 | | | 2.8 | | 2.8 | 3.6 |
| 11 | | | 3.8 | 6.3 | 16.0 | 8.25 | | | | 2.05 | | |
| 12 | | | 3.65 | 6.0 | 15.1 | 7.8 | | | | | 2.75 | |
| 13 | | | 3.8 | 6.25 | 14.0 | 7.55 | 1.0 | | 3.4 | 2.1 | | 3.75 |
| 14 | | | 4.1 | 7.5 | 13.35 | 7.4 | | 1.0 | | | | |
| 15 | | | 5.25 | 8.75 | 12.75 | 6.1 | | | 3.1 | 2.15 | 2.9 | 3.7 |
| 16 | | | 6.45 | 9.85 | 12.65 | 5.75 | 1.0 | 1.0 | | | | |
| 17 | | | 6.7 | 10.95 | 12.4 | 5.05 | | | | | 3.1 | 4.0 |
| 18 | | | 8.25 | 11.55 | 12.0 | 4.6 | 1.0 | | 2.8 | 2.3 | | |
| 19 | | | 6.7 | 11.75 | 12.25 | 4.5 | | | | | 3.45 | |
| 20 | | | 5.9 | 12.2 | 12.95 | 4.5 | 1.8 | 1.2 | 2.5 | 2.45 | | 3.6 |
| 21 | | | 5.05 | 10.65 | 13.3 | 4.15 | 1.4 | | | | | |
| 22 | | | 4.85 | 9.7 | 13.55 | 3.6 | 1.1 | | 2.35 | 2.5 | 5.15 | 3.35 |
| 23 | | | 6.3 | 9.25 | 13.75 | 2.95 | 1.2 | 1.25 | | | | |
| 24 | | | 5.2 | 9.85 | 13.45 | 2.7 | 1.2 | | 2.05 | | 3.95 | 3.4 |
| 25 | | | 5.3 | 9.2 | 12.4 | 2.15 | 1.25 | | | 2.65 | | |
| 26 | | | 5.65 | 10.15 | 11.7 | 1.65 | | | | | 3.7 | |
| 27 | | | 6.15 | 11.3 | 12.05 | 1.6 | 1.2 | 1.05 | 1.7 | 2.7 | | 3.5 |
| 28 | | | 5.8 | 12.0 | 12.4 | 1.25 | | | | | | |
| 29 | | | 5.9 | 13.6 | 13.25 | 1.1 | 1.1 | | 1.55 | 2.7 | 3.55 | 4.0 |
| 30 | | | 5.5 | 12.2 | 12.25 | 1.1 | | 1.1 | | | | |
| 31 | | | 5.1 | | 11.2 | | 1.05 | | | | | 4.5 |

*Daily discharge, in second-feet, of Spanish Fork at Lake Shore, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 280 | 799 | 752 | 4 | 3 | 217 | 9 | 40 | 105 |
| 2 | | | | 370 | 757 | 810 | 3.5 | 3 | 114 | 10 | 37 | 98 |
| 3 | | | | 478 | 799 | 887 | 3.5 | 3 | 11 | 12 | 35 | 90 |
| 4 | | | | 514 | 865 | 940 | 3.5 | 2.5 | 18 | 13 | 32 | 89 |
| 5 | | | | 361 | 985 | 952 | 3 | 2.5 | 14 | 14 | 28 | 88 |
| 6 | | | | 289 | 1,110 | 928 | 3 | 2.5 | 15 | 16 | 29 | 86 |
| 7 | | | | 266 | 1,110 | 854 | 3 | 2.5 | 20 | 18 | 31 | 84 |
| 8 | | | | 244 | 1,180 | 777 | 3 | 3 | 26 | 20 | 32 | 83 |
| 9 | | | | 253 | 1,200 | 658 | 3 | 3 | 36 | 20 | 39 | 86 |
| 10 | | | 121 | 320 | 1,210 | 590 | 3 | 3 | 46 | 22 | 46 | 90 |
| 11 | | | 105 | 316 | 1,430 | 492 | 3 | 3 | 56 | 22 | 45 | 94 |
| 12 | | | 94 | 289 | 1,280 | 451 | 3 | 3 | 66 | 23 | 44 | 98 |
| 13 | | | 105 | 312 | 1,110 | 428 | 3 | 3 | 77 | 23 | 46 | 101 |
| 14 | | | 129 | 424 | 1,020 | 415 | 3 | 3 | 68 | 23 | 48 | 99 |
| 15 | | | 222 | 536 | 940 | 298 | 3 | 3 | 60 | 24 | 50 | 97 |
| 16 | | | 330 | 636 | 928 | 266 | 3 | 3 | 56 | 26 | 55 | 109 |
| 17 | | | 352 | 742 | 898 | 205 | 3 | 3 | 50 | 27 | 60 | 121 |
| 18 | | | 492 | 804 | 854 | 169 | 3 | 4 | 46 | 29 | 70 | 111 |
| 19 | | | 352 | 826 | 882 | 161 | 9 | 4 | 40 | 32 | 80 | 100 |
| 20 | | | 280 | 876 | 966 | 161 | 15 | 5 | 35 | 34 | 124 | 90 |
| 21 | | | 205 | 712 | 1,010 | 133 | 7 | 5 | 32 | 34 | 168 | 82 |
| 22 | | | 189 | 622 | 1,040 | 90 | 4 | 5.5 | 30 | 35 | 213 | 74 |
| 23 | | | 316 | 582 | 1,070 | 52 | 5 | 5.5 | 26 | 37 | 165 | 76 |
| 24 | | | 217 | 636 | 1,030 | 42 | 5 | 5 | 22 | 38 | 117 | 77 |
| 25 | | | 226 | 577 | 898 | 24 | 5.5 | 4.5 | 20 | 40 | 107 | 79 |
| 26 | | | 258 | 662 | 821 | 12 | 5.2 | 4 | 15 | 41 | 97 | 81 |
| 27 | | | 302 | 777 | 860 | 11 | 5 | 3.5 | 13 | 42 | 97 | 83 |
| 28 | | | 271 | 854 | 898 | 5.5 | 4.5 | 3.5 | 11 | 42 | 86 | 102 |
| 29 | | | 280 | 1,050 | 1,000 | 4 | 4 | 4 | 10 | 42 | 86 | 121 |
| 30 | | | 244 | 876 | 882 | 4 | 3.8 | 4 | 10 | 41 | 95 | 141 |
| 31 | | | 209 | | 767 | | 3.5 | 110 | | 41 | | 161 |

NOTE.—These discharges are based on a well-defined rating curve.

*Monthly discharge of Spanish Fork at Lake Shore, Utah, for 1909.*

| Month. | Discharge in second-feet. | | | Run-off (total in acre-feet). | Accuracy. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | |
| March 10-31 | 492 | 94 | 241 | 10,500 | A. |
| April | 1,050 | 244 | 549 | 32,700 | A. |
| May | 1,430 | 757 | 987 | 60,700 | A. |
| June | 952 | 4 | 386 | 23,000 | A. |
| July | 15 | 3 | 4.26 | 262 | B. |
| August | 110 | 2.5 | 6.98 | 429 | B. |
| September | 217 | 10 | 41.8 | 2,490 | A. |
| October | 42 | 9 | 27.4 | 1,680 | A. |
| November | 213 | 28 | 73.4 | 4,370 | A. |
| December | 161 | 74 | 96.6 | 5,940 | B. |
| The period | | | | 142,000 | |

## DIAMOND FORK NEAR THISTLE, UTAH.

This station, which was established December 2, 1907, to determine the amount of water available for irrigation and power development in connection with the Strawberry Valley project of the United States Reclamation Service, is located about 2½ miles northwest of Thistle, Utah, and about one-fourth mile above the mouth of the river.

As the station is below all tributaries and there are no important diversions above or below, the records show the total run-off from the Diamond Fork drainage area.

Discharge measurements are made from a footbridge. The gage is an inclined staff near the bridge.

The river is frozen over at the station during several months, but as the winter flow is fairly constant good estimates may be made. The records are unaffected by artificial control. Although the section shifts a great deal throughout the year, many measurements were made in 1909 and the records may be considered good. The gage datum has remained unchanged since the station was established.

*Discharge measurements of Diamond Fork near Thistle, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 7 | E. A. Porter | 20.0 | 14.5 | 3.10 | 17.5 |
| March 8 | do | 19.7 | 19.3 | 3.25 | 26.4 |
| Do | do | 19.7 | 18.1 | 3.30 | 28.5 |
| March 12 | do | 19.7 | 19.1 | 3.25 | 23.9 |
| April 9 | W. M. O'Neill | 20.5 | 29.2 | 3.69 | 74.6 |
| April 27 | E. S. Fuller | 23.0 | 58.1 | 4.80 | 336 |
| Do | do | 23.0 | 55.8 | 4.80 | 318 |
| May 11 | do | 24.0 | 106 | 5.20 | 712 |
| June 5 | do | 23.0 | 86.2 | 4.40 | 542 |
| June 9 | do | 22.0 | 71.7 | 3.90 | 361 |
| July 4 | do | 20.5 | 33.7 | 2.70 | 100 |
| September 10 | do | 20.5 | 21.8 | 2.15 | 34.3 |
| October 14 | E. C. La Rue | 20.3 | 18.8 | 2.08 | 24.8 |

*Daily gage height, in feet, of Diamond Fork near Thistle, Utah, for 1909.*

[E. T. Cluff, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.9 | 2.9 | 3.2 | 3.8 | 4.5 | 4.2 | 2.7 | 2.35 | 2.4 | 2.05 | 2.1 |
| 2 | 2.9 | 2.9 | 3.2 | 3.9 | 4.55 | 4.3 | 2.7 | 2.35 | 2.2 | 2.05 | 2.1 |
| 3 | 2.9 | 2.95 | 3.2 | 4.0 | 4.65 | 4.4 | 2.7 | 2.3 | 2.3 | 2.05 | 2.1 |
| 4 | 2.9 | 3.1 | 3.3 | 3.95 | 5.0 | 4.45 | 2.65 | 2.3 | 2.1 | 2.05 | 2.1 |
| 5 | 2.9 | 3.1 | 3.3 | 3.85 | 5.4 | 4.35 | 2.65 | 2.3 | 2.2 | 2.05 | 2.1 |
| 6 | 2.9 | 3.0 | 3.3 | 3.75 | 5.5 | 4.15 | 2.6 | 2.3 | 2.2 | 2.05 | 2.1 |
| 7 | 3.1 | 3.05 | 3.3 | 3.7 | 5.6 | 4.1 | 2.6 | 2.3 | 2.2 | 2.05 | (a) |
| 8 | 3.15 | 3.0 | 3.25 | 3.7 | 5.5 | 3.9 | 2.6 | 2.3 | 2.2 | 2.1 | 2.1 |
| 9 | 3.25 | 3.0 | 3.3 | 3.7 | 5.5 | 3.8 | 2.6 | 2.3 | 2.1 | 2.05 | 2.1 |
| 10 | 3.2 | 3.0 | 3.3 | 3.8 | 5.2 | 3.7 | 2.6 | 2.9 | 2.1 | 2.05 | 2.2 |
| 11 | 3.0 | 3.0 | 3.3 | 3.8 | 5.1 | 3.55 | 2.6 | 2.7 | 2.1 | 2.05 | 2.2 |
| 12 | 3.0 | 3.15 | 3.3 | 3.8 | 5.0 | 3.5 | 2.55 | 2.3 | 2.1 | 2.05 | 2.1 |
| 13 | 3.0 | 3.2 | 3.2 | 3.9 | 4.85 | 3.4 | 2.55 | 2.3 | 2.1 | 2.1 | 2.1 |
| 14 | 3.3 | 3.2 | 3.3 | 3.9 | 4.6 | 3.3 | 2.5 | 2.3 | 2.1 | 2.1 | 2.1 |
| 15 | 3.6 | 3.2 | 3.45 | 4.15 | 4.6 | 3.3 | 2.5 | 2.3 | 2.1 | 2.1 | 2.05 |
| 16 | 3.4 | 3.2 | 3.45 | 4.4 | 4.55 | 3.25 | 2.5 | 2.3 | 2.1 | 2.1 | 2.05 |
| 17 | 3.3 | 3.2 | 3.55 | 4.55 | 4.5 | 3.25 | 2.5 | 2.3 | 2.1 | 2.1 | 2.05 |
| 18 | 3.3 | 3.2 | 3.6 | 4.7 | 4.4 | 3.25 | 2.5 | 2.3 | 2.1 | 2.1 | 2.05 |
| 19 | 3.2 | 3.2 | 3.55 | 4.8 | 4.55 | 3.25 | 2.5 | 2.3 | 2.1 | 2.1 | 2.05 |
| 20 | 3.2 | 3.15 | 3.5 | 4.65 | 4.65 | 3.2 | 2.5 | 2.3 | 2.1 | 2.1 | 2.1 |
| 21 | 3.2 | 3.15 | 3.5 | 4.5 | (a) | 3.15 | 2.45 | 2.3 | 2.1 | 2.1 | (a) |
| 22 | 3.25 | 3.1 | 3.5 | 4.3 | (a) | 3.1 | 2.45 | (a) | 2.1 | 2.1 | 2.1 |
| 23 | 3.2 | 3.3 | 3.5 | 4.3 | (a) | 3.0 | 2.45 | 2.25 | 2.1 | 2.1 | 2.1 |
| 24 | 3.2 | 3.3 | 3.5 | 4.4 | (a) | 2.95 | 2.45 | 2.25 | 2.1 | (a) | 2.1 |
| 25 | 3.25 | 3.3 | 3.5 | 4.4 | (a) | 2.9 | 2.45 | 2.2 | 2.1 | 2.1 | (a) |
| 26 | 3.3 | 3.2 | 3.55 | 4.6 | (a) | 2.9 | 2.4 | 2.1 | 2.1 | 2.1 | 2.1 |
| 27 | 3.25 | 3.3 | 3.65 | 4.8 | (a) | 2.85 | 2.4 | 2.0 | 2.1 | 2.1 | 2.05 |
| 28 | 3.0 | 3.15 | 3.6 | 5.1 | 4.75 | 2.8 | 2.4 | 2.0 | 2.1 | 2.1 | 2.0 |
| 29 | 2.8 | ..... | 3.65 | 4.8 | 4.5 | 2.75 | 2.35 | (a) | 2.05 | 2.1 | 2.05 |
| 30 | 2.9 | ..... | 3.6 | 4.65 | 4.3 | 2.75 | 2.35 | 2.0 | 2.05 | 2.1 | 2.05 |
| 31 | 2.9 | ..... | 3.7 | ..... | 4.1 | ..... | 2.35 | 2.1 | ..... | 2.1 | ..... |

a Gage height missing; discharge interpolated.

NOTE.—Frozen in December.

*Daily discharge, in second-feet, of Diamond Fork near Thistle, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 8 | 21 | 90 | 350 | 502 | 100 | 55 | 61 | 24 | 28 |
| 2 | 8 | 8 | 21 | 104 | 378 | 522 | 100 | 55 | 38 | 24 | 28 |
| 3 | 8 | 10 | 21 | 118 | 420 | 542 | 100 | 49 | 49 | 24 | 28 |
| 4 | 8 | 15 | 28 | 111 | 513 | 552 | 94 | 49 | 28 | 24 | 28 |
| 5 | 8 | 15 | 28 | 97 | 622 | 532 | 94 | 49 | 38 | 24 | 28 |
| 6 | 8 | 11 | 28 | 83 | 668 | 470 | 87 | 49 | 38 | 24 | 28 |
| 7 | 15 | 13 | 28 | 76 | 715 | 439 | 87 | 49 | 38 | 24 | 28 |
| 8 | 18 | 11 | 24 | 76 | 715 | 378 | 87 | 49 | 38 | 28 | 28 |
| 9 | 24 | 11 | 28 | 76 | 735 | 341 | 87 | 49 | 28 | 24 | 28 |
| 10 | 21 | 11 | 28 | 90 | 690 | 321 | 87 | 129 | 28 | 24 | 38 |
| 11 | 11 | 11 | 28 | 90 | 688 | 293 | 87 | 100 | 28 | 24 | 38 |
| 12 | 11 | 18 | 28 | 96 | 670 | 276 | 80 | 49 | 28 | 24 | 28 |
| 13 | 11 | 21 | 21 | 111 | 637 | 257 | 80 | 49 | 28 | 28 | 28 |
| 14 | 28 | 21 | 28 | 111 | 583 | 239 | 74 | 49 | 28 | 28 | 28 |
| 15 | 63 | 21 | 44 | 159 | 583 | 231 | 74 | 49 | 28 | 28 | 24 |
| 16 | 38 | 21 | 44 | 201 | 573 | 222 | 74 | 49 | 28 | 28 | 24 |
| 17 | 28 | 21 | 56 | 227 | 562 | 222 | 74 | 49 | 28 | 28 | 24 |
| 18 | 28 | 21 | 63 | 266 | 542 | 214 | 74 | 49 | 28 | 28 | 24 |
| 19 | 21 | 21 | 56 | 284 | 573 | 214 | 74 | 49 | 28 | 28 | 24 |
| 20 | 21 | 18 | 50 | 257 | 594 | 206 | 74 | 49 | 28 | 28 | 28 |
| 21 | 21 | 18 | 50 | 240 | 613 | 189 | 68 | 49 | 28 | 28 | 28 |
| 22 | 24 | 15 | 50 | 204 | 632 | 181 | 68 | 46 | 28 | 28 | 28 |
| 23 | 21 | 28 | 50 | 204 | 651 | 164 | 68 | 44 | 28 | 28 | 28 |
| 24 | 21 | 28 | 50 | 232 | 670 | 149 | 68 | 44 | 28 | 28 | 28 |
| 25 | 24 | 28 | 50 | 232 | 656 | 141 | 68 | 38 | 28 | 28 | 28 |
| 26 | 28 | 21 | 56 | 269 | 642 | 141 | 61 | 28 | 28 | 28 | 28 |
| 27 | 24 | 28 | 70 | 318 | 628 | 127 | 61 | 20 | 28 | 28 | 24 |
| 28 | 11 | 18 | 63 | 395 | 615 | 120 | 61 | 20 | 28 | 28 | 20 |
| 29 | 6 | ..... | 70 | 363 | 562 | 112 | 55 | 20 | 24 | 28 | 24 |
| 30 | 8 | ..... | 63 | 350 | 522 | 106 | 55 | 20 | 24 | 28 | 24 |
| 31 | 8 | ..... | 76 | ..... | 481 | ..... | 55 | 28 | ..... | 28 | ..... |

NOTE.—The daily discharges from January 1 to April 9 are based on a rating curve well defined between 11 and 90 second-feet. Discharges obtained by the indirect method for shifting channels April 10 to June 30. Discharges July 1 to November 30 are based on a rating curve well defined between 20 and 114 second-feet. Discharge interpolated for days of missing gage heights.

*Monthly discharge of Diamond Fork near Thistle, Utah, for 1909.*

[Drainage area, 157 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 63 | 6 | 18.8 | 0.120 | 0.14 | 1,160 | B. |
| February | 28 | 8 | 17.5 | .111 | .12 | 972 | B. |
| March | 76 | 21 | 42.6 | .271 | .31 | 2,620 | B. |
| April | 395 | 76 | 184 | 1.17 | 1.30 | 10,900 | B. |
| May | 735 | 350 | 596 | 3.80 | 4.38 | 36,600 | C. |
| June | 552 | 106 | 280 | 1.78 | 1.99 | 16,700 | C. |
| July | 100 | 55 | 76.6 | .488 | .56 | 4,710 | B. |
| August | 129 | 20 | 47.7 | .304 | .35 | 2,930 | B. |
| September | 61 | 24 | 31.2 | .199 | .22 | 1,860 | B |
| October | 28 | 24 | 26.6 | .169 | .19 | 1,640 | B. |
| November | 38 | 20 | 27.3 | .174 | .19 | 1,620 | B. |
| December | ..... | ..... | 24.0 | .153 | .18 | 1,480 | C. |
| The year | 735 | ..... | 114 | .728 | 9.93 | 83,200 | |

NOTE.—Monthly discharge for December estimated from the total flow of Spanish Fork at the mouth of canyon.

## PAYSON CREEK BASIN.

### PAYSON CREEK NEAR PAYSON, UTAH.

Payson Creek rises on the south of Spanish Fork at an elevation of about 7,000 feet above sea level and flows northwestward to Utah Lake. One station has been maintained in this basin, that near Payson, Utah, 1908–9.

This station was established April 8, 1908, to determine the amount of water available for irrigation in connection with the Strawberry Valley project of the United States Reclamation Service. It is located at the power plant in the mouth of the canyon, about 1½ miles southeast of Payson, Utah.

Records during 1908 and part of 1909 were obtained from a rectangular weir above the tail race of the power plant. During the latter part of 1909 records were obtained from a new weir below the tail race. Both weirs are rectangular, with 12-foot length of crest. As both these weirs are very poorly constructed and the records are very unsatisfactory, no reliable estimates of daily discharge can yet be made.

*Discharge measurements of Payson Creek near Payson, Utah, in 1909.*

| Date. | Hydrographer. | Gage height. | Discharge. |
|---|---|---|---|
| | | *Inches.* | *Sec.-ft.* |
| June 3 | E. S. Fuller | *a* 14⅛ | 69.0 |
| July 3 | do | *b* 7⅛ | 22.5 |
| September 17 | do | *b* 3½ | 9.0 |

*a* On old weir. *b* On new weir.

## SEVIER RIVER BASIN.

### DESCRIPTION.

Sevier River is formed by the junction of South and East forks, which rise in Garfield and Kane counties in southern Utah and meet near Junction. The river flows northeastward to a point near Gunnison, northwestward nearly to Leamington, and then turns sharply to the southwest and discharges into Sevier Lake. It is more than 200 miles long, measured by general course, and drains an area of about 5,000 square miles above the lower end of Sevier Valley.

The river occupies a long, narrow basin and receives few tributaries, San Pitch River and Salina Creek being the most important. Salina Creek, which enters about 15 miles above Gunnison, is characterized by rapid run-off and during flood season carries an immense amount of sediment.

The San Pitch joins the Sevier near Gunnison below the gaging station on the main stream. Its flow is controlled by a storage reservoir about 15 miles above the mouth and is used for irrigating small tracts along the river. Manti Creek, its principal tributary, which enters above the reservoir, drains a barren area and has a rapid run-off.

Considerable irrigation is practiced from the Sevier above Gunnison, and the flow is controlled by a few small storage reservoirs.

The wettest year in the basin since 1900 was 1907 and the driest was 1902, the ratios of discharge for the two years being about 11 to 1.

The following gaging stations have been maintained in this basin:

Sevier River near Marysvale, Utah, 1906–1909.
Sevier River near Gunnison, Utah, 1900–1909.
Sevier River near Leamington, Utah, 1889–1893.
Salina Creek near Salina, Utah, 1900.
San Pitch River near Gunnison, Utah, 1900–1905.
Manti Creek near Manti, Utah, 1900.

### SEVIER RIVER NEAR MARYSVALE, UTAH.

This station, which was established February 18, 1906, to determine the amount of water available for irrigation and storage in the upper valley of Sevier River, is located about 6 miles above Marysvale, Utah, about 3 miles below the site of the proposed state dam on Sevier River, and about 10 miles below the junction of South and East forks. The equipment consists of a cable and car and a vertical staff gage, which has remained unchanged since the station was established.

During very cold weather the records are somewhat affected by ice. The flow is not affected by artificial control below, but the daily flow depends to some extent on manipulations of gates at storage reservoirs on the South and East forks. The bed of the stream is somewhat shifting, but the results may be considered good.

*Discharge measurements of Sevier River near Marysvale, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 16 | E. A. Porter | 59 | 291 | 6.05 | 1,000 |
| June 25 | do | 52 | 112 | 2.95 | 194 |
| August 1 | do | 55 | 164 | 4.22 | 420 |
| November 19 | do | 52 | 148 | 3.40 | 353 |

*Daily gage height, in feet, of Sevier River near Marysvale, Utah, for 1909.*

[Martha Pitts, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.25 | 2.35 | 2.45 | 3.2 | 5.4 | 5.8 | 3.0 | ..... | 6.3 | 3.65 | ..... | ..... |
| 2 | 3.3 | 2.35 | 2.6 | 3.2 | 5.2 | 5.6 | 3.2 | ..... | 7.8 | 3.65 | ..... | ..... |
| 3 | 3.55 | 2.35 | ..... | 3.4 | 5.3 | 5.6 | 3.3 | 4.0 | ..... | 3.6 | ..... | ..... |
| 4 | 2.7 | 2.35 | ..... | 3.4 | 5.4 | ..... | 3.3 | 3.9 | 8.0 | 3.5 | ..... | ..... |
| 5 | 2.4 | 2.5 | 4.55 | 3.75 | 6.0 | ..... | ..... | 3.7 | 7.8 | 3.5 | ..... | ..... |
| 6 | 2.6 | ..... | 5.3 | 3.5 | 6.3 | 5.5 | ..... | 3.55 | 6.4 | 3.55 | ..... | ..... |
| 7 | 2.7 | 2.45 | 6.15 | 3.4 | 6.6 | 5.4 | 3.5 | 3.55 | 6.0 | 3.6 | 3.2 | ..... |
| 8 | 2.7 | 2.45 | 6.0 | 3.35 | 6.8 | 5.45 | 3.5 | 3.6 | 5.9 | 3.5 | 3.15 | ..... |
| 9 | 2.75 | 2.5 | 5.8 | ..... | 6.9 | 5.35 | 3.45 | 3.95 | 5.4 | 3.5 | 3.15 | ..... |
| 10 | 2.65 | 2.4 | 5.5 | ..... | ..... | 5.2 | 3.4 | 3.95 | 5.0 | 3.5 | 3.2 | ..... |
| 11 | ..... | 2.45 | 5.35 | 3.5 | 7.0 | 5.1 | 3.3 | 3.9 | 4.8 | 3.45 | 3.3 | ..... |
| 12 | ..... | 2.5 | 4.5 | 3.45 | 6.8 | 4.9 | 3.25 | 4.6 | 4.75 | 3.45 | ..... | ..... |
| 13 | ..... | 2.45 | 3.9 | 3.4 | 6.7 | 4.8 | 3.2 | 4.4 | 4.5 | 3.45 | 3.2 | ..... |
| 14 | 2.55 | ..... | 3.4 | 3.5 | ..... | 4.7 | 3.2 | 4.3 | 4.4 | 3.45 | ..... | 3.1 |
| 15 | 2.7 | 2.45 | ..... | 4.0 | 6.3 | 4.6 | 3.25 | ..... | 4.3 | 3.5 | ..... | ..... |
| 16 | 2.6 | 2.5 | 3.6 | 4.5 | 6.1 | 4.3 | 3.3 | 4.9 | 4.2 | 3.4 | ..... | ..... |
| 17 | 2.6 | 2.4 | ..... | 5.1 | 5.8 | 4.3 | 3.25 | 5.3 | 4.1 | ..... | 3.2 | ..... |
| 18 | 2.6 | 2.5 | 3.6 | 5.3 | 5.75 | 4.15 | 3.3 | 5.35 | 4.0 | ..... | 3.2 | ..... |
| 19 | 2.6 | 2.5 | 3.5 | 5.5 | 5.6 | 4.0 | 3.4 | 5.0 | 3.9 | 3.35 | ..... | ..... |
| 20 | 2.6 | 2.5 | 3.35 | 5.5 | 5.6 | 3.9 | 3.45 | 5.25 | 3.9 | 3.35 | ..... | ..... |
| 21 | 2.6 | 2.45 | 3.5 | 5.3 | 5.6 | 3.8 | 3.6 | 4.9 | 3.8 | 3.25 | 3.5 | ..... |
| 22 | 2.7 | 2.45 | 3.45 | 5.1 | 5.55 | 3.7 | ..... | 4.6 | 3.75 | 3.3 | ..... | ..... |
| 23 | 2.55 | 2.45 | ..... | 4.9 | ..... | 3.6 | 4.6 | 4.5 | 3.7 | ..... | ..... | ..... |
| 24 | 2.5 | 2.5 | 3.5 | 4.8 | ..... | 3.25 | ..... | 4.0 | 3.65 | 3.3 | ..... | ..... |
| 25 | 2.4 | 2.5 | 3.5 | 4.75 | ..... | 2.9 | 5.2 | 3.8 | 3.7 | 3.3 | ..... | ..... |
| 26 | 2.4 | 2.5 | ..... | 4.7 | 5.6 | 2.8 | ..... | 3.65 | 3.7 | 3.3 | ..... | ..... |
| 27 | 2.5 | 2.45 | 3.5 | 4.9 | 5.6 | ..... | ..... | 3.9 | ..... | ..... | 3.55 | ..... |
| 28 | 2.3 | 2.45 | ..... | 5.2 | ..... | ..... | 5.0 | 4.1 | 3.8 | ..... | ..... | ..... |
| 29 | 2.3 | ..... | ..... | 5.7 | 5.8 | ..... | ..... | 3.9 | 3.75 | ..... | ..... | ..... |
| 30 | 2.3 | ..... | ..... | 5.7 | 5.8 | ..... | ..... | 3.8 | 3.8 | ..... | ..... | ..... |
| 31 | 2.35 | ..... | ..... | ..... | 5.8 | ..... | ..... | 4.95 | ..... | ..... | ..... | ..... |

NOTE.—Ice conditions existed January 1 to 4.

*Daily discharge, in second-feet, of Sevier River near Marysvale, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 170 | 157 | 170 | 284 | 834 | 900 | 202 | 465 | 1,110 | 403 | 324 | ..... |
| 2 | 170 | 157 | 189 | 284 | 768 | 826 | 230 | 420 | 1,820 | 403 | 323 | ..... |
| 3 | 170 | 157 | 320 | 320 | 800 | 826 | 246 | 375 | [a]3,000 | 393 | 322 | ..... |
| 4 | 170 | 157 | 450 | 320 | 834 | 814 | 246 | 355 | 2,000 | 373 | 320 | ..... |
| 5 | 163 | 176 | 578 | 388 | 1,060 | 802 | 258 | 316 | 1,900 | 373 | 318 | ..... |
| 6 | 189 | 173 | 800 | 339 | 1,180 | 790 | 269 | 289 | 1,230 | 383 | 316 | ..... |
| 7 | 203 | 170 | 1,120 | 320 | 1,320 | 756 | 280 | 289 | 1,070 | 393 | 314 | ..... |
| 8 | 203 | 170 | 1,060 | 311 | 1,410 | 773 | 280 | 298 | 1,030 | 373 | 304 | ..... |
| 9 | 210 | 176 | 980 | 320 | 1,460 | 739 | 271 | 365 | 868 | 373 | 304 | ..... |
| 10 | 196 | 163 | 870 | 330 | 1,440 | 690 | 262 | 365 | 745 | 373 | 314 | ..... |
| 11 | 193 | 170 | 817 | 339 | 1,430 | 660 | 246 | 355 | 687 | 363 | 333 | ..... |
| 12 | 190 | 176 | 565 | 330 | 1,340 | 600 | 238 | 516 | 673 | 363 | 324 | ..... |
| 13 | 186 | 170 | 421 | 320 | 1,290 | 570 | 230 | 466 | 604 | 363 | 314 | ..... |
| 14 | 182 | 170 | 320 | 339 | 1,200 | 542 | 230 | 442 | 578 | 363 | 314 | 295 |
| 15 | 203 | 170 | 340 | 444 | 1,110 | 516 | 238 | 521 | 552 | 373 | 314 | ..... |

[a] Discharge estimated; gage height approximately 10 feet.

*Daily discharge, in second-feet, of Sevier River near Marysvale, Utah, for 1909*—Cont'd.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 189 | 176 | 358 | 565 | 1,020 | 442 | 246 | 600 | 526 | 353 | 314 | ..... |
| 17 | 189 | 163 | 358 | 736 | 900 | 442 | 238 | 722 | 502 | 350 | 314 | ..... |
| 18 | 189 | 176 | 358 | 800 | 881 | 408 | 246 | 739 | 478 | 346 | 314 | ..... |
| 19 | 189 | 176 | 339 | 870 | 826 | 375 | 262 | 630 | 456 | 343 | 334 | ..... |
| 20 | 189 | 176 | 311 | 870 | 826 | 355 | 271 | 706 | 456 | 343 | 353 | ..... |
| 21 | 189 | 170 | 339 | 800 | 826 | 335 | 298 | 600 | 434 | 324 | 373 | ..... |
| 22 | 203 | 170 | 330 | 736 | 808 | 316 | 407 | 516 | 424 | 333 | 380 | ..... |
| 23 | 182 | 170 | 334 | 675 | 813 | 298 | 516 | 490 | 413 | 333 | 380 | ..... |
| 24 | 176 | 176 | 339 | 646 | 818 | 238 | 603 | 375 | 403 | 333 | 380 | ..... |
| 25 | 163 | 176 | 339 | 632 | 822 | 189 | 690 | 335 | 413 | 333 | 380 | ..... |
| 26 | 163 | 176 | 339 | 618 | 826 | 176 | 670 | 307 | 413 | 333 | 380 | ..... |
| 27 | 176 | 170 | 339 | 675 | 826 | 181 | 650 | 355 | 424 | 332 | 383 | ..... |
| 28 | 151 | 170 | 328 | 768 | 863 | 186 | 630 | 397 | 434 | 331 | 380 | ..... |
| 29 | 151 | ..... | 317 | 942 | 900 | 191 | 590 | 355 | 424 | 330 | 370 | ..... |
| 30 | 151 | ..... | 306 | 942 | 900 | 196 | 550 | 335 | 434 | 328 | 360 | ..... |
| 31 | 157 | ..... | 295 | ..... | 900 | ..... | 510 | 615 | ..... | 326 | ..... | ..... |

NOTE.—Daily discharges were obtained from three fairly well-defined rating tables applicable between periods of high water as follows: January 1 to May 10 (1906–1908 table); May 11 to September 3; September 4 to December 31.

*Monthly discharge of Sevier River near Marysvale, Utah, for 1909.*

[Drainage area, 2,560 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 210 | 151 | 181 | 0.071 | 0.08 | 11,100 | B. |
| February | 176 | 157 | 170 | .066 | .07 | 9,440 | B. |
| March | 1,120 | 170 | 462 | .180 | .21 | 28,400 | B. |
| April | 942 | 284 | 542 | .212 | .24 | 32,300 | B. |
| May | 1,460 | 768 | 1,010 | .395 | .46 | 62,100 | B. |
| June | 900 | 176 | 504 | .197 | .22 | 30,000 | B. |
| July | 690 | 202 | 358 | .140 | .16 | 22,000 | B. |
| August | 739 | 289 | 449 | .175 | .20 | 27,600 | B. |
| September | 3,000 | 403 | 817 | .319 | .36 | 48,600 | B. |
| October | 403 | 324 | 356 | .139 | .16 | 21,900 | B. |
| November | 383 | 304 | 338 | .132 | .15 | 20,100 | B. |
| December | ..... | ..... | 295 | .115 | .13 | 18,100 | D. |
| The year | 3,000 | ..... | 457 | .178 | 2.44 | 332,000 | |

NOTE.—Monthly mean for December estimated from one reading and is only approximate.

## SEVIER RIVER NEAR GUNNISON, UTAH.

This station, which was established June 29, 1900, to determine the amount of water available for irrigation at this point, is located at the highway bridge on the road to Westview precinct, about 4 miles west of Gunnison, Utah.

It is about three-fourths of a mile above the mouth of San Pitch River and below all other important tributaries.

Measurements are made from the bridge or by wading. An inclined staff gage is located just below the bridge, the datum of which has remained unchanged since the station was established.

The records are occasionally slightly affected by ice and the bed of the stream shifts somewhat during floods, but on the whole the records may be considered good.

*Discharge measurements of Sevier River near Gunnison, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 10 | E. A. Porter | 70 | 317 | 4.55 | 1,230 |
| June 24 | do | 43 | 217 | 1.90 | 181 |

*Daily gage height, in feet, of Sevier River near Gunnison, Utah, for 1909.*

[Leroy H. Lund, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | 3.15 | ..... | 4.35 | 1.7 | 2.1 | 3.9 | 2.7 | 2.75 | 2.9 |
| 2 | ..... | ..... | 2.75 | 3.2 | 3.85 | 4.45 | 1.7 | 2.0 | 4.0 | 2.6 | 2.75 | 2.9 |
| 3 | ..... | 2.75 | 2.95 | 3.2 | ..... | 4.55 | 1.7 | 1.95 | 4.0 | 2.6 | 2.8 | 3.05 |
| 4 | ..... | ..... | 3.25 | 3.1 | 3.9 | 4.7 | 1.65 | 1.95 | 4.5 | 2.6 | 2.8 | 3.1 |
| 5 | ..... | ..... | ..... | ..... | ..... | 4.8 | 1.65 | 1.85 | 4.2 | 2.6 | 2.75 | 3.2 |
| 6 | ..... | 2.75 | 3.6 | ..... | 4.05 | 5.35 | 1.6 | 1.85 | 4.55 | 2.55 | 2.8 | 3.2 |
| 7 | ..... | ..... | ..... | ..... | 4.2 | 4.05 | 1.6 | 1.8 | 4.95 | 2.55 | 2.8 | 3.15 |
| 8 | 2.8 | ..... | ..... | 3.15 | 5.05 | 5.0 | 1.6 | 1.8 | 5.55 | 2.55 | 2.8 | 3.15 |
| 9 | ..... | ..... | 4.2 | ..... | 4.6 | 4.85 | 1.5 | 1.75 | 6.0 | 2.55 | 2.8 | 3.15 |
| 10 | 2.8 | 2.75 | ..... | ..... | 4.65 | 4.65 | 1.4 | 1.7 | 5.4 | 2.65 | 2.8 | 3.1 |
| 11 | ..... | ..... | ..... | ..... | ..... | 4.2 | 1.45 | 1.75 | 5.4 | 2.7 | 2.8 | 3.1 |
| 12 | 2.85 | ..... | 4.2 | 3.2 | ..... | ..... | 1.4 | 1.8 | 4.6 | 2.75 | 2.8 | 3.1 |
| 13 | 2.85 | ..... | 5.0 | 3.25 | ..... | 3.9 | 1.4 | 2.15 | 4.45 | 2.75 | 2.75 | 3.05 |
| 14 | ..... | 3.3 | 5.3 | ..... | 4.45 | 3.65 | 1.4 | 2.85 | 3.9 | 2.75 | 2.75 | 3.05 |
| 15 | 2.85 | 3.25 | 4.8 | ..... | 4.4 | 3.5 | 1.4 | 3.0 | 3.95 | 2.75 | 2.75 | 3.0 |
| 16 | 2.9 | 3.2 | 4.65 | ..... | 4.3 | 3.45 | 1.35 | 3.85 | 3.95 | 2.75 | 2.75 | 3.0 |
| 17 | 2.9 | 3.1 | 4.35 | ..... | 4.1 | 3.3 | 1.35 | 4.0 | 3.85 | 2.75 | 2.8 | 3.0 |
| 18 | 2.9 | ..... | 4.2 | 3.25 | 4.05 | 3.3 | 1.4 | 4.05 | ..... | 2.75 | 2.9 | 3.0 |
| 19 | 2.85 | 3.1 | 4.25 | ..... | 4.0 | 3.15 | 1.5 | 4.4 | 3.55 | 2.75 | 2.9 | 2.9 |
| 20 | 2.8 | ..... | 4.2 | ..... | 3.95 | 2.75 | 1.7 | 4.45 | 3.45 | 2.75 | 3.15 | 2.9 |
| 21 | ..... | 3.3 | 4.15 | 3.35 | 3.9 | 2.5 | 2.5 | 4.25 | 3.4 | 2.75 | 3.2 | 2.9 |
| 22 | 2.85 | 3.0 | 4.1 | ..... | 3.95 | 2.2 | 1.9 | 4.3 | 3.35 | 2.75 | 3.3 | ..... |
| 23 | ..... | 2.55 | 4.0 | ..... | 3.8 | 1.9 | 2.0 | 4.1 | 3.2 | 2.6 | 3.25 | 2.85 |
| 24 | 2.9 | 2.5 | 3.8 | 3.45 | 3.8 | 1.85 | 2.1 | 3.9 | 3.25 | 2.6 | 3.1 | 2.9 |
| 25 | ..... | 3.0 | 3.4 | 3.45 | 3.9 | ..... | 2.1 | 3.7 | 3.1 | 2.8 | 3.0 | 2.9 |
| 26 | 2.9 | 3.1 | 3.3 | ..... | 4.05 | 1.7 | 2.2 | 3.4 | 3.0 | 2.7 | 2.9 | 2.9 |
| 27 | 2.85 | 3.95 | 3.25 | 3.65 | 4.15 | 1.8 | 2.2 | 3.3 | 2.9 | 2.7 | 2.9 | 2.9 |
| 28 | ..... | 3.25 | ..... | ..... | 4.2 | 1.7 | 2.15 | 3.1 | 2.85 | 2.7 | 2.8 | 3.0 |
| 29 | 2.8 | ..... | ..... | 3.7 | 4.35 | 1.7 | 2.1 | 2.65 | 2.8 | 2.7 | 2.8 | 3.0 |
| 30 | ..... | ..... | 3.2 | ..... | ..... | 1.7 | 2.1 | 2.85 | 2.8 | 2.7 | 2.8 | ..... |
| 31 | 2.8 | ..... | ..... | ..... | 4.1 | ..... | 2.1 | 3.0 | ..... | 2.8 | ..... | 3.0 |

*Daily discharge, in second-feet, of Sevier River near Gunnison, Utah, for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 350 | 400 | 470 | 511 | 740 | 988 | 143 | 223 | 783 | 377 | 392 | 435 |
| 2 | 350 | 390 | 392 | 527 | 762 | 1,040 | 143 | 202 | 825 | 348 | 392 | 435 |
| 3 | 350 | 392 | 450 | 527 | 772 | 1,090 | 143 | 192 | 825 | 348 | 406 | 480 |
| 4 | 350 | 392 | 543 | 495 | 783 | 1,170 | 134 | 192 | 1,060 | 348 | 406 | 495 |
| 5 | 350 | 392 | 600 | 500 | 820 | 1,220 | 134 | 172 | 915 | 348 | 392 | 527 |
| 6 | 400 | 392 | 663 | 500 | 847 | 1,560 | 125 | 172 | 1,090 | 334 | 406 | 527 |
| 7 | 400 | 392 | 740 | 510 | 915 | 1,360 | 125 | 162 | 1,310 | 334 | 406 | 511 |
| 8 | 406 | 392 | 830 | 511 | 1,360 | 1,340 | 125 | 162 | 1,690 | 334 | 406 | 511 |
| 9 | 406 | 392 | 915 | 511 | 1,120 | 1,250 | 109 | 152 | 2,000 | 334 | 406 | 511 |
| 10 | 406 | 392 | 915 | 520 | 1,140 | 1,140 | 94 | 143 | 1,590 | 362 | 406 | 495 |
| 11 | 413 | 430 | 915 | 527 | 1,140 | 915 | 102 | 152 | 1,590 | 377 | 406 | 495 |
| 12 | 420 | 470 | 915 | 527 | 1,090 | 850 | 94 | 162 | 1,120 | 392 | 406 | 495 |
| 13 | 420 | 520 | 1,340 | 543 | 1,040 | 783 | 94 | 234 | 1,040 | 392 | 392 | 480 |
| 14 | 420 | 559 | 1,520 | 543 | 1,040 | 682 | 94 | 420 | 783 | 392 | 392 | 480 |
| 15 | 420 | 543 | 1,220 | 543 | 1,010 | 627 | 94 | 465 | 804 | 392 | 392 | 465 |
| 16 | 435 | 527 | 1,140 | 543 | 963 | 610 | 87 | 762 | 804 | 392 | 392 | 465 |
| 17 | 435 | 495 | 988 | 543 | 869 | 559 | 87 | 825 | 762 | 392 | 406 | 465 |
| 18 | 435 | 495 | 915 | 543 | 847 | 559 | 94 | 847 | 655 | 392 | 435 | 465 |
| 19 | 420 | 495 | 939 | 550 | 825 | 511 | 109 | 1,010 | 645 | 392 | 435 | 435 |
| 20 | 406 | 530 | 915 | 560 | 804 | 392 | 143 | 1,040 | 610 | 392 | 511 | 435 |

*Daily discharge, in second-feet, of Sevier River near Gunnison, Utah, for 1909*—Cont'd.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 413 | 559 | 892 | 576 | 783 | 320 | 320 | 939 | 593 | 392 | 527 | 435 |
| 22 | 420 | 465 | 869 | 590 | 804 | 245 | 182 | 963 | 576 | 392 | 559 | 428 |
| 23 | 428 | 334 | 825 | 600 | 741 | 182 | 202 | 869 | 527 | 348 | 543 | 420 |
| 24 | 435 | 320 | 741 | 610 | 741 | 172 | 223 | 783 | 543 | 348 | 495 | 435 |
| 25 | 435 | 465 | 593 | 610 | 783 | 160 | 223 | 701 | 495 | 406 | 465 | 435 |
| 26 | 435 | 495 | 559 | 645 | 847 | 143 | 245 | 593 | 465 | 377 | 435 | 435 |
| 27 | 420 | 804 | 543 | 682 | 892 | 162 | 245 | 559 | 435 | 377 | 435 | 435 |
| 28 | 413 | 543 | 540 | 690 | 915 | 143 | 234 | 495 | 420 | 377 | 406 | 465 |
| 29 | 406 | ..... | 530 | 701 | 988 | 143 | 223 | 362 | 406 | 377 | 406 | 465 |
| 30 | 406 | ..... | 527 | 720 | 930 | 143 | 223 | 420 | 406 | 377 | 406 | 465 |
| 31 | 406 | ..... | 520 | ..... | 869 | ..... | 223 | 465 | ..... | 406 | ..... | 465 |

NOTE.—These discharges are based on a rating curve fairly well defined below 348 second-feet. Discharges have been interpolated for days of missing gage heights.

*Monthly discharge of Sevier River near Gunnison, Utah, for 1909.*

[Drainage area, 3,990 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 435 | 350 | 407 | 0.102 | 0.12 | 25,000 | B. |
| February | 804 | 320 | 463 | .116 | .12 | 25,700 | B. |
| March | 1,520 | 392 | 789 | .198 | .23 | 48,500 | C. |
| April | 720 | 495 | 565 | .142 | .16 | 33,600 | B. |
| May | 1,360 | 740 | 909 | .228 | .26 | 55,900 | C. |
| June | 1,560 | 143 | 682 | .171 | .19 | 40,600 | B. |
| July | 320 | 87 | 155 | .039 | .04 | 9,530 | B. |
| August | 1,040 | 143 | 479 | .120 | .14 | 29,500 | B. |
| September | 2,000 | 406 | 859 | .215 | .24 | 51,100 | C. |
| October | 406 | 334 | 373 | .093 | .11 | 22,900 | B. |
| November | 559 | 392 | 429 | .108 | .12 | 25,500 | B. |
| December | 527 | 420 | 467 | .117 | .13 | 28,700 | B. |
| The year | 2,000 | 87 | 548 | .137 | 1.86 | 397,000 | |

## BEAVER RIVER BASIN.

### DESCRIPTION.

Beaver River with its tributaries, North, South, and Indian creeks, rises on the western slope of the Tushar Mountains, in the southwestern part of Utah, and flows in a westerly direction to Minersville, thence northerly until its waters are lost in the sands.

The upper portion of the drainage area is rough and mountainous, some of the peaks rising to elevations of over 12,000 feet, and the flow in this portion of the basin is regulated both by snow and by the nature of the soil which absorbs and holds back the moisture. The lower portion of the drainage area consists of a high dry plateau, most of which is desert.

Beaver River is nominally a part of the Sevier Lake drainage, but a few miles north of Milford it becomes intermittent in flow and only a small portion of the highest floods ever reaches the lake.

The following stations have been maintained in this basin:

Beaver River near Beaver, Utah, 1906.
Minersville Canal at Minersville, Utah, 1906.
North Fork of North Creek near Beaver, Utah, 1906.
South Fork of North Creek near Beaver, Utah, 1906.
South Creek near Beaver, Utah, 1906.
Indian Creek near Beaver, Utah, 1906.
Beaver River near Minersville, Utah, 1909.

### BEAVER RIVER AT MINERSVILLE, UTAH.

This station, which was established April 13, 1909, to determine the amount of unappropriated water available for irrigation at this point, is located about one-half mile below the Beaver County bridge and about three-fourths of a mile northwest of Minersville, Utah.

The station is below all tributaries, Indian Creek, North Creek, and South Creek entering 10, 12, and 15 miles, respectively, above the station. The Minersville Canal diverts all the normal low-water flow at a point about 2 miles above the station, at which the river is usually dry during several months in the summer.

Measurements are made from a footbridge, built for the purpose. An inclined staff gage is located just above the bridge. The gage datum has remained unchanged since the station was established.

The records are not affected by ice nor by artificial control below. The section is fairly permanent and the records may be considered good.

*Discharge measurements of Beaver River at Minersville, Utah, in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 13 | E. A. Porter | 24 | 38.3 | 2.60 | 68 |
| June 3 | do | 30 | 80.4 | 3.95 | 343 |
| October 4 | do | 19.5 | 21.9 | 1.85 | 8.4 |

*Daily gage height, in feet, of Beaver River at Minersville, Utah, for 1909.*

[Tus Gillins, observer.]

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | 3.2 | 3.25 | | | 2.8 | 2.0 | 2.0 | 2.6 |
| 2 | | | | | 3.2 | 3.7 | | | 2.9 | 2.0 | 1.9 | 2.6 |
| 3 | | | | | 3.3 | 3.9 | | | 2.2 | 1.85 | 1.9 | 2.6 |
| 4 | | | | | 3.5 | 4.0 | | | 2.3 | 1.85 | 1.9 | 2.5 |
| 5 | | | | | 3.75 | 4.0 | | | 2.4 | 1.9 | 1.8 | 2.6 |
| 6 | | | | | 3.9 | 4.25 | | | 3.6 | 1.9 | 1.8 | 2.6 |
| 7 | | | | | 4.05 | 4.2 | | | 3.0 | 1.9 | 1.8 | 2.6 |
| 8 | | | | | 4.05 | 4.4 | | | 2.5 | 1.9 | 1.8 | 2.6 |
| 9 | | | | | 4.15 | 3.7 | | | 2.4 | 1.9 | 2.2 | 2.7 |
| 10 | | | | | 4.3 | 3.55 | | | 2.4 | 1.8 | 2.2 | 2.6 |
| 11 | | | | | 4.35 | 3.3 | | 2.15 | 2.3 | 1.8 | 2.2 | 2.6 |
| 12 | | | | 2.6 | 4.2 | 3.1 | | 2.2 | 2.2 | 1.8 | 2.3 | 2.6 |
| 13 | | | | 2.6 | 3.95 | 2.8 | | 2.15 | 2.1 | 1.8 | 2.3 | 2.6 |
| 14 | | | | 2.6 | 3.75 | 2.8 | | | 2.0 | 1.8 | 2.3 | 2.6 |
| 15 | | | | 2.8 | 3.55 | 2.6 | | 2.0 | 2.1 | 1.8 | 2.5 | 2.5 |

*Daily gage height, in feet, of Beaver River at Minersville, Utah, for 1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | ..... | ..... | ..... | 2.9 | 3.05 | 2.5 | ..... | 2.8 | 1.9 | 1.8 | 2.5 | 2.5 |
| 17 | ..... | ..... | ..... | 3.05 | 3.1 | 2.1 | ..... | 2.5 | 1.8 | 1.8 | 2.5 | 2.5 |
| 18 | ..... | ..... | ..... | 3.1 | 3.1 | 2.0 | ..... | 2.45 | 1.8 | 1.8 | 2.5 | 2.5 |
| 19 | ..... | ..... | ..... | 3.4 | 3.1 | ..... | ..... | 3.25 | 1.8 | 1.8 | 2.6 | 2.5 |
| 20 | ..... | ..... | ..... | 3.4 | 3.2 | ..... | ..... | 3.0 | 1.9 | 1.8 | 2.6 | 2.5 |
| 21 | ..... | ..... | ..... | 3.4 | 3.3 | ..... | ..... | 2.4 | 1.9 | 1.9 | 2.6 | 2.4 |
| 22 | ..... | ..... | ..... | 3.2 | 3.5 | ..... | ..... | 2.35 | 1.9 | 1.9 | 2.6 | 2.4 |
| 23 | ..... | ..... | ..... | 3.2 | 3.5 | ..... | ..... | 2.2 | 1.9 | 1.9 | 2.6 | 2.4 |
| 24 | ..... | ..... | ..... | 2.7 | 3.35 | ..... | ..... | 1.8 | 2.1 | 1.9 | 2.7 | 2.55 |
| 25 | ..... | ..... | ..... | 2.7 | 3.1 | ..... | ..... | 1.6 | 2.55 | 1.8 | 2.7 | 2.5 |
| 26 | ..... | ..... | ..... | 2.75 | 3.1 | ..... | ..... | 1.9 | 2.7 | 1.8 | 2.8 | 2.6 |
| 27 | ..... | ..... | ..... | 3.1 | 3.35 | ..... | ..... | 2.15 | 2.0 | 1.8 | 2.8 | 2.65 |
| 28 | ..... | ..... | ..... | 3.5 | 3.45 | ..... | ..... | 1.8 | 1.8 | 1.8 | 2.8 | 3.0 |
| 29 | ..... | ..... | ..... | 3.5 | 3.4 | ..... | ..... | 1.6 | 1.65 | 1.8 | 2.7 | 3.0 |
| 30 | ..... | ..... | ..... | 3.35 | 3.25 | ..... | ..... | 1.45 | 2.0 | 1.8 | 2.6 | 3.0 |
| 31 | ..... | ..... | ..... | ..... | 3.1 | ..... | ..... | 2.7 | ..... | 1.8 | ..... | 1.5 |

NOTE.—No flow from June 19 to August 10 and on August 14 and 30.

*Daily discharge, in second-feet, of Beaver River at Minersville, Utah, for 1909.*

| | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | ..... | ..... | 155 | 164 | 0 | 0 | 93 | 17 | 17 | 68 |
| 2 | ..... | ..... | ..... | ..... | 155 | 268 | 0 | 0 | 107 | 17 | 11 | 68 |
| 3 | ..... | ..... | ..... | ..... | 174 | 326 | 0 | 0 | 30 | 8.5 | 11 | 68 |
| 4 | ..... | ..... | ..... | ..... | 218 | 358 | 0 | 0 | 38 | 8.5 | 11 | 57 |
| 5 | ..... | ..... | ..... | ..... | 282 | 358 | 0 | 0 | 47 | 11 | 6 | 68 |
| 6 | ..... | ..... | ..... | ..... | 326 | 440 | 0 | 0 | 242 | 11 | 6 | 68 |
| 7 | ..... | ..... | ..... | ..... | 374 | 423 | 0 | 0 | 122 | 11 | 6 | 68 |
| 8 | ..... | ..... | ..... | ..... | 374 | 493 | 0 | 0 | 57 | 11 | 6 | 68 |
| 9 | ..... | ..... | ..... | ..... | 406 | 268 | 0 | 0 | 47 | 11 | 30 | 80 |
| 10 | ..... | ..... | ..... | ..... | 457 | 230 | 0 | 0 | 47 | 6 | 30 | 68 |
| 11 | ..... | ..... | ..... | ..... | 475 | 174 | 0 | 26 | 38 | 6 | 30 | 68 |
| 12 | ..... | ..... | ..... | 68 | 423 | 138 | 0 | 30 | 30 | 6 | 38 | 68 |
| 13 | ..... | ..... | ..... | 68 | 342 | 93 | 0 | 26 | 23 | 6 | 38 | 68 |
| 14 | ..... | ..... | ..... | 68 | 282 | 93 | 0 | 0 | 17 | 6 | 38 | 68 |
| 15 | ..... | ..... | ..... | 93 | 230 | 68 | 0 | 17 | 23 | 6 | 57 | 57 |
| 16 | ..... | ..... | ..... | 107 | 130 | 57 | 0 | 93 | 11 | 6 | 57 | 57 |
| 17 | ..... | ..... | ..... | 130 | 138 | 23 | 0 | 57 | 6 | 6 | 57 | 57 |
| 18 | ..... | ..... | ..... | 138 | 138 | 17 | 0 | 52 | 6 | 6 | 57 | 57 |
| 19 | ..... | ..... | ..... | 195 | 138 | 0 | 0 | 164 | 6 | 6 | 68 | 57 |
| 20 | ..... | ..... | ..... | 195 | 155 | 0 | 0 | 122 | 11 | 6 | 68 | 57 |
| 21 | ..... | ..... | ..... | 195 | 174 | 0 | 0 | 47 | 11 | 11 | 68 | 47 |
| 22 | ..... | ..... | ..... | 155 | 218 | 0 | 0 | 42 | 11 | 11 | 68 | 47 |
| 23 | ..... | ..... | ..... | 155 | 218 | 0 | 0 | 30 | 11 | 11 | 68 | 47 |
| 24 | ..... | ..... | ..... | 80 | 184 | 0 | 0 | 6 | 23 | 11 | 80 | 62 |
| 25 | ..... | ..... | ..... | 80 | 138 | 0 | 0 | 2 | 62 | 6 | 80 | 57 |
| 26 | ..... | ..... | ..... | 86 | 138 | 0 | 0 | 11 | 80 | 6 | 93 | 68 |
| 27 | ..... | ..... | ..... | 138 | 184 | 0 | 0 | 26 | 17 | 6 | 93 | 74 |
| 28 | ..... | ..... | ..... | 218 | 206 | 0 | 0 | 6 | 6 | 6 | 93 | 122 |
| 29 | ..... | ..... | ..... | 218 | 195 | 0 | 0 | 2 | 2.5 | 6 | 80 | 122 |
| 30 | ..... | ..... | ..... | 184 | 164 | 0 | 0 | 0 | 17 | 6 | 68 | 122 |
| 31 | ..... | ..... | ..... | ..... | 138 | ..... | 0 | 80 | ..... | 6 | ..... | 57 |

NOTE.—The discharges are based on a well-defined rating curve.

*Monthly discharge of Beaver River at Minersville, Utah, for 1909.*

[Drainage area, 549 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| April 12-30 | 218 | 68 | 135 | 0.246 | 0.17 | 5,090 | A. |
| May | 475 | 130 | 236 | .430 | .50 | 14,500 | A. |
| June | 493 | 0 | 133 | .242 | .27 | 7,910 | A. |
| July | 0 | 0 | 0 | .000 | .00 | 0 | ..... |
| August | 164 | 0 | 27.1 | .049 | .06 | 1,670 | B. |
| September | 242 | 2.5 | 41.4 | .075 | .08 | 2,460 | B. |
| October | 17 | 6.0 | 8.32 | .015 | .02 | 512 | B. |
| November | 93 | 6.0 | 47.8 | .087 | .10 | 2,840 | A. |
| December | 122 | 47 | 68.4 | .125 | .14 | 4,210 | B. |
| The period | ..... | ..... | ..... | ..... | ..... | 39,200 | |

## HUMBOLDT SINK DRAINAGE BASIN.

### HUMBOLDT RIVER.

#### DESCRIPTION.

Humboldt River rises in the northeastern part of Nevada and flows west and southwest a distance of about 350 miles into Humboldt Lake or Sink, in the western part of the State. The entire basin is surrounded by high and rugged peaks, some of which attain elevations of 11,000 feet above sea. A dam built a few years ago prevents the overflow in flood season from reaching Carson Sink, about 30 miles to the west.

The river is anomalous among the streams of the Great Basin in that both its source and its terminus are well within the area of interior drainage. Its valley is narrow, and its course and that of its tributaries lie in general through a barren region destitute of large trees and supporting few shrubs except scattered clusters of willows. The valley of the main stream affords the only east and west pass through the mountains of Nevada, and is followed by the Southern Pacific Railroad.

During the early spring and summer months the run-off of the North and South forks is very heavy because of the melting of the snows at the headwaters; as soon as the snow is all gone the rivers are left without a source of supply and their channels gradually become dry.

Several tributaries find their way into the main river, Rock Creek and Reese River entering near Battle Mountain, the North and South forks near Elko, and the Little Humboldt near Winnemucca.

Although opportunities for reclamation are many, the cost of the necessary work would be very great owing to the engineering difficulties to be overcome. The basin affords several reservoir sites where the flood waters could be collected and stored for use during the summer months.

Lovelock Valley is considered the most fertile valley in the basin, and the entire flow of the river is appropriated for irrigation.

Alfalfa and grass hay are the chief crops; the land is best adapted for grazing.

The availability of the stream for power development is small, owing to the slight fall. Possibly the best stream for this purpose is the South Fork.

Within the period for which records are available the wettest year was 1907 and the driest year 1905.

The following stations have been maintained in this basin:

Humboldt River near Elko, Nev., 1895–1902.
Humboldt River at Palisade, Nev., 1902–1906.
Humboldt River at Battle Mountain, Nev., 1896–1897.
Humboldt River near Golconda, Nev., 1894–1909.
Humboldt River near Oreana, Nev., 1896–1909.
Marys River near Deeth, Nev., 1902–1903.
North Fork of Humboldt River near Peko, Nev., 1898–1900.
North Fork of Humboldt River near Halleck, Nev., 1902–1909.
South Fork of Humboldt River near Elko, Nev., 1896–1909.
Pine Creek near Palisade, Nev., 1902–1904.
Rock Creek near Battle Mountain, Nev., 1896.

### HUMBOLDT RIVER NEAR GOLCONDA, NEV.

This station, which was established October 24, 1894, to determine the quantity of water available for irrigation in the vicinity of Golconda and Winnemucca, is located at the highway bridge 1¼ miles north of the town of Golconda. It was discontinued December 31, 1909.

The station is below the central valley, below Reese River and Rock and Keely creeks, and above all other important tributaries except Little Humboldt River, which enters about 12 miles below. Considerable water is diverted above the station, almost the entire low-water flow being used for irrigation.

The records are believed not to be materially affected by ice, but information as to winter conditions is meager.

Discharge measurements are made from the highway bridge or by wading.

During 1907 the staff gage was fastened to the bridge. The bridge and gage were washed out in December, 1907, and beginning January 1, 1908, all readings have been taken from the original inclined staff gage on the left bank, reading 0.1 foot higher than the gage on the bridge.

As the channel is somewhat shifting the records are not of the best, but the station is nevertheless probably the most reliable on the Humboldt.

63150°—WSP 270—11——7

*Discharge measurements of Humboldt River near Golconda, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| February 5 | E. A. Porter | 80 | 243 | 7.30 | 350 |
| June 29 | L. J. Towne | 86 | 399 | 8.20 | 817 |
| July 15 | do | 80 | 261 | 7.55 | 483 |
| August 6 | do | 44 | 97 | 4.85 | 70 |
| December 21 [a] | E. A. Porter | 49 | 129 | 6.00 | 142 |

[a] Partly frozen.

*Daily gage height, in feet, of Humboldt River near Golconda, Nev., for 1909.*

[Willie Duyck, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.0 | ..... | 7.1 | 8.5 | 8.4 | 7.3 | 8.4 | 4.9 | 4.0 | 3.6 | 3.5 | ..... |
| 2 | 5.0 | 7.2 | 7.1 | 8.5 | 8.4 | 7.2 | 8.4 | 4.8 | 4.1 | 3.7 | 3.5 | ..... |
| 3 | 5.0 | 7.2 | 7.2 | 8.5 | 8.4 | 7.2 | 8.5 | 4.6 | 4.1 | 3.7 | 3.5 | ..... |
| 4 | 5.0 | 7.2 | 7.3 | 8.5 | 8.4 | 7.1 | ..... | 4.5 | 4.0 | 3.7 | 3.5 | ..... |
| 5 | 5.2 | 7.2 | 7.3 | 8.6 | 8.4 | 7.1 | 8.4 | 4.4 | 3.9 | 3.6 | 3.5 | 4.5 |
| 6 | 5.5 | 7.2 | 7.35 | 8.6 | 8.4 | 7.2 | 8.4 | 4.3 | 3.9 | 3.6 | 3.5 | 4.5 |
| 7 | 5.7 | 7.15 | 7.35 | 8.7 | 8.4 | 7.3 | 8.3 | ..... | 3.8 | 3.6 | 3.5 | 4.6 |
| 8 | 5.9 | 7.1 | 7.4 | 8.8 | 8.4 | 7.3 | 8.3 | ..... | 3.7 | 3.6 | 3.5 | 4.6 |
| 9 | 6.0 | 7.1 | 7.4 | 8.8 | 8.3 | 7.4 | 8.2 | ..... | 3.6 | 3.5 | 3.6 | 4.6 |
| 10 | 6.0 | 7.1 | 7.5 | 8.8 | 8.2 | 7.5 | 8.1 | ..... | 3.5 | 3.5 | 3.6 | 4.6 |
| 11 | 6.0 | 7.0 | 7.6 | 8.8 | 8.2 | 7.55 | 8.0 | ..... | 3.5 | 3.5 | 3.7 | 4.7 |
| 12 | 6.3 | 6.9 | 7.6 | 8.8 | 8.2 | 7.6 | 7.8 | ..... | 3.5 | 3.5 | 3.8 | 4.8 |
| 13 | 6.6 | 6.9 | 7.7 | 8.8 | 8.1 | 7.7 | 7.7 | ..... | 3.5 | 3.5 | 3.8 | 4.8 |
| 14 | 6.9 | 6.9 | 7.8 | 8.8 | 8.1 | 7.8 | 7.6 | ..... | ..... | 3.5 | 3.8 | 4.9 |
| 15 | 6.9 | 6.9 | 7.8 | 8.7 | 8.0 | 7.9 | 7.5 | 4.6 | 3.5 | 3.5 | 3.8 | 4.9 |
| 16 | 6.7 | 6.9 | 7.8 | 8.7 | 7.8 | 8.0 | 7.3 | 4.5 | 3.5 | 3.5 | 3.8 | 4.9 |
| 17 | 6.9 | 6.9 | 7.8 | 8.7 | 7.8 | 8.2 | 7.2 | 4.4 | 3.5 | ..... | 3.85 | 5.0 |
| 18 | 7.0 | 6.9 | 7.8 | 8.7 | 7.8 | 8.3 | 7.0 | 4.3 | 3.5 | 3.5 | 3.9 | 5.1 |
| 19 | 7.2 | 6.95 | 7.85 | 8.7 | 7.8 | 8.5 | 6.8 | 4.2 | 3.5 | 3.5 | 4.0 | 5.3 |
| 20 | 7.5 | 7.0 | 7.85 | 8.8 | 7.8 | 8.4 | 6.7 | 3.9 | 3.5 | 3.5 | 4.1 | 5.6 |
| 21 | ..... | 7.3 | 7.9 | 8.8 | 7.8 | 8.4 | 6.6 | 4.0 | 3.5 | 3.5 | 4.2 | 6.0 |
| 22 | 7.8 | 7.3 | 8.0 | 8.9 | 7.8 | 8.4 | 6.3 | 3.9 | 3.5 | 3.4 | 4.2 | 6.0 |
| 23 | 7.8 | 7.3 | 8.1 | 8.9 | 7.8 | 8.4 | 6.2 | 3.8 | 3.5 | 3.5 | 4.3 | 6.0 |
| 24 | 8.1 | 7.3 | 8.2 | 8.9 | 7.8 | 8.4 | 6.0 | 3.7 | 3.5 | 3.5 | 4.3 | 6.0 |
| 25 | 8.1 | 7.3 | 8.3 | 8.8 | 7.7 | 8.4 | 5.9 | 3.6 | 3.5 | 3.5 | 4.3 | 6.0 |
| 26 | 8.0 | 7.2 | 8.4 | 8.7 | 7.7 | 8.4 | 5.7 | 3.5 | 3.5 | 3.5 | 4.3 | 6.0 |
| 27 | 7.9 | 7.2 | 8.5 | 8.6 | 7.7 | 8.4 | 5.6 | 3.5 | 3.6 | 3.5 | 4.3 | 6.0 |
| 28 | 7.8 | 7.1 | 8.55 | 8.6 | 7.6 | 8.4 | 5.4 | 3.5 | 3.7 | 3.5 | 4.4 | 5.9 |
| 29 | 7.7 | ..... | 8.55 | 8.5 | 7.6 | 8.4 | 5.1 | 3.5 | 3.75 | 3.5 | 4.4 | 5.9 |
| 30 | 7.5 | ..... | 8.5 | 8.5 | 7.5 | 8.4 | 5.0 | 3.55 | 3.8 | 3.5 | 4.5 | 5.9 |
| 31 | 7.4 | ..... | 8.5 | ..... | 7.4 | ..... | 4.95 | 3.8 | ..... | 3.5 | ..... | 5.9 |

NOTE.—The gage used in 1908 and 1909 was the old gage on the left bank, which read 0.1 foot higher than the gage at the bridge. River frozen from December 21 to 31, and probably at other times during winter period.

*Daily discharge, in second-feet, of Humboldt River near Golconda, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 72 | 354 | 360 | 720 | 790 | 550 | 880 | 90 | 20 | 7 | 5 | 45 |
| 2 | 72 | 338 | 360 | 720 | 790 | 530 | 880 | 80 | 24 | 10 | 5 | 45 |
| 3 | 72 | 338 | 380 | 720 | 790 | 530 | 860 | 51 | 24 | 10 | 5 | 45 |
| 4 | 72 | 338 | 400 | 720 | 790 | 510 | 850 | 45 | 20 | 10 | 5 | 45 |
| 5 | 88 | 338 | 400 | 750 | 790 | 510 | 840 | 39 | 16 | 7 | 5 | 45 |
| 6 | 117 | 338 | 410 | 750 | 790 | 530 | 840 | 34 | 16 | 7 | 5 | 45 |
| 7 | 137 | 330 | 410 | 830 | 790 | 550 | 760 | 36 | 13 | 7 | 5 | 51 |
| 8 | 158 | 322 | 420 | 860 | 790 | 550 | 760 | 38 | 10 | 7 | 5 | 51 |
| 9 | 170 | 322 | 420 | 860 | 760 | 580 | 740 | 40 | 7 | 5 | 7 | 51 |
| 10 | 170 | 322 | 440 | 860 | 740 | 600 | 710 | 42 | 5 | 5 | 7 | 51 |

*Daily discharge, in second-feet, of Humboldt River near Golconda, Nev., for 1909*—Cont'd.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 170 | 306 | 460 | 860 | 740 | 615 | 640 | 44 | 5 | 5 | 10 | 58 |
| 12 | 206 | 290 | 460 | 860 | 740 | 630 | 590 | 46 | 5 | 5 | 13 | 65 |
| 13 | 245 | 290 | 480 | 860 | 710 | 650 | 560 | 48 | 5 | 5 | 13 | 65 |
| 14 | 290 | 290 | 540 | 860 | 710 | 680 | 500 | 50 | 5 | 5 | 13 | 72 |
| 15 | 290 | 290 | 540 | 830 | 680 | 700 | 480 | 51 | 5 | 5 | 13 | 72 |
| 16 | 260 | 290 | 540 | 830 | 630 | 730 | 440 | 45 | 5 | 5 | 13 | 72 |
| 17 | 290 | 290 | 540 | 830 | 630 | 790 | 420 | 39 | 5 | 5 | 14 | 80 |
| 18 | 306 | 330 | 540 | 830 | 630 | 850 | 380 | 34 | 5 | 5 | 16 | 88 |
| 19 | 338 | 340 | 550 | 830 | 630 | 900 | 350 | 29 | 5 | 5 | 20 | 106 |
| 20 | 386 | 350 | 550 | 860 | 630 | 880 | 330 | 16 | 5 | 5 | 24 | 135 |
| 21 | 412 | 400 | 560 | 860 | 630 | 880 | 310 | 20 | 5 | 5 | 29 | 140 |
| 22 | 438 | 400 | 590 | 890 | 630 | 880 | 270 | 16 | 5 | 3 | 29 | 140 |
| 23 | 438 | 400 | 610 | 890 | 630 | 880 | 250 | 13 | 5 | 5 | 34 | 140 |
| 24 | 502 | 400 | 640 | 890 | 630 | 880 | 220 | 10 | 5 | 5 | 34 | 140 |
| 25 | 502 | 400 | 670 | 860 | 650 | 880 | 210 | 7 | 5 | 5 | 34 | 140 |
| 26 | 480 | 380 | 690 | 830 | 650 | 880 | 190 | 5 | 5 | 5 | 34 | 140 |
| 27 | 458 | 380 | 720 | 800 | 650 | 880 | 160 | 5 | 7 | 5 | 34 | 140 |
| 28 | 438 | 360 | 730 | 800 | 630 | 880 | 140 | 5 | 10 | 5 | 39 | 140 |
| 29 | 420 | ..... | 730 | 770 | 630 | 880 | 110 | 5 | 12 | 5 | 39 | 140 |
| 30 | 386 | ..... | 720 | 770 | 600 | 880 | 100 | 6 | 13 | 5 | 45 | 140 |
| 31 | 370 | ..... | 720 | ..... | 580 | ..... | 95 | 13 | ..... | 5 | ..... | 140 |

NOTE.—The daily discharges from January 1 to August 2, were obtained by the indirect method for shifting channels. Discharges after August 3 are based on a rating curve, fairly well defined above 45 second-feet. Discharge estimated December 21 to 31.

*Monthly discharge of Humboldt River near Golconda, Nev., for 1909.*

[Drainage area, 10,800 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 502 | 72 | 282 | 0.026 | 0.03 | 17,300 | C. |
| February | 400 | 290 | 340 | .031 | .03 | 18,900 | C. |
| March | 730 | 360 | 535 | .050 | .06 | 32,900 | C. |
| April | 890 | 720 | 820 | .076 | .08 | 48,800 | C. |
| May | 790 | 580 | 692 | .064 | .07 | 42,500 | C. |
| June | 900 | 510 | 722 | .067 | .07 | 43,000 | B. |
| July | 880 | 95 | 480 | .044 | .05 | 29,500 | B. |
| August | 90 | 5 | 32.3 | .0030 | .003 | 1,990 | C. |
| September | 24 | 5 | 9.2 | .00085 | .0009 | 547 | C. |
| October | 10 | 3 | 5.7 | .00053 | .0006 | 350 | C. |
| November | 45 | 5 | 18.5 | .0017 | .002 | 1,100 | C. |
| December | 140 | 45 | 91.2 | .0084 | .01 | 5,610 | C. |
| The year | 900 | 3 | 335 | .030 | .41 | 243,000 | |

## HUMBOLDT RIVER NEAR OREANA, NEV.

This station, which was established January 27, 1896, to determine the amount of water available for storage-reservoir sites in the vicinity of Humboldt station and also for the six canal systems now in operation below Oreana, is located near Oreana, Nev., about 12 miles northeast of Lovelock and below all tributaries. The station was discontinued December 31, 1909.

Discharge measurements are made by means of a cable and car or by wading. Several staff gages have been in use at this station. The datum of the present gage has remained unchanged since 1904.

The channel is very unstable and sufficient measurements have not been made to give results that are entirely satisfactory or reliable. The gage heights are affected by ice during severe weather.

*Discharge measurements of Humboldt River near Oreana, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 4 | E. A. Porter | 90 | 511 | 3.80 | 400 |
| June 30 | L. J. Towne | 79 | 339 | 4.75 | 597 |
| July 16 | do | 64 | 344 | 4.55 | 504 |
| August 7 | do | 98 | 97 | 2.90 | 143 |
| December 22 [a] | E. A. Porter | 99 | 182 | 3.56 | 146 |

[a] Almost frozen over.

*Daily gage height of Humboldt River near Oreana, Nev., for 1909.*

[J. J. McCarthy, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.1 | 3.75 | 3.75 | 4.65 | 4.75 | 3.9 | 5.0 | 3.7 | 2.35 | 2.05 | 2.0 | 2.3 |
| 2 | 3.1 | 3.8 | 3.75 | 4.65 | 4.6 | 3.9 | 5.0 | 3.75 | 2.35 | 2.1 | 2.0 | 2.35 |
| 3 | 3.05 | 3.9 | 3.8 | 4.7 | 4.6 | 3.95 | 4.95 | 3.75 | 2.25 | 2.25 | 1.95 | 2.5 |
| 4 | 3.05 | 3.95 | 3.8 | 4.7 | 4.6 | 4.0 | 4.9 | 3.5 | 2.25 | 2.3 | 1.95 | 2.55 |
| 5 | 3.1 | 4.5 | 3.85 | 4.7 | 4.6 | 4.05 | 4.85 | 3.5 | 2.15 | 3.0 | 1.95 | 2.6 |
| 6 | 3.15 | 4.5 | 3.85 | 4.65 | 4.55 | 4.0 | 4.7 | 3.0 | 2.1 | 3.0 | 1.95 | 2.6 |
| 7 | 3.2 | 4.0 | 3.85 | 4.65 | 4.55 | 3.8 | 4.65 | 2.9 | 2.1 | 2.7 | 2.0 | 2.75 |
| 8 | 3.35 | 3.95 | 3.85 | 4.65 | 4.5 | 3.75 | 4.75 | 2.95 | 2.1 | 2.65 | 2.0 | 2.75 |
| 9 | 3.4 | 3.95 | 3.9 | 4.6 | 4.4 | 3.6 | 4.75 | 2.8 | 2.1 | 2.5 | 2.0 | 2.9 |
| 10 | 3.4 | 3.95 | 3.9 | 4.6 | 4.35 | 3.4 | 4.8 | 2.8 | 2.1 | 2.3 | 2.05 | 3.15 |
| 11 | 3.35 | 3.9 | 3.95 | 4.6 | 4.3 | 3.2 | 4.8 | 2.75 | 2.1 | 2.15 | 2.05 | 3.5 |
| 12 | 3.35 | 3.9 | 3.95 | 4.55 | 4.2 | 3.1 | 4.75 | 2.7 | 2.05 | 2.15 | 2.1 | 3.9 |
| 13 | 3.2 | 3.95 | 3.95 | 4.55 | 4.15 | 3.15 | 4.7 | 2.7 | 2.0 | 2.15 | 2.1 | 3.75 |
| 14 | 3.15 | 3.9 | 3.95 | 4.55 | 4.05 | 3.25 | 4.65 | 2.7 | 2.0 | 2.1 | 2.05 | 3.7 |
| 15 | 3.1 | 3.9 | 3.9 | 4.6 | 3.9 | 3.35 | 4.65 | 2.65 | 2.0 | 2.1 | 2.05 | 3.65 |
| 16 | 3.05 | 3.95 | 3.95 | 4.6 | 3.9 | 3.4 | 4.55 | 2.65 | 2.0 | 2.05 | 2.05 | 3.65 |
| 17 | 3.15 | 3.85 | 4.1 | 4.6 | 3.95 | 3.55 | 4.55 | 2.6 | 1.95 | 2.05 | 2.05 | 3.6 |
| 18 | 3.2 | 3.8 | 4.15 | 4.65 | 3.95 | 3.7 | 4.4 | 2.6 | 1.95 | 2.05 | 2.05 | 3.6 |
| 19 | 3.25 | 3.85 | 4.25 | 4.65 | 4.05 | 3.95 | 4.35 | 2.55 | 1.85 | 2.05 | 2.1 | 3.55 |
| 20 | 3.25 | 3.85 | 4.25 | 4.6 | 4.1 | 4.0 | 4.2 | 2.55 | 1.85 | 2.1 | 2.1 | 3.55 |
| 21 | 3.3 | 3.85 | 4.3 | 4.6 | 4.15 | 4.15 | 4.2 | 2.5 | 1.8 | 2.1 | 2.0 | 3.55 |
| 22 | 3.35 | 3.8 | 4.35 | 4.6 | 4.2 | 4.2 | 4.15 | 2.5 | 1.8 | 2.05 | 2.05 | 3.55 |
| 23 | 3.4 | 3.8 | 4.35 | 4.65 | 4.15 | 4.25 | 4.05 | 2.65 | 1.8 | 2.05 | 2.05 | 3.6 |
| 24 | 3.4 | 3.75 | 4.35 | 4.65 | 4.1 | 4.35 | 3.75 | 2.45 | 1.8 | 2.0 | 2.1 | 3.7 |
| 25 | 3.35 | 3.75 | 4.4 | 4.7 | 4.1 | 4.45 | 3.75 | 2.3 | 1.8 | 2.0 | 2.15 | 3.7 |
| 26 | 3.35 | 3.75 | 4.4 | 4.7 | 4.1 | 4.5 | 3.65 | 2.3 | 1.85 | 1.95 | 2.1 | 3.7 |
| 27 | 3.4 | 3.8 | 4.45 | 4.7 | 4.05 | 4.65 | 3.75 | 2.2 | 1.9 | 1.95 | 2.1 | 3.85 |
| 28 | 3.45 | 3.75 | 4.5 | 4.75 | 4.05 | 4.7 | 3.6 | 2.2 | 2.0 | 1.95 | 2.1 | 3.85 |
| 29 | 3.45 | ..... | 4.6 | 4.75 | 3.8 | 4.75 | 3.4 | 2.2 | 2.0 | 1.95 | 2.15 | 3.8 |
| 30 | 3.4 | ..... | 4.65 | 4.75 | 3.85 | 4.8 | 3.4 | 2.2 | 2.05 | 1.95 | 2.15 | 3.85 |
| 31 | 3.6 | ..... | 4.65 | ..... | 3.9 | ..... | 3.3 | 2.25 | ..... | 1.95 | ..... | 3.9 |

NOTE.—Slight ice conditions existed during January and December.

*Daily discharge, in second-feet, of Humboldt River near Oreana, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 226 | 385 | 385 | 635 | 630 | 378 | 680 | 320 | 56 | 21 | 16 | 49 |
| 2 | 226 | 400 | 385 | 630 | 585 | 376 | 680 | 332 | 56 | 26 | 16 | 56 |
| 3 | 215 | 430 | 400 | 640 | 585 | 388 | 665 | 332 | 43 | 43 | 13 | 75 |
| 4 | 215 | 445 | 400 | 640 | 585 | 400 | 650 | 272 | 43 | 49 | 13 | 82 |
| 5 | 226 | 610 | 415 | 640 | 585 | 415 | 635 | 272 | 32 | 163 | 13 | 90 |
| 6 | 237 | 610 | 415 | 625 | 570 | 400 | 590 | 163 | 26 | 163 | 13 | 90 |
| 7 | 248 | 460 | 415 | 625 | 570 | 349 | 575 | 143 | 26 | 106 | 16 | 115 |
| 8 | 282 | 445 | 415 | 625 | 555 | 338 | 605 | 153 | 26 | 98 | 16 | 115 |
| 9 | 295 | 445 | 430 | 610 | 525 | 302 | 605 | 124 | 26 | 75 | 16 | 143 |
| 10 | 295 | 445 | 430 | 610 | 510 | 255 | 620 | 124 | 26 | 49 | 21 | 145 |
| 11 | 282 | 430 | 445 | 610 | 495 | 208 | 620 | 115 | 26 | 32 | 21 | 145 |
| 12 | 282 | 430 | 445 | 593 | 470 | 187 | 605 | 106 | 21 | 32 | 26 | 145 |
| 13 | 248 | 445 | 445 | 593 | 455 | 197 | 590 | 106 | 16 | 32 | 26 | 145 |
| 14 | 237 | 430 | 445 | 593 | 428 | 219 | 575 | 106 | 16 | 26 | 21 | 145 |
| 15 | 226 | 430 | 430 | 605 | 390 | 238 | 575 | 98 | 16 | 26 | 21 | 145 |
| 16 | 215 | 445 | 445 | 600 | 385 | 249 | 545 | 98 | 16 | 21 | 21 | 145 |
| 17 | 237 | 415 | 490 | 595 | 395 | 284 | 545 | 90 | 13 | 21 | 21 | 145 |
| 18 | 248 | 400 | 505 | 610 | 395 | 320 | 500 | 90 | 13 | 21 | 21 | 145 |
| 19 | 259 | 415 | 535 | 610 | 420 | 382 | 485 | 82 | 8 | 21 | 26 | 145 |
| 20 | 259 | 415 | 535 | 595 | 434 | 395 | 445 | 82 | 8 | 26 | 26 | 145 |
| 21 | 270 | 415 | 535 | 595 | 448 | 432 | 445 | 75 | 6 | 26 | 16 | 145 |
| 22 | 282 | 400 | 546 | 595 | 462 | 445 | 432 | 75 | 6 | 21 | 21 | 145 |
| 23 | 295 | 400 | 546 | 610 | 448 | 458 | 408 | 98 | 6 | 21 | 21 | 145 |
| 24 | 295 | 385 | 546 | 610 | 434 | 485 | 332 | 68 | 6 | 16 | 26 | 145 |
| 25 | 282 | 385 | 562 | 625 | 434 | 515 | 332 | 49 | 6 | 16 | 32 | 145 |
| 26 | 282 | 385 | 562 | 625 | 434 | 530 | 308 | 49 | 8 | 13 | 26 | 145 |
| 27 | 295 | 400 | 577 | 625 | 420 | 575 | 332 | 37 | 10 | 13 | 26 | 145 |
| 28 | 308 | 385 | 590 | 640 | 420 | 590 | 296 | 37 | 16 | 13 | 26 | 145 |
| 29 | 308 | ..... | 625 | 640 | 355 | 605 | 249 | 37 | 16 | 13 | 32 | 145 |
| 30 | 295 | ..... | 640 | 635 | 368 | 620 | 249 | 37 | 21 | 13 | 32 | 145 |
| 31 | 345 | ..... | 640 | ..... | 380 | ..... | 226 | 43 | ..... | 13 | ..... | 145 |

NOTE.—The discharges from January 1 to March 20 are based on a rating curve fairly well defined above 70 second-feet. Results for January probably too large because of possible ice effects. Discharges March 21 to June 14 were obtained by the indirect method for shifting channels. Discharges June 15 to December 9 are based on a rating curve well defined above 163 second-feet. December 10 to 31, discharge estimated because of ice conditions.

*Monthly discharge of Humboldt River near Oreana, Nev., for 1909.*

[Drainage area, 13,800 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 345 | 215 | 265 | 0.019 | 0.02 | 16,300 | C. |
| February | 610 | 385 | 432 | .031 | .03 | 24,000 | B. |
| March | 640 | 385 | 490 | .036 | .04 | 30,100 | B. |
| April | 640 | 593 | 616 | .045 | .05 | 36,700 | C. |
| May | 630 | 355 | 470 | .034 | .04 | 28,900 | C. |
| June | 620 | 187 | 384 | .028 | .03 | 22,800 | B. |
| July | 680 | 226 | 497 | .036 | .04 | 30,600 | B. |
| August | 332 | 37 | 123 | .0089 | .01 | 7,560 | C. |
| September | 56 | 6 | 20.5 | .0015 | .002 | 1,220 | C. |
| October | 163 | 13 | 39.6 | .0029 | .003 | 2,430 | C. |
| November | 32 | 13 | 21.4 | .0016 | .002 | 1,270 | C. |
| December | ..... | ..... | 129 | .0093 | .01 | 7,930 | D. |
| The year | 680 | 6 | 287 | .021 | .277 | 207,000 | |

## NORTH FORK OF HUMBOLDT RIVER NEAR HALLECK,[a] NEV.

This station, which was established October 10, 1902, is located one-fourth mile above the mouth of North Fork, 2 miles west of Elburz station on the Southern Pacific Railroad, and about 6 miles west of Halleck, the nearest post-office. It was discontinued December 31, 1909. Records at this point show the total flow of the river.

Discharge measurements are made by means of a cable and car. A new gage was installed August 5, 1909, being set to read the same as the old gage.

The channel is somewhat shifting, and the results are therefore only approximate. The gage heights also seem to be affected by backwater from the main Humboldt. The river freezes during the winter, but information as to ice conditions is very meager.

*Discharge measurements of North Fork of Humboldt River near Halleck, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec. ft.* |
| June 28 | L. J. Towne | 41 | 52 | 4.45 | 88 |
| July 13 | do | 28 | 32 | 3.62 | 38 |
| August 5 | do | 15 | 11.9 | 2.95 | 4.8 |
| December 20[a] | E. A. Porter | 22 | 43 | 3.60 | 26 |

[a] Ice 10 inches thick.

*Daily gage height, in feet, of North Fork of Humboldt River near Halleck, Nev., for 1909.*

[F. R. Fowler, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.6 | 4.2 | 3.3 | 4.5 | 4.7 | 5.0 | 4.3 | 2.9 | 2.65 | 2.7 | 3.1 | 3.6 |
| 2 | 3.6 | 4.4 | 3.3 | 4.5 | 4.7 | 4.9 | 4.3 | 2.9 | 2.65 | 2.7 | 3.15 | 3.65 |
| 3 | 3.6 | 4.4 | 3.4 | 4.5 | 4.7 | 4.9 | 4.3 | 2.9 | 2.65 | 2.7 | 3.15 | 3.7 |
| 4 | 3.6 | 4.0 | 3.7 | 4.7 | 4.7 | 5.2 | 4.3 | 2.9 | 2.65 | 2.7 | 3.2 | 3.7 |
| 5 | 3.7 | 4.0 | 4.3 | 5.0 | 4.6 | 5.4 | 4.3 | 2.9 | 2.65 | 2.7 | 3.2 | 3.7 |
| 6 | 3.7 | 4.0 | 4.5 | 5.0 | 4.6 | 5.8 | 4.2 | 2.9 | 2.7 | 2.7 | 3.2 | 3.8 |
| 7 | 3.6 | 4.1 | 4.5 | 4.7 | ..... | 6.4 | 4.0 | 2.9 | 2.7 | 2.7 | 3.2 | 3.85 |
| 8 | 3.5 | 4.1 | 4.2 | 4.5 | ..... | 6.5 | 3.9 | 2.8 | 3.7 | 2.7 | 3.3 | 3.9 |
| 9 | 3.5 | 4.1 | 4.0 | 4.3 | ..... | 6.5 | 3.8 | 2.8 | 2.65 | 2.7 | 3.3 | 4.1 |
| 10 | 3.5 | 4.1 | 3.8 | 4.3 | 4.7 | 6.4 | 3.8 | 2.8 | 2.65 | 2.7 | 3.3 | 4.1 |
| 11 | 3.5 | 4.1 | 3.6 | 4.5 | 4.7 | 6.4 | 3.8 | 2.75 | 2.65 | 2.7 | 3.35 | 4.1 |
| 12 | 3.6 | 4.3 | 3.5 | 4.6 | 4.7 | 6.1 | 3.75 | 2.75 | 2.7 | 2.7 | 3.4 | 4.1 |
| 13 | 4.1 | 4.1 | 3.5 | 4.6 | 4.7 | 5.9 | 3.7 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 14 | 4.7 | 3.6 | 3.8 | 4.6 | 4.65 | 5.6 | 3.6 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 15 | 4.0 | 3.2 | 4.2 | 4.7 | 4.6 | 5.5 | 3.5 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 16 | 4.0 | 3.2 | 4.2 | 4.8 | 4.5 | 5.5 | 3.5 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 17 | 4.3 | 3.2 | 4.6 | 4.8 | 4.45 | 5.4 | 3.45 | 2.7 | 2.7 | 2.75 | 3.4 | 4.1 |
| 18 | 4.9 | 3.6 | 4.7 | 4.8 | 4.45 | 5.4 | 3.4 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 19 | 5.2 | 3.9 | 4.8 | 5.0 | 4.4 | 5.3 | 3.4 | 2.7 | 2.7 | 2.7 | 3.4 | 4.1 |
| 20 | 5.0 | 3.6 | 4.8 | 5.0 | 4.4 | 5.2 | 3.35 | 2.65 | 2.7 | 2.7 | 3.4 | 4.1 |
| 21 | 4.4 | 3.6 | 4.5 | 5.2 | 4.3 | 5.1 | 3.3 | 2.65 | 2.7 | 2.7 | 3.4 | 4.1 |
| 22 | 4.4 | 3.5 | 4.3 | 5.2 | 4.4 | 5.0 | 3.3 | 2.65 | 2.7 | 2.7 | 3.4 | 4.1 |
| 23 | 4.3 | 3.4 | 4.2 | 5.0 | 4.5 | 4.9 | 3.25 | 2.65 | 2.7 | 2.7 | 3.4 | 4.1 |
| 24 | 4.3 | 3.4 | 4.1 | 5.0 | 4.6 | 4.8 | 3.2 | 2.65 | 2.7 | 2.8 | 3.4 | 4.1 |
| 25 | 4.8 | 3.4 | 4.1 | 4.8 | 4.5 | 4.7 | 3.2 | 2.65 | 2.7 | 2.8 | 3.5 | 4.1 |
| 26 | 5.2 | 3.4 | 4.1 | 4.6 | 4.5 | 4.6 | 3.2 | 2.65 | 2.7 | 2.9 | 3.65 | 4.1 |
| 27 | 5.0 | 3.4 | 4.1 | 4.6 | 4.5 | 4.5 | 3.0 | 2.6 | 2.7 | 2.9 | 3.7 | 4.1 |
| 28 | 5.0 | 3.3 | 4.3 | 4.7 | 4.55 | 4.5 | 2.8 | 2.6 | 2.7 | 2.9 | 3.65 | 4.1 |
| 29 | 4.8 | ..... | 4.5 | 4.7 | 4.6 | 4.4 | 2.8 | 2.6 | 2.7 | 3.0 | 3.65 | 4.1 |
| 30 | 4.2 | ..... | 4.5 | 4.6 | 4.8 | 4.4 | 2.8 | 2.6 | 2.7 | 3.0 | 3.6 | 4.1 |
| 31 | 4.2 | ..... | 4.5 | ..... | 5.0 | ..... | 2.9 | 2.65 | ..... | 3.0 | ..... | 4.1 |

NOTE.—Ice conditions existed January 1 to 15. River was frozen over December 9 to 31.

[a] In reports previous to that for 1907–8, this station has been referred to as "near Elburz, Nev."

*Daily discharge, in second-feet, of North Fork of Humboldt River near Halleck, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10 | 68 | 14 | 96 | 120 | 165 | 88 | 4 | 1.8 | 2 | 8 | ..... |
| 2 | 10 | 86 | 14 | 96 | 120 | 149 | 88 | 4 | 1.8 | 2 | 10 | ..... |
| 3 | 10 | 86 | 18 | 96 | 120 | 149 | 88 | 4 | 1.8 | 2 | 10 | ..... |
| 4 | 10 | 51 | 31 | 120 | 120 | 200 | 88 | 4 | 1.8 | 2 | 11 | ..... |
| 5 | 10 | 51 | 77 | 165 | 107 | 238 | 88 | 4 | 1.8 | 2 | 11 | ..... |
| 6 | 10 | 51 | 96 | 165 | 107 | 324 | 78 | 4 | 2 | 2 | 11 | ..... |
| 7 | 10 | 59 | 96 | 120 | 110 | 475 | 60 | 4 | 2 | 2 | 11 | ..... |
| 8 | 10 | 59 | 68 | 96 | 113 | 502 | 52 | 3 | 2 | 2 | 14 | ..... |
| 9 | 10 | 59 | 51 | 77 | 116 | 502 | 51 | 3 | 1.8 | 2 | 14 | ..... |
| 10 | 10 | 59 | 37 | 77 | 120 | 475 | 51 | 3 | 1.8 | 2 | 14 | ..... |
| 11 | 10 | 59 | 26 | 96 | 120 | 475 | 51 | 2.5 | 1.8 | 2 | 16 | ..... |
| 12 | 10 | 77 | 22 | 107 | 120 | 397 | 46 | 2.5 | 2 | 2 | 18 | ..... |
| 13 | 20 | 59 | 22 | 107 | 120 | 348 | 42 | 2 | 2 | 2 | 18 | ..... |
| 14 | 30 | 26 | 37 | 107 | 114 | 279 | 37 | 2 | 2 | 2 | 18 | ..... |
| 15 | 40 | 11 | 68 | 120 | 107 | 258 | 31 | 2 | 2 | 2 | 18 | ..... |
| 16 | 51 | 11 | 68 | 134 | 96 | 258 | 31 | 2 | 2 | 2 | 18 | ..... |
| 17 | 77 | 11 | 107 | 134 | 91 | 238 | 29 | 2 | 2 | 2.5 | 18 | ..... |
| 18 | 149 | 26 | 120 | 134 | 91 | 238 | 26 | 2 | 2 | 2 | 18 | ..... |
| 19 | 200 | 44 | 134 | 165 | 86 | 219 | 26 | 2 | 2 | 2 | 18 | ..... |
| 20 | 165 | 26 | 134 | 165 | 86 | 200 | 20 | 1.8 | 2 | 2 | 18 | ..... |
| 21 | 86 | 26 | 96 | 200 | 77 | 182 | 18 | 1.8 | 2 | 2 | 18 | ..... |
| 22 | 86 | 22 | 77 | 200 | 86 | 165 | 18 | 1.8 | 2 | 2 | 18 | ..... |
| 23 | 77 | 18 | 68 | 165 | 96 | 149 | 16 | 1.8 | 2 | 2 | 18 | ..... |
| 24 | 77 | 18 | 59 | 165 | 107 | 134 | 14 | 1.8 | 2 | 3 | 18 | ..... |
| 25 | 134 | 18 | 59 | 134 | 96 | 120 | 14 | 1.8 | 2 | 3 | 22 | ..... |
| 26 | 200 | 18 | 59 | 107 | 96 | 107 | 14 | 1.8 | 2 | 4 | 28 | ..... |
| 27 | 165 | 18 | 59 | 107 | 96 | 96 | 9 | 1.5 | 2 | 4 | 31 | ..... |
| 28 | 165 | 14 | 77 | 120 | 102 | 96 | 4 | 1.5 | 2 | 4 | 28 | ..... |
| 29 | 134 | ..... | 96 | 120 | 107 | 86 | 4 | 1.5 | 2 | 6 | 28 | ..... |
| 30 | 68 | ..... | 96 | 107 | 134 | 86 | 4 | 1.5 | 2 | 6 | 26 | ..... |
| 31 | 68 | ..... | 96 | ..... | 165 | ..... | 6 | 1.8 | ..... | 6 | ..... | ..... |

NOTE.—These discharges were obtained from a rating curve which is not well defined. Discharges January 1 to 15 are estimated because of ice conditions. Discharges for July were obtained by the indirect method for shifting channels.

*Monthly discharge of North Fork of Humboldt River near Halleck, Nev., for 1909.*

[Drainage area, 1,020 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 200 | 10 | 68.1 | 0.067 | 0.08 | 4,190 | D. |
| February | 86 | 11 | 40.4 | .040 | .04 | 2,240 | C. |
| March | 134 | 14 | 67.2 | .066 | .08 | 4,130 | C. |
| April | 200 | 77 | 127 | .125 | .14 | 7,560 | C. |
| May | 165 | 77 | 108 | .106 | .12 | 6,640 | C. |
| June | 502 | 86 | 244 | .239 | .27 | 14,500 | D. |
| July | 88 | 4 | 38.5 | .038 | .04 | 2,370 | C. |
| August | 4 | 1.5 | 2.46 | .0024 | .003 | 151 | C. |
| September | 2 | 1.8 | 1.95 | .0019 | .002 | 116 | D. |
| October | 6 | 2 | 2.66 | .0026 | .003 | 164 | D. |
| November | 31 | 8 | 17.6 | .017 | .02 | 1,050 | C. |
| December | ..... | ..... | [a] 25.0 | .025 | .03 | 1,540 | D. |
| The year | 502 | ..... | 61.7 | .061 | .83 | 44,700 | |

[a] Estimated.

## SOUTH FORK OF HUMBOLDT RIVER NEAR ELKO, NEV.

This station, which was established August 29, 1906, to determine the amount of water available for storage, is located about 12 miles southwest of Elko, Nev., 6 miles above the mouth of the river, and is above the proposed reservoir site of the United States Reclamation Service. The station was discontinued December 31, 1909. As the station is below all tributaries the records show the total run-off from the basin of the South Fork.

The river freezes during two or three months of the winter, the ice probably reaching a considerable thickness, but information as to winter conditions is very meager.

Discharge measurements are made by means of a cable and car, or by wading.

The gage was removed February 26, 1907, about 1,000 feet upstream; and gage heights since that time bear no determined relation to previous readings. The channel at the station is somewhat shifting. During 1909 the gage heights were affected by the raising of a diversion dam below. As sufficient measurements have not been made to indicate the full extent of these changes the published estimates of discharge are only approximate.

*Discharge measurements of South Fork of Humboldt River near Elko, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| June 26 | L. J. Towne | 49 | 128 | 3.22 | 466 |
| July 14 | do | 45 | 53 | 1.82 | 76 |
| August 4 | do | 16 | 5.2 | .70 | 5.16 |
| Do[a] | do | ..... | ..... | .70 | 4.10 |
| September 17 | F. C. Schafer | 33 | 10.6 | .90 | 5.88 |
| December 19[b] | E. A. Porter | ..... | ..... | 2.16 | 50 |

[a] Wading measurement below cable.
[b] Ice 11 inches thick.

*Daily gage height, in feet, of South Fork of Humboldt River near Elko, Nev., for 1909.*

[James Cowling, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.3 | 2.3 | 2.0 | 1.8 | 2.1 | 3.05 | 3.05 | 0.7 | 1.0 | 1.1 | 1.1 | 1.9 |
| 2 | 2.3 | 2.3 | 2.0 | 1.9 | 2.1 | 3.25 | 3.05 | .7 | 1.0 | 1.1 | 1.1 | 2.2 |
| 3 | 2.3 | 2.3 | 2.05 | 1.9 | 2.1 | 3.45 | 3.05 | .7 | 1.0 | 1.1 | 1.1 | 2.4 |
| 4 | 2.3 | 2.3 | 2.05 | 1.85 | 2.15 | 4.2 | 2.85 | .7 | ..... | 1.1 | 1.1 | ..... |
| 5 | 2.3 | 2.3 | 2.1 | 1.8 | 2.2 | 4.7 | 2.65 | .7 | 1.0 | 1.1 | 1.1 | 2.4 |
| 6 | 2.3 | 2.3 | 2.15 | 1.8 | 2.25 | 4.95 | 2.45 | ..... | 1.0 | 1.0 | ..... | 2.4 |
| 7 | 2.3 | 2.3 | 2.15 | 1.8 | 2.3 | 5.25 | 2.25 | .7 | 1.0 | 1.0 | 1.1 | 2.4 |
| 8 | 2.3 | 2.3 | 2.2 | 1.8 | 2.3 | 5.25 | 2.15 | .7 | 1.0 | 1.0 | 1.1 | 2.4 |
| 9 | 2.3 | 2.3 | 2.2 | 1.8 | 2.2 | 4.95 | 1.85 | .7 | 1.0 | .8 | 1.1 | 2.4 |
| 10 | 2.3 | 2.3 | 2.25 | 1.8 | 2.15 | 4.6 | 1.8 | .7 | 1.0 | 1.0 | 1.1 | ..... |
| 11 | 2.3 | 2.4 | 2.25 | 1.8 | 2.1 | 4.3 | 1.9 | .7 | ..... | 1.0 | 1.1 | 2.4 |
| 12 | 2.3 | 2.45 | 2.3 | 1.8 | 2.05 | 4.0 | 1.9 | .6 | .9 | 1.0 | 1.1 | 2.4 |
| 13 | 2.6 | 2.5 | 2.3 | 1.8 | 2.0 | 3.9 | 1.9 | .6 | .9 | 1.0 | ..... | 2.4 |
| 14 | 4.95 | 2.5 | 2.3 | 1.8 | 2.0 | 4.05 | 1.9 | .6 | .9 | 1.0 | 1.2 | 2.4 |
| 15 | 3.55 | 2.5 | 2.25 | 1.8 | 2.0 | 4.15 | 1.8 | .6 | .9 | 1.0 | 1.2 | 2.4 |

*Daily gage height, in feet, of South Fork of Humboldt River near Elko, Nev., for 1909—Continued.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 3.1 | 2.55 | 2.35 | 1.8 | 2.1 | 4.2 | 1.7 | .6 | .9 | ..... | 1.2 | 2.4 |
| 17 | 2.7 | 2.6 | 2.35 | 1.9 | 2.15 | 4.2 | 1.7 | .6 | .9 | 1.0 | 1.2 | 2.4 |
| 18 | 2.55 | 2.4 | 2.35 | 1.95 | 2.05 | 4.05 | 1.65 | .6 | ..... | 1.0 | 1.2 | 2.4 |
| 19 | 2.55 | 2.15 | 2.25 | 2.05 | 2.0 | 3.85 | 1.6 | .5 | 1.0 | 1.0 | 1.3 | 2.4 |
| 20 | 2.6 | 2.0 | 2.2 | 2.1 | 2.0 | 3.75 | 1.55 | ..... | 1.0 | 1.0 | 1.0 | 2.4 |
| 21 | 2.5 | 2.0 | 2.2 | 2.2 | 2.05 | 3.65 | 1.5 | .5 | 1.0 | 1.0 | 1.8 | 2.4 |
| 22 | 2.4 | 2.0 | 2.2 | 2.3 | 2.1 | 3.55 | 1.45 | .5 | 1.0 | 1.0 | 1.7 | 2.4 |
| 23 | 2.4 | 2.0 | 2.2 | 2.2 | 2.1 | 3.35 | 1.4 | .5 | 1.0 | ..... | 1.5 | 2.4 |
| 24 | 2.3 | 2.0 | 2.05 | 2.15 | 2.2 | 3.35 | 1.3 | .5 | 1.0 | 1.0 | 1.4 | 2.4 |
| 25 | 2.3 | 2.0 | 2.0 | 2.1 | 2.3 | 3.35 | 1.2 | .5 | ..... | 1.0 | 1.4 | 2.4 |
| 26 | 2.3 | 2.0 | 1.95 | 2.2 | 2.4 | 3.25 | 1.2 | .5 | 1.0 | 1.0 | 1.5 | 2.4 |
| 27 | 2.3 | 2.0 | 1.85 | 2.2 | 2.5 | 3.25 | 1.1 | .5 | 1.0 | 1.0 | 1.6 | 2.4 |
| 28 | 2.3 | 2.0 | 1.7 | 2.25 | 2.65 | 3.25 | 1.1 | .8 | 1.1 | 1.0 | 1.6 | 2.4 |
| 29 | 2.3 | ..... | 1.7 | 2.2 | 2.8 | 3.15 | 1.0 | .8 | 1.1 | 1.0 | 1.7 | 2.4 |
| 30 | 2.3 | ..... | 1.7 | 2.15 | 2.95 | 3.15 | 1.0 | .85 | ..... | ..... | 1.75 | 2.4 |
| 31 | 2.3 | ..... | 1.7 | ..... | 3.1 | ..... | .9 | 1.0 | ..... | 1.1 | ..... | 2.4 |

NOTE.—Ice conditions existed January 1 to 14. River frozen over December 4 to 31.

*Daily discharge, in second-feet, of South Fork of Humboldt River near Elko, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 20 | 189 | 133 | 102 | 150 | 395 | 395 | 4 | 10 | 16 | 16 | 85 |
| 2 | 20 | 189 | 133 | 117 | 150 | 455 | 395 | 4 | 10 | 16 | 16 | 127 |
| 3 | 20 | 189 | 142 | 117 | 150 | 515 | 395 | 4 | 10 | 16 | 16 | 165 |
| 4 | 20 | 189 | 142 | 110 | 159 | 752 | 335 | 4 | 10 | 16 | 16 | 150 |
| 5 | 20 | 189 | 150 | 102 | 168 | 912 | 278 | 4 | 10 | 16 | 16 | 120 |
| 6 | 20 | 189 | 159 | 102 | 178 | 992 | 225 | 4 | 10 | 10 | 16 | 110 |
| 7 | 20 | 189 | 159 | 102 | 189 | 1,090 | 178 | 4 | 10 | 10 | 16 | 100 |
| 8 | 20 | 189 | 168 | 102 | 189 | 1,090 | 159 | 4 | 10 | 10 | 16 | 90 |
| 9 | 20 | 189 | 168 | 102 | 168 | 992 | 110 | 4 | 10 | 3 | 16 | 90 |
| 10 | 20 | 189 | 178 | 102 | 159 | 880 | 102 | 4 | 10 | 10 | 16 | 80 |
| 11 | 20 | 212 | 178 | 102 | 150 | 784 | 79 | 4 | 8 | 10 | 16 | 80 |
| 12 | 20 | 225 | 189 | 102 | 142 | 688 | 79 | 3 | 6 | 10 | 16 | 80 |
| 13 | 50 | 238 | 189 | 102 | 133 | 656 | 79 | 3 | 6 | 10 | 20 | 70 |
| 14 | 600 | 238 | 189 | 102 | 133 | 704 | 79 | 3 | 6 | 10 | 23 | 70 |
| 15 | 545 | 238 | 178 | 102 | 133 | 736 | 70 | 3 | 6 | 10 | 23 | 70 |
| 16 | 410 | 251 | 200 | 102 | 150 | 752 | 61 | 3 | 6 | 10 | 23 | 60 |
| 17 | 292 | 264 | 200 | 117 | 159 | 752 | 61 | 3 | 6 | 10 | 23 | 60 |
| 18 | 251 | 212 | 200 | 125 | 142 | 704 | 57 | 3 | 8 | 10 | 23 | 60 |
| 19 | 251 | 159 | 178 | 142 | 133 | 640 | 53 | 2 | 10 | 10 | 30 | 50 |
| 20 | 264 | 133 | 168 | 150 | 133 | 608 | 49 | 2 | 10 | 10 | 10 | 50 |
| 21 | 238 | 133 | 168 | 168 | 142 | 576 | 45 | 2 | 10 | 10 | 74 | 50 |
| 22 | 212 | 133 | 168 | 189 | 150 | 545 | 41 | 2 | 10 | 10 | 64 | 50 |
| 23 | 212 | 133 | 168 | 168 | 150 | 485 | 37 | 2 | 10 | 10 | 45 | 50 |
| 24 | 189 | 133 | 142 | 159 | 168 | 485 | 30 | 2 | 10 | 10 | 37 | 50 |
| 25 | 189 | 133 | 133 | 150 | 189 | 485 | 24 | 2 | 10 | 10 | 37 | 50 |
| 26 | 189 | 133 | 125 | 168 | 212 | 455 | 24 | 2 | 10 | 10 | 45 | 50 |
| 27 | 189 | 133 | 110 | 168 | 238 | 455 | 19 | 2 | 10 | 10 | 54 | 50 |
| 28 | 189 | 133 | 88 | 178 | 278 | 455 | 19 | 3 | 16 | 10 | 54 | 50 |
| 29 | 189 | ..... | 88 | 168 | 320 | 425 | 14 | 3 | 16 | 10 | 64 | 50 |
| 30 | 189 | ..... | 88 | 159 | 365 | 425 | 14 | 4 | 16 | 13 | 69 | 50 |
| 31 | 189 | ..... | 88 | ..... | 410 | ..... | 10 | 10 | ..... | 16 | ..... | 50 |

NOTE.—Discharges January 1 to 14 and December 4 to 31 are estimated because of ice conditions; January 15 to July 10 are based on a rating curve that is not well defined. Periods July 11 to August 27, and August 28 to December are each based on a fairly well-defined rating curve.

*Monthly discharge of South Fork of Humboldt River near Elko, Nev., for 1909.*

[Drainage area, 1,150 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | a 600 | a 20 | 164 | 0.143 | 0.16 | 10,100 | D. |
| February | 264 | 133 | 183 | .159 | .17 | 10,200 | D. |
| March | 260 | 88 | 154 | .134 | .15 | 9,470 | D. |
| April | 189 | 102 | 129 | .112 | .12 | 7,680 | C. |
| May | 410 | 133 | 184 | .160 | .18 | 11,300 | C. |
| June | 1,090 | 395 | 663 | .577 | .64 | 39,500 | C. |
| July | 395 | 10 | 113 | .098 | .11 | 6,950 | C. |
| August | 10 | 2 | 3.3 | .0029 | .003 | 203 | D. |
| September | 16 | 6 | 9.7 | .0084 | .009 | 577 | C. |
| October | 16 | 3 | 11.0 | .0096 | .01 | 676 | C. |
| November | 74 | 10 | 30.3 | .026 | .03 | 1,800 | C. |
| December | 165 | 50 | 74.7 | .065 | .07 | 4,590 | C. |
| The year | 1,090 | 2 | 143 | .125 | 1.65 | 103,000 | |

a Estimated.

## SIERRA NEVADA DRAINAGE AREA.

### PRINCIPAL STREAMS.

The Sierra Nevada drainage area includes the western part of Nevada, the eastern part of California, and a small part of south-central Oregon. The principal rivers of the area are Truckee River, discharging into Pyramid and Winnemucca lakes; Walker River, flowing into Walker Lake; Carson River, emptying into Carson Sink; Susan River, which flows into Honey Lake; and Owens River, discharging into Owens Lake.

### TRUCKEE RIVER BASIN.

#### DESCRIPTION.

The Truckee River system comprises the main river and several minor tributaries, all having as their chief sources of supply small mountain lakes. Truckee River itself is the natural outlet of Lake Tahoe, a beautiful mountain lake, 193 square miles in area, lying at an elevation of more than 6,000 feet above sea, and noted as the largest body of fresh water in the United States at so high an altitude. Nearly three-fourths of the lake is in California and the rest is in Nevada.

Issuing from the northwest side of Lake Tahoe the Truckee flows almost due north to the town of Truckee, Cal., where it turns to the east. At Wadsworth, Nev., the river again turns north and discharges into Pyramid and Winnemucca lakes, saline bodies of water without outlets. From the lake to Verdi, Nev., a distance of 35 miles, the country is heavily timbered with fir and pine; below Verdi barren wastes alternate with small and fertile valleys—the Verdi

Valley, the Reno or Truckee Valley, and the Wadsworth Valley—all of which have a rich, productive soil. The total length of the Truckee is about 110 miles and its total fall is about 2,350 feet.

Donner Creek, the natural outlet of Donner Lake, is the first important tributary of the Truckee, which it enters at the town of Truckee. Prosser Creek, the second tributary, and the natural outlet of several small lakes, enters about 5 miles northeast of Truckee, and Little Truckee River, the natural outlet of Webber and Independence lakes, comes in at Boca, Cal., about 2 miles farther along. Each of these tributaries rises at an elevation of 6,000 feet above sea level, and each flows from a lake whose capacity can be enlarged by building a dam across its outlet. The region about the lakes is thickly forested and receives during the winter months very heavy snowfall. During the season of thaw this snow affords an immense run-off, almost all of which could be stored by enlarging the natural lakes.

Three power plants have been installed on the Truckee—the Farad (Mystic), Fleish, and Washoe plants—with an emergency plant near Reno, Nev. The plants have an average capacity of about 2,500 horsepower each and they supply practically all the power used by the towns of Verdi, Reno, Carson City, Yerington, Gardnerville, Sparks, and Virginia City, Nev. There are many falls on the headwaters of the small tributaries.

Almost all the minimum flow of the river is appropriated for irrigation, but further storage development would make more water available for both irrigation and power.

Within the period covered by the records, 1907 was by far the wettest year and 1900 the driest year. The ratio in the two years for the state-line station was about 3.4 to 1.

The following gaging stations have been maintained in the Truckee River basin:

Lake Tahoe at Tahoe, Cal., 1900–1909.
Truckee River at Tahoe, Cal., 1895, 1900–1909.
Truckee River near Boca, Cal., 1890.
Truckee River at Nevada-California state line, 1899–1909.
Truckee River near Laughtons, Nev., 1890.
Truckee River at Reno, Nev., 1906–1909.
Truckee River near Essex, Nev., 1889.
Truckee River at Vista, Nev., 1890–91, 1899–1907.
Truckee River at Derby dam, Nev., 1907–1909.
Truckee River near Wadsworth, Nev., 1902–1905.
Lake Winnemucca Inlet near Wadsworth, Nev., 1902–1905.
Donner Creek near Truckee, Cal., 1902–1909.
Prosser Creek near Hobart Mills, Cal., 1903–4, 1907–1909.
Prosser Creek near Boca, Cal., 1889–90, 1902–3.
Independence Creek below Independence Lake, Cal., 1902–1907.
Little Truckee River at Pine Station and Starr, Cal., 1903–1909.
Little Truckee River near Boca, Cal., 1890.
Steamboat Creek at Steamboat Springs, Nev., 1900–1901.

## LAKE TAHOE AT TAHOE, CAL.

Records of the height of Lake Tahoe have been kept since 1900 to determine the amount of water drawn from storage and the possibility of further regulation of the outflow. These records are now for the first time available for publication. All gage heights have been referred to a datum 6,220 feet above sea level, the gage now in use being set at that datum. The gage heights for 1907 and 1908 as given in Water-Supply Paper 250, page 102, refer to a datum 6,225.5 feet above sea level.

From 1889 until early in 1904, the floor of the outlet gates of the dam had a mean elevation of 6,223.3 feet, and the crest of the spillway at its highest point was 6,229.3 feet. Since 1904 the mean elevation of the floor of the gates has been 6,223.08, that of the lowest gate 6,223.04, and that of the lowest part of the spillway has been 6,229.50.

The following table summarizes the fluctuations of the lake for the past twenty-two years as far as they have been recorded:

*Table showing fluctuation of Lake Tahoe from 1888 to 1909.*

| Year. | High water. | | Low water. | | Fluctuation. |
|---|---|---|---|---|---|
| | Gage height. | Date. | Gage height. | Date. | |
| | *Feet.* | | *Feet.* | | *Feet.* |
| 1888 | 4.90 | Sept. 8 | | | |
| 1889 | 4.60 | Spring | 3.05 | October | 1.55 |
| 1890 | 8.55± | | | | |
| 1895 | 9.02 | July 7 | 7.55 | [a]Dec. 17 | 1.47 |
| 1900 | 7.00 | June 17 | 5.87 | [b]Oct. 17 | 1.17 |
| 1901 | 8.43 | July 27 | 6.10 | Jan. 1 | 2.33 |
| 1902 | 9.02 | June 22 | 6.97 | Dec. 5 | 2.05 |
| 1903 | 8.90 | July 5 | 6.80 | Jan. 21 | 2.10 |
| 1904 | 10.40 | June 22 | 7.10 | Feb. 5 | 3.30 |
| 1905 | 8.70 | June 18 | 6.20 | Dec. 23 | 2.50 |
| 1906 | 9.87 | July 21 | 6.16 | Jan. 5 | 3.71 |
| 1907 | 11.26 | July 14 | 7.80 | Jan. 19 | 3.46 |
| 1908 | 8.40 | Jan. 1 | 6.10 | Dec. 31 | 2.28 |
| 1909 | 8.88 | July 11 | 6.10 | Jan. 1 | 2.78 |

[a] The lake was also low in January.

[b] Lower earlier in year, no record.

NOTE.—Records for 1888 to 1890 were reported by W. H. Hall.

*Daily gage height, in feet, of Lake Tahoe at Tahoe, Cal., for 1900–1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1900. | | | | | | | | | | | | |
| 1 | | | | | 6.39 | 6.84 | 7.00 | 6.69 | 6.19 | 5.93 | 5.91 | |
| 2 | | | | | 6.40 | 6.85 | 6.99 | 6.68 | 6.18 | 5.92 | 5.91 | |
| 3 | | | | | 6.41 | 6.86 | 6.97 | 6.66 | 6.17 | 5.92 | 5.91 | |
| 4 | | | | | 6.45 | 6.87 | 6.97 | 6.64 | 6.20 | 5.93 | 5.90 | |
| 5 | | | | | 6.46 | 6.88 | 6.96 | 6.63 | 6.20 | 5.94 | 5.90 | |
| 6 | | | | | 6.47 | 6.89 | 6.95 | 6.62 | 6.19 | 5.95 | 5.90 | |
| 7 | | | | | 6.48 | 6.90 | 6.94 | 6.60 | 6.18 | 5.94 | 5.89 | |
| 8 | | | | | 6.49 | 6.91 | 6.93 | 6.58 | 6.17 | 5.94 | 5.94 | |
| 9 | | | | | 6.50 | 6.92 | 6.91 | 6.57 | 6.16 | 5.93 | 5.94 | |
| 10 | | | | | 6.52 | 6.93 | 6.90 | 6.55 | 6.14 | 5.92 | 5.95 | |
| 11 | | | | | 6.54 | 6.94 | 6.89 | 6.54 | 6.13 | 5.91 | 5.95 | |
| 12 | | | | | 6.56 | 6.95 | 6.88 | 6.52 | 6.12 | 5.90 | 5.95 | |
| 13 | | | | | 6.58 | 6.96 | 6.89 | 6.50 | 6.11 | 5.90 | 5.95 | |
| 14 | | | | | 6.60 | 6.98 | 6.88 | 6.49 | 6.10 | 5.89 | 5.94 | |
| 15 | | | | | 6.62 | 6.99 | 6.87 | 6.47 | 6.08 | 5.88 | 5.94 | |
| 16 | | | | | 6.64 | 6.99 | 6.86 | 6.45 | 6.07 | 5.88 | 5.94 | |
| 17 | | | | | 6.66 | 7.00 | 6.85 | 6.43 | 6.06 | 5.87 | 5.99 | |
| 18 | | | | | 6.67 | 7.00 | 6.84 | 6.41 | 6.05 | 5.87 | 6.00 | |
| 19 | | | | | 6.69 | 7.00 | 6.83 | 6.40 | 6.04 | 5.93 | 5.99 | |
| 20 | | | | | 6.70 | 7.00 | 6.82 | 6.38 | 6.03 | 5.93 | 6.00 | |
| 21 | | | | | 6.71 | 7.00 | 6.81 | 6.37 | 6.02 | 5.93 | 6.02 | |
| 22 | | | | | 6.73 | 7.00 | 6.80 | 6.35 | 6.01 | 5.92 | 6.03 | |
| 23 | | | | | 6.74 | 7.00 | 6.79 | 6.33 | 5.99 | 5.91 | 6.03 | |
| 24 | | | | | 6.75 | 7.00 | 6.78 | 6.32 | 5.98 | 5.91 | 6.02 | |
| 25 | | | | | 6.76 | 7.00 | 6.77 | 6.30 | 5.97 | 5.90 | 6.01 | |
| 26 | | | | | 6.77 | 7.00 | 6.76 | 6.28 | 5.97 | 5.89 | 6.02 | |
| 27 | | | | | 6.78 | 7.00 | 6.75 | 6.26 | 5.96 | 5.89 | 6.02 | |
| 28 | | | | 6.35 | 6.79 | 7.00 | 6.74 | 6.24 | 5.95 | 5.92 | 6.01 | |
| 29 | | | | 6.36 | 6.81 | 7.00 | 6.73 | 6.23 | 5.94 | 5.92 | 6.01 | |
| 30 | | | | 6.37 | 6.82 | 7.00 | 6.72 | 6.21 | 5.93 | 5.91 | 6.00 | |
| 31 | | | | | 6.83 | | 6.71 | 6.20 | | 5.91 | | [a] 6.10 |
| 1901. | | | | | | | | | | | | |
| 1 | [a] 6.10 | 6.18 | | | | | | 8.43 | 8.11 | | | |
| 2 | | | | | | | | 8.43 | 8.09 | | | |
| 3 | | 6.18 | | | | | | 8.43 | 8.06 | | | |
| 4 | | | | | | | 8.35 | 8.43 | 8.04 | | | |
| 5 | | | 7.00 | | | | | 8.42 | 8.01 | | | |
| 6 | | | | 7.20 | | | | 8.42 | 7.98 | | | 7.36 |
| 7 | | | | 7.20 | | | | 8.42 | 7.99 | | | 7.35 |
| 8 | | | | | | | | 8.42 | 7.93 | | | |
| 9 | | 6.37 | | | | | | 8.42 | 7.91 | | | 7.33 |
| 10 | | | | | | | | 8.42 | 7.89 | | | 7.32 |
| 11 | | | | | | | | 8.42 | 7.86 | | | |
| 12 | | | | | | | | 8.42 | 7.88 | | 7.34 | |
| 13 | | | | 7.20 | | | | 8.42 | 7.83 | | | 7.30 |
| 14 | | | | | | | | 8.41 | 7.81 | | 7.33 | |
| 15 | | | | | | | | 8.41 | 7.81 | | | 7.28 |
| 16 | | | | | | | | 8.41 | 7.81 | | | |
| 17 | | | 7.10 | | | | | 8.41 | 7.81 | | | |
| 18 | | | | | | | | 8.40 | 7.80 | | 7.28 | |
| 19 | | 6.77 | | | | | | 8.40 | 7.79 | | | |
| 20 | 6.18 | | | | | | | 8.39 | 7.77 | | | |
| 21 | | | | | | | | 8.37 | 7.76 | | | |
| 22 | | | | | | | | 8.35 | 7.75 | | | |
| 23 | | | 7.10 | | | | | 8.32 | 7.74 | | | |
| 24 | | | | | | | | 8.29 | 7.79 | | | |
| 25 | | | | | | | | 8.26 | 7.78 | | | |
| 26 | | | | | | 8.31 | | 8.23 | 7.77 | | | |
| 27 | 6.18 | | | | | | 8.43 | 8.21 | 7.76 | | | |
| 28 | | 6.95 | | | | | 8.43 | 8.19 | 7.75 | | | |
| 29 | | | | | | | 8.43 | 8.17 | 7.74 | | | |
| 30 | | | 7.10 | 7.40 | | [a] 8.33 | 8.43 | 8.15 | 7.73 | | 7.16 | |
| 31 | | | | | 7.92 | | 8.43 | 8.13 | | 7.50 | | 7.28 |

[a] Estimated.

*Daily gage height, in feet, of Lake Tahoe at Tahoe, Cal., for 1900–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1902. | | | | | | | | | | | | |
| 1 | 7.30 | 7.08 | ..... | a 8.24 | ..... | ..... | 9.02 | 8.77 | 8.36 | 7.80 | 7.37 | 7.06 |
| 2 | ..... | ..... | ..... | ..... | ..... | ..... | 9.02 | 8.77 | 8.35 | 7.78 | 7.35 | 7.03 |
| 3 | ..... | ..... | ..... | ..... | ..... | ..... | 9.02 | 8.76 | 8.34 | 7.77 | 7.32 | 7.01 |
| 4 | ..... | ..... | ..... | ..... | ..... | 8.77 | 9.02 | 8.76 | 8.34 | 7.75 | 7.30 | 6.99 |
| 5 | ..... | 7.05 | ..... | ..... | ..... | 8.79 | 9.02 | 8.75 | 8.33 | 7.75 | 7.29 | 6.97 |
| 6 | ..... | ..... | ..... | ..... | ..... | 8.81 | 9.02 | 8.74 | 8.32 | 7.73 | 7.27 | ..... |
| 7 | 7.25 | ..... | ..... | ..... | ..... | 8.83 | 9.01 | 8.74 | 8.31 | 7.71 | 7.26 | ..... |
| 8 | ..... | ..... | ..... | ..... | ..... | 8.84 | ..... | 8.73 | 8.30 | 7.69 | 7.25 | ..... |
| 9 | ..... | ..... | ..... | ..... | ..... | 8.85 | ..... | 8.72 | 8.28 | 7.67 | 7.24 | ..... |
| 10 | ..... | ..... | ..... | ..... | ..... | 8.87 | ..... | 8.71 | 8.27 | 7.65 | 7.24 | ..... |
| 11 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8.70 | 8.26 | 7.64 | 7.24 | ..... |
| 12 | ..... | ..... | ..... | ..... | ..... | ..... | 8.97 | 8.69 | 8.25 | 7.62 | ..... | 7.20 |
| 13 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 8.68 | 8.24 | 7.60 | ..... | 7.20 |
| 14 | ..... | ..... | ..... | ..... | ..... | 8.97 | ..... | 8.66 | 8.22 | 7.58 | 7.23 | ..... |
| 15 | 7.20 | ..... | ..... | ..... | ..... | 8.95 | ..... | 8.64 | 8.20 | 7.56 | ..... | ..... |
| 16 | ..... | ..... | 8.15 | ..... | ..... | 8.95 | 8.90 | 8.62 | 8.18 | 7.55 | ..... | ..... |
| 17 | ..... | ..... | ..... | ..... | ..... | 8.95 | ..... | 8.60 | 8.16 | 7.53 | ..... | ..... |
| 18 | ..... | 7.28 | ..... | ..... | ..... | 8.97 | 8.89 | 8.57 | 8.12 | 7.51 | ..... | ..... |
| 19 | ..... | 7.28 | ..... | ..... | ..... | 8.98 | 8.90 | 8.55 | 8.09 | 7.49 | ..... | ..... |
| 20 | ..... | ..... | ..... | ..... | ..... | 8.99 | 8.90 | 8.52 | 8.06 | 7.47 | ..... | ..... |
| 21 | ..... | ..... | ..... | ..... | ..... | 9.01 | 8.90 | 8.50 | 8.03 | ..... | ..... | ..... |
| 22 | ..... | 7.25 | ..... | ..... | ..... | 9.02 | 8.90 | 8.48 | 8.01 | 7.48 | 7.27 | ..... |
| 23 | ..... | ..... | ..... | ..... | ..... | 9.02 | 8.90 | 8.46 | ..... | ..... | ..... | ..... |
| 24 | ..... | ..... | ..... | ..... | ..... | ..... | 8.90 | 8.44 | ..... | ..... | ..... | ..... |
| 25 | ..... | ..... | ..... | ..... | 8.59 | ..... | 8.90 | 8.43 | ..... | 7.50 | ..... | ..... |
| 26 | ..... | ..... | ..... | ..... | 8.60 | ..... | 8.88 | 8.42 | ..... | 7.47 | 7.19 | ..... |
| 27 | ..... | ..... | ..... | ..... | 8.61 | ..... | 8.86 | 8.41 | 7.90 | 7.45 | 7.16 | ..... |
| 28 | ..... | 7.50 | ..... | ..... | 8.63 | ..... | 8.84 | 8.40 | 7.88 | 7.44 | 7.14 | ..... |
| 29 | ..... | ..... | ..... | ..... | ..... | 9.02 | 8.82 | 8.39 | 7.85 | 7.42 | 7.11 | ..... |
| 30 | ..... | ..... | ..... | a 8.42 | 8.68 | ..... | 8.81 | 8.38 | 7.83 | 7.41 | 7.08 | ..... |
| 31 | 7.08 | ..... | ..... | ..... | ..... | ..... | 8.79 | 8.37 | ..... | 7.39 | ..... | ..... |
| 1903. | | | | | | | | | | | | |
| 1 | a 7.04 | a 6.91 | ..... | ..... | 7.87 | ..... | a 8.88 | 8.70 | 8.25 | a 7.74 | ..... | 7.55 |
| 2 | ..... | ..... | ..... | 7.52 | 7.89 | ..... | ..... | 8.70 | 8.25 | ..... | 7.27 | ..... |
| 3 | ..... | ..... | ..... | 7.54 | 7.91 | 8.50 | ..... | 8.68 | 8.20 | ..... | 7.25 | ..... |
| 4 | ..... | ..... | ..... | 7.56 | 7.93 | 8.48 | ..... | 8.66 | 8.20 | ..... | ..... | ..... |
| 5 | ..... | ..... | ..... | 7.60 | 7.96 | ..... | 8.90 | 8.65 | 8.20 | ..... | ..... | 7.50 |
| 6 | ..... | ..... | 7.30 | 7.63 | 7.99 | 8.53 | 8.90 | 8.64 | 8.20 | ..... | ..... | ..... |
| 7 | ..... | ..... | 7.30 | 7.65 | 8.01 | 8.55 | 8.90 | 8.62 | 8.10 | ..... | ..... | ..... |
| 8 | ..... | ..... | ..... | ..... | 8.03 | 8.57 | 8.90 | 8.60 | ..... | ..... | ..... | ..... |
| 9 | ..... | ..... | 7.32 | ..... | 8.05 | 8.62 | 8.90 | 8.60 | ..... | ..... | ..... | ..... |
| 10 | ..... | ..... | 7.30 | ..... | ..... | ..... | 8.90 | ..... | ..... | ..... | ..... | 7.40 |
| 11 | ..... | ..... | ..... | 7.71 | ..... | 8.68 | 8.90 | ..... | ..... | ..... | ..... | 7.40 |
| 12 | ..... | ..... | ..... | 7.73 | ..... | ..... | 8.90 | 8.58 | ..... | ..... | ..... | 7.40 |
| 13 | ..... | ..... | ..... | 7.73 | 8.17 | 8.72 | 8.90 | 8.57 | ..... | 7.50 | ..... | 7.40 |
| 14 | 6.88 | ..... | ..... | ..... | ..... | ..... | 8.90 | 8.55 | ..... | 7.50 | ..... | 7.40 |
| 15 | 6.87 | ..... | ..... | ..... | 8.23 | ..... | 8.90 | 8.52 | ..... | 7.50 | 7.40 | 7.50 |
| 16 | 6.85 | ..... | ..... | ..... | ..... | ..... | 8.90 | 8.50 | 7.90 | 7.45 | 7.40 | ..... |
| 17 | 6.85 | ..... | ..... | ..... | ..... | ..... | 8.85 | ..... | 7.90 | 7.45 | 7.40 | 7.50 |
| 18 | 6.83 | ..... | 7.30 | ..... | ..... | 8.76 | 8.85 | ..... | 7.90 | 7.40 | 7.40 | 7.40 |
| 19 | 6.82 | ..... | 7.28 | ..... | ..... | 8.77 | 8.80 | ..... | 7.90 | 7.40 | 7.40 | 7.40 |
| 20 | 6.81 | ..... | 7.25 | ..... | ..... | 8.77 | 8.80 | 8.45 | ..... | 7.40 | 7.40 | 7.35 |
| 21 | 6.80 | ..... | 7.23 | 7.77 | ..... | ..... | 8.80 | ..... | ..... | 7.40 | 7.40 | 7.35 |
| 22 | ..... | ..... | 7.22 | 7.78 | 8.30 | 8.79 | 8.80 | 8.40 | 7.80 | 7.40 | ..... | 7.35 |
| 23 | ..... | ..... | 7.21 | ..... | ..... | 8.80 | ..... | 8.38 | 7.80 | 7.40 | 7.55 | ..... |
| 24 | ..... | ..... | 7.20 | 7.80 | 8.30 | 8.82 | 8.77 | 8.35 | 7.80 | 7.35 | 7.60 | 7.30 |
| 25 | ..... | ..... | ..... | ..... | 8.30 | 8.82 | 8.76 | ..... | 7.80 | 7.35 | 7.60 | 7.30 |
| 26 | ..... | ..... | 7.23 | ..... | ..... | ..... | 8.75 | 8.30 | 7.80 | 7.35 | 7.60 | 7.30 |
| 27 | ..... | ..... | 7.28 | ..... | ..... | 8.86 | 8.73 | 8.30 | 7.75 | 7.35 | 7.60 | 7.30 |
| 28 | ..... | a 7.24 | ..... | ..... | ..... | ..... | 8.72 | 8.30 | 7.75 | 7.32 | 7.55 | 7.30 |
| 29 | ..... | ..... | ..... | 7.85 | 8.35 | ..... | ..... | 8.25 | 7.75 | 7.32 | 7.60 | 7.30 |
| 30 | ..... | ..... | ..... | 7.86 | 8.39 | ..... | ..... | 8.25 | ..... | 7.30 | 7.55 | 7.35 |
| 31 | a 6.91 | ..... | 7.45 | ..... | 8.44 | ..... | 8.70 | 8.25 | ..... | 7.30 | ..... | ..... |

a Estimated.

*Daily gage height, in feet, of Lake Tahoe at Tahoe, Cal., for 1900–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1904. | | | | | | | | | | | | |
| 1 | 7.25 | 7.10 | ..... | ..... | 9.55 | ..... | 10.38 | ..... | ..... | ..... | ..... | ..... |
| 2 | 7.30 | 7.10 | ..... | 9.30 | 9.55 | 10.17 | 10.36 | ..... | ..... | 8.75 | ..... | ..... |
| 3 | 7.25 | 7.10 | 8.30 | ..... | 9.55 | ..... | 10.36 | 9.92 | ..... | 8.70 | 8.40 | ..... |
| 4 | ..... | ..... | 8.30 | ..... | 9.55 | ..... | 10.36 | 9.90 | 9.27 | 8.72 | ..... | ..... |
| 5 | ..... | 7.10 | 8.30 | ..... | 9.55 | ..... | 10.35 | ..... | 9.25 | 8.70 | ..... | ..... |
| 6 | 7.25 | ..... | ..... | ..... | 9.55 | 10.20 | 10.35 | 9.88 | 9.24 | ..... | ..... | 7.80 |
| 7 | ..... | ..... | ..... | ..... | 9.55 | 10.20 | 10.35 | 9.86 | 9.22 | ..... | 8.30 | ..... |
| 8 | 7.25 | ..... | ..... | ..... | 9.55 | 10.22 | ..... | 9.85 | 9.20 | ..... | ..... | ..... |
| 9 | 7.25 | ..... | ..... | ..... | 9.58 | 10.24 | 10.32 | 9.83 | 9.18 | ..... | ..... | ..... |
| 10 | 7.25 | ..... | ..... | 9.25 | 9.60 | 10.26 | 10.30 | ..... | 9.15 | ..... | ..... | 7.68 |
| 11 | 7.20 | ..... | ..... | 9.25 | 9.63 | 10.30 | ..... | 9.80 | 9.13 | ..... | 8.20 | 7.68 |
| 12 | 7.20 | ..... | ..... | 9.30 | 9.66 | 10.30 | ..... | ..... | 9.13 | 8.80 | ..... | ..... |
| 13 | 7.25 | ..... | ..... | 9.30 | 9.70 | 10.32 | 10.25 | 9.76 | 9.10 | 8.80 | ..... | 7.70 |
| 14 | 7.20 | ..... | ..... | ..... | 9.73 | 10.34 | ..... | 9.73 | 9.08 | 8.80 | ..... | ..... |
| 15 | 7.20 | ..... | ..... | ..... | 9.77 | ..... | ..... | 9.70 | 9.07 | 8.78 | ..... | ..... |
| 16 | 7.20 | 7.60 | ..... | 9.35 | 9.80 | 10.35 | ..... | ..... | ..... | ..... | 8.15 | ..... |
| 17 | 7.20 | 7.60 | ..... | 9.40 | ..... | 10.36 | 10.18 | ..... | 9.04 | 8.70 | ..... | 7.68 |
| 18 | 7.20 | 7.60 | ..... | 9.40 | ..... | 10.38 | 10.15 | 9.68 | 9.00 | 8.65 | ..... | 7.68 |
| 19 | 7.20 | 7.60 | ..... | 9.45 | ..... | 10.38 | ..... | ..... | 8.98 | ..... | 8.10 | ..... |
| 20 | ..... | 7.60 | ..... | 9.50 | ..... | ..... | 10.10 | ..... | 8.95 | ..... | ..... | ..... |
| 21 | 7.20 | ..... | ..... | 9.50 | ..... | ..... | ..... | ..... | ..... | 8.60 | ..... | ..... |
| 22 | ..... | ..... | ..... | 9.55 | 9.90 | 10.40 | ..... | ..... | ..... | 8.60 | 8.05 | ..... |
| 23 | 7.15 | ..... | ..... | 9.55 | 9.95 | ..... | ..... | ..... | ..... | 8.60 | 8.05 | ..... |
| 24 | 7.15 | ..... | ..... | 9.60 | ..... | ..... | 10.09 | 9.50 | ..... | 8.55 | 8.00 | ..... |
| 25 | ..... | ..... | ..... | 9.60 | ..... | 10.40 | 10.08 | ..... | ..... | 8.50 | 8.00 | 7.60 |
| 26 | 7.15 | ..... | ..... | 9.60 | ..... | 10.36 | ..... | ..... | 8.85 | 8.50 | 7.95 | ..... |
| 27 | 7.15 | ..... | ..... | 9.55 | 10.03 | 10.38 | ..... | ..... | ..... | 8.50 | ..... | ..... |
| 28 | 7.15 | ..... | ..... | 9.55 | 10.08 | ..... | ..... | ..... | ..... | 8.50 | ..... | ..... |
| 29 | 7.10 | ..... | ..... | 9.55 | ..... | ..... | ..... | ..... | ..... | 8.50 | ..... | ..... |
| 30 | 7.10 | ..... | 9.25 | 9.55 | ..... | 10.38 | 9.95 | 9.37 | 8.76 | 8.45 | [a]7.88 | ..... |
| 31 | 7.10 | ..... | 9.25 | ..... | ..... | ..... | ..... | 9.33 | ..... | ..... | ..... | 7.80 |
| 1905. | | | | | | | | | | | | |
| 1 | 7.80 | ..... | 7.75 | 7.90 | ..... | 8.50 | 8.65 | 8.35 | 7.85 | 7.30 | 6.70 | ..... |
| 2 | 7.75 | ..... | 7.75 | 7.90 | ..... | 8.50 | 8.65 | 8.35 | 7.85 | 7.30 | 6.70 | ..... |
| 3 | 7.75 | ..... | 7.75 | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.85 | 7.30 | 6.70 | 6.40 |
| 4 | 7.75 | 7.70 | 7.70 | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.80 | 7.30 | 6.70 | 6.40 |
| 5 | 7.75 | 7.70 | 7.70 | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.80 | ..... | ..... | ..... |
| 6 | 7.75 | ..... | 7.70 | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.80 | ..... | ..... | ..... |
| 7 | 7.75 | ..... | ..... | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.75 | ..... | ..... | ..... |
| 8 | ..... | ..... | ..... | 7.90 | ..... | 8.55 | 8.60 | 8.30 | 7.75 | ..... | 6.55 | ..... |
| 9 | ..... | ..... | 7.70 | ..... | ..... | 8.60 | 8.60 | 8.25 | 7.70 | ..... | 6.55 | ..... |
| 10 | ..... | ..... | 7.65 | ..... | ..... | 8.60 | 8.60 | 8.20 | 7.70 | ..... | 6.50 | ..... |
| 11 | 7.70 | ..... | 7.65 | ..... | ..... | 8.60 | 8.60 | 8.20 | 7.65 | ..... | 6.50 | ..... |
| 12 | 7.70 | ..... | ..... | ..... | 8.30 | 8.60 | 8.60 | 8.20 | 7.65 | ..... | 6.50 | 6.30 |
| 13 | ..... | ..... | ..... | ..... | 8.30 | 8.60 | 8.60 | 8.20 | 7.65 | 7.05 | 6.50 | 6.30 |
| 14 | 7.70 | ..... | ..... | 7.95 | 8.30 | 8.65 | 8.55 | 8.20 | ..... | ..... | 6.40 | 6.30 |
| 15 | 7.65 | 7.75 | ..... | 7.95 | 8.30 | 8.65 | 8.55 | 8.20 | ..... | ..... | 6.40 | 6.30 |
| 16 | 7.65 | ..... | ..... | 7.95 | 8.30 | 8.65 | 8.55 | 8.15 | ..... | ..... | 6.40 | 6.30 |
| 17 | ..... | ..... | ..... | ..... | 8.30 | 8.65 | 8.50 | 8.15 | 7.57 | ..... | 6.40 | ..... |
| 18 | 7.60 | 7.75 | ..... | ..... | 8.30 | 8.70 | 8.50 | 8.10 | ..... | ..... | 6.40 | ..... |
| 19 | ..... | ..... | ..... | 8.00 | 8.40 | 8.70 | 8.50 | 8.10 | 7.50 | ..... | 6.40 | ..... |
| 20 | ..... | ..... | ..... | 8.00 | 8.40 | 8.70 | 8.50 | 8.10 | 7.50 | 6.90 | 6.40 | ..... |
| 21 | ..... | ..... | ..... | 8.00 | 8.40 | 8.70 | 8.45 | 8.05 | 7.50 | ..... | 6.40 | ..... |
| 22 | ..... | ..... | ..... | 8.00 | 8.40 | 8.70 | 8.45 | 8.05 | 7.45 | ..... | 6.40 | ..... |
| 23 | 7.70 | ..... | 7.70 | 8.00 | 8.45 | 8.70 | 8.40 | 8.00 | 7.45 | 6.80 | 6.40 | 6.20 |
| 24 | 7.70 | ..... | ..... | 8.00 | 8.45 | 8.70 | 8.40 | 8.00 | ..... | 6.80 | ..... | ..... |
| 25 | 7.70 | ..... | ..... | 8.00 | 8.45 | 8.70 | 8.40 | 8.00 | ..... | 6.80 | ..... | ..... |
| 26 | 7.70 | 7.75 | ..... | 8.10 | 8.45 | 8.70 | 8.40 | 7.95 | ..... | 6.75 | ..... | ..... |
| 27 | 7.65 | 7.75 | 7.85 | 8.15 | 8.45 | 8.70 | 8.40 | 7.95 | ..... | 6.75 | ..... | ..... |
| 28 | 7.65 | 7.75 | ..... | 8.15 | 8.50 | 8.65 | 8.40 | 7.95 | ..... | 6.75 | ..... | ..... |
| 29 | ..... | ..... | ..... | ..... | 8.50 | 8.65 | 8.40 | 7.90 | ..... | 6.70 | ..... | ..... |
| 30 | ..... | ..... | 7.90 | [a]8.18 | 8.50 | 8.65 | 8.40 | 7.90 | ..... | 6.70 | [a]6.40 | ..... |
| 31 | ..... | ..... | 7.90 | ..... | 8.50 | ..... | 8.40 | 7.90 | ..... | 6.70 | ..... | [a]6.20 |

[a] Estimated.

*Daily gage height, in feet, of Lake Tahoe at Tahoe, Cal., for 1900–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1906. | | | | | | | | | | | | |
| 1 | a 6.20 | | 7.20 | | 7.90 | 8.70 | 9.55 | 9.80 | 9.30 | 8.70 | | |
| 2 | | | | | 7.90 | 8.75 | 9.55 | 9.80 | 9.30 | 8.70 | | |
| 3 | | 7.04 | | | 7.90 | | 9.60 | 9.80 | 9.30 | | | |
| 4 | | 7.04 | | | 7.95 | | 9.60 | 9.75 | 9.30 | | | |
| 5 | 6.16 | 7.04 | 7.30 | | 7.95 | | 9.60 | 9.75 | 9.20 | | | |
| 6 | 6.16 | 7.02 | 7.30 | | 8.00 | | 9.70 | 9.75 | 9.20 | 8.58 | | |
| 7 | | 7.02 | 7.30 | | 8.05 | | 9.70 | 9.75 | 9.20 | 8.56 | | 7.45 |
| 8 | | 7.02 | 7.30 | | 8.10 | | 9.75 | 9.75 | | 8.54 | | |
| 9 | | 7.02 | 7.30 | | 8.10 | | 9.75 | 9.70 | | | | |
| 10 | | 7.02 | 7.30 | | | | 9.80 | 9.70 | | | | |
| 11 | | 7.02 | | | | | 9.80 | 9.70 | 9.10 | | 7.95 | |
| 12 | | | | 7.70 | | | 9.80 | 9.70 | 9.10 | 8.40 | | |
| 13 | | | | 7.70 | | | 9.80 | 9.70 | 9.05 | 8.40 | | |
| 14 | | | | 7.70 | | | 9.85 | 9.70 | 9.05 | 8.40 | | |
| 15 | | | | 7.70 | | | 9.85 | 9.65 | 9.05 | 8.40 | | 7.80 |
| 16 | | 7.06 | | | | | 9.85 | 9.65 | 9.05 | 8.40 | | 7.80 |
| 17 | | | | 7.70 | 8.30 | 9.10 | 9.85 | 9.65 | | 8.40 | | |
| 18 | | | | 7.70 | 8.30 | 9.15 | 9.85 | 9.60 | | 8.35 | | |
| 19 | | 7.00 | 7.50 | 7.70 | 8.30 | 9.20 | 9.85 | 9.60 | 8.90 | | | 7.83 |
| 20 | 7.06 | 7.00 | | 7.70 | 8.30 | 9.25 | 9.85 | 9.60 | 8.88 | | | 7.80 |
| 21 | 7.06 | | | 7.70 | 8.40 | 9.25 | 9.87 | 9.60 | | | | 7.76 |
| 22 | 7.06 | | | | 8.40 | 9,30 | 9.87 | 9.60 | | | | |
| 23 | 7.10 | | | | | 9.30 | 9.87 | 9.60 | | 8.12 | | 7.70 |
| 24 | 7.10 | | | | | 9.35 | 9.87 | 9.50 | 8.75 | 8.12 | | |
| 25 | 7.10 | | | 7.75 | | 9.35 | 9.87 | 9.50 | 8.75 | 8.12 | | |
| 26 | 7.10 | | | 7.75 | | 9.40 | 9.87 | 9.40 | 8.75 | 8.12 | | |
| 27 | 7.10 | | | | | 9.45 | 9.87 | 9.40 | 8.75 | 8.10 | | |
| 28 | 7.10 | | 7.55 | | | 9.45 | 9.85 | 9.40 | 8.70 | 8.10 | | |
| 29 | 7.10 | | | | 8.70 | 9.45 | 9.85 | 9.40 | 8.70 | 8.05 | | 7.85 |
| 30 | | | | | 8.70 | 9.50 | 9.85 | 9.40 | 8.70 | 8.00 | a 7.50 | |
| 31 | | | | | 8.70 | | 9.85 | 9.30 | | 8.00 | | |
| 1907. | | | | | | | | | | | | |
| 1 | 7.85 | | 8.00 | | | 10.45 | | 11.17 | | | | 8.30 |
| 2 | | | | | 9.30 | 10.50 | 11.15 | 11.15 | 10.38 | | 8.94 | 8.28 |
| 3 | | | | | | | 11.20 | 11.15 | | | 8.92 | 8.26 |
| 4 | | | | | | | 11.20 | 11.13 | | | 8.90 | |
| 5 | | 8.00 | | | | | 11.20 | 11.10 | | 9.40 | 8.88 | |
| 6 | | | | 9.35 | | | 11.20 | | 10.30 | | 8.86 | |
| 7 | | | | 9.35 | | | 11.20 | | 10.28 | | | |
| 8 | | | | 9.40 | 9.92 | | 11.20 | | 10.25 | | | |
| 9 | | | | 9.40 | | 10.68 | 11.22 | | 10.23 | | | |
| 10 | 7.85 | | | 9.40 | | | 11.24 | | 10.21 | 9.35 | 8.80 | |
| 11 | | | | 9.38 | | | 11.23 | 10.92 | | 9.33 | 8.78 | 8.40 |
| 12 | | | | | | | 11.23 | | | 9.32 | 8.75 | 8.40 |
| 13 | | | | | | | 11.25 | 10.90 | | 9.30 | 8.72 | 8.40 |
| 14 | | | | 9.45 | 10.10 | | 11.26 | 10.87 | | 9.30 | 8.70 | 8.40 |
| 15 | 7.82 | | | 9.50 | 10.08 | 10.90 | 11.26 | 10.85 | | 9.28 | | |
| 16 | | | 8.00 | | 10.08 | 10.90 | 11.25 | 10.83 | | 9.26 | | |
| 17 | | | | 9.55 | 10.10 | 10.90 | 11.26 | 10.82 | | 9.24 | | 8.38 |
| 18 | | | | 9.60 | 10.14 | 10.92 | 11.26 | 10.80 | 9.90 | 9.20 | | 8.38 |
| 19 | 7.80 | | 9.00 | | | 10.92 | | 10.76 | | 9.18 | 8.55 | |
| 20 | | | | | 10.20 | 10.92 | | 10.75 | | 9.16 | 8.50 | 8.40 |
| 21 | | | | 9.60 | 10.22 | 10.93 | 11.23 | 10.74 | 9.83 | 9.14 | | |
| 22 | | | | 9.63 | | | 11.22 | 10.70 | 9.80 | | 8.47 | 8.38 |
| 23 | | | | 9.63 | 10.26 | 11.00 | 11.22 | 10.66 | 9.80 | | | 8.36 |
| 24 | | | | 9.67 | 10.27 | 11.00 | 11.21 | 10.65 | | 9.12 | 8.40 | |
| 25 | | | | 9.70 | 10.30 | 11.02 | 11.22 | 10.60 | | | | |
| 26 | | | | 9.70 | | 11.03 | 11.21 | 10.60 | 9.73 | | | |
| 27 | | | | 9.74 | | 11.05 | 11.20 | 10.58 | 9.70 | | | |
| 28 | | | | | | | 11.20 | | | 9.04 | | |
| 29 | | | | | 10.35 | | 11.19 | | | | 8.33 | 8.38 |
| 30 | | | | 9.80 | 10.38 | | 11.19 | | 9.60 | 9.00 | 8.30 | |
| 31 | a 8.00 | | a 9.35 | | 10.40 | | 11.19 | | | | | |

a Estimated.

*Daily gaye height, in feet, of Lake Tahoe at Tahoe, Cal., for 1900–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1908. | | | | | | | | | | | | |
| 1 | 8.40 | | | | | | 8.10 | 7.90 | 7.33 | 6.89 | 6.60 | 6.40 |
| 2 | | | | | | 7.90 | 8.10 | 7.90 | 7.30 | | 6.60 | |
| 3 | | | | | | | 8.10 | 7.90 | 7.30 | | 6.60 | |
| 4 | | | | | | | 8.10 | 7.90 | 7.30 | 6.81 | 6.60 | |
| 5 | | | | | 7.58 | 7.90 | 8.10 | 7.88 | 7.29 | 6.80 | 6.60 | 6.40 |
| 6 | 8.36 | | 7.75 | | 7.58 | 7.90 | 8.10 | 7.86 | 7.28 | 6.78 | 6.60 | 6.40 |
| 7 | | | 7.75 | 7.40 | | 7.95 | 8.10 | 7.87 | | 6.77 | 6.60 | 6.35 |
| 8 | | | 7.75 | 7.40 | | 7.95 | 8.10 | 7.85 | | 6.76 | 6.56 | |
| 9 | 8.32 | | 7.70 | | 7.66 | 7.95 | 8.10 | 7.84 | 7.20 | 6.75 | 6.52 | |
| 10 | 8.32 | | 7.65 | | | 7.95 | 8.10 | 7.82 | 7.23 | 6.75 | 6.50 | |
| 11 | 8.30 | | 7.65 | | | 7.95 | 8.10 | 7.80 | 7.20 | 6.73 | 6.50 | 6.30 |
| 12 | 8.30 | | 7.60 | 7.40 | | 7.95 | 8.10 | 7.77 | 7.20 | 6.70 | 6.50 | 6.30 |
| 13 | | | 7.60 | 7.40 | | 7.95 | 8.10 | | 7.20 | 6.69 | 6.50 | 6.30 |
| 14 | | 7.98 | 7.60 | | | 7.95 | 8.10 | | 7.20 | | 6.50 | |
| 15 | | 7.95 | 7.60 | 7.45 | 7.70 | 7.95 | 8.10 | | | | 6.50 | |
| 16 | 8.22 | | 7.60 | 7.45 | | 7.95 | 8.10 | | | 6.75 | 6.45 | 6.30 |
| 17 | 8.20 | | 7.60 | 7.45 | | | 8.10 | 7.65 | 7.10 | | 6.42 | |
| 18 | | | 7.60 | 7.50 | | | 8.08 | 7.65 | | | 6.42 | |
| 19 | | | 7.60 | 7.50 | | 7.95 | | 7.60 | | | 6.40 | |
| 20 | | | 7.60 | 7.50 | | 7.95 | | 7.60 | | | | 6.20 |
| 21 | | | | 7.50 | 7.80 | | | 7.60 | 7.07 | | | 6.20 |
| 22 | | | 7.55 | | | 8.05 | | 7.58 | 7.06 | | | |
| 23 | 8.20 | | 7.55 | | | 8.05 | | 7.55 | | 6.65 | | |
| 24 | | 7.75 | | | | 8.05 | | 7.53 | | | 6.50 | 6.15 |
| 25 | | 7.74 | | 7.50 | | 8.08 | | 7.51 | | | | 6.12 |
| 26 | | 7.70 | | | | 8.08 | | 7.50 | 7.00 | 6.70 | | |
| 27 | | | | | 7.85 | 8.08 | | | 6.95 | 6.70 | | 6.12 |
| 28 | | | 7.40 | | | 8.08 | | | 6.95 | 6.70 | 6.40 | |
| 29 | | [a]7.72 | | | | 8.08 | | | 6.90 | | 6.40 | |
| 30 | | | | [a]7.54 | | 8.08 | | | 6.90 | 6.65 | 6.40 | |
| 31 | [a]8.12 | | [a]7.40 | | [a]7.88 | | | 7.33 | | 6.62 | | [a]6.10 |
| 1909. | | | | | | | | | | | | |
| 1 | [a]6.10 | | 7.90 | 7.65 | 7.80 | 8.32 | 8.92 | 8.64 | | 7.50 | 7.20 | |
| 2 | | | 7.90 | 7.65 | 7.81 | 8.35 | 8.92 | 8.62 | 8.15 | | 7.20 | 7.50 |
| 3 | | | 7.90 | 7.65 | 7.83 | 8.40 | 8.93 | 8.60 | 8.13 | | 7.10 | 7.50 |
| 4 | | | 7.90 | 7.65 | 7.85 | | 8.93 | | 8.12 | | 7.16 | 7.50 |
| 5 | | 7.70 | 7.90 | 7.65 | 7.88 | 8.48 | 8.93 | | 8.10 | | 7.16 | 7.50 |
| 6 | | | 7.90 | 7.65 | 7.90 | 8.52 | | | 8.10 | 7.52 | 7.14 | 7.25 |
| 7 | | | 7.90 | 7.65 | 7.92 | 8.55 | 8.88 | 8.57 | 8.08 | 7.52 | 7.14 | |
| 8 | | | 7.90 | 7.65 | 7.95 | 8.57 | 8.87 | 8.53 | 8.05 | 7.50 | 7.12 | |
| 9 | | | | 7.60 | 7.97 | 8.60 | 8.86 | 8.51 | 8.02 | 7.50 | 7.12 | 7.65 |
| 10 | | | | | | 8.63 | 8.86 | 8.50 | | 7.45 | 7.12 | 7.68 |
| 11 | 6.45 | | | 7.60 | | 8.66 | 8.88 | 8.50 | | 7.45 | 7.12 | 7.70 |
| 12 | | 7.80 | | 7.60 | | 8.68 | 8.85 | 8.50 | | 7.45 | 7.10 | 7.72 |
| 13 | | 7.80 | | 7.60 | 8.00 | 8.70 | 8.84 | 8.45 | 7.90 | 7.41 | 7.10 | 7.74 |
| 14 | | | 7.80 | 7.60 | 8.02 | 8.70 | 8.84 | 8.45 | 7.88 | 7.40 | 7.10 | |
| 15 | | 7.90 | 7.80 | 7.60 | | | 8.84 | 8.42 | 7.87 | 7.40 | 7.10 | |
| 16 | 7.30 | 7.90 | 7.75 | 7.60 | | | 8.84 | 8.41 | 7.85 | 7.38 | 7.10 | |
| 17 | | | 7.75 | 7.60 | | | 8.84 | 8.40 | 7.88 | 7.36 | 7.10 | |
| 18 | 7.35 | | 7.75 | 7.65 | 8.09 | 8.80 | | 8.40 | | 7.36 | 7.10 | |
| 19 | | 7.85 | 7.75 | 7.65 | 8.10 | 8.83 | | 8.40 | | 7.35 | | 7.70 |
| 20 | | 7.85 | 7.75 | 7.65 | 8.13 | 8.82 | | | | 7.34 | | |
| 21 | | 7.85 | 7.80 | | | 8.82 | 8.80 | | | 7.34 | | |
| 22 | | | 7.80 | 7.68 | | 8.83 | 8.80 | | 7.70 | 7.32 | | 7.50 |
| 23 | 7.70 | | 7.80 | 7.68 | | 8.85 | 8.79 | | 7.70 | 7.32 | | 7.50 |
| 24 | | 7.90 | 7.75 | | 8.20 | 8.87 | 8.78 | 8.28 | 7.66 | 7.30 | 7.34 | 7.49 |
| 25 | | | 7.75 | 7.68 | 8.20 | 8.89 | | 8.25 | | 7.30 | 7.36 | 7.49 |
| 26 | | | 7.75 | 7.68 | 8.20 | | | 8.22 | 7.60 | 7.30 | 7.38 | 7.48 |
| 27 | 7.78 | | 7.75 | 7.68 | | | | 8.20 | | 7.28 | | 7.49 |
| 28 | 7.80 | | 7.75 | 7.72 | | | 8.70 | 8.20 | | 7.26 | | 7.49 |
| 29 | 7.80 | | | 7.75 | 8.25 | 8.90 | 8.69 | 8.18 | | | | 7.49 |
| 30 | | | 7.70 | 7.78 | 8.28 | 8.90 | 8.66 | | | | | 7.48 |
| 31 | | | 7.70 | | 8.29 | | 8.66 | | | 7.20 | | |

[a] Estimated.

## TRUCKEE RIVER AT TAHOE, CAL.

This station, which is located at Tahoe, Cal., about one-fourth mile below the outlet of Lake Tahoe, was established June 17, 1900, to determine the total outflow of the lake and its value as a storage reservoir—information needed by the United States Reclamation Service in connection with the Truckee-Carson project.

A timber dam across the river about 500 feet from the lake completely regulates the flow of the river, sometimes causing sudden fluctuations and often cutting down the outflow to 15 or 20 second-feet, or the amount of leakage through the dam. The equipment consists of a cable and car and a vertical staff gage.

The channel is liable to shift only in a slight degree and records are reliable. The datum of the gage has not been changed. The flow is practically unaffected by ice.

The following discharge measurement was made by L. J. Towne:

May 18, 1909: Width, 68 feet; area, 126 square feet; gage height, 1.40 feet; discharge, 134 second-feet.

*Daily gage height, in feet, of Truckee River at Tahoe, Cal., for 1909.*

[J. U. Haley, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.70 | 2.70 | 2.75 | 2.75 | 1.78 | 1.43 | 3.30 | 2.60 | 2.56 | 2.30 | 2.25 | 1.70 |
| 2 | 1.70 | 2.70 | 2.75 | 2.75 | 1.55 | 1.45 | 3.30 | 2.60 | 2.56 | 2.30 | 2.30 | 1.80 |
| 3 | 1.70 | 2.65 | 2.75 | 2.75 | 2.30 | 1.47 | 3.30 | 2.60 | 2.56 | 2.28 | 2.20 | 2.00 |
| 4 | 1.70 | 2.65 | 2.75 | 2.75 | 1.90 | 1.47 | 1.90 | 2.60 | 2.55 | 2.28 | 2.05 | 2.00 |
| 5 | 1.50 | 2.65 | 2.75 | 2.75 | 2.85 | 1.47 | 3.30 | 2.55 | 2.28 | 2.28 | 2.05 | 2.00 |
| 6 | 1.50 | 2.60 | 2.75 | 2.75 | 2.85 | 1.47 | 3.30 | 2.55 | 2.28 | 2.28 | 2.05 | 2.05 |
| 7 | 1.55 | 2.70 | 2.75 | 2.75 | 2.85 | 1.48 | 3.30 | 2.55 | 2.27 | 2.27 | 2.05 | 2.05 |
| 8 | 1.60 | 2.75 | 2.75 | 2.75 | 1.75 | 1.50 | 3.30 | 2.55 | 2.26 | 2.25 | 2.05 | 2.22 |
| 9 | 1.65 | 2.75 | 2.75 | 2.75 | 1.75 | 1.50 | 2.60 | 2.55 | 2.25 | 2.20 | 2.05 | 2.40 |
| 10 | 1.65 | 2.75 | 2.60 | 2.70 | 2.90 | 2.05 | 2.60 | 2.58 | 2.25 | 2.18 | 2.05 | 2.40 |
| 11 | 2.00 | 2.75 | 2.90 | 2.70 | 2.90 | 2.45 | 2.20 | 2.25 | 2.24 | 2.19 | 2.05 | 2.40 |
| 12 | 1.65 | 2.80 | 2.90 | 2.70 | 2.50 | 2.45 | 2.20 | 2.20 | 2.23 | 2.19 | 2.05 | 2.40 |
| 13 | 1.45 | 2.80 | 2.90 | 2.70 | 2.50 | 2.80 | 2.20 | 2.20 | 2.22 | 2.18 | 2.05 | 2.47 |
| 14 | ..... | 2.80 | 2.90 | 2.70 | 2.50 | 2.80 | 1.85 | 2.33 | 2.21 | 2.20 | 2.05 | 2.55 |
| 15 | ..... | 2.75 | 2.90 | 2.70 | 1.40 | 2.80 | 1.85 | 2.33 | 2.20 | 2.20 | 2.05 | 2.62 |
| 16 | ..... | 2.75 | 2.85 | 2.70 | 1.40 | 2.80 | 1.85 | 2.33 | 2.20 | 2.20 | 2.05 | 2.70 |
| 17 | ..... | 2.75 | 2.85 | 2.70 | 1.40 | 2.80 | 2.05 | .90 | 2.19 | 2.20 | 2.04 | 2.75 |
| 18 | ..... | 2.75 | 2.85 | 2.75 | 1.40 | 2.80 | 1.50 | 2.38 | 2.17 | 2.19 | 2.04 | 2.80 |
| 19 | ..... | 2.75 | 2.85 | 2.75 | 1.40 | 2.85 | 2.05 | 2.38 | 2.16 | 1.70 | 2.05 | 2.80 |
| 20 | ..... | 2.75 | 2.80 | .60 | 1.40 | 3.30 | 2.05 | 2.38 | 2.16 | 1.70 | 2.05 | 2.80 |
| 21 | ..... | 2.75 | 2.80 | 2.78 | 1.40 | 3.30 | 2.05 | 2.67 | 2.15 | 2.18 | 2.05 | 2.80 |
| 22 | 1.00 | 2.75 | 2.80 | 2.78 | 1.40 | 3.30 | 2.05 | 2.67 | 2.25 | 2.17 | 2.05 | 2.79 |
| 23 | 1.00 | 2.75 | 2.80 | 2.78 | 1.40 | 3.30 | 2.70 | 2.65 | 2.25 | 2.16 | 2.05 | 2.79 |
| 24 | 1.00 | 2.75 | 2.80 | 2.78 | 1.40 | 2.60 | 2.70 | 2.65 | 2.25 | 2.15 | 2.05 | 2.78 |
| 25 | 1.00 | 2.75 | 2.80 | 2.78 | 1.40 | 3.30 | 2.70 | 2.63 | 2.30 | 2.13 | 2.05 | 2.78 |
| 26 | 2.45 | 2.75 | 2.80 | 1.69 | 1.40 | 3.30 | 2.70 | 2.61 | 2.25 | 2.11 | 2.05 | 2.78 |
| 27 | 2.45 | 2.75 | 2.80 | 2.29 | 1.40 | 3.30 | 2.70 | 2.60 | 2.25 | 2.10 | 2.05 | 2.77 |
| 28 | 2.50 | 2.75 | 2.80 | 2.80 | 1.40 | 3.30 | 2.65 | 2.59 | 2.35 | 2.20 | 2.05 | 2.75 |
| 29 | 2.50 | ..... | 2.80 | 2.80 | 1.45 | 3.30 | 2.65 | 2.58 | 2.35 | 2.28 | 2.05 | 3.13 |
| 30 | 2.50 | ..... | 2.80 | 1.62 | 1.45 | 3.30 | 2.65 | 2.58 | 2.35 | 2.35 | 2.05 | 3.13 |
| 31 | 2.50 | ..... | 2.80 | ..... | 1.45 | ..... | 2.60 | 2.58 | ..... | 2.10 | ..... | 3.35 |

NOTE.—Gates closed at dam January 14-21.

*Daily discharge, in second-feet, of Truckee River at Tahoe, Cal., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 258 | 617 | 638 | 638 | 281 | 186 | 869 | 575 | 559 | 456 | 438 | 258 |
| 2 | 258 | 617 | 638 | 638 | 217 | 192 | 869 | 575 | 559 | 456 | 456 | 287 |
| 3 | 258 | 596 | 638 | 638 | 456 | 196 | 869 | 575 | 559 | 449 | 419 | 350 |
| 4 | 258 | 596 | 638 | 638 | 318 | 196 | 318 | 575 | 554 | 449 | 367 | 350 |
| 5 | 204 | 596 | 638 | 638 | 680 | 196 | 869 | 554 | 449 | 449 | 367 | 350 |
| 6 | 204 | 575 | 638 | 638 | 680 | 196 | 869 | 554 | 449 | 449 | 367 | 367 |
| 7 | 217 | 617 | 638 | 638 | 680 | 199 | 869 | 554 | 445 | 445 | 367 | 367 |
| 8 | 230 | 638 | 638 | 638 | 272 | 204 | 869 | 554 | 441 | 438 | 367 | 426 |
| 9 | 244 | 638 | 638 | 638 | 272 | 204 | 575 | 554 | 438 | 419 | 367 | 494 |
| 10 | 244 | 638 | 575 | 617 | 701 | 367 | 575 | 567 | 438 | 412 | 367 | 494 |
| 11 | 350 | 638 | 701 | 617 | 701 | 514 | 419 | 438 | 434 | 416 | 367 | 494 |
| 12 | 244 | 659 | 701 | 617 | 534 | 514 | 419 | 419 | 430 | 416 | 367 | 494 |
| 13 | 192 | 659 | 701 | 617 | 534 | 659 | 419 | 419 | 426 | 412 | 367 | 522 |
| 14 | 15 | 659 | 701 | 617 | 534 | 659 | 302 | 467 | 423 | 419 | 367 | 554 |
| 15 | 15 | 638 | 701 | 617 | 179 | 659 | 302 | 467 | 419 | 419 | 367 | 583 |
| 16 | 15 | 638 | 680 | 617 | 179 | 659 | 302 | 467 | 419 | 419 | 367 | 617 |
| 17 | 15 | 638 | 680 | 617 | 179 | 659 | 367 | 77 | 416 | 419 | 364 | 638 |
| 18 | 15 | 638 | 680 | 638 | 179 | 659 | 204 | 486 | 408 | 416 | 364 | 659 |
| 19 | 15 | 638 | 680 | 638 | 179 | 680 | 367 | 486 | 405 | 258 | 364 | 659 |
| 20 | 15 | 638 | 659 | 35 | 179 | 869 | 367 | 486 | 405 | 258 | 367 | 659 |
| 21 | 15 | 638 | 659 | 651 | 179 | 869 | 367 | 604 | 402 | 412 | 367 | 659 |
| 22 | 95 | 638 | 659 | 651 | 179 | 869 | 367 | 604 | 438 | 408 | 367 | 655 |
| 23 | 95 | 638 | 659 | 651 | 179 | 869 | 617 | 596 | 449 | 405 | 367 | 655 |
| 24 | 95 | 638 | 659 | 651 | 179 | 575 | 617 | 596 | 438 | 402 | 367 | 651 |
| 25 | 95 | 638 | 659 | 651 | 179 | 869 | 617 | 588 | 456 | 394 | 367 | 651 |
| 26 | 514 | 638 | 659 | 255 | 179 | 869 | 617 | 579 | 438 | 388 | 367 | 651 |
| 27 | 514 | 638 | 659 | 452 | 179 | 869 | 617 | 575 | 438 | 384 | 367 | 646 |
| 28 | 534 | 638 | 659 | 659 | 179 | 869 | 596 | 571 | 475 | 419 | 367 | 638 |
| 29 | 534 | ..... | 659 | 659 | 192 | 869 | 596 | 567 | 475 | 449 | 367 | 798 |
| 30 | 534 | ..... | 659 | 236 | 192 | 869 | 596 | 567 | 475 | 475 | 367 | 798 |
| 31 | 534 | ..... | 659 | ..... | 192 | ..... | 575 | 567 | ..... | 384 | ..... | 890 |

NOTE.—These discharges are based on a rating curve that is well defined. Discharge estimated January 14–21.

*Monthly discharge of Truckee River at Tahoe, Cal., for 1909.*

[Drainage area, 519 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 534 | ..... | 220 | 0.424 | 0.49 | 13,500 | B. |
| February | 659 | 575 | 630 | 1.21 | 1.26 | 35,000 | A. |
| March | 701 | 575 | 660 | 1.27 | 1.46 | 40,600 | A. |
| April | 659 | 35 | 584 | 1.13 | 1.26 | 34,800 | A. |
| May | 680 | 179 | 321 | .618 | .71 | 19,700 | A. |
| June | 869 | 186 | 569 | 1.10 | 1.23 | 33,900 | A. |
| July | 869 | 204 | 555 | 1.07 | 1.23 | 34,100 | A. |
| August | 604 | 77 | 525 | 1.01 | 1.16 | 32,300 | A. |
| September | 559 | 402 | 452 | .871 | .97 | 26,900 | A. |
| October | 475 | 258 | 413 | .796 | .92 | 25,400 | A. |
| November | 456 | 364 | 374 | .721 | .80 | 22,300 | A. |
| December | 890 | 258 | 559 | 1.08 | 1.24 | 34,400 | A. |
| The year | 890 | ..... | 488 | .942 | 12.73 | 353,000 | |

## TRUCKEE RIVER AT NEVADA-CALIFORNIA STATE LINE.

This station, which is located at the state line, 17 miles west of Reno, Nev., was established September 1, 1899, to determine the quantity of water available for use in the Reno or Truckee Valley.

The station is below all tributaries which have their headwaters in the Sierra Nevada divide, and is above all diversions.

The gage was formerly located at Farad, 2½ miles above the measuring section. On June 14, 1909, the station was moved downstream 2½ miles to Calvada.

The equipment consists of a cable and car and an inclined staff gage located 50 feet downstream from the cable. Gage heights in the following table January 1 to June 30 are from the old gage; from July 1 to December 31 they are from the new gage.

The flow is probably unaffected by ice. The channel is somewhat shifting, requiring rerating after each high-water period. Flood measurements are made with difficulty, owing to the high velocities of the current. Records are fairly reliable.

*Discharge measurements of Truckee River at Nevada-California state line in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 24 | L. J. Towne | 118 | 459 | 3.82 | 1,670 |
| Do | do | 118 | 468 | 3.92 | 1,850 |
| June 11 | do | 123 | 568 | 4.60 | 2,690 |
| July 1 | do | 121 | 541 | 4.40 | 2,590 |
| July 10 | do | 114 | 403 | 3.36 | 1,300 |
| July 22 | do | 111 | 310 | 2.80 | 708 |
| July 24 | do | 113 | 365 | 3.15 | 1,030 |
| September 14 | F. C. Schafer | 110 | 288 | 2.40 | 573 |
| October 19 | do | 111 | 302 | 2.35 | 546 |
| December 4 | do | 117 | 406 | 3.30 | 1,310 |

NOTE.—Gage heights of above measurements refer to new gage at cable.

*Daily gage height, in feet, of Truckee River at Nevada-California state line for 1909.*

[E. Biglow, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.05 | 3.05 | 3.05 | ..... | 5.35 | 5.0 | 4.5 | 3.0 | 2.7 | 2.6 | 2.4 | 3.8 |
| 2 | 2.1 | 3.2 | 3.0 | ..... | 5.35 | 5.25 | 4.5 | 3.0 | 2.7 | 2.6 | 2.4 | 4.5 |
| 3 | 2.1 | 3.15 | 3.1 | ..... | 5.4 | 5.25 | 4.4 | 3.0 | 2.7 | 2.6 | 2.4 | 3.8 |
| 4 | 2.35 | 3.15 | 3.2 | 3.85 | 5.55 | 5.25 | 4.3 | 3.0 | 2.8 | 2.7 | 2.5 | 3.2 |
| 5 | 2.8 | 3.1 | 3.1 | 3.8 | 5.9 | 5.25 | 4.2 | 2.9 | 2.7 | 2.6 | 2.4 | 3.1 |
| 6 | 3.0 | 3.1 | 3.1 | 3.7 | 5.85 | 5.0 | 4.1 | 2.9 | 2.7 | 2.6 | 2.4 | 3.2 |
| 7 | 2.55 | 3.0 | 3.1 | 3.8 | 5.9 | 4.8 | 3.8 | 2.8 | 2.6 | 2.6 | 2.4 | 3.1 |
| 8 | 2.25 | 3.0 | 3.05 | 3.9 | 5.7 | 4.8 | 3.7 | 2.8 | 2.6 | 2.6 | 2.4 | 3.2 |
| 9 | 2.1 | 3.0 | 3.0 | 4.0 | 5.6 | 4.65 | 3.5 | 2.7 | 2.6 | 2.5 | 2.4 | 3.5 |
| 10 | 2.05 | 3.1 | 3.0 | 4.3 | 5.7 | 4.6 | 3.3 | 2.6 | 2.5 | 2.5 | 2.5 | 3.3 |
| 11 | 2.2 | 3.2 | 3.0 | 4.2 | 5.35 | 4.6 | 3.3 | 2.6 | 2.5 | 2.5 | 2.5 | 3.2 |
| 12 | 2.4 | 3.2 | 3.05 | 4.3 | 5.1 | 4.65 | 3.3 | 2.5 | 2.5 | 2.4 | 2.5 | 3.2 |
| 13 | 2.9 | 3.2 | 3.0 | 4.6 | 4.75 | 4.75 | 3.1 | 2.5 | 2.4 | 2.4 | 2.4 | 3.1 |
| 14 | 5.5 | 3.15 | 3.1 | 5.0 | 4.55 | 4.7 | 3.1 | 2.5 | 2.4 | 2.5 | 2.5 | 3.1 |
| 15 | 7.45 | 3.2 | 3.2 | 5.25 | 4.85 | 4.75 | 3.0 | 2.5 | 2.4 | 2.4 | 2.5 | 3.1 |
| 16 | 7.9 | 3.15 | 3.2 | 4.9 | 4.4 | 4.65 | 3.0 | 2.5 | 2.4 | 2.5 | 2.6 | 3.1 |
| 17 | 6.15 | 3.2 | 3.4 | 5.55 | 4.3 | 4.65 | 2.9 | 2.6 | 2.4 | 2.4 | 2.7 | 3.1 |
| 18 | 5.65 | 3.35 | 3.5 | 5.8 | 4.25 | 4.6 | 2.8 | 2.7 | 2.5 | 2.4 | 3.0 | 3.1 |
| 19 | 4.75 | 3.3 | 3.4 | 5.75 | 4.3 | 4.45 | 2.7 | 2.7 | 2.5 | 2.4 | 3.5 | 3.0 |
| 20 | 4.65 | 3.3 | 3.4 | 4.85 | 4.45 | 4.3 | 2.7 | 2.7 | 2.5 | 2.5 | 4.1 | 3.0 |
| 21 | 5.15 | 3.2 | 3.35 | 4.9 | 4.55 | 4.4 | 2.7 | 2.7 | 2.5 | 2.5 | 4.1 | 3.0 |
| 22 | 4.1 | 3.1 | 3.3 | 4.75 | 4.15 | 4.65 | 2.7 | 2.7 | 2.4 | 2.4 | 4.1 | 3.0 |
| 23 | 3.7 | 3.15 | 3.25 | 4.9 | 3.95 | 4.8 | 2.8 | 2.7 | 2.4 | 2.3 | 3.7 | 3.0 |
| 24 | 3.6 | 3.2 | 3.2 | 4.95 | 3.85 | 4.65 | 3.1 | 2.8 | 2.5 | 2.3 | 4.1 | 2.9 |
| 25 | 3.55 | 3.05 | 3.2 | 5.1 | 3.85 | 4.75 | 3.1 | 2.8 | 2.5 | 2.4 | 4.0 | 2.3 |
| 26 | 3.5 | 3.0 | 3.15 | 4.75 | 4.15 | 4.65 | 3.1 | 2.8 | 2.5 | 2.4 | 3.7 | 2.9 |
| 27 | 3.5 | 3.0 | 3.15 | 5.45 | 4.3 | 4.65 | 3.1 | 2.8 | 2.5 | 2.4 | 3.2 | 2.9 |
| 28 | 3.4 | 3.05 | 3.15 | 5.55 | 4.5 | 4.6 | 3.0 | 2.8 | 2.5 | 2.4 | 3.2 | 2.9 |
| 29 | 3.3 | ..... | 3.15 | 5.5 | 4.1 | 4.5 | 3.0 | 2.7 | 2.6 | 2.5 | 3.1 | 2.9 |
| 30 | 3.2 | ..... | 3.1 | 5.5 | 4.0 | 4.6 | 3.0 | 2.7 | 2.6 | 2.5 | 3.1 | 3.2 |
| 31 | 3.1 | ..... | 3.15 | ..... | 4.25 | ..... | 3.0 | 2.7 | ..... | 2.5 | ..... | 3.2 |

NOTE.—Gage heights January 1 to June 30 are from old gage; those from July 1 to December 31 are from new gage. No gage relation was determined.

*Daily discharge, in second-feet, of Truckee River at Nevada-California state line for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 385 | 1,070 | 1,070 | 1,470 | 3,700 | 3,190 | 2,620 | 950 | 735 | 675 | 565 | 1,730 |
| 2 | 410 | 1,200 | 1,030 | 1,560 | 3,700 | 3,540 | 2,620 | 950 | 735 | 675 | 565 | 2,620 |
| 3 | 410 | 1,160 | 1,110 | 1,660 | 3,770 | 3,540 | 2,480 | 950 | 735 | 675 | 565 | 1,730 |
| 4 | 550 | 1,160 | 1,200 | 1,810 | 4,000 | 3,540 | 2,350 | 950 | 800 | 735 | 620 | 1,120 |
| 5 | 870 | 1,110 | 1,110 | 1,760 | 4,540 | 3,540 | 2,220 | 870 | 735 | 675 | 565 | 1,030 |
| 6 | 1,030 | 1,110 | 1,110 | 1,660 | 4,460 | 3,190 | 2,090 | 870 | 735 | 675 | 565 | 1,120 |
| 7 | 685 | 1,030 | 1,110 | 1,760 | 4,540 | 2,920 | 1,730 | 800 | 675 | 675 | 565 | 1,030 |
| 8 | 490 | 1,030 | 1,070 | 1,860 | 4,220 | 2,920 | 1,620 | 800 | 675 | 675 | 565 | 1,120 |
| 9 | 410 | 1,030 | 1,030 | 1,960 | 4,070 | 2,720 | 1,410 | 735 | 675 | 620 | 565 | 1,410 |
| 10 | 385 | 1,110 | 1,030 | 2,300 | 4,220 | 2,660 | 1,210 | 675 | 620 | 620 | 620 | 1,210 |
| 11 | 460 | 1,200 | 1,030 | 2,180 | 3,700 | 2,660 | 1,210 | 675 | 629 | 620 | 620 | 1,120 |
| 12 | 580 | 1,200 | 1,070 | 2,300 | 3,330 | 2,720 | 1,210 | 620 | 620 | 565 | 620 | 1,120 |
| 13 | 950 | 1,200 | 1,030 | 2,660 | 2,860 | 2,860 | 1,030 | 620 | 565 | 565 | 565 | 1,030 |
| 14 | 3,920 | 1,160 | 1,110 | 3,190 | 2,600 | 2,790 | 1,030 | 620 | 565 | 620 | 620 | 1,030 |
| 15 | 7,260 | 1,200 | 1,200 | 3,540 | 2,980 | 2,860 | 950 | 620 | 565 | 565 | 620 | 1,030 |
| 16 | 8,110 | 1,160 | 1,200 | 3,050 | 2,420 | 2,720 | 950 | 620 | 565 | 620 | 675 | 1,030 |
| 17 | 4,960 | 1,200 | 1,380 | 4,000 | 2,300 | 2,720 | 870 | 675 | 565 | 565 | 735 | 1,030 |
| 18 | 4,140 | 1,340 | 1,470 | 4,380 | 2,240 | 2,660 | 800 | 735 | 620 | 565 | 950 | 1,030 |
| 19 | 2,860 | 1,290 | 1,380 | 4,300 | 2,300 | 2,480 | 735 | 735 | 620 | 565 | 1,410 | 950 |
| 20 | 2,720 | 1,290 | 1,380 | 2,980 | 2,480 | 2,300 | 735 | 735 | 620 | 620 | 2,090 | 950 |
| 21 | 3,400 | 1,200 | 1,340 | 3,050 | 2,600 | 2,420 | 735 | 735 | 620 | 620 | 2,090 | 950 |
| 22 | 2,070 | 1,110 | 1,290 | 2,860 | 2,120 | 2,720 | 735 | 735 | 565 | 565 | 2,090 | 950 |
| 23 | 1,660 | 1,160 | 1,240 | 3,050 | 1,910 | 2,920 | 800 | 735 | 565 | 515 | 1,620 | 950 |
| 24 | 1,560 | 1,200 | 1,200 | 3,120 | 1,810 | 2,720 | 1,030 | 800 | 620 | 515 | 2,090 | 870 |
| 25 | 1,520 | 1,070 | 1,200 | 3,330 | 1,810 | 2,860 | 1,030 | 800 | 620 | 565 | 1,970 | 515 |
| 26 | 1,470 | 1,030 | 1,160 | 2,860 | 2,120 | 2,720 | 1,030 | 800 | 620 | 565 | 1,620 | 870 |
| 27 | 1,470 | 1,030 | 1,160 | 3,840 | 2,300 | 2,720 | 1,030 | 800 | 620 | 565 | 1,120 | 870 |
| 28 | 1,380 | 1,070 | 1,160 | 4,000 | 2,540 | 2,660 | 950 | 800 | 620 | 565 | 1,120 | 870 |
| 29 | 1,290 | ..... | 1,160 | 3,920 | 2,070 | 2,540 | 950 | 735 | 675 | 620 | 1,030 | 870 |
| 30 | 1,200 | ..... | 1,110 | 3,920 | 1,960 | 2,660 | 950 | 735 | 675 | 620 | 1,030 | 1,120 |
| 31 | 1,110 | ..... | 1,160 | ..... | 2,240 | ..... | 950 | 735 | ..... | 620 | ..... | 1,120 |

NOTE.—Daily discharges January 1 to June 30 are based on the rating curve for the station at Mystic or Farad, which is fairly well defined between 360 and 3,190 second-feet. Discharges July 1 to December 31 are based on the Calvada station rating curve, which is fairly well defined between 515 and 2,760 second-feet.

*Monthly discharge of Truckee River at Nevada-California state line for 1909.*

[Drainage area, 955 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 8,110 | 385 | 1,930 | 2.02 | 2.33 | 119,000 | B. |
| February | 1,340 | 1,030 | 1,150 | 1.20 | 1.25 | 63,900 | A. |
| March | 1,470 | 1,030 | 1,170 | 1.23 | 1.42 | 71,900 | A. |
| April | 4,380 | 1,470 | 2,810 | 2.94 | 3.28 | 167,000 | B. |
| May | 4,540 | 1,810 | 2,960 | 3.10 | 3.57 | 182,000 | B. |
| June | 3,540 | 2,300 | 2,850 | 2.98 | 3.32 | 170,000 | B. |
| July | 2,620 | 735 | 1,320 | 1.38 | 1.59 | 81,200 | A. |
| August | 950 | 620 | 762 | .798 | .92 | 46,900 | A. |
| September | 800 | 565 | 642 | .672 | .75 | 38,200 | A. |
| October | 735 | 515 | 610 | .639 | .74 | 37,500 | A. |
| November | 2,090 | 565 | 1,010 | 1.06 | 1.17 | 60,100 | A. |
| December | 2,620 | 515 | 1,110 | 1.16 | 1.34 | 68,200 | A. |
| The year | 8,110 | 385 | 1,530 | 1.60 | 21.69 | 1,110,000 | |

## TRUCKEE RIVER AT RENO, NEV.

This station, which is located in the city of Reno, about 12 miles below the California-Nevada line, near the upper end of Truckee Meadows, was established July 1, 1906, by the United States Weather

Bureau, in connection with its measurements of snowfall in the high Sierra, and gage heights have been furnished by that bureau.

The station is below all diversions for Truckee Valley, above any return waters, and below practically all tributaries except Steamboat Creek, which enters from the south a few miles below.

Discharge measurements are made from the Rock Street Bridge, about 800 feet downstream from the Virginia Street Bridge, where the vertical staff gage is located. Low-water measurements are made by wading. The datum of the staff gage is 4,481.60 feet above sea level and has remained unchanged. Measuring conditions are good, the stream bed is permanent, and the records are unaffected by ice and are considered good. (See fig 1.)

*Discharge measurements of Truckee River at Reno, Nev., in 1908–9.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1908. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| October 9[a] | E. A. Porter | | 360 | 1.10 | 213 |
| 1909. | | | | | |
| January 14[b] | D. W. Hays | | 1,140 | 6.60 | 9,910 |
| January 16 | M. B. Kennedy | | 1,020 | 6.40 | 8,020 |
| January 18 | E. A. Porter | | 750 | 4.75 | 4,280 |
| January 27 | do | | 466 | 2.90 | 1,570 |
| February 23 | do | 118 | 368 | 2.40 | 1,030 |
| May 22 | L. J. Towne | 126 | 524 | 3.35 | 1,910 |
| June 18 | do | 129 | 555 | 3.70 | 2,550 |
| September 11 | F. C. Schafer | 116 | 318 | 1.10 | 218 |
| September 14 | do | 119 | 389 | 1.45 | 372 |
| October 19 | do | 118 | 386 | 1.40 | 354 |
| December 4 | do | 119 | 455 | 2.65 | 1,340 |

[a] Wading measurement. [b] Float measurement.

NOTE.—The 1909 measurements were made rom the Rock Street Bridge.

*Daily gage height, in feet, of Truckee River at Reno, Nev., for 1906–1909.*

[H. O. Geren, observer, 1906-1908; H. F. Alps, observer, 1909.]

| Day. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Day. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1906. | | | | | | | 1906. | | | | | | |
| 1 | 3.5 | 2.0 | 1.6 | 1.5 | 1.8 | 1.8 | 16 | 3.0 | 1.6 | 1.5 | 1.7 | 2.0 | 2.4 |
| 2 | 3.7 | 1.8 | 1.5 | 1.0 | 1.8 | 1.8 | 17 | 2.8 | 1.6 | 1.5 | 1.7 | 1.9 | 2.4 |
| 3 | 3.8 | 1.9 | 1.5 | 1.4 | 1.8 | 1.8 | 18 | 2.7 | 1.6 | 1.5 | 1.6 | 1.9 | 2.3 |
| 4 | 3.8 | 1.8 | 1.4 | 1.4 | 2.0 | 1.8 | 19 | 2.6 | 1.6 | 1.4 | 1.6 | 1.8 | 2.3 |
| 5 | 3.8 | 1.4 | 1.4 | 1.3 | 2.2 | 1.8 | 20 | 2.5 | 1.7 | 1.5 | 1.6 | 1.8 | 2.3 |
| 6 | 3.7 | 1.1 | 1.5 | 1.3 | 1.9 | 1.8 | 21 | 2.5 | 1.6 | 1.4 | 1.6 | 1.8 | 2.3 |
| 7 | 3.7 | 1.4 | 1.5 | 1.4 | 1.9 | 1.8 | 22 | 2.4 | 1.6 | 1.4 | 1.7 | 1.9 | 2.3 |
| 8 | 3.6 | 1.4 | 1.5 | 1.4 | 1.9 | 1.8 | 23 | 2.4 | 1.6 | 1.4 | 1.7 | 1.9 | 2.3 |
| 9 | 3.5 | 1.5 | 1.4 | 1.4 | 1.9 | 1.8 | 24 | 2.4 | 1.6 | 1.4 | 1.7 | 1.9 | 2.3 |
| 10 | 3.4 | 1.6 | 1.5 | 1.4 | 1.9 | 1.8 | 25 | 2.4 | 1.6 | 1.4 | 1.7 | 1.9 | 2.3 |
| 11 | 3.2 | 1.8 | 1.5 | 1.6 | 1.9 | 2.4 | 26 | 2.5 | 1.6 | 1.5 | 1.7 | 1.9 | 2.2 |
| 12 | 3.3 | 1.7 | 1.5 | 1.6 | 1.9 | 2.4 | 27 | 2.6 | 1.5 | 1.6 | 1.8 | 1.9 | 2.2 |
| 13 | 3.2 | 1.6 | 1.5 | 1.7 | 1.9 | 2.4 | 28 | 2.4 | 1.5 | 1.4 | 1.8 | 1.9 | 2.1 |
| 14 | 3.1 | 1.6 | 1.5 | 1.8 | 1.9 | 2.4 | 29 | 2.2 | 1.5 | 1.5 | 1.2 | 1.8 | 2.1 |
| 15 | 3.0 | 1.6 | 1.5 | 1.7 | 1.9 | 2.4 | 30 | 2.1 | 1.5 | 1.4 | 1.7 | 1.8 | 2.0 |
| | | | | | | | 31 | 2.0 | 1.6 | ..... | 1.9 | ..... | 1.9 |

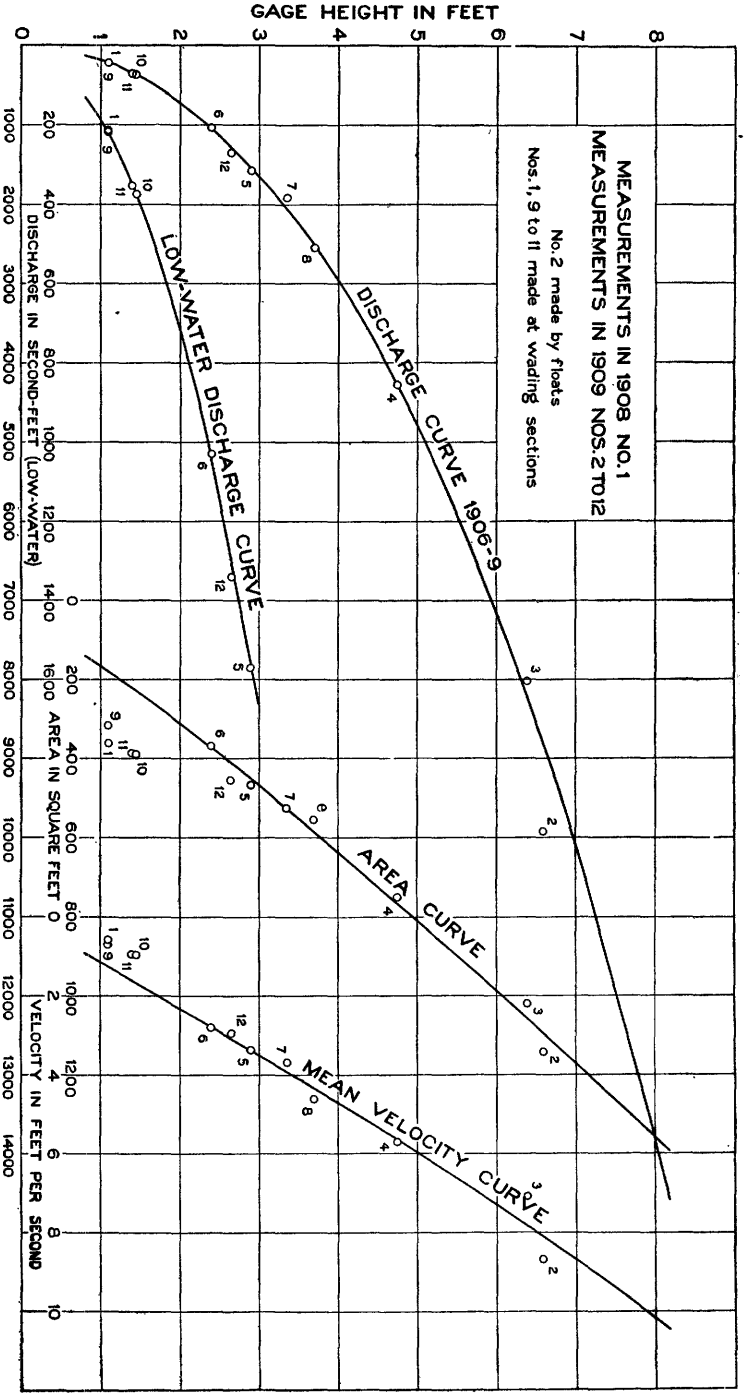



FIGURE 1.—Discharge, area, and mean velocity curves for Truckee River at Reno, Nev.

*Daily gage height, in feet, of Truckee River at Reno, Nev., for 1906–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907. | | | | | | | | | | | | |
| 1 | 1.9 | 2.2 | 2.4 | 3.7 | 4.8 | 5.0 | 4.2 | 3.1 | 2.4 | 2.4 | 2.5 | 2.2 |
| 2 | 1.9 | 2.8 | 2.4 | 3.8 | 4.9 | 5.1 | 4.1 | 3.0 | 2.4 | 2.4 | 2.5 | 2.1 |
| 3 | 1.9 | 3.2 | 2.4 | 3.7 | 4.8 | 5.1 | 4.1 | 3.0 | 2.5 | 2.3 | 2.5 | 2.2 |
| 4 | 1.9 | 3.4 | 2.4 | 3.6 | 4.5 | 5.0 | 4.3 | 2.9 | 2.5 | 2.0 | 2.5 | 2.2 |
| 5 | 1.8 | 3.2 | 2.4 | 3.5 | 4.3 | 4.9 | 4.2 | 2.9 | 2.5 | 2.3 | 2.5 | 2.2 |
| 6 | 1.8 | 3.0 | 2.4 | 3.5 | 4.3 | 4.7 | 4.0 | 2.9 | 2.5 | 2.0 | 2.4 | 2.2 |
| 7 | 1.9 | 2.9 | 2.4 | 3.6 | 4.3 | 4.6 | 4.0 | 2.8 | 2.5 | 1.8 | 2.4 | 2.5 |
| 8 | 1.9 | 2.7 | 2.4 | 3.6 | 4.1 | 4.4 | 3.9 | 2.8 | 2.4 | 1.7 | 2.1 | 2.3 |
| 9 | 1.9 | 2.6 | 2.4 | 3.8 | 4.3 | 4.3 | 3.8 | 2.8 | 2.4 | 2.0 | 2.1 | 2.3 |
| 10 | 1.9 | 2.6 | 2.4 | 4.0 | 4.5 | 4.3 | 3.8 | 2.7 | 2.4 | 2.3 | 2.3 | 2.3 |
| 11 | 1.9 | 2.6 | 2.4 | 4.3 | 4.9 | 4.4 | 3.8 | 2.7 | 2.4 | 2.1 | 2.4 | 2.5 |
| 12 | 1.9 | 2.5 | 2.4 | 4.5 | 4.8 | 5.0 | 3.8 | 2.6 | 2.4 | 2.2 | 2.3 | 2.4 |
| 13 | 1.9 | 2.5 | 2.3 | 4.7 | 4.5 | 4.3 | 3.7 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 |
| 14 | 1.9 | 2.5 | 2.3 | 5.5 | 4.4 | 4.3 | 3.6 | 2.6 | 2.4 | 2.3 | 2.3 | 2.3 |
| 15 | 1.9 | 2.5 | 2.3 | 5.4 | 4.3 | 4.0 | 3.6 | 2.5 | 2.4 | 2.3 | 2.3 | 2.2 |
| 16 | 1.9 | 2.5 | 2.3 | 5.0 | 4.5 | 3.8 | 3.5 | 2.5 | 2.3 | 2.3 | 2.3 | 2.3 |
| 17 | 1.9 | 2.5 | 2.5 | 4.9 | 4.5 | 3.6 | 3.4 | 2.5 | 2.3 | 2.3 | 2.3 | 2.2 |
| 18 | 1.9 | 2.5 | 8.2 | 4.8 | 4.7 | 3.6 | 3.5 | 2.5 | 2.3 | 2.4 | 2.3 | 2.2 |
| 19 | 1.9 | 2.5 | 7.5 | 4.8 | 4.9 | 3.8 | 3.5 | 2.5 | 2.3 | 2.4 | 2.3 | 2.2 |
| 20 | 1.9 | 2.5 | 6.3 | 5.4 | 5.3 | 3.9 | 3.5 | 2.5 | 2.3 | 2.4 | 2.4 | 2.2 |
| 21 | 1.9 | 2.5 | 5.2 | 5.2 | 4.8 | 4.0 | 3.4 | 2.5 | 2.3 | 2.4 | 2.3 | 2.2 |
| 22 | 1.8 | 2.5 | 4.6 | 5.0 | 4.5 | 4.3 | 3.4 | 2.4 | 2.3 | 2.4 | 2.3 | 2.1 |
| 23 | 1.8 | 2.5 | 4.0 | 5.3 | 4.4 | 4.0 | 3.4 | 2.4 | 2.3 | 2.4 | 2.3 | 2.1 |
| 24 | 1.8 | 2.5 | 3.9 | 5.3 | 4.3 | 3.9 | 3.3 | 2.4 | 2.3 | 2.4 | 2.2 | 2.1 |
| 25 | 1.8 | 2.5 | 3.8 | 5.3 | 4.3 | 3.9 | 3.3 | 2.4 | 2.3 | 2.5 | 2.2 | 2.1 |
| 26 | 1.8 | 2.5 | 3.6 | 5.3 | 4.3 | 3.8 | 3.3 | 2.4 | 2.2 | 2.5 | 2.2 | 2.2 |
| 27 | 1.8 | 2.5 | 3.5 | 5.3 | 4.3 | 3.9 | 3.2 | 2.4 | 2.3 | 2.6 | 2.2 | 2.7 |
| 28 | 2.2 | 2.5 | 3.4 | 5.3 | 4.4 | 4.0 | 3.3 | 2.4 | 2.3 | 2.5 | 2.2 | 2.4 |
| 29 | 2.2 | ..... | 3.3 | 5.1 | 4.5 | 4.1 | 3.3 | 2.4 | 2.3 | 2.5 | 2.2 | 2.2 |
| 30 | 2.1 | ..... | 3.4 | 5.0 | 4.6 | 4.0 | 3.3 | 2.3 | 2.3 | 2.4 | 2.1 | 2.3 |
| 31 | 2.1 | ..... | 3.4 | ..... | 4.7 | ..... | 3.1 | 2.4 | ..... | 2.5 | ..... | 2.3 |
| 1908. | | | | | | | | | | | | |
| 1 | 2.2 | 2.2 | 2.2 | 2.4 | 2.5 | 1.9 | 1.1 | 1.2 | .9 | .9 | 1.4 | 1.4 |
| 2 | 2.2 | 2.2 | 2.1 | 2.3 | 2.4 | 1.8 | 1.2 | 1.4 | .9 | .9 | 1.4 | 1.4 |
| 3 | 2.2 | 2.2 | 2.2 | 2.3 | 2.3 | 1.8 | 1.1 | 1.4 | .9 | 1.0 | 1.4 | 1.4 |
| 4 | 2.3 | 2.2 | 2.2 | 2.4 | 2.0 | 1.8 | 1.1 | 1.2 | .9 | 1.0 | 1.4 | 1.4 |
| 5 | 2.1 | 2.2 | 2.1 | 2.5 | 2.0 | 1.7 | 1.0 | 1.1 | .8 | 1.1 | 1.4 | 1.4 |
| 6 | 2.1 | 2.2 | 2.1 | 2.5 | 2.0 | 1.8 | .9 | 1.0 | .8 | 1.0 | 1.4 | 1.4 |
| 7 | 2.2 | 2.2 | 2.0 | 2.4 | 2.2 | 1.7 | .9 | 1.0 | .8 | 1.0 | 1.4 | 1.4 |
| 8 | 2.2 | 2.2 | 2.0 | 2.2 | 2.1 | 1.9 | .9 | 1.1 | .9 | 1.0 | 1.4 | 1.4 |
| 9 | 2.3 | 2.2 | 2.2 | 2.3 | 1.9 | 2.0 | 1.1 | 1.1 | 1.0 | 1.1 | 1.4 | 1.4 |
| 10 | 2.2 | 2.1 | 2.2 | 2.4 | 1.8 | 2.0 | 1.2 | 1.2 | 1.0 | 1.1 | 1.4 | 1.4 |
| 11 | 2.3 | 2.1 | 2.1 | 2.7 | 1.8 | 2.0 | 1.0 | 1.0 | .9 | 1.1 | 1.4 | 1.4 |
| 12 | 2.3 | 2.1 | 2.2 | 2.3 | 2.0 | 2.0 | 1.1 | 1.1 | 1.0 | 1.2 | 1.4 | 1.4 |
| 13 | 2.3 | 2.0 | 2.2 | 3.0 | 1.9 | 2.1 | 1.2 | 1.1 | 1.0 | 1.2 | 1.4 | 1.4 |
| 14 | 2.3 | 2.1 | 2.3 | 3.0 | 1.8 | 2.3 | 1.1 | 1.1 | .9 | 1.4 | 1.4 | 1.4 |
| 15 | 2.3 | 2.1 | 2.3 | 2.9 | 1.8 | 2.1 | 1.0 | 1.1 | 1.0 | 1.6 | 1.3 | 1.3 |
| 16 | 2.3 | 2.1 | 2.5 | 2.7 | 1.7 | 2.0 | 1.0 | 1.1 | 1.0 | 1.7 | 1.3 | 1.3 |
| 17 | 2.3 | 2.1 | 2.5 | 2.5 | 1.7 | 1.9 | 1.0 | 1.0 | 1.0 | 1.6 | 1.4 | 1.3 |
| 18 | 2.4 | 2.0 | 2.6 | 2.4 | 1.6 | 1.8 | .9 | 1.1 | 1.0 | 1.5 | 1.4 | 1.3 |
| 19 | 2.4 | 2.1 | 2.7 | 2.5 | 1.8 | 1.8 | .9 | 1.0 | 1.1 | 1.4 | 1.4 | 1.4 |
| 20 | 2.3 | 2.1 | 2.7 | 2.5 | 1.7 | 1.6 | .9 | 1.0 | 1.0 | 1.4 | 1.4 | 1.5 |
| 21 | 2.3 | 2.0 | 2.7 | 2.8 | 1.6 | 1.7 | .9 | 1.0 | 1.0 | 1.4 | 1.5 | 1.5 |
| 22 | 2.3 | 2.1 | 2.6 | 2.6 | 1.6 | 1.6 | .9 | 1.0 | .9 | 1.4 | 1.5 | 1.5 |
| 23 | 2.2 | 2.0 | 2.6 | 2.4 | 1.7 | 1.3 | 1.2 | 1.1 | .9 | 1.4 | 1.5 | 1.5 |
| 24 | 2.3 | 2.0 | 2.7 | 2.2 | 1.8 | 1.3 | 1.3 | 1.0 | .9 | 1.4 | 1.5 | 1.5 |
| 25 | 2.3 | 2.0 | 2.9 | 2.1 | 1.9 | 1.3 | 1.2 | 1.0 | .9 | 1.4 | 1.4 | 1.4 |
| 26 | 2.3 | 2.1 | 2.8 | 2.2 | 2.1 | 1.3 | 1.1 | 1.0 | .9 | 1.4 | 1.4 | 1.4 |
| 27 | 2.3 | 2.1 | 2.6 | 2.1 | 2.1 | 1.2 | 1.1 | .9 | .9 | 1.4 | 1.4 | 1.4 |
| 28 | 2.3 | 2.2 | 2.5 | 2.3 | 2.0 | 1.1 | 1.1 | .9 | .9 | 1.4 | 1.4 | 1.4 |
| 29 | 2.2 | 2.1 | 2.4 | 2.3 | 2.0 | 1.1 | 1.3 | .9 | .9 | 1.4 | 1.4 | 1.4 |
| 30 | 2.2 | ..... | 2.5 | 2.4 | 2.1 | 1.0 | 1.2 | .9 | .9 | 1.4 | 1.4 | 1.4 |
| 31 | 2.2 | ..... | 2.4 | ..... | 2.0 | ..... | 1.7 | .9 | ..... | 1.4 | ..... | 1.3 |

*Daily gage height, in feet, of Truckee River at Reno, Nev., for 1906–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909. | | | | | | | | | | | | |
| 1 | 1.3 | 2.6 | 2.4 | 2.7 | 4.4 | 3.7 | 3.4 | 1.7 | 1.4 | 1.4 | 1.7 | 3.0 |
| 2 | 1.4 | 2.6 | 2.4 | 2.8 | 4.4 | 4.2 | 3.4 | 1.7 | 1.4 | 1.4 | 1.7 | 4.4 |
| 3 | 1.4 | 2.6 | 2.5 | 3.1 | 4.5 | 4.3 | 3.4 | 1.7 | 1.4 | 1.5 | 1.7 | 3.5 |
| 4 | 1.4 | 2.6 | 2.6 | 3.2 | 4.6 | 4.3 | 3.3 | 1.6 | 1.4 | 1.5 | 1.6 | 2.6 |
| 5 | 1.6 | 2.5 | 2.5 | 3.3 | 4.7 | 4.3 | 3.6 | 1.5 | 1.4 | 1.3 | 1.7 | 2.4 |
| 6 | 2.7 | 2.4 | 2.5 | 3.1 | 4.7 | 3.9 | 2.9 | 1.5 | 1.4 | 1.5 | 1.7 | 2.4 |
| 7 | 2.2 | 2.5 | 2.5 | 3.3 | 4.8 | 3.9 | 2.8 | 1.6 | 1.3 | 1.4 | 1.7 | 2.4 |
| 8 | 2.0 | 2.5 | 2.5 | 3.2 | 4.6 | 3.8 | 2.8 | 1.5 | 1.3 | 1.4 | 1.7 | 2.4 |
| 9 | 1.7 | 2.5 | 2.5 | 3.3 | 4.6 | 3.8 | 2.9 | 1.4 | 1.2 | 1.4 | 1.6 | 3.0 |
| 10 | 1.6 | 2.5 | 2.4 | 3.5 | 4.6 | 3.7 | 2.8 | 1.4 | 1.1 | 1.4 | 1.8 | 2.7 |
| 11 | 1.4 | 2.5 | 2.4 | 3.4 | 4.3 | 3.7 | 2.6 | 1.5 | 1.1 | 1.3 | 1.8 | 2.5 |
| 12 | 1.9 | 2.5 | 2.4 | 3.6 | 4.1 | 3.7 | 2.4 | 1.4 | 1.1 | 1.4 | 1.7 | 2.5 |
| 13 | 2.3 | 2.5 | 2.5 | 3.8 | 3.9 | 3.8 | 2.4 | 1.2 | 1.2 | 1.4 | 1.6 | 2.5 |
| 14 | 4.2 | 2.5 | 2.5 | 4.0 | 3.8 | 3.8 | 2.3 | 1.3 | 1.1 | 1.4 | 1.7 | 2.4 |
| 15 | 6.2 | 2.5 | 2.5 | 4.3 | 3.8 | 3.8 | 2.2 | 1.2 | 1.1 | 1.4 | 1.8 | 2.3 |
| 16 | 6.5 | 2.5 | 2.8 | 4.4 | 3.6 | 3.8 | 2.0 | 1.2 | 1.1 | 1.4 | 1.7 | 2.4 |
| 17 | 5.4 | 2.8 | 2.9 | 4.5 | 3.5 | 3.8 | 1.8 | 1.2 | 1.2 | 1.4 | 1.7 | 2.3 |
| 18 | 4.9 | 2.8 | 2.8 | 4.7 | 3.3 | 3.7 | 1.8 | 1.2 | 1.1 | 1.4 | 1.7 | 2.3 |
| 19 | 4.2 | 2.7 | 2.8 | 5.0 | 3.3 | 3.7 | 1.8 | 1.2 | 1.2 | 1.5 | 1.7 | 2.3 |
| 20 | 3.9 | 2.6 | 2.8 | 4.2 | 3.4 | 3.4 | 1.8 | 1.2 | 1.1 | 1.4 | 2.6 | 2.3 |
| 21 | 3.9 | 2.6 | 2.8 | 3.9 | 3.6 | 3.5 | 1.8 | 1.3 | 1.4 | 1.3 | 4.8 | 2.3 |
| 22 | 3.7 | 2.5 | 2.8 | 3.8 | 3.3 | 3.5 | 1.6 | 1.4 | 1.1 | 1.5 | 3.3 | 2.3 |
| 23 | 3.4 | 2.5 | 2.7 | 4.0 | 3.1 | 3.7 | 1.8 | 1.4 | 1.1 | 1.5 | 3.4 | 2.3 |
| 24 | 3.1 | 2.6 | 2.6 | 4.1 | 3.1 | 3.9 | 1.8 | 1.4 | 1.1 | 1.5 | 3.2 | 2.3 |
| 25 | 3.0 | 2.5 | 2.6 | 4.1 | 3.2 | 3.9 | 1.9 | 1.4 | 1.1 | 1.5 | 3.5 | 2.3 |
| 26 | 2.9 | 2.5 | 2.6 | 4.3 | 3.2 | 3.7 | 1.9 | 1.4 | 1.2 | 1.6 | 3.5 | 2.3 |
| 27 | 2.9 | 2.5 | 2.6 | 4.5 | 3.4 | 3.7 | 1.9 | 1.4 | 1.2 | 1.5 | 2.5 | 2.3 |
| 28 | 2.9 | 2.5 | 2.5 | 4.8 | 3.4 | 3.6 | 1.9 | 1.4 | 1.2 | 1.5 | 2.4 | 2.3 |
| 29 | 2.7 | ..... | 2.6 | 4.6 | 3.3 | 3.6 | 1.8 | 1.4 | 1.2 | 1.6 | 2.3 | 2.3 |
| 30 | 2.7 | ..... | 2.5 | 4.5 | 3.1 | 3.5 | 1.9 | 1.4 | 1.3 | 1.7 | 2.3 | 2.3 |
| 31 | 2.6 | ..... | 2.5 | ..... | 3.4 | ..... | 1.8 | 1.4 | ..... | 1.7 | ..... | 2.5 |

*Daily discharge, in second-feet, of Truckee River at Reno, Nev., for 1906–1909.*

| Day. | July. | Aug. | Sept. | Oct. | Nov. | Dec. | Day. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1906. | | | | | | | 1906. | | | | | | |
| 1 | 2,250 | 720 | 460 | 400 | 580 | 580 | 16 | 1,660 | 460 | 400 | 520 | 720 | 1,060 |
| 2 | 2,520 | 580 | 400 | 185 | 580 | 580 | 17 | 1,450 | 460 | 400 | 520 | 650 | 1,060 |
| 3 | 2,660 | 650 | 400 | 350 | 580 | 580 | 18 | 1,350 | 460 | 400 | 460 | 650 | 970 |
| 4 | 2,660 | 580 | 350 | 350 | 720 | 580 | 19 | 1,250 | 460 | 350 | 460 | 580 | 970 |
| 5 | 2,660 | 350 | 350 | 300 | 880 | 580 | 20 | 1,150 | 520 | 400 | 460 | 580 | 970 |
| 6 | 2,520 | 220 | 400 | 300 | 650 | 580 | 21 | 1,150 | 460 | 350 | 460 | 580 | 970 |
| 7 | 2,520 | 350 | 400 | 350 | 650 | 580 | 22 | 1,060 | 460 | 350 | 520 | 650 | 970 |
| 8 | 2,380 | 350 | 400 | 350 | 650 | 580 | 23 | 1,060 | 460 | 350 | 520 | 650 | 970 |
| 9 | 2,250 | 400 | 350 | 350 | 650 | 580 | 24 | 1,060 | 460 | 350 | 520 | 650 | 970 |
| 10 | 2,120 | 460 | 400 | 350 | 650 | 580 | 25 | 1,060 | 460 | 350 | 520 | 650 | 970 |
| 11 | 1,880 | 580 | 400 | 460 | 650 | 1,060 | 26 | 1,150 | 460 | 400 | 520 | 650 | 880 |
| 12 | 2,000 | 520 | 400 | 460 | 650 | 1,060 | 27 | 1,250 | 400 | 460 | 580 | 650 | 880 |
| 13 | 1,880 | 460 | 400 | 520 | 650 | 1,060 | 28 | 1,060 | 400 | 350 | 580 | 650 | 800 |
| 14 | 1,770 | 460 | 400 | 580 | 650 | 1,060 | 29 | 880 | 400 | 400 | 255 | 580 | 800 |
| 15 | 1,660 | 460 | 400 | 520 | 650 | 1,060 | 30 | 800 | 400 | 350 | 520 | 580 | 720 |
| | | | | | | | 31 | 720 | 460 | ..... | 650 | ..... | 650 |

*Daily discharge, in second-feet, of Truckee River at Reno, Nev., for 1906–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907. | | | | | | | | | | | | |
| 1 | 650 | 880 | 1,060 | 2,520 | 4,380 | 4,780 | 3,270 | 1,770 | 1,060 | 1,060 | 1,150 | 880 |
| 2 | 650 | 1,450 | 1,060 | 2,660 | 4,580 | 5,000 | 3,110 | 1,660 | 1,060 | 1,060 | 1,150 | 800 |
| 3 | 650 | 1,880 | 1,060 | 2,520 | 4,380 | 5,000 | 3,110 | 1,660 | 1,150 | 970 | 1,150 | 880 |
| 4 | 650 | 2,120 | 1,060 | 2,380 | 3,800 | 4,780 | 3,440 | 1,550 | 1,150 | 720 | 1,150 | 880 |
| 5 | 580 | 1,880 | 1,060 | 2,250 | 3,440 | 4,580 | 3,270 | 1,550 | 1,150 | 970 | 1,150 | 880 |
| 6 | 580 | 1,660 | 1,060 | 2,250 | 3,440 | 4,180 | 2,950 | 1,550 | 1,150 | 720 | 1,060 | 880 |
| 7 | 650 | 1,550 | 1,060 | 2,380 | 3,440 | 3,990 | 2,950 | 1,450 | 1,150 | 580 | 1,060 | 1,150 |
| 8 | 650 | 1,350 | 1,060 | 2,380 | 3,110 | 3,620 | 2,800 | 1,450 | 1,060 | 520 | 800 | 970 |
| 9 | 650 | 1,250 | 1,060 | 2,660 | 3,440 | 3,440 | 2,660 | 1,450 | 1,060 | 720 | 800 | 970 |
| 10 | 650 | 1,250 | 1,060 | 2,950 | 3,800 | 3,440 | 2,660 | 1,350 | 1,060 | 970 | 970 | 970 |
| 11 | 650 | 1,250 | 1,060 | 3,440 | 4,580 | 3,620 | 2,660 | 1,350 | 1,060 | 800 | 1,060 | 1,150 |
| 12 | 650 | 1,150 | 1,060 | 3,800 | 4,380 | 4,780 | 2,660 | 1,250 | 1,060 | 880 | 970 | 1,060 |
| 13 | 650 | 1,150 | 970 | 4,180 | 3,800 | 3,440 | 2,520 | 1,250 | 1,060 | 970 | 970 | 970 |
| 14 | 650 | 1,150 | 970 | 5,900 | 3,620 | 3,440 | 2,380 | 1,250 | 1,060 | 970 | 970 | 970 |
| 15 | 650 | 1,150 | 970 | 5,670 | 3,440 | 2,950 | 2,380 | 1,150 | 1,060 | 970 | 970 | 880 |
| 16 | 650 | 1,150 | 970 | 4,780 | 3,800 | 2,660 | 2,250 | 1,150 | 970 | 970 | 970 | 970 |
| 17 | 650 | 1,150 | 1,150 | 4,580 | 3,800 | 2,380 | 2,120 | 1,150 | 970 | 970 | 970 | 880 |
| 18 | 650 | 1,150 | 14,600 | 4,380 | 4,180 | 2,380 | 2,250 | 1,150 | 970 | 1,060 | 970 | 880 |
| 19 | 650 | 1,150 | 11,900 | 4,380 | 4,580 | 2,660 | 2,250 | 1,150 | 970 | 1,060 | 970 | 880 |
| 20 | 650 | 1,150 | 7,980 | 5,670 | 5,440 | 2,800 | 2,250 | 1,150 | 970 | 1,060 | 1,060 | 880 |
| 21 | 650 | 1,150 | 5,220 | 5,220 | 4,380 | 2,950 | 2,120 | 1,150 | 970 | 1,060 | 970 | 880 |
| 22 | 580 | 1,150 | 3,990 | 4,780 | 3,800 | 3,440 | 2,120 | 1,060 | 970 | 1,060 | 970 | 800 |
| 23 | 580 | 1,150 | 2,950 | 5,440 | 3,620 | 2,950 | 2,120 | 1,060 | 970 | 1,060 | 970 | 800 |
| 24 | 580 | 1,150 | 2,800 | 5,440 | 3,440 | 2,800 | 2,000 | 1,060 | 970 | 1,060 | 880 | 800 |
| 25 | 580 | 1,150 | 2,660 | 5,440 | 3,440 | 2,800 | 2,000 | 1,060 | 970 | 1,150 | 880 | 800 |
| 26 | 580 | 1,150 | 2,380 | 5,440 | 3,440 | 2,660 | 2,000 | 1,060 | 880 | 1,150 | 880 | 880 |
| 27 | 580 | 1,150 | 2,250 | 5,440 | 3,440 | 2,800 | 1,880 | 1,060 | 970 | 1,250 | 880 | 1,350 |
| 28 | 880 | 1,150 | 2,120 | 5,440 | 3,620 | 2,950 | 2,000 | 1,060 | 970 | 1,150 | 880 | 1,060 |
| 29 | 880 | ..... | 2,000 | 5,000 | 3,800 | 3,110 | 2,000 | 1,060 | 970 | 1,150 | 880 | 880 |
| 30 | 800 | ..... | 2,120 | 4,780 | 3,990 | 2,950 | 2,000 | 970 | 970 | 1,060 | 800 | 970 |
| 31 | 800 | ..... | 2,120 | ..... | 4,180 | ..... | 1,770 | 1,060 | ..... | 1,150 | ..... | 970 |
| 1908. | | | | | | | | | | | | |
| 1 | 880 | 880 | 880 | 1,060 | 1,150 | 650 | 220 | 255 | 155 | 155 | 350 | 350 |
| 2 | 880 | 880 | 800 | 970 | 1,060 | 580 | 255 | 350 | 155 | 155 | 350 | 350 |
| 3 | 880 | 880 | 880 | 970 | 970 | 580 | 220 | 350 | 155 | 185 | 350 | 350 |
| 4 | 970 | 880 | 880 | 1,060 | 720 | 580 | 220 | 255 | 155 | 185 | 350 | 350 |
| 5 | 800 | 880 | 800 | 1,150 | 720 | 520 | 185 | 220 | 125 | 220 | 350 | 350 |
| 6 | 800 | 880 | 800 | 1,150 | 720 | 580 | 155 | 185 | 125 | 185 | 350 | 350 |
| 7 | 880 | 880 | 720 | 1,060 | 880 | 520 | 155 | 185 | 125 | 185 | 350 | 350 |
| 8 | 880 | 880 | 720 | 880 | 800 | 650 | 155 | 220 | 155 | 185 | 350 | 350 |
| 9 | 970 | 880 | 880 | 970 | 650 | 720 | 220 | 220 | 185 | 220 | 350 | 350 |
| 10 | 880 | 800 | 880 | 1,060 | 580 | 720 | 255 | 255 | 185 | 220 | 350 | 350 |
| 11 | 970 | 800 | 800 | 1,350 | 580 | 720 | 185 | 185 | 155 | 220 | 350 | 350 |
| 12 | 970 | 800 | 880 | 970 | 720 | 720 | 220 | 220 | 185 | 255 | 350 | 350 |
| 13 | 970 | 720 | 880 | 1,660 | 650 | 800 | 255 | 220 | 185 | 255 | 350 | 350 |
| 14 | 970 | 800 | 970 | 1,660 | 580 | 970 | 220 | 220 | 155 | 350 | 350 | 350 |
| 15 | 970 | 800 | 970 | 1,550 | 580 | 800 | 185 | 220 | 185 | 460 | 300 | 300 |
| 16 | 970 | 800 | 1,150 | 1,350 | 520 | 720 | 185 | 220 | 185 | 520 | 300 | 300 |
| 17 | 970 | 800 | 1,150 | 1,150 | 520 | 650 | 185 | 185 | 185 | 460 | 350 | 300 |
| 18 | 1,060 | 720 | 1,250 | 1,060 | 460 | 580 | 155 | 220 | 185 | 400 | 350 | 300 |
| 19 | 1,060 | 800 | 1,350 | 1,150 | 580 | 580 | 155 | 185 | 220 | 350 | 350 | 350 |
| 20 | 970 | 800 | 1,350 | 1,150 | 520 | 460 | 155 | 185 | 185 | 350 | 350 | 400 |
| 21 | 970 | 720 | 1,350 | 1,450 | 460 | 520 | 155 | 185 | 185 | 350 | 400 | 400 |
| 22 | 970 | 800 | 1,250 | 1,250 | 460 | 460 | 155 | 185 | 155 | 350 | 400 | 400 |
| 23 | 880 | 720 | 1,250 | 1,060 | 520 | 300 | 255 | 220 | 155 | 350 | 400 | 400 |
| 24 | 970 | 720 | 1,350 | 880 | 580 | 300 | 300 | 185 | 155 | 350 | 400 | 400 |
| 25 | 970 | 720 | 1,550 | 800 | 650 | 300 | 255 | 185 | 155 | 350 | 350 | 350 |
| 26 | 970 | 800 | 1,450 | 880 | 800 | 300 | 220 | 185 | 155 | 350 | 350 | 350 |
| 27 | 970 | 800 | 1,250 | 800 | 800 | 255 | 220 | 155 | 155 | 350 | 350 | 350 |
| 28 | 970 | 880 | 1,150 | 970 | 720 | 220 | 220 | 155 | 155 | 350 | 350 | 350 |
| 29 | 880 | 800 | 1,060 | 970 | 720 | 220 | 300 | 155 | 155 | 350 | 350 | 350 |
| 30 | 880 | ..... | 1,150 | 1,060 | 800 | 185 | 255 | 155 | 155 | 350 | 350 | 350 |
| 31 | 880 | ..... | 1,060 | ..... | 720 | ..... | 520 | 155 | ..... | 350 | ..... | 300 |

*Daily discharge, in second-feet, of Truckee River at Reno, Nev., for 1906–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909. | | | | | | | | | | | | |
| 1 | 300 | 1,250 | 1,060 | 1,350 | 3,620 | 2,520 | 2,120 | 520 | 350 | 350 | 520 | 1,060 |
| 2 | 350 | 1,250 | 1,060 | 1,450 | 3,620 | 3,270 | 2,120 | 520 | 350 | 350 | 520 | 3,620 |
| 3 | 350 | 1,250 | 1,150 | 1,770 | 3,800 | 3,440 | 2,120 | 520 | 350 | 400 | 520 | 2,250 |
| 4 | 350 | 1,250 | 1,250 | 1,880 | 3,990 | 3,440 | 2,000 | 460 | 350 | 400 | 460 | 1,250 |
| 5 | 460 | 1,150 | 1,150 | 2,000 | 4,180 | 3,440 | 2,380 | 400 | 350 | 300 | 520 | 1,060 |
| 6 | 1,350 | 1,060 | 1,150 | 1,770 | 4,180 | 2,800 | 1,550 | 400 | 350 | 400 | 520 | 1,060 |
| 7 | 880 | 1,150 | 1,150 | 2,000 | 4,380 | 2,800 | 1,450 | 460 | 300 | 350 | 520 | 1,060 |
| 8 | 720 | 1,150 | 1,150 | 1,880 | 3,990 | 2,660 | 1,450 | 400 | 300 | 350 | 520 | 1,060 |
| 9 | 520 | 1,150 | 1,150 | 2,000 | 3,990 | 2,660 | 1,550 | 350 | 255 | 350 | 460 | 1,660 |
| 10 | 400 | 1,150 | 1,060 | 2,250 | 3,990 | 2,520 | 1,450 | 350 | 220 | 350 | 580 | 1,350 |
| 11 | 350 | 1,150 | 1,060 | 2,120 | 3,440 | 2,520 | 1,250 | 450 | 220 | 300 | 580 | 1,150 |
| 12 | 650 | 1,150 | 1,060 | 2,380 | 3,110 | 2,520 | 1,060 | 350 | 220 | 350 | 520 | 1,150 |
| 13 | 970 | 1,150 | 1,150 | 2,660 | 2,800 | 2,660 | 1,060 | 255 | 255 | 350 | 460 | 1,150 |
| 14 | 3,270 | 1,150 | 1,150 | 2,950 | 2,660 | 2,660 | 970 | 300 | 220 | 350 | 520 | 1,060 |
| 15 | 7,700 | 1,150 | 1,150 | 3,440 | 2,660 | 2,660 | 880 | 255 | 220 | 350 | 580 | 970 |
| 16 | 8,540 | 1,150 | 1,450 | 3,620 | 2,660 | 2,660 | 720 | 255 | 220 | 350 | 520 | 1,060 |
| 17 | 5,670 | 1,450 | 1,550 | 3,800 | 2,250 | 2,660 | 580 | 255 | 255 | 350 | 520 | 970 |
| 18 | 4,580 | 1,450 | 1,450 | 4,180 | 2,000 | 2,520 | 580 | 255 | 220 | 350 | 520 | 970 |
| 19 | 3,270 | 1,350 | 1,450 | 4,780 | 2,000 | 2,520 | 580 | 255 | 255 | 400 | 520 | 970 |
| 20 | 2,800 | 1,250 | 1,450 | 3,270 | 2,120 | 2,120 | 580 | 255 | 220 | 350 | 1,250 | 970 |
| 21 | 2,800 | 1,250 | 1,450 | 2,800 | 2,380 | 2,250 | 580 | 300 | 350 | 300 | 4,380 | 970 |
| 22 | 2,520 | 1,150 | 1,450 | 2,660 | 2,000 | 2,250 | 460 | 350 | 220 | 400 | 2,000 | 970 |
| 23 | 2,120 | 1,150 | 1,350 | 2,950 | 1,770 | 2,520 | 580 | 350 | 220 | 400 | 2,120 | 970 |
| 24 | 1,770 | 1,250 | 1,250 | 3,110 | 1,770 | 2,800 | 580 | 350 | 220 | 400 | 1,880 | 970 |
| 25 | 1,660 | 1,150 | 1,250 | 3,110 | 1,880 | 2,800 | 650 | 350 | 220 | 400 | 2,250 | 970 |
| 26 | 1,550 | 1,150 | 1,250 | 3,440 | 1,880 | 2,520 | 650 | 350 | 255 | 460 | 2,250 | 970 |
| 27 | 1,550 | 1,150 | 1,250 | 3,800 | 2,120 | 2,520 | 650 | 350 | 255 | 400 | 1,150 | 970 |
| 28 | 1,550 | 1,150 | 1,150 | 4,380 | 2,120 | 2,380 | 650 | 350 | 255 | 400 | 1,060 | 970 |
| 29 | 1,350 | ..... | 1,250 | 3,990 | 2,000 | 2,380 | 580 | 350 | 255 | 460 | 970 | 970 |
| 30 | 1,350 | ..... | 1,150 | 3,800 | 1,770 | 2,250 | 650 | 350 | 300 | 520 | 970 | 970 |
| 31 | 1,250 | ..... | 1,150 | ..... | 2,120 | ..... | 580 | 350 | ..... | 520 | ..... | 1,150 |

NOTE.—These discharges are based on a rating curve well defined between 220 and 10,100 second-feet.

*Monthly discharge of Truckee River at Reno, Nev., for 1906–1909.*

| Month. | Discharge in second-feet. | | | Run-off (total in acre-feet). | Accuracy. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | |
| 1906. | | | | | |
| July | 2,660 | 720 | 1,670 | 103,000 | A. |
| August | 720 | 220 | 462 | 28,400 | A. |
| September | 460 | 350 | 386 | 23,000 | A. |
| October | 650 | 185 | 448 | 27,500 | A. |
| November | 880 | 580 | 644 | 38,300 | A. |
| December | 1,060 | 580 | 829 | 51,000 | A. |
| The period | ..... | ..... | ..... | 271,000 | |
| 1907. | | | | | |
| January | 880 | 580 | 656 | 40,300 | A. |
| February | 2,120 | 880 | 1,290 | 71,600 | A. |
| March | 14,600 | 970 | 2,670 | 164,000 | A. |
| April | 5,900 | 2,250 | 4,140 | 246,000 | A. |
| May | 5,440 | 3,110 | 3,890 | 239,000 | A. |
| June | 5,000 | 2,380 | 3,440 | 205,000 | A. |
| July | 3,440 | 1,770 | 2,450 | 151,000 | A. |
| August | 1,770 | 970 | 1,260 | 77,500 | A. |
| September | 1,150 | 970 | 1,030 | 61,300 | A. |
| October | 1,250 | 520 | 977 | 60,100 | A. |
| November | 1,150 | 800 | 977 | 58,100 | A. |
| December | 1,350 | 800 | 935 | 57,500 | A. |
| The year | 14,600 | 520 | 1,980 | 1,430,000 | |

*Monthly discharge of Truckee River at Reno, Nev., for 1906–1909*—Continued.

| Month. | Discharge in second-feet. | | | Run-off (total in acre-feet). | Accuracy. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | |
| 1908. | | | | | |
| January | 1,060 | 800 | 936 | 57,600 | A. |
| February | 880 | 720 | 811 | 46,600 | A. |
| March | 1,550 | 720 | 1,060 | 65,200 | A. |
| April | 1,660 | 800 | 1,120 | 66,600 | A. |
| May | 1,150 | 460 | 684 | 42,100 | A. |
| June | 970 | 185 | 539 | 32,100 | A. |
| July | 520 | 155 | 219 | 13,500 | B. |
| August | 350 | 155 | 209 | 12,900 | B. |
| September | 220 | 125 | 164 | 9,760 | B. |
| October | 520 | 155 | 302 | 18,600 | A. |
| November | 400 | 300 | 353 | 21,000 | A. |
| December | 400 | 300 | 350 | 21,500 | A. |
| The year | 1,660 | 125 | 562 | 407,000 | |
| 1909. | | | | | |
| January | 8,540 | 300 | 2,030 | 125,000 | A. |
| February | 1,450 | 1,060 | 1,200 | 66,600 | A. |
| March | 1,550 | 1,060 | 1,230 | 75,600 | A. |
| April | 4,780 | 1,350 | 2,850 | 170,000 | A. |
| May | 4,380 | 1,770 | 2,810 | 173,000 | A. |
| June | 3,440 | 2,120 | 2,660 | 158,000 | A. |
| July | 2,380 | 460 | 1,070 | 65,800 | A. |
| August | 520 | 255 | 357 | 22,000 | A. |
| September | 350 | 220 | 268 | 15,900 | A. |
| October | 520 | 300 | 379 | 23,300 | A. |
| November | 4,380 | 460 | 1,010 | 60,100 | A. |
| December | 3,620 | 970 | 1,200 | 73,800 | A. |
| The year | 8,540 | 220 | 1,420 | 1,030,000 | |

## TRUCKEE RIVER AT DERBY DAM, NEV.

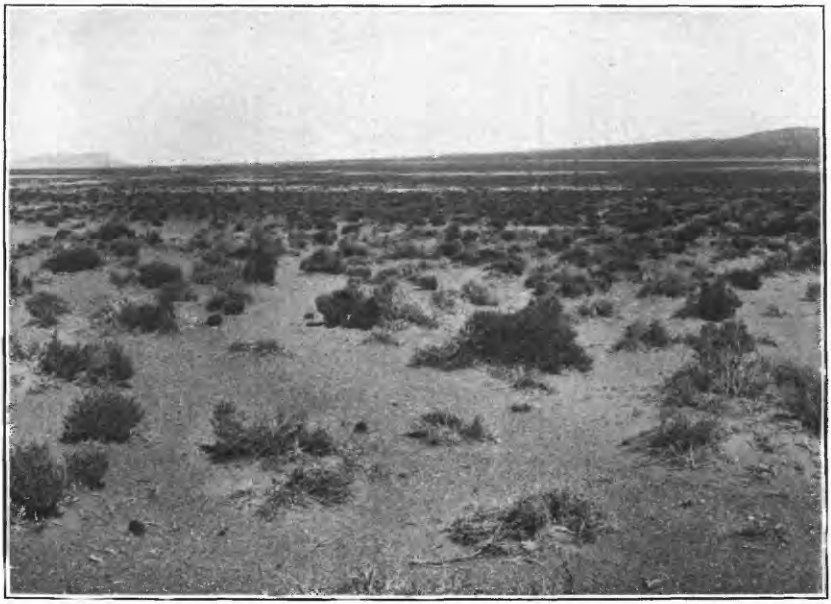
This station, which is located about 2 miles east of Clarks, Nev., three-fourths of a mile above the Reclamation Service diversion dam for the main canal of the Truckee-Carson project (see Pl. V), was established July 1, 1907, to determine the amount of water available for the canal and the amount in excess of the requirements of the water users in the Wadsworth Valley.

The equipment consists of a cable and car and an inclined staff gage in two sections, the datum of which has remained unchanged. This station replaces the station at Vista, giving practically the same record.

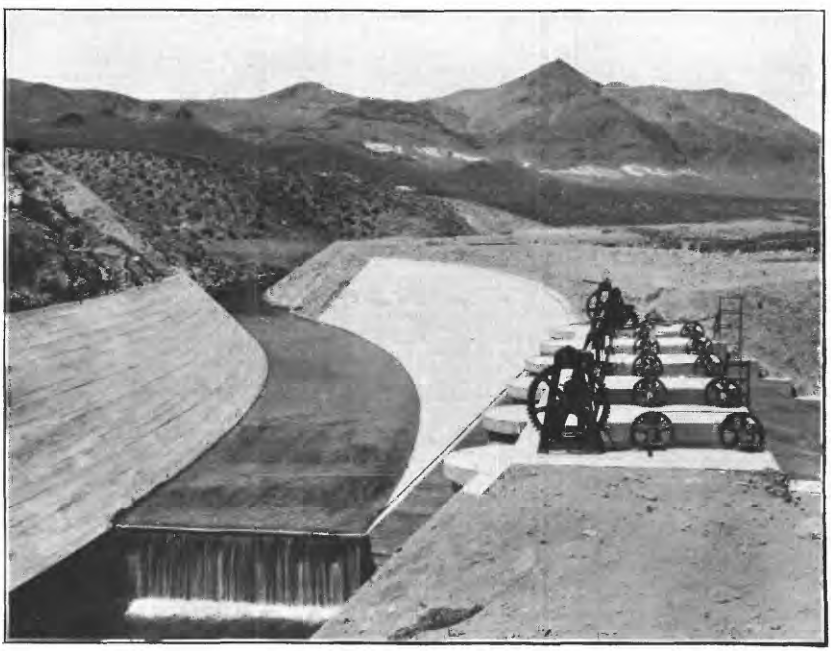
Results obtained at this station are good, although at times gage heights are evidently affected by backwater.

*Discharge measurements of Truckee River at Derby dam, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 17 | M. B. Kennedy | | 1,460 | 14.00 | 9,080 |
| January 20 | E. A. Porter | | 762 | 9.20 | 4,030 |
| January 21 | do | | 908 | 10.20 | 4,900 |
| January 28 | do | | 371 | 6.20 | 1,660 |
| July 26 | L. J. Towne | | 382 | 5.80 | 702 |
| September 15 | F. C. Schafer | 96 | 215 | 4.20 | 385 |
| October 20 | do | 99 | 219 | 4.30 | 539 |
| December 6 | do | 108 | 349 | 5.60 | 1,250 |



*A*. IRRIGATION LANDS IN VICINITY OF MAIN TRUCKEE CANAL NEAR WADSWORTH, NEV.



*B*. MAIN TRUCKEE CANAL AT THE DERBY WASTEWAY.

TRUCKEE-CARSON PROJECT, NEVADA.

*Daily gage height, in feet, of Truckee River at Derby dam, Nev., for 1909.*

[R. Harling, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.0 | 5.85 | 5.6 | 5.75 | 8.8 | 7.7 | 7.1 | 5.55 | 5.1 | 5.1 | 5.0 | 6.5 |
| 2 | 4.1 | 5.75 | 5.65 | 6.0 | 8.75 | 8.4 | 6.9 | 5.55 | 5.0 | 5.5 | 5.0 | 9.4 |
| 3 | 4.2 | 5.7 | 5.65 | 6.35 | 8.9 | 8.45 | 7.3 | 5.7 | 5.1 | 6.0 | 5.0 | 6.0 |
| 4 | 4.2 | 5.65 | 5.8 | 7.0 | 9.1 | 8.5 | 6.5 | 4.9 | 5.1 | 6.2 | 5.0 | 5.9 |
| 5 | 4.25 | 5.55 | 5.7 | 7.05 | 9.3 | 8.6 | 6.3 | 4.95 | 5.1 | 5.6 | 5.0 | 5.8 |
| 6 | 5.9 | 5.5 | 5.6 | 6.65 | 9.35 | 8.5 | 6.2 | 4.9 | 4.9 | 5.3 | 5.0 | 5.6 |
| 7 | 5.15 | 5.5 | 5.6 | 6.5 | 9.5 | 8.1 | 6.2 | 5.1 | 4.9 | 5.0 | 5.0 | 5.45 |
| 8 | 4.15 | 5.5 | 5.55 | 6.45 | 9.6 | 7.8 | 6.0 | 5.0 | 4.75 | 5.0 | 4.8 | 5.45 |
| 9 | 4.95 | 5.55 | 5.55 | 6.7 | 9.5 | 7.5 | 5.7 | 5.0 | 4.5 | 4.8 | 4.8 | 6.5 |
| 10 | 4.2 | 5.85 | 5.5 | 7.3 | 9.2 | 7.2 | 5.5 | 5.05 | 4.0 | 4.75 | 4.8 | 5.95 |
| 11 | 4.1 | 6.2 | 5.45 | 7.1 | 9.0 | 7.3 | 5.5 | 5.05 | 3.9 | 4.7 | 4.8 | 5.6 |
| 12 | 4.7 | 6.3 | 5.35 | 7.2 | 8.6 | 7.5 | 5.45 | 4.7 | 4.0 | 4.75 | 5.0 | 5.6 |
| 13 | 4.55 | 6.45 | 5.45 | 7.4 | 7.9 | 7.7 | 5.4 | 4.2 | 4.2 | 4.7 | 4.1 | 5.55 |
| 14 | 9.6 | 6.5 | 5.45 | 8.1 | 7.65 | 7.7 | 5.4 | 4.9 | 4.2 | 4.75 | 4.5 | 5.55 |
| 15 | 10.95 | 6.55 | 5.5 | 8.35 | 7.2 | 7.7 | 5.3 | 3.95 | 4.2 | 4.75 | 4.5 | 5.55 |
| 16 | 12.75 | 6.7 | 5.7 | 8.45 | 6.9 | 7.7 | 5.3 | 4.0 | 4.3 | 4.8 | 4.5 | 5.55 |
| 17 | 12.95 | 6.8 | 5.9 | 8.6 | 6.9 | 7.7 | 4.7 | 4.0 | 4.4 | 4.7 | 4.5 | 5.55 |
| 18 | 11.45 | 6.4 | 6.1 | 9.3 | 6.9 | 7.6 | 5.1 | 4.0 | 4.0 | 4.4 | 4.5 | 5.55 |
| 19 | 10.25 | 6.0 | 6.0 | 9.0 | 6.9 | 7.5 | 5.0 | 4.0 | 4.2 | 4.9 | 5.4 | 5.55 |
| 20 | 9.35 | 6.0 | 6.0 | 8.1 | 6.9 | 7.2 | 5.0 | 4.1 | 4.4 | 4.3 | 6.0 | 5.55 |
| 21 | 10.2 | 5.9 | 5.9 | 8.1 | 7.3 | 7.1 | 5.0 | 4.1 | 5.8 | 4.3 | 9.5 | 5.6 |
| 22 | 9.2 | 5.8 | 5.8 | 7.9 | 6.8 | 7.25 | 4.9 | 4.7 | 4.4 | 4.3 | 8.2 | 5.65 |
| 23 | 7.9 | 5.6 | 5.7 | 7.9 | 6.4 | 7.4 | 4.7 | 4.75 | 4.0 | 5.5 | 7.3 | 5.6 |
| 24 | 6.9 | 5.55 | 5.7 | 8.15 | 6.4 | 7.6 | 4.9 | 4.9 | 4.1 | 5.0 | 6.9 | 5.65 |
| 25 | 6.5 | 5.55 | 5.65 | 8.5 | 6.8 | 7.9 | 5.6 | 4.9 | 4.1 | 5.0 | 5.4 | 5.6 |
| 26 | 6.3 | 5.55 | 5.65 | 8.8 | 6.9 | 7.8 | 5.8 | 5.0 | 4.2 | 5.4 | 5.3 | 5.6 |
| 27 | 6.2 | 5.65 | 5.65 | 9.0 | 7.2 | 7.5 | 5.6 | 5.0 | 4.1 | 5.0 | 5.43 | 5.6 |
| 28 | 6.2 | 5.65 | 5.65 | 8.9 | 7.2 | 7.5 | 5.5 | 5.0 | 4.5 | 5.3 | 5.9 | 5.6 |
| 29 | 6.1 | ..... | 5.65 | 8.85 | 7.0 | 7.3 | 5.4 | 5.1 | 4.6 | 5.3 | 5.4 | 5.6 |
| 30 | 6.0 | ..... | 5.65 | 8.85 | 6.65 | 7.2 | 5.45 | 5.0 | 4.9 | 5.3 | 5.35 | 5.6 |
| 31 | 5.9 | ..... | 5.65 | ..... | 7.05 | ..... | 5.55 | 5.2 | ..... | 5.0 | ..... | 5.65 |

NOTE.—Gage heights July 16 to November 12 were probably affected at times by backwater from the dam.

*Daily discharge, in second-feet, of Truckee River at Derby dam, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 370 | 1,380 | 1,220 | 1,310 | 3,700 | 2,790 | 2,310 | 690 | 500 | 520 | 550 | 1,850 |
| 2 | 415 | 1,310 | 1,250 | 1,480 | 3,660 | 3,360 | 2,150 | 680 | 500 | 550 | 550 | 4,210 |
| 3 | 460 | 1,280 | 1,250 | 1,740 | 3,780 | 3,400 | 2,470 | 650 | 500 | 550 | 550 | 1,480 |
| 4 | 460 | 1,250 | 1,340 | 2,230 | 3,960 | 3,440 | 1,850 | 620 | 500 | 520 | 550 | 1,410 |
| 5 | 482 | 1,180 | 1,280 | 2,270 | 4,120 | 3,530 | 1,700 | 600 | 500 | 520 | 550 | 1,340 |
| 6 | 1,410 | 1,150 | 1,220 | 1,960 | 4,170 | 3,440 | 1,620 | 580 | 500 | 520 | 550 | 1,220 |
| 7 | 940 | 1,150 | 1,220 | 1,850 | 4,300 | 3,110 | 1,620 | 560 | 480 | 520 | 550 | 1,120 |
| 8 | 438 | 1,150 | 1,180 | 1,810 | 4,390 | 2,870 | 1,480 | 550 | 450 | 520 | 550 | 1,120 |
| 9 | 828 | 1,180 | 1,180 | 2,000 | 4,300 | 2,630 | 1,280 | 530 | 410 | 520 | 550 | 1,850 |
| 10 | 460 | 1,380 | 1,150 | 2,470 | 4,040 | 2,390 | 1,150 | 520 | 370 | 520 | 590 | 1,440 |
| 11 | 415 | 1,620 | 1,120 | 2,310 | 3,870 | 2,470 | 1,150 | 500 | 330 | 510 | 600 | 1,220 |
| 12 | 700 | 1,700 | 1,060 | 2,390 | 3,530 | 2,630 | 1,120 | 480 | 370 | 510 | 570 | 1,220 |
| 13 | 625 | 1,810 | 1,120 | 2,550 | 2,950 | 2,790 | 1,090 | 460 | 370 | 510 | 415 | 1,180 |
| 14 | 4,390 | 1,850 | 1,120 | 3,110 | 2,750 | 2,790 | 1,090 | 400 | 380 | 510 | 600 | 1,180 |
| 15 | 5,650 | 1,890 | 1,150 | 3,320 | 2,390 | 2,790 | 1,030 | 350 | 380 | 510 | 600 | 1,180 |
| 16 | 7,450 | 2,000 | 1,280 | 3,400 | 2,150 | 2,790 | 1,030 | 370 | 390 | 510 | 600 | 1,180 |
| 17 | 7,650 | 2,080 | 1,410 | 3,530 | 2,150 | 2,790 | 700 | 370 | 380 | 510 | 600 | 1,180 |
| 18 | 6,150 | 1,780 | 1,550 | 4,120 | 2,150 | 2,710 | 700 | 370 | 370 | 510 | 600 | 1,180 |
| 19 | 4,980 | 1,480 | 1,480 | 3,870 | 2,150 | 2,630 | 700 | 370 | 400 | 510 | 1,090 | 1,180 |
| 20 | 4,170 | 1,480 | 1,480 | 3,110 | 2,150 | 2,390 | 700 | 415 | 430 | 505 | 1,480 | 1,180 |
| 21 | 4,930 | 1,410 | 1,410 | 3,110 | 2,470 | 2,310 | 700 | 415 | 480 | 505 | 4,300 | 1,220 |
| 22 | 4,040 | 1,340 | 1,340 | 2,950 | 2,080 | 2,430 | 700 | 470 | 420 | 505 | 3,190 | 1,250 |
| 23 | 2,950 | 1,220 | 1,280 | 2,950 | 1,780 | 2,550 | 700 | 500 | 370 | 505 | 2,470 | 1,220 |
| 24 | 2,150 | 1,180 | 1,280 | 3,150 | 1,780 | 2,710 | 700 | 500 | 415 | 505 | 2,150 | 1,250 |
| 25 | 1,850 | 1,180 | 1,250 | 3,440 | 2,080 | 2,950 | 700 | 500 | 415 | 505 | 1,090 | 1,220 |
| 26 | 1,700 | 1,180 | 1,250 | 3,700 | 2,150 | 2,870 | 700 | 500 | 460 | 500 | 1,030 | 1,220 |
| 27 | 1,620 | 1,250 | 1,250 | 3,870 | 2,390 | 2,630 | 700 | 500 | 415 | 510 | 1,110 | 1,220 |
| 28 | 1,620 | 1,250 | 1,250 | 3,780 | 2,390 | 2,630 | 700 | 500 | 450 | 540 | 1,410 | 1,220 |
| 29 | 1,550 | ..... | 1,250 | 3,740 | 2,230 | 2,470 | 700 | 500 | 480 | 550 | 1,090 | 1,220 |
| 30 | 1,480 | ..... | 1,250 | 3,740 | 1,960 | 2,390 | 700 | 500 | 510 | 550 | 1,060 | 1,220 |
| 31 | 1,410 | ..... | 1,250 | ..... | 2,270 | ..... | 700 | 500 | ..... | 550 | ..... | 1,250 |

NOTE.—These discharges, except for July 16 to November 12, are based on a rating curve well defined between 180 and 4,930 second-feet. Discharges July 16 to November 12 are estimated from a hydrograph following the rise and fall at the Reno station, the open-water rating being used for a few days.

*Monthly discharge of Truckee River at Derby dam, Nev., for 1909.*

[Drainage area, 1,740 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 7,650 | 370 | 2,380 | 1.37 | 1.58 | 146,000 | B. |
| February | 2,080 | 1,150 | 1,430 | .822 | .86 | 79,400 | A. |
| March | 1,550 | 1,060 | 1,260 | .724 | .83 | 77,500 | A. |
| April | 4,120 | 1,310 | 2,840 | 1.63 | 1.82 | 169,000 | A. |
| May | 4,390 | 1,780 | 2,910 | 1.67 | 1.92 | 179,000 | A. |
| June | 3,530 | 2,310 | 2,790 | 1.61 | 1.80 | 166,000 | A. |
| July | 2,470 | 700 | 1,120 | .644 | .74 | 68,900 | B. |
| August | 730 | 350 | 498 | .286 | .33 | 30,600 | B. |
| September | 510 | 330 | 431 | .248 | .28 | 25,600 | B. |
| October | 550 | 500 | 519 | .298 | .34 | 31,900 | B. |
| November | 4,300 | 415 | 1,050 | .603 | .67 | 62,500 | B. |
| December | 4,210 | 1,120 | 1,370 | .787 | .91 | 84,200 | B. |
| The year | 7,650 | 330 | 1,550 | .892 | 12.08 | 1,120,000 | |

## DONNER CREEK NEAR TRUCKEE, CAL.

Donner Creek flows from the east end of Donner Lake eastward into Truckee River about 1½ miles above Truckee, Cal., its length being about 2 miles.

The gaging station, which was established October 23, 1902, to determine the amount of water available for storage in Donner Lake for use on the Truckee-Carson project, is located 150 feet below the dam of the Donner Creek Ice Company and 1½ miles west of Truckee, Cal., and below the mouth of Cold Creek, the principal tributary.

Discharge measurements are made from a cable and car. Four different gages were used during 1909. Previous to June 1 all gage heights are referred to the datum of the old gage. Beginning June 1 they refer to a permanent inclined gage installed September 12, 1909, about 40 feet downstream from the old gage.

The record is considered reliable. It is probably not greatly affected by ice, but it is affected by the raising and lowering of the gates of the storage dam at the outlet of Donner Lake.

*Discharge measurements of Donner Creek near Truckee, Cal., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 2 | E. A. Porter | 39 | 68 | 2.10 | 52 |
| May 19 | L. J. Towne | 41 | 114 | 2.40 | 314 |
| June 10 | do | 42 | 116 | 2.50 | 350 |
| July 2 | do | 40 | 91 | 1.85 | 166 |
| July 23 | do | 40 | 57 | .90 | 32 |

NOTE.—Gage height of measurement on March 2 is referred to old gage. The other gage heights refer to the new gage set September 12, 1909.

*Daily gage height, in feet, of Donner Creek near Truckee, Cal., for 1909.*

[W. O. Blinn, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.4 | 1.9 | 2.0 | 2.1 | 3.4 | 2.2 | 1.9 | 0.75 | 0.5 | 0.2 | 0.4 | 3.25 |
| 2 | 1.5 | 1.9 | 2.1 | 2.15 | 3.4 | 2.2 | 1.8 | .7 | .5 | .3 | .4 | 2.7 |
| 3 | 1.45 | 1.9 | 2.1 | 2.25 | 3.5 | 2.2 | 1.8 | .7 | .5 | .4 | .4 | 2.2 |
| 4 | 1.45 | 1.9 | 2.1 | 2.3 | 3.55 | 2.3 | 1.75 | .7 | .5 | .4 | .4 | 2.2 |
| 5 | 2.25 | 1.9 | 2.1 | 2.3 | 3.65 | 2.3 | 1.65 | .65 | .5 | .5 | .4 | 1.9 |
| 6 | 2.4 | 1.9 | 2.1 | 2.3 | 3.7 | 2.15 | 1.3 | .6 | .5 | .5 | .4 | 1.9 |
| 7 | 1.9 | 1.9 | 2.1 | 2.3 | 3.75 | 2.15 | 1.4 | .65 | .5 | .5 | .4 | 1.85 |
| 8 | 1.9 | 1.85 | 2.1 | 2.3 | 3.8 | 2.1 | 1.5 | .65 | .5 | .5 | .4 | 1.8 |
| 9 | 1.8 | 1.9 | 2.1 | 2.45 | 3.9 | 2.1 | 1.45 | .6 | .5 | .5 | .4 | 1.75 |
| 10 | 1.8 | 1.9 | 2.1 | 2.5 | 3.75 | 2.15 | 1.4 | .6 | .5 | .4 | .4 | 1.7 |
| 11 | 1.8 | 2.0 | 2.1 | 2.5 | 3.55 | 2.15 | 1.4 | .6 | .5 | .4 | .4 | 1.55 |
| 12 | 2.1 | 2.0 | 2.0 | 2.6 | 3.4 | 2.15 | 1.4 | .6 | .5 | .4 | .4 | 1.5 |
| 13 | 2.3 | 2.0 | 2.0 | 2.6 | 3.25 | 2.15 | 1.4 | .6 | .4 | .4 | .4 | 1.5 |
| 14 | 3.6 | 2.0 | 2.0 | 2.7 | 3.1 | 2.15 | 1.3 | .6 | .4 | .35 | .4 | 1.45 |
| 15 | 4.6 | 2.0 | 2.0 | 2.85 | 3.2 | 2.05 | 1.25 | .6 | .4 | .3 | .4 | 1 4 |
| 16 | 5.0 | 2.0 | 2.0 | 2.95 | 3.1 | 2.0 | 1.15 | .6 | .4 | .3 | .4 | 1.3 |
| 17 | 4.85 | 2.0 | 2.05 | 3.05 | 3.1 | 1.9 | 1.0 | .6 | .4 | .3 | .4 | 1.25 |
| 18 | 4.85 | 2.0 | 2.15 | 3.2 | 3.1 | 1.8 | 1.0 | .6 | .4 | .3 | .4 | 1.2 |
| 19 | 4.6 | 1.9 | 2.2 | 3.2 | 3.15 | 1.4 | .95 | .6 | .4 | .3 | 1.5 | 1.0 |
| 20 | 4.5 | 1.9 | 2.2 | 3.0 | 3.2 | 1.4 | .9 | .6 | .4 | .3 | 2.1 | 1.0 |
| 21 | 4.4 | 1.9 | 2.2 | 3.0 | 3.2 | 1.4 | .9 | .6 | .4 | .3 | 2.2 | 1.0 |
| 22 | 3.9 | 1.95 | 2.2 | 2.95 | 3.1 | 1.5 | .9 | .6 | .4 | .3 | 2.4 | .85 |
| 23 | 3.45 | 1.9 | 2.15 | 3.0 | 3.05 | 1.55 | .9 | .6 | .4 | .3 | 2.5 | .7 |
| 24 | 2.0 | 2.0 | 2.1 | 3.0 | 3.05 | 1.45 | .85 | .6 | .4 | .3 | 2.3 | .7 |
| 25 | 2.0 | 2.0 | 2.1 | 3.0 | 3.05 | 1.4 | .8 | .6 | .4 | .3 | 2.2 | .7 |
| 26 | 2.0 | 2.0 | 2.1 | 3.1 | 3.2 | 1.35 | .8 | .6 | .4 | .3 | 2.0 | .7 |
| 27 | 2.0 | 2.0 | 2.1 | 3.2 | 3.35 | 1.3 | .8 | .6 | .4 | .3 | 1.8 | .7 |
| 28 | 2.0 | 2.0 | 2.1 | 3.35 | 3.25 | 1.25 | .8 | .6 | .3 | .3 | 1.8 | .7 |
| 29 | 2.0 | ..... | 2.05 | 3.3 | 3.1 | 1.2 | .8 | .6 | .2 | .4 | 1.9 | .7 |
| 30 | 1.9 | ..... | 2.0 | 3.4 | 3.15 | 1.15 | .8 | .5 | .2 | .4 | 2.7 | .7 |
| 31 | 1.9 | ..... | 2.0 | ..... | 3.35 | ..... | .8 | .5 | ..... | .4 | ..... | .8 |

NOTE.—Gage heights after June 1 refer to a different datum from that used previous to that date.

*Daily discharge, in second-feet, of Donner Creek near Truckee, Cal., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 34 | 43 | 52 | 276 | 255 | 180 | 20 | 7 | 1 | 4 | 570 |
| 2 | 12 | 34 | 52 | 57 | 276 | 255 | 160 | 16 | 7 | 2 | 4 | 538 |
| 3 | 10 | 34 | 52 | 68 | 300 | 255 | 160 | 16 | 7 | 4 | 4 | 382 |
| 4 | 10 | 34 | 52 | 73 | 313 | 285 | 150 | 16 | 7 | 4 | 4 | 382 |
| 5 | 68 | 34 | 52 | 73 | 340 | 285 | 131 | 14 | 7 | 7 | 4 | 300 |
| 6 | 86 | 34 | 52 | 73 | 354 | 242 | 76 | 11 | 7 | 7 | 4 | 300 |
| 7 | 34 | 34 | 52 | 73 | 368 | 242 | 90 | 14 | 7 | 7 | 4 | 288 |
| 8 | 34 | 30 | 52 | 73 | 382 | 230 | 106 | 14 | 7 | 7 | 4 | 276 |
| 9 | 27 | 34 | 52 | 92 | 410 | 230 | 98 | 11 | 7 | 7 | 4 | 264 |
| 10 | 27 | 34 | 52 | 99 | 368 | 242 | 90 | 11 | 7 | 4 | 4 | 253 |
| 11 | 27 | 43 | 52 | 99 | 313 | 242 | 90 | 11 | 7 | 4 | 4 | 218 |
| 12 | 52 | 43 | 43 | 113 | 276 | 242 | 90 | 11 | 7 | 4 | 4 | 207 |
| 13 | 73 | 43 | 43 | 113 | 242 | 242 | 90 | 11 | 4 | 4 | 4 | 207 |
| 14 | 326 | 43 | 43 | 128 | 207 | 242 | 76 | 11 | 4 | 3 | 4 | 196 |
| 15 | 1,050 | 43 | 43 | 154 | 230 | 218 | 70 | 11 | 4 | 2 | 4 | 185 |
| 16 | 1,210 | 43 | 43 | 174 | 207 | 205 | 58 | 11 | 4 | 2 | 4 | 164 |
| 17 | 1,150 | 43 | 48 | 196 | 207 | 180 | 41 | 11 | 4 | 2 | 4 | 154 |
| 18 | 1,150 | 43 | 57 | 230 | 207 | 160 | 41 | 11 | 4 | 2 | 4 | 145 |
| 19 | 1,050 | 34 | 62 | 230 | 218 | 90 | 36 | 11 | 4 | 2 | 106 | 113 |
| 20 | 1,010 | 34 | 62 | 185 | 230 | 90 | 31 | 11 | 4 | 2 | 230 | 113 |
| 21 | 972 | 34 | 62 | 185 | 230 | 90 | 31 | 11 | 4 | 2 | 255 | 113 |
| 22 | 410 | 38 | 62 | 175 | 207 | 106 | 31 | 11 | 4 | 2 | 315 | 92 |
| 23 | 288 | 34 | 57 | 185 | 196 | 114 | 31 | 11 | 4 | 2 | 345 | 73 |
| 24 | 43 | 43 | 52 | 185 | 196 | 98 | 27 | 11 | 4 | 2 | 285 | 73 |
| 25 | 43 | 43 | 52 | 185 | 196 | 90 | 23 | 11 | 4 | 2 | 255 | 73 |
| 26 | 43 | 43 | 52 | 207 | 230 | 83 | 23 | 11 | 4 | 2 | 205 | 73 |
| 27 | 43 | 43 | 52 | 230 | 264 | 76 | 23 | 11 | 4 | 2 | 160 | 73 |
| 28 | 43 | 43 | 52 | 264 | 242 | 70 | 23 | 11 | 2 | 2 | 160 | 73 |
| 29 | 43 | ..... | 48 | 253 | 207 | 63 | 23 | 11 | 1 | 4 | 180 | 73 |
| 30 | 34 | ..... | 43 | 276 | 218 | 58 | 23 | 7 | 1 | 4 | 405 | 73 |
| 31 | 34 | ..... | 43 | ..... | 264 | ..... | 23 | 7 | ..... | 4 | ..... | 86 |

NOTE.—The discharges from January 1 to June 1 are based on a well-defined rating curve. The same rating curve is applicable for December 2 to 31 if the gage heights to the rating curve are first reduced 1.6 feet, corresponding to the difference in datums of the two gages. Discharges June 2 to December 1 are based on a rating curve well defined between 31 and 345 second-feet.

*Monthly discharge of Donner Creek near Truckee, Cal., for 1909.*

[Drainage area, 30 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 1,210 | 8 | 304 | 10.1 | 11.64 | 18,700 | B. |
| February | 43 | 30 | 38.2 | 1.27 | 1.32 | 2,120 | B. |
| March | 62 | 43 | 51.0 | 1.70 | 1.96 | 3,140 | A. |
| April | 276 | 52 | 150 | 5.00 | 5.58 | 8,930 | A. |
| May | 410 | 196 | 264 | 8.80 | 10.14 | 16,200 | B. |
| June | 285 | 58 | 176 | 5.87 | 6.55 | 10,500 | B. |
| July | 180 | 23 | 69.2 | 2.31 | 2.66 | 4,250 | A. |
| August | 20 | 7 | 11.8 | .393 | .45 | 726 | A. |
| September | 7 | 1 | 4.9 | .163 | .18 | 292 | A. |
| October | 7 | 1 | 3.4 | .113 | .13 | 209 | A. |
| November | 405 | 4 | 99.1 | 3.30 | 3.68 | 5,900 | A. |
| December | 570 | 73 | 198 | 6.60 | 7.61 | 12,200 | C. |
| The year | 1,210 | 1 | 114 | 3.80 | 51.90 | 83,200 | |

## PROSSER CREEK NEAR HOBART MILLS, CAL.

This station, which is located just below Alder Creek, about 2 miles above the mouth of Prosser Creek, 4 miles north of Truckee, and 3 miles below Hobart Mills, Cal., was established June 27, 1903, to determine the amount of water available for storage near the headwaters of the stream. It was discontinued October 15, 1904, and reestablished September 23, 1907, some miscellaneous measurements having been made at this point in the meantime.

Measurements are made from a wagon bridge or by means of a car and cable. The present gage is painted on the northeast iron pier of the bridge, and has been used since January 15, 1909.

The section is permanent between floods, but results are sometimes affected by ice conditions. Estimates for 1907–8 have been recomputed on the basis of data more recently available. Gage heights for 1907–8 are given in Water-Supply Paper 250, page 116.

*Discharge measurements of Prosser Creek near Hobart Mills, Cal., in 1908–9.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1908. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 12[a] | E. A. Porter | ..... | ..... | 3.52 | 114 |
| June 16 | do | 60 | 66 | 3.70 | 138 |
| July 7 | M. B. Kennedy | 53 | 52 | 3.30 | 74 |
| Oct. 16 | E. A. Porter | 54 | 44 | 3.10 | 47 |
| 1909. | | | | | |
| January 29 | E. A. Porter | ..... | 70 | [b] 3.20 | 157 |
| April 19 | L. J. Towne | 58 | 102 | 4.15 | 348 |
| June 10 | do | 56 | 91 | 4.15 | 305 |
| July 2[a] | do | 36 | 104 | 3.75 | 222 |
| August 2 | do | 52 | 47 | 2.68 | 52 |
| September 12 | F. C. Schafer | 37 | 27 | 2.20 | 15 |
| October 16 | do | 38 | 28 | 2.30 | 17 |

[a] Measured at bridge about 200 feet above the cable. Other measurements made from cable.
[b] Gage height was 3.80 feet on old gage.

*Daily gage height, in feet, of Prosser Creek near Hobart Mills, Cal., for 1909.*

[E. A. Curtis, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3.2 | 3.0 | 3.1 | 3.15 | 4.9 | 4.65 | 3.75 | 2.9 | 2.0 | 2.3 | 2.8 | 4.5 |
| 2 | 3.25 | 2.9 | 3.05 | 3.25 | 4.85 | 4.85 | 3.6 | 2.75 | 2.0 | 2.35 | 2.8 | 4.3 |
| 3 | 3.25 | 3.0 | 3.05 | 3.35 | 4.95 | 4.75 | 3.6 | 2.7 | 2.0 | 2.45 | 2.8 | 4.0 |
| 4 | 3.25 | 3.0 | 3.1 | 3.35 | 4.95 | 4.65 | 3.55 | 2.65 | 2.1 | 2.45 | 2.8 | 3.85 |
| 5 | 3.25 | 2.85 | 3.1 | 3.35 | 4.85 | 4.75 | 3.5 | 2.65 | 2.2 | 2.45 | 2.9 | 3.7 |
| 6 | 3.55 | 2.75 | 3.05 | 3.35 | 4.85 | 4.65 | 3.5 | 2.65 | 2.2 | 2.55 | 2.9 | 3.6 |
| 7 | 3.5 | 2.7 | 3.0 | 3.35 | 4.85 | 4.65 | 3.45 | 2.55 | 2.15 | 2.55 | 2.8 | 3.6 |
| 8 | 3.45 | 2.65 | 3.05 | 3.35 | 4.75 | 4.65 | 3.45 | 2.5 | 2.15 | 2.55 | 2.8 | 3.5 |
| 9 | 3.4 | 2.6 | 3.15 | 3.45 | 4.65 | 4.7 | 3.45 | 2.45 | 2.15 | 2.55 | 2.8 | 3.5 |
| 10 | 3.55 | 2.6 | 3.15 | 3.65 | 4.65 | 4.35 | 3.35 | 2.45 | 2.2 | 2.55 | 2.8 | 3.4 |
| 11 | 3.6 | 2.55 | 3.15 | 3.85 | 4.55 | 4.3 | 3.45 | 2.35 | 2.2 | 2.55 | 2.8 | 3.4 |
| 12 | 3.7 | 2.55 | 3.15 | 4.2 | 4.5 | 4.4 | 3.45 | 2.35 | 2.2 | 2.65 | 2.8 | 3.4 |
| 13 | 4.05 | 2.5 | 3.25 | 4.4 | 4.45 | 4.4 | 3.4 | 2.35 | 2.2 | 2.65 | 2.8 | 3.35 |
| 14 | 4.65 | 2.5 | 3.25 | 4.45 | 4.45 | 4.4 | 3.45 | 2.35 | 2.2 | 2.65 | 2.8 | 3.3 |
| 15 | 5.1 | 2.75 | 3.2 | 4.5 | 4.45 | 4.35 | 3.4 | 2.25 | 2.2 | 2.65 | 2.7 | 3.3 |
| 16 | 5.7 | 3.0 | 3.25 | 4.6 | 4.35 | 4.3 | 3.45 | 2.25 | 2.2 | 2.65 | 2.7 | 3.3 |
| 17 | 4.9 | 3.15 | 3.2 | 4.65 | 4.35 | 4.15 | 3.4 | 2.2 | 2.3 | 2.65 | 2.7 | 3.4 |
| 18 | 4.5 | 3.2 | 3.15 | 4.9 | 4.25 | 4.05 | 3.35 | 2.2 | 2.3 | 2.65 | 2.7 | 3.4 |
| 19 | 4.1 | 3.15 | 3.25 | 4.85 | 4.25 | 4.05 | 3.35 | 2.1 | 2.3 | 2.65 | 2.8 | 3.4 |
| 20 | 4.1 | 3.1 | 3.25 | 4.5 | 4.2 | 4.05 | 3.3 | 2.1 | 2.3 | 2.65 | 3.6 | 3.4 |
| 21 | 4.3 | 3.25 | 3.2 | 4.25 | 4.15 | 4.15 | 3.3 | 2.1 | 2.3 | 2.65 | 5.3 | 3.35 |
| 22 | 3.95 | 3.3 | 3.2 | 4.25 | 4.05 | 4.15 | 3.3 | 2.1 | 2.3 | 2.65 | 4.3 | 3.3 |
| 23 | 3.8 | 3.45 | 3.15 | 4.35 | 4.05 | 4.15 | 3.3 | 2.1 | 2.25 | 2.65 | 4.0 | 3.3 |
| 24 | 3.75 | 3.45 | 3.05 | 4.25 | 3.95 | 4.15 | 3.15 | 2.1 | 2.25 | 2.7 | 4.0 | 3.2 |
| 25 | 3.6 | 3.4 | 3.0 | 4.25 | 4.05 | 4.05 | 3.15 | 2.0 | 2.3 | 2.7 | 3.85 | 3.2 |
| 26 | 3.6 | 3.3 | 3.0 | 4.35 | 4.15 | 4.05 | 3.1 | 2.0 | 2.3 | 2.7 | 3.8 | 3.2 |
| 27 | 3.45 | 3.25 | 3.0 | 4.6 | 4.15 | 4.05 | 3.0 | 2.0 | 2.35 | 2.7 | 3.65 | 3.2 |
| 28 | 3.35 | 3.2 | 3.05 | 4.85 | 4.2 | 3.9 | 3.0 | 2.0 | 2.35 | 2.8 | 3.45 | 3.2 |
| 29 | 3.1 | ..... | 3.1 | 4.85 | 4.25 | 3.85 | 3.05 | 2.0 | 2.35 | 2.85 | 3.4 | 3.3 |
| 30 | 3.0 | ..... | 3.1 | 4.9 | 4.35 | 3.8 | 3.05 | 2.0 | 2.35 | 2.85 | 3.4 | 3.4 |
| 31 | 3.0 | ..... | 3.05 | ..... | 4.55 | ..... | 3.0 | 2.0 | ..... | 2.9 | ..... | 4.0 |

NOTE.—Gage heights beginning January 15 refer to new gage painted on bridge pier with a datum different from that previously used.

*Daily discharge, in second-feet, of Prosser Creek near Hobart Mills, Cal., for 1907–1909.*

| Day. | Sept. | Oct. | Nov. | Day. | Sept. | Oct. | Nov. | Day. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907. | | | | | | | | | | | |
| 1 | ..... | 38 | 38 | 11 | ..... | 38 | 38 | 21 | ..... | 38 | 38 |
| 2 | ..... | 48 | 38 | 12 | ..... | 38 | 38 | 22 | ..... | 38 | 29 |
| 3 | ..... | 38 | 38 | 13 | ..... | 38 | 38 | 23 | 38 | 38 | 29 |
| 4 | ..... | 38 | 38 | 14 | ..... | 38 | 38 | 24 | 38 | 48 | 29 |
| 5 | ..... | 38 | 38 | 15 | ..... | 38 | 38 | 25 | 38 | 48 | 29 |
| 6 | ..... | 38 | 38 | 16 | ..... | 38 | 38 | 26 | 38 | 48 | 29 |
| 7 | ..... | 38 | 38 | 17 | ..... | 38 | 38 | 27 | 38 | 43 | 29 |
| 8 | ..... | 38 | 38 | 18 | ..... | 38 | 38 | 28 | 29 | 38 | 29 |
| 9 | ..... | 38 | 38 | 19 | ..... | 38 | 38 | 29 | 29 | 38 | 29 |
| 10 | ..... | 38 | 38 | 20 | ..... | 38 | 38 | 30 | 29 | 38 | 29 |
| | | | | | | | | 31 | ..... | 38 | ..... |

NOTE.—These discharges are based on a rating curve well defined between 38 and 200 second-feet.

*Daily discharge, in second-feet, of Prosser Creek near Hobart Mills, Cal., for 1907–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1908. | | | | | | | | | | | | |
| 1 | ..... | 29 | 22 | 159 | 190 | 179 | 96 | 11 | 9 | 29 | 22 | 43 |
| 2 | ..... | 29 | 29 | 159 | 169 | 159 | 96 | 11 | 14 | 22 | 22 | 38 |
| 3 | ..... | 29 | 29 | 159 | 169 | 169 | 114 | 9 | 14 | 26 | 26 | 34 |
| 4 | ..... | 29 | 29 | 200 | 159 | 179 | 114 | 9 | 11 | 29 | 22 | 29 |
| 5 | ..... | 29 | 29 | 190 | 150 | 200 | 96 | 11 | 16 | 26 | 22 | 29 |
| 6 | ..... | 29 | 22 | 179 | 179 | 200 | 96 | 9 | 14 | 29 | 22 | 38 |
| 7 | ..... | 29 | 22 | 159 | 179 | 200 | 81 | 9 | 14 | 29 | 22 | 43 |
| 8 | ..... | 29 | 30 | 159 | 179 | 190 | 81 | 6 | 11 | 29 | 22 | 60 |
| 9 | ..... | 29 | 38 | 179 | 169 | 200 | 67 | 6 | 16 | 26 | 22 | 48 |
| 10 | ..... | 29 | 105 | 179 | 169 | 179 | 81 | 6 | 16 | 29 | 22 | 38 |
| 11 | ..... | 29 | 74 | 179 | 190 | 190 | 81 | 6 | 22 | 29 | 26 | 38 |
| 12 | ..... | 29 | 60 | 179 | 179 | 221 | 114 | 4 | 22 | 29 | 26 | 43 |
| 13 | ..... | 29 | 38 | 179 | 150 | 210 | 81 | 6 | 26 | 29 | 22 | 38 |
| 14 | ..... | 29 | 38 | 179 | 140 | 200 | 67 | 7 | 26 | 43 | 22 | 38 |
| 15 | ..... | 29 | 88 | 200 | 159 | 159 | 54 | 6 | 29 | 179 | 26 | 43 |
| 16 | ..... | 29 | 159 | 200 | 150 | 150 | 43 | 9 | 29 | 67 | 26 | 43 |
| 17 | ..... | 22 | 179 | 200 | 179 | 150 | 34 | 9 | 29 | 38 | 26 | 38 |
| 18 | ..... | 29 | 200 | 179 | 159 | 150 | 29 | 14 | 29 | 34 | 22 | 38 |
| 19 | ..... | 38 | 179 | 190 | 190 | 122 | 26 | 9 | 29 | 29 | 22 | 38 |
| 20 | ..... | 29 | 179 | 200 | 169 | 150 | 34 | 9 | 26 | 29 | 22 | 38 |
| 21 | ..... | 29 | 159 | 200 | 169 | 169 | 29 | 9 | 22 | 26 | 43 | 38 |
| 22 | ..... | 38 | 150 | 200 | 190 | 150 | 26 | 11 | 22 | 26 | 48 | 38 |
| 23 | ..... | 34 | 140 | 200 | 179 | 131 | 29 | 9 | 26 | 29 | 48 | 38 |
| 24 | ..... | 29 | 159 | 200 | 190 | 131 | 26 | 9 | 29 | 29 | 43 | 48 |
| 25 | ..... | 29 | 159 | 140 | 200 | 105 | 19 | 9 | 29 | 26 | 38 | 54 |
| 26 | ..... | 29 | 159 | 150 | 179 | 114 | 26 | 11 | 22 | 26 | 38 | 43 |
| 27 | ..... | 29 | 200 | 159 | 190 | 114 | 26 | 9 | 26 | 29 | 38 | 43 |
| 28 | ..... | 29 | 200 | 159 | 200 | 105 | 22 | 11 | 29 | 26 | 38 | 54 |
| 29 | ..... | 16 | 170 | 140 | 179 | 105 | 19 | 11 | 22 | 22 | 54 | 54 |
| 30 | ..... | ..... | 140 | 159 | 150 | 105 | 16 | 11 | 29 | 22 | 48 | 43 |
| 31 | ..... | ..... | 140 | ..... | 169 | ..... | 14 | 9 | ..... | 22 | ..... | 43 |
| 1909. | | | | | | | | | | | | |
| 1 | 60 | 104 | 120 | 128 | 474 | 424 | 244 | 89 | 4 | 20 | 75 | 394 |
| 2 | 67 | 89 | 112 | 146 | 464 | 464 | 214 | 68 | 4 | 24 | 75 | 354 |
| 3 | 67 | 104 | 112 | 164 | 484 | 444 | 214 | 62 | 4 | 34 | 75 | 294 |
| 4 | 67 | 104 | 120 | 164 | 484 | 424 | 204 | 56 | 8 | 34 | 75 | 264 |
| 5 | 67 | 82 | 120 | 164 | 464 | 444 | 194 | 56 | 13 | 34 | 89 | 234 |
| 6 | 114 | 68 | 112 | 164 | 464 | 424 | 194 | 56 | 13 | 44 | 89 | 214 |
| 7 | 105 | 62 | 104 | 164 | 464 | 424 | 184 | 44 | 10 | 44 | 75 | 214 |
| 8 | 96 | 56 | 112 | 164 | 444 | 424 | 184 | 39 | 10 | 44 | 75 | 194 |
| 9 | 88 | 50 | 128 | 184 | 424 | 434 | 184 | 34 | 10 | 44 | 75 | 194 |
| 10 | 114 | 50 | 128 | 224 | 424 | 364 | 164 | 34 | 13 | 44 | 75 | 174 |
| 11 | 122 | 44 | 128 | 264 | 404 | 354 | 184 | 24 | 13 | 44 | 75 | 174 |
| 12 | 140 | 44 | 128 | 334 | 394 | 374 | 184 | 24 | 13 | 56 | 75 | 174 |
| 13 | 210 | 39 | 146 | 374 | 384 | 374 | 174 | 24 | 13 | 56 | 75 | 164 |
| 14 | 347 | 39 | 146 | 384 | 384 | 374 | 184 | 24 | 13 | 56 | 75 | 155 |
| 15 | 514 | 68 | 137 | 394 | 384 | 364 | 174 | 16 | 13 | 56 | 62 | 155 |
| 16 | 634 | 104 | 146 | 414 | 364 | 354 | 184 | 16 | 13 | 56 | 62 | 155 |
| 17 | 474 | 128 | 137 | 424 | 364 | 324 | 174 | 13 | 20 | 56 | 62 | 174 |
| 18 | 394 | 137 | 128 | 474 | 344 | 304 | 164 | 13 | 20 | 56 | 62 | 174 |
| 19 | 314 | 128 | 146 | 464 | 344 | 304 | 164 | 8 | 20 | 56 | 75 | 174 |
| 20 | 314 | 120 | 146 | 394 | 334 | 304 | 155 | 8 | 20 | 56 | 214 | 174 |
| 21 | 354 | 146 | 137 | 344 | 324 | 324 | 155 | 8 | 20 | 56 | 554 | 164 |
| 22 | 284 | 155 | 137 | 344 | 304 | 324 | 155 | 8 | 20 | 56 | 354 | 155 |
| 23 | 254 | 184 | 128 | 364 | 304 | 324 | 155 | 8 | 16 | 56 | 294 | 155 |
| 24 | 344 | 184 | 112 | 344 | 284 | 324 | 128 | 8 | 16 | 62 | 294 | 137 |
| 25 | 214 | 174 | 104 | 344 | 304 | 304 | 128 | 4 | 20 | 62 | 264 | 137 |
| 26 | 214 | 155 | 104 | 364 | 324 | 304 | 120 | 4 | 20 | 62 | 254 | 137 |
| 27 | 184 | 146 | 104 | 414 | 324 | 304 | 104 | 4 | 24 | 62 | 224 | 137 |
| 28 | 164 | 137 | 112 | 464 | 334 | 274 | 104 | 4 | 24 | 75 | 184 | 137 |
| 29 | 120 | ..... | 120 | 464 | 344 | 264 | 112 | 4 | 24 | 82 | 174 | 155 |
| 30 | 104 | ..... | 120 | 474 | 364 | 254 | 112 | 4 | 24 | 82 | 174 | 174 |
| 31 | 104 | ..... | 112 | ..... | 404 | ..... | 104 | 4 | ..... | 89 | ..... | 294 |

NOTE.—Discharges February 1–16, 1908, estimated because of ice conditions. The daily discharges from September 23, 1907, to January 15, 1909, are based on a rating curve well defined between 38 and 200 second-feet. Discharges from January 15 to December 31 are based on a rating curve well defined between 13 and 334 second-feet. Discharges interpolated for days with gage heights missing.

*Monthly discharge of Prosser Creek near Hobart Mills, Cal., for 1907–1909.*

[Drainage area, 48 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1907. | | | | | | | |
| September 23–30 | 38 | 29 | 34.6 | 0.721 | 0.21 | 549 | B. |
| October | 48 | 38 | 39.5 | .823 | .95 | 2,430 | A. |
| November | 38 | 29 | 35.3 | .735 | .82 | 2,100 | A. |
| December | ..... | ..... | [a] 29.0 | .604 | .70 | 1,780 | C. |
| 1908. | | | | | | | |
| January | ..... | ..... | [b] 29.0 | .604 | .70 | 1,780 | C. |
| February | ..... | 16 | [b] 29.1 | .606 | .65 | 1,670 | C. |
| March | 200 | 22 | 107 | 2.23 | 2.57 | 6,580 | B. |
| April | 200 | 140 | 177 | 3.69 | 4.12 | 10,500 | A. |
| May | 200 | 140 | 173 | 3.60 | 4.15 | 10,600 | A. |
| June | 221 | 105 | 160 | 3.33 | 3.72 | 9,520 | A. |
| July | 114 | 14 | 56.0 | 1.17 | 1.35 | 3,440 | B. |
| August | 14 | 4 | 8.9 | .185 | .21 | 547 | C. |
| September | 29 | 9 | 21.9 | .456 | .51 | 1,300 | C. |
| October | 179 | 22 | 34.3 | .715 | .82 | 2,110 | B. |
| November | 54 | 22 | 30.0 | .625 | .70 | 1,790 | B. |
| December | 60 | 29 | 41.6 | .867 | 1.00 | 2,560 | C. |
| The year | 221 | 4 | 72.3 | 1.51 | 20.50 | 52,400 | |
| 1909. | | | | | | | |
| January | 634 | 60 | 214 | 4.46 | 5.14 | 13,200 | B. |
| February | 184 | 39 | 104 | 2.17 | 2.26 | 5,780 | A. |
| March | 146 | 104 | 124 | 2.58 | 2.97 | 7,620 | A. |
| April | 474 | 128 | 317 | 6.60 | 7.36 | 18,900 | B. |
| May | 484 | 284 | 384 | 8.00 | 9.22 | 23,600 | B. |
| June | 464 | 254 | 357 | 7.44 | 8.30 | 21,200 | B. |
| July | 244 | 104 | 164 | 3.42 | 3.94 | 10,100 | A. |
| August | 89 | 4 | 24.8 | .517 | .60 | 1,520 | B. |
| September | 24 | 4 | 15.2 | .317 | .35 | 904 | B. |
| October | 89 | 20 | 53.5 | 1.11 | 1.28 | 3,290 | A. |
| November | 554 | 62 | 146 | 3.04 | 3.39 | 8,690 | A. |
| December | 394 | 137 | 193 | 4.02 | 4.64 | 11,900 | B. |
| The year | 634 | 4 | 175 | 3.64 | 49.45 | 127,000 | |

[a] Monthly mean for December, 1907, estimated because of ice conditions.
[b] Mean for January, 1908, and February 1 to 15, 1908, estimated at 29 second-feet because of ice conditions.

## LITTLE TRUCKEE RIVER AT STARR, CAL.

Little Truckee River rises on the eastern slope of the Sierra Nevada, in northwestern Nevada County, Cal., flows north, then east, and then south, and unites with the Truckee at the town of Boca, Cal.

The station was established June 25, 1903, to obtain data for the United States Reclamation Service as to the quantity of water available for storage at Independence and Webber lakes and along the course of the stream, and also for power development. It was originally located at Bruhn's mill, or Pine station, on the Boca and Loyalton Railroad. On January 1, 1908, it was moved 2 miles upstream to Starr, Cal., which is about 5 miles north of Boca, the nearest post-office. The flow is practically the same at both places. The station is below all tributaries except Dry Creek.

Discharge measurements are made from a cable and car. A new inclined gage was established August 3, 1909, with a datum 1 foot lower than the original gage. All 1909 gage heights refer to the new gage.

Results at Pine station have been poor on account of shifting channel, but the station at Starr promises to give good results. The creek freezes during parts of the winter.

*Discharge measurements of Little Truckee River at Starr, Cal., for 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 20 | L. J. Towne | 89 | 189 | 3.20 | 856 |
| July 9 | do | 84 | 77 | 2.05 | 254 |
| August 3 | do | 40 | 35 | 1.28 | 63 |
| September 13 | F. C. Schafer | 27 | 13 | .85 | 22 |

NOTE.—Gage heights refer to new gage established August 3, 1909.

*Daily gage height, in feet, of Little Truckee River at Starr, Cal., for 1909.*

[S. Wallace, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.2 | 1.95 | 1.6 | 1.8 | 3.95 | 3.4 | 2.8 | 1.4 | 0.9 | 0.95 | 1.05 | 2.2 |
| 2 | 2.35 | 1.95 | 1.55 | 1.95 | 3.7 | 3.75 | 2.75 | 1.3 | .85 | 1.0 | 1.1 | 2.2 |
| 3 | 2.35 | 1.8 | 1.6 | 2.1 | 3.4 | 3.85 | 2.7 | 1.3 | .9 | 1.05 | 1.05 | 1.6 |
| 4 | 2.3 | 1.75 | 1.6 | 2.2 | 3.75 | 3.9 | 2.6 | 1.25 | .9 | 1.05 | 1.0 | 2.1 |
| 5 | 2.85 | 1.7 | 1.6 | 2.15 | 3.85 | 3.9 | 2.4 | 1.2 | 1.0 | 1.0 | 1.0 | 2.9 |
| 6 | 3.05 | 1.7 | 1.6 | 2.15 | 3.9 | 3.7 | 2.25 | 1.15 | .95 | .95 | 1.05 | 2.4 |
| 7 | 2.8 | 1.6 | 1.6 | 2.2 | 4.0 | 3.6 | 2.15 | 1.1 | .9 | .95 | 1.1 | 1.9 |
| 8 | 2.35 | 1.6 | 1.6 | 2.25 | 3.95 | 3.5 | 2.1 | 2.3 | .9 | .95 | 1.15 | 1.9 |
| 9 | 2.6 | 1.7 | 1.6 | 2.4 | 3.75 | 3.4 | 2.05 | 2.15 | .85 | .9 | 1.55 | 1.9 |
| 10 | 3.1 | 1.7 | 1.6 | 2.55 | 3.6 | 3.3 | 2.05 | 1.8 | .85 | .9 | 1.4 | 2.05 |
| 11 | 4.0 | 1.7 | 1.6 | 2.5 | 3.6 | 3.3 | 2.05 | 1.8 | .8 | .9 | 1.5 | 1.95 |
| 12 | 4.1 | 1.75 | 1.55 | 2.6 | 3.15 | 3.3 | 2.05 | 1.8 | .85 | .95 | 1.15 | 1.85 |
| 13 | 4.0 | 1.7 | 1.5 | 2.8 | 3.2 | 3.3 | 2.15 | 1.5 | .85 | .9 | 1.15 | 1.8 |
| 14 | 4.8 | 1.7 | 1.5 | 3.2 | 3.15 | 3.1 | 2.1 | 1.4 | .85 | .9 | 1.15 | 1.75 |
| 15 | 4.8 | 1.65 | 1.6 | 3.3 | 3.3 | 3.2 | 2.0 | 1.5 | .85 | .9 | 1.1 | 1.7 |
| 16 | 4.8 | 1.65 | 1.65 | 3.45 | 3.15 | 3.15 | 2.0 | 1.0 | .85 | 1.05 | 1.05 | 1.6 |
| 17 | 4.35 | 1.8 | 1.8 | 4.0 | 3.15 | 3.15 | 1.95 | 1.0 | .85 | 1.1 | 1.2 | 1.65 |
| 18 | 4.0 | 1.75 | 1.85 | 3.8 | 3.15 | 3.2 | 1.8 | 1.0 | .85 | .9 | 1.1 | 1.55 |
| 19 | 3.2 | 1.8 | 1.8 | 3.85 | 3.2 | 3.05 | 1.65 | .95 | .85 | 1.0 | 1.25 | 1.45 |
| 20 | 2.9 | 1.75 | 1.85 | 3.5 | 3.3 | 2.8 | 1.55 | 1.0 | .85 | 1.1 | 2.3 | 1.5 |
| 21 | 2.8 | 1.7 | 1.8 | 3.5 | 3.3 | 2.8 | 1.55 | .95 | .85 | 1.0 | 3.3 | 1.6 |
| 22 | 2.45 | 1.65 | 1.8 | 3.5 | 3.0 | 2.9 | 1.5 | .95 | .85 | 1.2 | 2.65 | 1.6 |
| 23 | 2.2 | 1.75 | 1.75 | 3.3 | 2.85 | 3.05 | 1.5 | 1.1 | .85 | 1.0 | 2.7 | 1.55 |
| 24 | 2.2 | 1.65 | 1.75 | 3.35 | 2.7 | 3.2 | 1.55 | .95 | .85 | 1.0 | 2.9 | 1.4 |
| 25 | 2.15 | 1.65 | 1.7 | 3.35 | 2.75 | 3.1 | 1.65 | .9 | .85 | 1.0 | 2.75 | 1.6 |
| 26 | 2.1 | 1.65 | 1.7 | 3.55 | 2.95 | 2.95 | 1.5 | .9 | .85 | .9 | 2.45 | 1.6 |
| 27 | 2.8 | 1.65 | 1.7 | 4.1 | 3.1 | 2.95 | 1.4 | .9 | .9 | .9 | 2.15 | 1.35 |
| 28 | 1.95 | 1.6 | 1.7 | 3.95 | 3.3 | 2.9 | 1.4 | .9 | .9 | 1.0 | 1.95 | 1.3 |
| 29 | 2.0 | ..... | 1.7 | 3.8 | 2.95 | 2.9 | 1.35 | .85 | .95 | 1.05 | 1.9 | 1.65 |
| 30 | 1.9 | ..... | 1.7 | 3.75 | 2.85 | 2.8 | 1.35 | .85 | .95 | 1.05 | 1.85 | 1.75 |
| 31 | 1.9 | ..... | 1.7 | ..... | 3.05 | ..... | 1.3 | .9 | ..... | 1.05 | ..... | 2.2 |

NOTE.—The above gage heights refer to the new gage, established August 3, 1909.

*Daily discharge, in second-feet, of Little Truckee River at Starr, Cal., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 80 | 215 | 128 | 174 | 1,410 | 980 | 620 | 90 | 25 | 30 | 42 | 302 |
| 2 | 90 | 215 | 118 | 215 | 1,160 | 1,190 | 590 | 74 | 20 | 36 | 48 | 302 |
| 3 | 90 | 174 | 128 | 264 | 980 | 1,250 | 560 | 74 | 25 | 42 | 42 | 128 |
| 4 | 90 | 162 | 128 | 302 | 1,190 | 1,380 | 500 | 67 | 25 | 42 | 36 | 264 |
| 5 | 120 | 150 | 128 | 283 | 1,250 | 1,380 | 390 | 60 | 36 | 36 | 36 | 680 |
| 6 | 140 | 150 | 128 | 283 | 1,380 | 1,160 | 323 | 54 | 30 | 30 | 42 | 390 |
| 7 | 120 | 128 | 128 | 302 | 1,440 | 1,100 | 283 | 48 | 25 | 30 | 48 | 200 |
| 8 | 90 | 128 | 128 | 323 | 1,410 | 1,040 | 264 | 344 | 25 | 30 | 54 | 200 |
| 9 | 120 | 150 | 128 | 390 | 1,190 | 980 | 247 | 283 | 20 | 25 | 118 | 200 |
| 10 | 200 | 150 | 128 | 468 | 1,100 | 920 | 247 | 174 | 20 | 25 | 90 | 247 |
| 11 | 250 | 150 | 128 | 440 | 1,100 | 920 | 247 | 174 | 15 | 25 | 108 | 215 |
| 12 | 300 | 162 | 118 | 500 | 830 | 920 | 247 | 174 | 20 | 30 | 54 | 187 |
| 13 | 925 | 150 | 108 | 620 | 860 | 920 | 283 | 108 | 20 | 25 | 54 | 174 |
| 14 | 1,400 | 150 | 118 | 860 | 830 | 800 | 264 | 90 | 20 | 25 | 54 | 162 |
| 15 | 1,920 | 139 | 128 | 920 | 920 | 860 | 230 | 108 | 20 | 25 | 48 | 150 |
| 16 | 1,920 | 139 | 139 | 1,010 | 830 | 830 | 230 | 36 | 20 | 42 | 42 | 128 |
| 17 | 1,640 | 174 | 174 | 1,440 | 830 | 830 | 215 | 36 | 20 | 48 | 60 | 139 |
| 18 | 1,440 | 162 | 187 | 1,220 | 830 | 860 | 174 | 36 | 20 | 25 | 48 | 118 |
| 19 | 860 | 174 | 174 | 1,250 | 860 | 770 | 139 | 30 | 20 | 36 | 67 | 99 |
| 20 | 680 | 162 | 187 | 1,040 | 920 | 620 | 118 | 36 | 20 | 48 | 344 | 108 |
| 21 | 620 | 150 | 174 | 1,040 | 920 | 620 | 118 | 30 | 20 | 36 | 920 | 128 |
| 22 | 415 | 139 | 174 | 1,040 | 740 | 680 | 108 | 30 | 20 | 60 | 530 | 128 |
| 23 | 302 | 162 | 162 | 920 | 650 | 770 | 108 | 48 | 20 | 36 | 560 | 118 |
| 24 | 302 | 139 | 162 | 950 | 560 | 860 | 118 | 30 | 20 | 36 | 680 | 90 |
| 25 | 283 | 139 | 150 | 950 | 590 | 800 | 139 | 25 | 20 | 36 | 590 | 128 |
| 26 | 264 | 139 | 150 | 1,070 | 710 | 710 | 108 | 25 | 20 | 25 | 415 | 128 |
| 27 | 620 | 139 | 150 | 1,500 | 800 | 710 | 90 | 25 | 25 | 25 | 283 | 82 |
| 28 | 215 | 128 | 150 | 1,410 | 920 | 680 | 90 | 25 | 25 | 36 | 215 | 74 |
| 29 | 230 | ..... | 150 | 1,220 | 710 | 680 | 82 | 20 | 30 | 42 | 200 | 139 |
| 30 | 200 | ..... | 150 | 1,190 | 650 | 620 | 82 | 20 | 30 | 42 | 187 | 162 |
| 31 | 200 | ..... | 150 | ..... | 770 | ..... | 74 | 25 | ..... | 42 | ..... | 302 |

NOTE.—Daily discharges January 1 to 14 have been estimated because of probable ice conditions. Discharges for the remainder of the year are based on a rating curve well defined between 230 and 1,040 second-feet.

*Monthly discharge of Little Truckee River at Starr, Cal., for 1909.*

[Drainage area, 166 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 1,920 | 80 | 520 | 3.13 | 3.61 | 32,000 | C. |
| February | 215 | 128 | 154 | .928 | .97 | 8,550 | B. |
| March | 187 | 108 | 144 | .867 | 1.00 | 8,850 | B. |
| April | 1,500 | 174 | 786 | 4.73 | 5.28 | 46,800 | A. |
| May | 1,440 | 560 | 946 | 5.70 | 6.57 | 58,200 | A. |
| June | 1,380 | 620 | 895 | 5.39 | 6.01 | 53,300 | A. |
| July | 620 | 74 | 235 | 1.42 | 1.64 | 14,400 | B. |
| August | 344 | 20 | 77.7 | .468 | .54 | 4,780 | B. |
| September | 36 | 15 | 22.5 | .136 | .15 | 1,340 | B. |
| October | 60 | 25 | 34.5 | .208 | .24 | 2,120 | B. |
| November | 920 | 36 | 200 | 1.20 | 1.34 | 11,900 | B. |
| December | 680 | 74 | 189 | 1.14 | 1.31 | 11,600 | B. |
| The year | 1,920 | | 350 | 2.11 | 28.66 | 254,000 | |

## INDEPENDENCE CREEK BELOW INDEPENDENCE LAKE, CAL.

Independence Creek flows northeastward into Little Truckee River from the east end of Independence Lake, which lies near the crest of the Sierra Nevada at an elevation of nearly 7,000 feet and has an area of 709 acres.

The gaging station was established October 24, 1902, about one-eighth mile below the lake, in order to determine the amount of water available for storage. The records are also of interest as showing the run-off of a small area near the mountain crest. The station was discontinued June 30, 1907; records for 1907 were omitted from Water-Supply Paper 250 through an oversight.

Discharge measurements were made from a cable and car, or by wading. Two vertical staff gages were used; one 200 feet upstream from the cable was used until July 1, 1904, when a new gage was installed about 75 feet below the lake outlet, both gages reading the same. Measuring conditions were good; the stream bed shifted somewhat, due to the filling in of sand, but the records as a whole are good, except those for 1906 and 1907, which are somewhat uncertain on account of lack of sufficient measurements. The discharge is controlled by the dam at the lower end of the lake. The monthly discharges for the entire period of records have been recomputed and are given below:

*Discharge measurements of Independence Creek below Independence Lake, Cal., in 1902–1906.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1902. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| October 24 | E. C. Murphy | | | 1.23 | 0.3 |
| 1903. | | | | | |
| June 21 | G. B. Lorenz | | 18.5 | 1.90 | 15.2 |
| July 19 | do | | 14 | 1.60 | 7.3 |
| August 6 | do | | 14 | 1.50 | 4.7 |
| August 27 | do | | 5.2 | 1.40 | 1.0 |
| 1904. | | | | | |
| June 17 | A. E. Chandler | 29 | 62 | 3.15 | 123 |
| July 1 | W. A. Wolf | 28 | 60 | 3.08 | 97 |
| July 13 | do | 28 | 52 | 2.75 | 47 |
| July 23 | do | 13 | 7.8 | 2.30 | 13 |
| August 29 | do | 6 | 3.0 | 1.80 | 3.0 |
| November 16 | do | 6 | 4.2 | 2.05 | 5.0 |
| 1905. | | | | | |
| June 12 | W. A. Wolf | 28 | 62 | 3.25 | 77 |
| June 26 | do | | 3.0 | 1.80 | 3.0 |
| July 7 | do | 11 | 9.0 | 2.30 | 15 |
| August 3 | do | 6 | 3.0 | 2.00 | 4.4 |
| September 11 | do | | | 1.70 | *a* .5 |
| 1906. | | | | | |
| July 31 | M. B. Kennedy | 16 | 25.6 | 2.65 | 25.3 |

*a* Estimated.

*Daily gage height, in feet, of Independence Creek below Independence Lake, Cal., for 1907.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | Day. | Jan. | Feb. | Mar. | Apr. | May. | June. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.8 | 2.8 | 2.7 | 2.55 | 3.25 | 3.7 | 16 | 2.95 | 2.7 | 2.7 | 3.3 | 3.3 | 3.15 |
| 2 | 2.5 | 2.9 | 2.7 | 2.6 | 3.3 | 3.7 | 17 | 3.0 | 2.7 | 2.9 | 3.2 | 3.4 | 3.2 |
| 3 | 2.5 | 2.9 | 2.7 | 2.6 | 3.25 | 3.75 | 18 | 2.9 | 2.65 | 3.35 | 3.2 | 3.4 | 3.2 |
| 4 | 2.6 | 2.9 | 2.7 | 2.6 | 3.25 | 3.75 | 19 | 2.9 | 2.65 | 3.55 | 3.2 | 3.5 | 3.3 |
| 5 | 2.7 | 2.9 | 2.7 | 2.6 | 3.25 | 3.75 | 20 | 2.8 | 2.6 | 3.5 | 3.2 | 3.55 | 3.4 |
| 6 | 2.8 | 2.9 | 2.7 | 2.65 | 3.2 | 3.75 | 21 | 2.75 | 2.6 | 3.5 | 3.2 | 3.55 | 3.45 |
| 7 | 2.8 | 2.8 | 2.7 | 2.65 | 3.2 | 3.7 | 22 | 2.7 | 2.65 | 3.4 | 3.2 | 3.5 | 3.75 |
| 8 | 2.9 | 2.85 | 2.7 | 2.65 | 3.2 | 3.7 | 23 | 2.7 | 2.6 | 3.4 | 3.2 | 3.5 | 3.9 |
| 9 | 2.9 | 2.85 | 2.65 | 2.6 | 3.2 | 3.45 | 24 | 2.7 | 2.6 | 3.4 | 3.2 | 3.4 | 3.4 |
| 10 | 3.0 | 2.8 | 2.7 | 2.65 | 3.3 | 3.35 | 25 | 2.7 | 2.65 | 3.4 | 3.3 | 3.4 | 3.3 |
| 11 | 2.95 | 2.8 | 2.8 | 2.7 | 3.35 | 3.4 | 26 | 2.7 | 2.65 | 3.35 | 3.3 | 3.4 | 3.2 |
| 12 | 3.0 | 2.75 | 2.8 | 2.7 | 3.4 | 3.5 | 27 | 2.65 | 2.65 | 3.2 | 3.3 | 3.4 | 3.45 |
| 13 | 3.0 | 2.75 | 2.75 | 2.8 | 3.35 | 3.3 | 28 | 2.7 | 2.65 | 3.1 | 3.3 | 3.4 | 3.6 |
| 14 | 3.0 | 2.75 | 2.7 | 3.1 | 3.35 | 3.15 | 29 | 2.7 | ..... | 3.05 | 3.3 | 3.5 | 3.55 |
| 15 | 3.0 | 2.75 | 2.7 | 3.35 | 3.3 | 3.15 | 30 | 2.7 | ..... | 2.6 | 3.3 | 3.55 | 3.55 |
| | | | | | | | 31 | 2.7 | ..... | 2.55 | ..... | 3.6 | ..... |

*Monthly discharge of Independence Creek below Independence Lake, Cal., for 1902–1907.*

[Drainage area, 8.5 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1902. | | | | | | | |
| October 24–31 | 1.1 | 0.2 | 0.46 | 0.054 | 0.02 | 7 | B. |
| November | 14 | .2 | 9.50 | 1.12 | 1.25 | 565 | B. |
| December | 27 | 2.8 | 8.01 | .942 | 1.09 | 493 | B. |
| 1903. | | | | | | | |
| January | 41 | 4.4 | 17.9 | 2.11 | 2.43 | 1,100 | B. |
| February | 50 | 17 | 37.2 | 4.38 | 4.56 | 2,070 | B. |
| March | 27 | 17 | 19.7 | 2.32 | 2.68 | 1,210 | A. |
| April | 88 | 13 | 26.1 | 3.07 | 3.42 | 1,550 | A. |
| May | 154 | 52 | 92.6 | 10.9 | 12.57 | 5,690 | A. |
| June | 149 | 9.2 | 73.2 | 8.61 | 9.61 | 4,360 | C. |
| July | 124 | 4.7 | 19.3 | 2.27 | 2.62 | 1,190 | C. |
| August | 4.9 | [a].9 | 3.56 | .419 | .48 | 219 | C. |
| September | .9 | .4 | .73 | .086 | .10 | 43 | C. |
| October | 27 | .6 | 3.22 | .379 | .44 | 198 | A. |
| November | 99 | 1.2 | 28.0 | 3.29 | 3.67 | 1,670 | A. |
| December | 10 | 2.0 | 6.88 | .809 | .93 | 423 | B. |
| The year | 154 | .4 | 27 4 | 3.22 | 43.51 | 19,700 | |
| 1904. | | | | | | | |
| January | 10 | 2.3 | 6.24 | .734 | .85 | 384 | B. |
| February | 98 | 4.8 | 39.7 | 4.67 | 5.04 | 2,280 | B. |
| March | 96 | 21 | 56.5 | 6.65 | 7.67 | 3,470 | A. |
| April | 145 | 19 | 41.4 | 4.87 | 5.43 | 2,460 | B. |
| May | 203 | 20 | 128 | 15.1 | 17.41 | 7,870 | B. |
| June | 176 | 60 | 114 | 13.4 | 14.95 | 6,780 | B. |
| July | 105 | 12 | 43.7 | 5.14 | 5.93 | 2,690 | A. |
| August | 12 | 2.6 | 5.97 | .702 | .81 | 367 | A. |
| September | 2.6 | 2.2 | 2.41 | .284 | .32 | 143 | A. |
| October | 162 | 2.6 | 19.6 | 2.31 | 2.66 | 1,210 | A. |
| November | 35 | 4.6 | 6.13 | .721 | .80 | 365 | A. |
| December | 130 | 3.4 | 29.0 | 3.41 | 3.93 | 1,780 | B. |
| The year | 203 | 2 2 | 41.1 | 4.83 | 65.80 | 29,800 | |

[a] Estimated.

*Monthly discharge of Independence Creek below Independence Lake, Cal., for 1902–1907*—Continued.

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1905. | | | | | | | |
| January | 146 | 6.6 | 44.3 | 5.21 | 6.01 | 2,720 | B. |
| February | 44 | 9.6 | 18.4 | 2.16 | 2.25 | 1,020 | B. |
| March | 54 | 27 | 34.5 | 4.06 | 4.68 | 2,120 | A. |
| April | 130 | 12 | 53.0 | 6.24 | 6.96 | 3,150 | A. |
| May | 232 | 31 | 118 | 13.9 | 16.03 | 7,260 | B. |
| June | 136 | 2.6 | 99.9 | 11.8 | 13.17 | 5,940 | A. |
| July | 14 | 3.2 | 8.41 | .989 | 1.14 | 517 | A. |
| August | 4.4 | .4 | 2.42 | .285 | .33 | 149 | B. |
| September | .4 | .0 | .22 | .026 | .03 | 13 | C. |
| October | .0 | .0 | .0 | .00 | .00 | 0 | D. |
| November | 17 | .0 | 4.90 | .576 | .64 | 292 | C. |
| December | 17 | 1.1 | 3.37 | .396 | .46 | 207 | B. |
| The year | 232 | .0 | 32.3 | 3.80 | 51.70 | 23,400 | |
| 1906. | | | | | | | |
| January | 117 | 1.6 | 27.2 | 3.20 | 3.69 | 1,670 | B. |
| February | 29 | 1.6 | 8.33 | .980 | 1.02 | 463 | B. |
| March | 37 | 8.0 | 18.6 | 2.19 | 2.52 | 1,140 | A. |
| April | 46 | 9.3 | 21.8 | 2.56 | 2.86 | 1,300 | A. |
| May | 154 | 5.6 | 89.7 | 10.6 | 12.22 | 5,520 | B. |
| June | 268 | .0 | 159 | 18.7 | 20.86 | 9,460 | B. |
| July | 250 | 21 | 141 | 16.6 | 19.14 | 8,670 | B. |
| August | 28 | 8.0 | 16.0 | 1.88 | 2.17 | 984 | A. |
| September | 8.0 | 2.6 | 4.55 | .535 | .60 | 271 | A. |
| October | 154 | 1.6 | 15.0 | 1.76 | 2.03 | 922 | A. |
| November | 15 | 6.6 | 11.5 | 1.35 | 1.51 | 684 | A. |
| December | 250 | 6.2 | 27.8 | 3.27 | 3.77 | 1,710 | B. |
| The year | 268 | .0 | 45.0 | 5.30 | 72.39 | 32,800 | |
| 1907.[a] | | | | | | | |
| January | 56 | 17 | 37.9 | 4.46 | 5.14 | 2,330 | B. |
| February | 46 | 22 | 32.9 | 3.87 | 4.03 | 1,830 | B. |
| March | 169 | 20 | 64.9 | 7.64 | 8.81 | 3,990 | B. |
| April | 117 | 20 | 65.1 | 7.66 | 8.55 | 3,870 | A. |
| May | 184 | 87 | 124 | 14.6 | 16.83 | 7,620 | B. |
| June | 286 | 78 | 158 | 18.6 | 20.75 | 9,400 | B. |
| July | ..... | ..... | 64 | 7.53 | 8.68 | 3,940 | D. |
| August | ..... | ..... | 21 | 2.47 | 2.85 | 1,290 | D. |
| September | ..... | ..... | 13 | 1.53 | 1.71 | 774 | D. |
| October | ..... | ..... | 14 | 1.65 | 1.90 | 861 | D. |
| November | ..... | ..... | 14 | 1.65 | 1.84 | 833 | D. |
| December | ..... | ..... | 17 | 2.00 | 2.31 | 1,050 | D. |
| The year | ..... | ..... | 52.2 | 6.14 | 83.40 | 37,800 | |

[a] Discharges for July to December have been estimated as 14 per cent of Little Truckee River at Starr station, this being a mean ratio derived from comparison of records; results are approximate.

NOTE.—These discharges are based on rating curves covering the following periods: October 24, 1902, to May 15, 1903; May 16 to August 22, 1903; August 27, 1903, to May 25, 1904; May 26, 1904, to July 8, 1905; July 9 to September 30, 1905; October 1, 1905, to June 30, 1907. All are fairly well defined between 0.5 and 130 second-feet except the last, which is not well defined for 1907.

## CARSON RIVER BASIN.

### DESCRIPTION.

The Carson River basin includes the area lying south of Lake Tahoe and between the Walker and Truckee river basins. Carson River is formed by its West and East forks, which rise in the extreme eastern part of California in a rugged and mountainous country heavily timbered with fir and pine, and flow northeastward to their union near the town of Gardnerville, Nev. From this point the river flows northward to Carson City, thence eastward through a rough and barren chain of hills and valleys, and finally discharges into the Carson Sink. The river is about 120 miles long, falling in this distance about 1,900 feet.

The water of the Carson is derived entirely from the snowfall and run-off from the high mountains. The basin contains no lakes, but many ideal reservoir sites are available near the headwaters and along the main river. These sites have been thoroughly investigated by the United States Reclamation Service and others interested.

Several fertile valleys lie along the course of this river and much land is unutilized for lack of water.

The minimum flow is all appropriated and the distribution of the water each year is the cause of much dissatisfaction. During the early spring and summer months the river is a raging torrent, but in the later summer the discharge is barely sufficient to supply the irrigation demand. By building reservoirs in the mountains this condition could be greatly improved and the waters of the two forks so controlled that the average daily flow would be greatly increased.

Good power sites are available along both forks of the river, but are at present wholly undeveloped.

Within the period for which records are available the wettest year was 1907 and the driest year 1905. The rate of run-off in these two years was three to one.

The following is a list of the stations maintained in the Carson River basin:

East Fork of Carson River at Rodenbah's ranch, near Gardnerville, Nev., 1900–1907.
East Fork of Carson River at Horseshoe Bend, near Gardnerville, Nev., 1908–9.
Carson River near Empire, Nev., 1900–1909.
Carson River near Hazen, Nev., 1908–9.
West Fork of Carson River at Woodfords, Cal., 1900–1909.

## EAST FORK OF CARSON RIVER NEAR GARDNERVILLE, NEV.

This station, which was established October 17, 1900, at Rodenbah's ranch, about 5 miles southeast of Gardnerville, proved unsatisfactory, and on March 27, 1908, a new station was established at a place known as Horseshoe Bend, about 9 miles south of Gardnerville and 3 miles above the old station. This point is below all tributaries and above all diversions. Measuring conditions are favorable, the section is permanent, and results are good.

The equipment consists of a car and cable and an inclined staff gage.

*Discharge measurements of East Fork of Carson River near Gardnerville, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 25 | E. A. Porter | ..... | 101 | 3.25 | 402 |
| June 15 | L. J. Towne | 93 | 309 | 5.25 | 1,760 |
| July 7 | ....do | ..... | 170 | 3.95 | 728 |
| August 9 | ....do | ..... | 75 | 2.75 | 190 |

*Daily gage height, in feet, of East Fork of Carson River near Gardnerville, Nev., for 1909.*

[H. M. Everett, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.4 | 2.8 | 2.7 | 2.9 | 5.0 | 6.0 | 5.0 | 3.0 | 2.6 | 2.7 | 2.6 | 4.8 |
| 2 | 2.4 | 2.7 | 2.7 | 3.1 | 4.85 | 6.25 | 4.8 | 3.0 | 2.6 | 2.7 | 2.6 | 3.2 |
| 3 | 2.4 | 2.7 | 2.7 | 3.4 | 5.0 | 6.45 | 4.7 | 3.0 | 2.6 | 2.6 | 2.6 | 3.2 |
| 4 | 2.4 | 2.7 | 2.7 | 3.4 | 5.3 | 6.85 | 4.5 | 2.9 | 2.6 | 2.6 | 2.6 | 3.0 |
| 5 | 2.9 | 2.7 | 2.7 | 3.3 | 5.3 | 6.8 | 4.4 | 2.9 | 2.6 | 2.6 | 2.6 | 3.0 |
| 6 | 3.2 | 2.7 | 2.7 | 3.2 | 5.4 | 6.05 | 4.2 | 2.9 | 2.6 | 2.6 | 2.6 | 3.0 |
| 7 | 2.5 | 2.7 | 2.7 | 3.1 | 5.4 | 5.6 | 4.2 | 2.9 | 2.6 | 2.6 | 2.6 | 3.0 |
| 8 | 2.6 | 2.7 | 2.7 | 3.1 | 5.3 | 5.35 | 4.2 | 2.8 | 2.6 | 2.6 | 2.6 | 3.0 |
| 9 | 2.4 | 2.7 | 2.7 | 3.2 | 5.3 | 5.35 | 4.0 | 2.8 | 2.6 | 2.6 | 2.6 | 3.0 |
| 10 | 2.4 | 2.7 | 2.7 | 3.3 | 5.1 | 5.35 | 4.0 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 11 | 2.4 | 2.7 | 2.7 | 3.4 | 4.8 | 5.35 | 4.0 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 12 | 2.7 | 2.7 | 2.7 | 3.5 | 4.6 | 5.6 | 4.0 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 13 | 3.3 | 2.7 | 2.7 | 3.7 | 4.3 | 5.6 | 3.9 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 14 | 5.85 | 2.7 | 2.7 | 3.85 | 4.45 | 5.4 | 3.8 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 15 | 5.8 | 2.7 | 2.8 | 4.15 | 4.45 | 5.7 | 3.8 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 16 | 5.2 | 2.9 | 2.8 | 4.3 | 4.45 | 5.4 | 3.7 | 2.7 | 2.6 | 2.6 | 2.6 | 3.0 |
| 17 | 4.0 | 3.4 | 2.8 | 4.65 | 4.5 | 4.9 | 3.7 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 |
| 18 | 3.65 | 3.0 | 2.8 | 4.7 | 4.6 | 4.9 | 3.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 |
| 19 | 3.45 | 2.9 | 2.8 | 4.65 | 4.8 | 4.8 | 3.5 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 |
| 20 | 4.1 | 2.8 | 2.8 | 4.3 | 4.9 | 4.7 | 3.4 | 2.6 | 2.6 | 2.6 | 2.6 | 2.7 |
| 21 | 4.8 | 2.7 | 2.8 | 4.05 | 5.1 | 5.0 | 3.2 | 2.6 | 2.6 | 2.6 | 5.6 | 2.7 |
| 22 | 3.5 | 2.7 | 2.8 | 3.9 | 4.7 | 5.2 | 3.2 | 2.6 | 2.6 | 2.6 | 3.5 | 2.7 |
| 23 | 3.2 | 2.7 | 2.8 | 3.9 | 4.4 | 5.3 | 3.2 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 24 | 3.2 | 2.6 | 2.8 | 4.05 | 4.2 | 5.4 | 3.1 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 25 | 3.1 | 2.6 | 2.8 | 4.05 | 4.4 | 5.4 | 3.1 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 26 | 3.0 | 2.6 | 2.8 | 4.35 | 4.7 | 5.4 | 3.0 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 27 | 3.0 | 2.7 | 2.8 | 4.55 | 4.9 | 5.4 | 3.0 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 28 | 2.9 | 2.7 | 2.8 | 4.6 | 4.8 | 5.4 | 3.0 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 29 | 2.9 | ..... | 2.8 | 4.7 | 4.7 | 5.3 | 3.0 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 30 | 2.9 | ..... | 2.8 | 4.8 | 4.7 | 5.2 | 3.0 | 2.6 | 2.6 | 2.6 | 3.3 | 2.7 |
| 31 | 2.8 | ..... | 2.8 | ..... | 4.7 | ..... | 3.0 | 2.6 | ..... | 2.6 | ..... | 4.7 |

*Daily discharge, in second-feet, of East Fork of Carson River near Gardnerville, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 104 | 213 | 182 | 250 | 1,520 | 2,480 | 1,520 | 290 | 154 | 182 | 154 | 1,360 |
| 2 | 104 | 182 | 182 | 330 | 1,400 | 2,760 | 1,360 | 290 | 154 | 182 | 154 | 375 |
| 3 | 104 | 182 | 182 | 470 | 1,520 | 2,980 | 1,280 | 290 | 154 | 154 | 154 | 375 |
| 4 | 104 | 182 | 182 | 470 | 1,790 | 3,430 | 1,120 | 250 | 154 | 154 | 154 | 290 |
| 5 | 250 | 182 | 182 | 420 | 1,790 | 3,370 | 1,050 | 250 | 154 | 154 | 154 | 290 |
| 6 | 375 | 182 | 182 | 375 | 1,880 | 2,540 | 910 | 250 | 154 | 154 | 154 | 290 |
| 7 | 128 | 182 | 182 | 330 | 1,880 | 2,070 | 910 | 250 | 154 | 154 | 154 | 290 |
| 8 | 154 | 182 | 182 | 330 | 1,790 | 1,840 | 910 | 213 | 154 | 154 | 154 | 290 |
| 9 | 104 | 182 | 182 | 375 | 1,790 | 1,840 | 790 | 213 | 154 | 154 | 154 | 290 |
| 10 | 104 | 182 | 182 | 420 | 1,610 | 1,840 | 790 | 182 | 154 | 154 | 154 | 290 |
| 11 | 104 | 182 | 182 | 470 | 1,360 | 1,840 | 790 | 182 | 154 | 154 | 154 | 290 |
| 12 | 182 | 182 | 182 | 520 | 1,200 | 2,070 | 790 | 182 | 154 | 154 | 154 | 290 |
| 13 | 420 | 182 | 182 | 620 | 980 | 2,070 | 730 | 182 | 154 | 154 | 154 | 290 |
| 14 | 2,320 | 182 | 182 | 702 | 1,080 | 1,880 | 675 | 182 | 154 | 154 | 154 | 290 |
| 15 | 2,270 | 182 | 213 | 880 | 1,080 | 2,170 | 675 | 182 | 154 | 154 | 154 | 290 |
| 16 | 1,700 | 250 | 213 | 980 | 1,080 | 1,880 | 620 | 182 | 154 | 154 | 154 | 290 |
| 17 | 790 | 470 | 213 | 1,240 | 1,120 | 1,440 | 620 | 154 | 154 | 154 | 154 | 182 |
| 18 | 595 | 290 | 213 | 1,280 | 1,200 | 1,440 | 570 | 154 | 154 | 154 | 154 | 182 |
| 19 | 495 | 250 | 213 | 1,240 | 1,360 | 1,360 | 520 | 154 | 154 | 154 | 154 | 182 |
| 20 | 850 | 213 | 213 | 980 | 1,440 | 1,280 | 470 | 154 | 154 | 154 | 154 | 182 |
| 21 | 1,360 | 182 | 213 | 820 | 1,610 | 1,520 | 375 | 154 | 154 | 154 | 2,070 | 182 |
| 22 | 520 | 182 | 213 | 730 | 1,280 | 1,700 | 375 | 154 | 154 | 154 | 520 | 182 |
| 23 | 375 | 182 | 213 | 730 | 1,050 | 1,790 | 375 | 154 | 154 | 154 | 420 | 182 |
| 24 | 375 | 154 | 213 | 820 | 910 | 1,880 | 330 | 154 | 154 | 154 | 420 | 182 |
| 25 | 330 | 154 | 213 | 820 | 1,050 | 1,880 | 330 | 154 | 154 | 154 | 420 | 182 |
| 26 | 290 | 154 | 213 | 1,020 | 1,280 | 1,880 | 290 | 154 | 154 | 154 | 420 | 182 |
| 27 | 290 | 182 | 213 | 1,160 | 1,440 | 1,880 | 290 | 154 | 154 | 154 | 420 | 182 |
| 28 | 250 | 182 | 213 | 1,200 | 1,360 | 1,880 | 290 | 154 | 154 | 154 | 420 | 182 |
| 29 | 250 | ..... | 213 | 1,280 | 1,280 | 1,790 | 290 | 154 | 154 | 154 | 420 | 182 |
| 30 | 250 | ..... | 213 | 1,360 | 1,280 | 1,700 | 290 | 154 | 154 | 154 | 420 | 182 |
| 31 | 213 | ..... | 213 | ..... | 1,280 | ..... | 290 | 154 | ..... | 154 | ..... | 1,280 |

NOTE.—These daily discharges are based on a rating curve well defined between 128 and 1,790 second-feet.

*Monthly discharge of East Fork of Carson River near Gardnerville, Nev., for 1909.*

[Drainage area, 361 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 2,320 | 104 | 508 | 1.41 | 1.63 | 31,200 | C. |
| February | 470 | 154 | 200 | .554 | .58 | 11,100 | C. |
| March | 213 | 182 | 199 | .551 | .64 | 12,200 | B. |
| April | 1,360 | 250 | 754 | 2.09 | 2.33 | 44,900 | A. |
| May | 1,880 | 910 | 1,380 | 3.82 | 4.40 | 84,800 | A. |
| June | 3,430 | 1,280 | 2,020 | 5.60 | 6.25 | 120,000 | B. |
| July | 1,520 | 290 | 665 | 1.84 | 2.12 | 40,900 | A. |
| August | 290 | 154 | 190 | .526 | .61 | 11,700 | A. |
| September | 154 | 154 | 154 | .427 | .48 | 9,160 | A. |
| October | 182 | 154 | 156 | .432 | .50 | 9,590 | A. |
| November | 2,070 | 154 | 301 | .834 | .93 | 17,900 | B. |
| December | 1,360 | 182 | 313 | .867 | 1.00 | 19,200 | C. |
| The year | 3,430 | 104 | 570 | 1.58 | 21.47 | 413,000 | |

CARSON RIVER AND BRUNSWICK MILL POWER CANAL NEAR EMPIRE, NEV.

This station, which was established October 21, 1900, was originally located three-fourths of a mile east of Brunswick Mill and 2½ miles east of Empire, Nev. This gage was washed out by a flood March 19, 1907. On April 12, 1907, a new gage was installed on the crest of the diversion dam of the Brunswick Mill canal, 1½ miles below Empire and 6 miles east of Carson City, Nev. Only one measurement was referred to this gage, and elevation of the gage datum was not referred to the crest of the dam, therefore no discharges can be computed from this time until June 7, 1907, when a new gage was installed on the county bridge at Brunswick Mill, 500 feet below. All gage heights since that time refer to the same datum. Discharge measurements are made from a car and cable located just above the highway bridge. An inclined gage is located under the bridge. The power canal of the mill has diverted water past the gage on the river since April 12, 1907, so its discharge must be added to give the total. As records have been kept on the canal only since April 13, 1908, the total flow of the river prior to that time can be estimated only approximately. The power is now used to pump water for irrigation, although formerly it was used to run a stamp mill. The station on the canal is at a bridge crossing the canal directly opposite the cable in the river.

The records at this point show the discharge of the river below the Gardnerville Valley and above the Dayton Valley, and are of value to the United States Reclamation Service in connection with the Truckee-Carson project and to the state engineer of Nevada in the adjustment of water rights.

Good results have been obtained on the river, but the gage in the canal is within the influence of backwater from the mill and is not always an index of the discharge. Discharges for the canal are therefore only approximate. Ice interferes with records at times during the winter.

*Discharge measurements of Carson River near Empire, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 19 | D. W. Hays | ..... | 645 | 6.25 | 1,210 |
| June 17 | L. J. Towne | ..... | 723 | 6.80 | 1,910 |
| June 25 | do | 139 | 717 | 6.88 | 1,740 |
| July 8 | do | 126 | 516 | 5.40 | 696 |
| July 12 | do | 124 | 479 | 5.22 | 609 |
| July 31 | do | ..... | 114 | 3.14 | 67 |
| August 11 [a] | do | 42 | 54 | 2.90 | 30 |
| September 8 | F. C. Schafer | 61 | 43 | 2.50 | 35 |

[a] By wading below cable.

*Daily gage height, in feet, of Carson River near Empire, Nev., for 1909.*

[J. Loyd, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.8 | 5.0 | 4.6 | 4.6 | 6.3 | 6.7 | 6.4 | 3.2 | 2.5 | 2.5 | 3.4 | 5.8 |
| 2 | 2.8 | 5.0 | 4.6 | 4.7 | 6.4 | 7.0 | 6.4 | 3.2 | 2.5 | 2.8 | 3.4 | 6.4 |
| 3 | 3.8 | 4.9 | 4.6 | 4.8 | 6.5 | 7.3 | 6.4 | 3.2 | 2.5 | 3.3 | 3.4 | 6.0 |
| 4 | 4.0 | 4.8 | 4.6 | 5.0 | 6.7 | 7.5 | 6.4 | 3.1 | 2.5 | 3.7 | 3.4 | 5.4 |
| 5 | 4.1 | 4.8 | 4.9 | 5.1 | 6.8 | 7.6 | 6.3 | 3.1 | 2.5 | 3.6 | 3.4 | 4.8 |
| 6 | 4.8 | 4.8 | 4.7 | 5.0 | 6.9 | 7.7 | 6.0 | 3.1 | 2.5 | 3.5 | 3.4 | 4.5 |
| 7 | 5.1 | 4.8 | 4.6 | 4.9 | 7.0 | 7.6 | 5.7 | 3.0 | 2.5 | 3.5 | 3.4 | 4.7 |
| 8 | 4.6 | 4.7 | 4.6 | 4.9 | 7.1 | 7.4 | 5.5 | 2.9 | 2.5 | 3.4 | 3.4 | 5.0 |
| 9 | 4.9 | 4.5 | 4.6 | 5.0 | 7.1 | 7.2 | 5.3 | 2.9 | 2.5 | 3.4 | 3.5 | 5.7 |
| 10 | 4.5 | 4.5 | 4.6 | 4.9 | 7.1 | 7.1 | 5.2 | 2.9 | 2.5 | 3.4 | 3.6 | 6.0 |
| 11 | 4.0 | 4.7 | 4.6 | 5.1 | 7.0 | 7.0 | 5.2 | 2.9 | 2.5 | 3.4 | 3.6 | 5.3 |
| 12 | 4.2 | 4.8 | 4.6 | 5.2 | 6.7 | 7.0 | 5.2 | 2.9 | 2.5 | 3.3 | 3.7 | 5.1 |
| 13 | 5.1 | 5.3 | 4.6 | 5.5 | 6.6 | 7.0 | 5.2 | 2.8 | 2.5 | 3.3 | 3.7 | 5.0 |
| 14 | 7.2 | 5.6 | 4.6 | 6.0 | 6.3 | 7.0 | 5.2 | 2.8 | 2.5 | 3.3 | 3.8 | 4.9 |
| 15 | 8.1 | 5.5 | 4.6 | 6.4 | 6.1 | 7.0 | 5.1 | 2.8 | 2.5 | 3.3 | 3.8 | 4.8 |
| 16 | 7.9 | 5.5 | 4.6 | 6.6 | 6.3 | 6.9 | 4.9 | 2.8 | 2.5 | 3.3 | 3.7 | 4.5 |
| 17 | 7.5 | 5.9 | 4.5 | 6.7 | 6.4 | 6.8 | 4.8 | 2.7 | 2.5 | 3.4 | 3.7 | 4.4 |
| 18 | 6.8 | 5.9 | 4.5 | 6.8 | 6.3 | 6.7 | 4.6 | 2.6 | 2.5 | 3.4 | 3.8 | 4.4 |
| 19 | 6.5 | 5.4 | 4.5 | 6.9 | 6.2 | 6.7 | 4.4 | 2.6 | 2.5 | 3.3 | 3.8 | 4.4 |
| 20 | 6.0 | 5.0 | 4.6 | 6.7 | 6.2 | 6.6 | 4.2 | 2.6 | 2.5 | 3.3 | 4.3 | 4.4 |
| 21 | 6.5 | 4.9 | 4.6 | 6.1 | 6.3 | 6.5 | 4.0 | 2.6 | 2.5 | 3.2 | 6.2 | 4.4 |
| 22 | 7.5 | 4.8 | 4.5 | 6.0 | 6.5 | 6.6 | 3.9 | 2.5 | 2.5 | 3.2 | 5.6 | 4.4 |
| 23 | 6.5 | 4.7 | 4.5 | 5.7 | 6.3 | 6.7 | 3.9 | 2.5 | 2.5 | 3.3 | 5.4 | 4.4 |
| 24 | 5.9 | 4.8 | 4.5 | 5.6 | 6.2 | 6.8 | 3.8 | 2.5 | 2.5 | 3.3 | 5.2 | 4.4 |
| 25 | 5.7 | 4.8 | 4.5 | 5.6 | 6.0 | 6.9 | 3.8 | 2.5 | 2.5 | 3.3 | 5.4 | 4.4 |
| 26 | 5.5 | 4.8 | 4.5 | 5.8 | 6.1 | 6.8 | 3.8 | 2.5 | 2.5 | 3.3 | 5.5 | 4.4 |
| 27 | 5.5 | 4.7 | 4.5 | 6.0 | 6.4 | 6.7 | 3.6 | 2.5 | 2.5 | 3.3 | 5.6 | 4.4 |
| 28 | 5.4 | 4.6 | 4.5 | 6.2 | 6.7 | 6.6 | 3.5 | 2.5 | 2.5 | 3.2 | 5.7 | 4.4 |
| 29 | 5.3 | ..... | 4.5 | 6.3 | 6.7 | 6.5 | 3.4 | 2.5 | 2.5 | 3.3 | 5.7 | 4.4 |
| 30 | 5.1 | ..... | 4.5 | 6.3 | 6.4 | 6.5 | 3.2 | 2.5 | 2.5 | 3.3 | ..... | 4.4 |
| 31 | 5.0 | ..... | 4.5 | ..... | 6.3 | ..... | 3.2 | 2.5 | ..... | 3.3 | ..... | 4.9 |

*Daily discharge, in second-feet, of Carson River near Empire, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 51 | 485 | 345 | 345 | 1,260 | 1,580 | 1,340 | 82 | 32 | 32 | 106 | 910 |
| 2 | 51 | 485 | 345 | 375 | 1,340 | 1,840 | 1,340 | 82 | 32 | 51 | 106 | 1,340 |
| 3 | 158 | 445 | 345 | 410 | 1,420 | 2,110 | 1,340 | 82 | 32 | 94 | 106 | 1,050 |
| 4 | 195 | 410 | 345 | 485 | 1,580 | 2,200 | 1,340 | 73 | 32 | 143 | 106 | 680 |
| 5 | 215 | 410 | 445 | 530 | 1,660 | 2,390 | 1,260 | 73 | 32 | 130 | 106 | 410 |
| 6 | 410 | 410 | 375 | 485 | 1,750 | 2,490 | 1,050 | 73 | 32 | 118 | 106 | 315 |
| 7 | 530 | 410 | 345 | 445 | 1,840 | 2,390 | 850 | 65 | 32 | 118 | 106 | 375 |
| 8 | 345 | 375 | 345 | 445 | 1,930 | 2,200 | 730 | 58 | 32 | 106 | 106 | 485 |
| 9 | 445 | 315 | 345 | 485 | 1,930 | 2,020 | 630 | 58 | 32 | 106 | 118 | 850 |
| 10 | 315 | 315 | 345 | 445 | 1,930 | 1,930 | 580 | 58 | 32 | 106 | 130 | 1,050 |
| 11 | 195 | 375 | 345 | 530 | 1,840 | 1,840 | 580 | 58 | 32 | 106 | 130 | 630 |
| 12 | 235 | 410 | 345 | 580 | 1,580 | 1,840 | 580 | 58 | 32 | 94 | 143 | 530 |
| 13 | 530 | 630 | 345 | 730 | 1,500 | 1,840 | 580 | 51 | 32 | 94 | 143 | 485 |
| 14 | 2,020 | 790 | 345 | 1,050 | 1,260 | 1,840 | 580 | 51 | 32 | 94 | 158 | 445 |
| 15 | 2,890 | 730 | 345 | 1,340 | 1,120 | 1,840 | 530 | 51 | 32 | 94 | 158 | 410 |
| 16 | 2,690 | 730 | 345 | 1,500 | 1,260 | 1,750 | 445 | 51 | 32 | 94 | 143 | 315 |
| 17 | 2,290 | 980 | 315 | 1,580 | 1,340 | 1,660 | 410 | 44 | 32 | 106 | 143 | 285 |
| 18 | 1,660 | 980 | 315 | 1,660 | 1,260 | 1,580 | 345 | 38 | 32 | 106 | 158 | 285 |
| 19 | 1,420 | 680 | 315 | 1,750 | 1,190 | 1,580 | 285 | 38 | 32 | 94 | 158 | 285 |
| 20 | 1,050 | 485 | 345 | 1,580 | 1,190 | 1,500 | 235 | 38 | 32 | 94 | 260 | 285 |
| 21 | 1,420 | 445 | 345 | 1,120 | 1,260 | 1,420 | 195 | 38 | 32 | 82 | 1,190 | 285 |
| 22 | 2,290 | 410 | 315 | 1,050 | 1,420 | 1,500 | 175 | 32 | 32 | 82 | 790 | 285 |
| 23 | 1,420 | 375 | 315 | 850 | 1,260 | 1,580 | 175 | 32 | 32 | 94 | 680 | 285 |
| 24 | 980 | 410 | 315 | 790 | 1,190 | 1,660 | 158 | 32 | 32 | 94 | 580 | 285 |
| 25 | 850 | 410 | 315 | 790 | 1,050 | 1,750 | 158 | 32 | 32 | 94 | 680 | 285 |
| 26 | 730 | 410 | 315 | 910 | 1,120 | 1,660 | 158 | 32 | 32 | 94 | 730 | 285 |
| 27 | 730 | 375 | 315 | 1,050 | 1,340 | 1,580 | 130 | 32 | 32 | 94 | 790 | 285 |
| 28 | 680 | 345 | 315 | 1,190 | 1,580 | 1,500 | 118 | 32 | 32 | 82 | 850 | 285 |
| 29 | 630 | ..... | 315 | 1,260 | 1,580 | 1,420 | 106 | 32 | 32 | 94 | 850 | 285 |
| 30 | 530 | ..... | 315 | 1,260 | 1,340 | 1,420 | 82 | 32 | 32 | 94 | 880 | 285 |
| 31 | 485 | ..... | 315 | ..... | 1,260 | ..... | 82 | 32 | ..... | 94 | ..... | 445 |

NOTE.—These discharges are based on a rating curve fairly well defined.

*Discharge measurements of Brunswick mill power canal near Empire, Nev., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 19 | D. W. Hays | ..... | 25.7 | 1.50 | 39 |
| January 26 | E. A. Porter | ..... | ..... | 1.40 | 30 |
| June 17 | L. J. Towne | 15 | 44.3 | 2.70 | 78 |
| June 25[a] | do | 14 | 43 | 2.80 | 79 |
| July 12[b] | do | 15 | 40.4 | 2.65 | 65 |
| July 31 | do | 14.5 | 34.8 | 2.50 | 57 |
| September 8[c] | F. C. Shafer | 16 | 41.0 | 1.50 | 8.5 |

[a] Backwater due to change in gates.
[b] Mill started during measurement and caused backwater.
[c] Mill not running.

*Daily gage height, in feet, of Brunswick mill power canal near Empire, Nev., for 1909.*

[J. Loyd, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.6 | 1.4 | 1.3 | 2.6 | 2.6 | 2.6 | 2.6 | 2.5 | 1.5 | 1.6 | 2.7 | 3.1 |
| 2 | 1.6 | 1.4 | 1.3 | 2.6 | 2.6 | 2.8 | 2.6 | 2.5 | 1.5 | 1.7 | 2.7 | 3.3 |
| 3 | 1.7 | 1.4 | 1.3 | 2.8 | 2.6 | 2.8 | 2.6 | 2.5 | 1.5 | 2.8 | 2.7 | 3.1 |
| 4 | 1.7 | 1.3 | 1.3 | 2.8 | 2.6 | 2.8 | 2.6 | 2.2 | 1.5 | 2.8 | 2.7 | 3.0 |
| 5 | 1.7 | 1.3 | 1.3 | 3.0 | 2.6 | 2.8 | 2.6 | 2.2 | 1.5 | 2.8 | 2.7 | 2.9 |
| 6 | 1.9 | 1.4 | 1.3 | 2.4 | 2.8 | 3.0 | 2.6 | 2.2 | 1.5 | 2.8 | 2.7 | 2.8 |
| 7 | 1.9 | 1.4 | 1.3 | 2.4 | 2.8 | 2.8 | 2.6 | 2.0 | 1.5 | 2.8 | 2.7 | 2.9 |
| 8 | 2.0 | 1.4 | 1.3 | 2.4 | 2.8 | 2.8 | 2.5 | 1.9 | 1.5 | 2.8 | 2.7 | 3.0 |
| 9 | 2.1 | 1.4 | 1.3 | 2.4 | 2.8 | 2.8 | 2.5 | 1.8 | 1.5 | 2.8 | 2.7 | 3.2 |
| 10 | 2.0 | 1.3 | 1.3 | 2.4 | 2.8 | 2.8 | 2.5 | 1.8 | 1.5 | 2.7 | 2.8 | 3.3 |
| 11 | 2.4 | 1.3 | 1.3 | 2.4 | 2.8 | 2.8 | 2.5 | 1.8 | 1.5 | 2.7 | 2.9 | 2.9 |
| 12 | 2.4 | 1.4 | 1.3 | 2.4 | 2.8 | 2.8 | 2.5 | 1.8 | 1.5 | 2.7 | 2.9 | 2.9 |
| 13 | 2.0 | 1.4 | 1.3 | 2.5 | 2.6 | 2.8 | 2.5 | 1.7 | 1.5 | 2.7 | 2.9 | 2.8 |
| 14 | 2.1 | 1.5 | 1.3 | 2.5 | 2.6 | 2.8 | 2.5 | 1.7 | 1.5 | 2.7 | 2.9 | 2.8 |
| 15 | 1.7 | 1.5 | 1.3 | 2.6 | 2.6 | 2.8 | 2.5 | 1.7 | 1.5 | 2.7 | 2.9 | 2.7 |
| 16 | 1.7 | 1.5 | 1.3 | 2.6 | 2.6 | 2.8 | 2.4 | 1.7 | 1.5 | 2.7 | 2.9 | 2.7 |
| 17 | 1.6 | 1.5 | 2.6 | 2.6 | 2.6 | 2.6 | 2.4 | 1.6 | 1.5 | 2.7 | 2.9 | 2.6 |
| 18 | 1.5 | 1.5 | 2.6 | 2.6 | 2.6 | 2.6 | 2.4 | 1.6 | 1.5 | 2.7 | 2.9 | 2.6 |
| 19 | 1.0 | 1.4 | 2.6 | 2.8 | 2.6 | 2.8 | 2.4 | 1.6 | 1.5 | 2.6 | 2.9 | 2.6 |
| 20 | 1.5 | 1.4 | 2.6 | 2.7 | 2.6 | 2.8 | 3.0 | 1.6 | 1.5 | 2.6 | 2.9 | 2.6 |
| 21 | 1.6 | 1.4 | 2.6 | 2.7 | 2.6 | 2.8 | 2.8 | 1.6 | 1.5 | 2.6 | 3.2 | 2.6 |
| 22 | 1.7 | 1.4 | 2.6 | 2.7 | 2.6 | 2.8 | 2.6 | 1.5 | 1.5 | 2.6 | 4.1 | 2.6 |
| 23 | 1.5 | 1.4 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | 1.5 | 1.5 | 2.6 | 2.8 | 2.6 |
| 24 | .8 | 1.4 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | 1.5 | 1.5 | 2.6 | 3.0 | 2.6 |
| 25 | 1.5 | 1.4 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | 1.5 | 1.5 | 2.6 | 3.0 | 2.6 |
| 26 | 1.5 | 1.3 | 2.6 | 2.6 | 2.6 | 2.8 | 2.6 | 1.5 | 1.5 | 2.6 | 3.0 | 2.6 |
| 27 | 1.4 | 1.3 | 2.6 | 2.6 | 2.6 | 2.6 | 2.5 | 1.5 | 1.5 | 2.6 | 3.0 | 2.6 |
| 28 | 1.5 | 1.3 | 2.6 | 2.6 | 2.6 | 2.6 | 2.4 | 1.5 | 1.5 | 2.6 | 3.0 | 2.6 |
| 29 | 1.4 | ..... | 2.6 | 2.6 | 2.6 | 2.6 | 2.3 | 1.5 | 1.6 | 2.6 | 3.0 | 2.6 |
| 30 | 1.4 | ..... | 2.6 | 2.6 | 2.6 | 2.6 | 2.1 | 1.5 | 1.6 | 2.6 | 3.0 | 2.6 |
| 31 | 1.4 | ..... | 2.6 | ..... | 2.6 | ..... | 2.4 | 1.5 | ..... | 2.6 | 3.0 | 2.8 |

NOTE.—The 1908 measurements indicate occasional backwater from the mill, and the same may have occurred at times during 1909.

*Daily discharge, in second-feet, of Brunswick mill power canal near Empire, Nev., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 38 | 32 | 29 | 69 | 69 | 69 | 69 | 66 | 35 | 38 | 72 | 85 |
| 2 | 38 | 32 | 29 | 69 | 69 | 75 | 69 | 66 | 35 | 41 | 72 | 92 |
| 3 | 41 | 32 | 29 | 75 | 69 | 75 | 69 | 66 | 35 | 75 | 72 | 85 |
| 4 | 41 | 29 | 29 | 75 | 69 | 75 | 69 | 56 | 35 | 75 | 72 | 82 |
| 5 | 41 | 29 | 29 | 82 | 69 | 75 | 69 | 56 | 35 | 75 | 72 | 78 |
| 6 | 47 | 32 | 29 | 62 | 75 | 82 | 69 | 56 | 35 | 75 | 72 | 75 |
| 7 | 47 | 32 | 29 | 62 | 75 | 75 | 69 | 50 | 35 | 75 | 72 | 78 |
| 8 | 50 | 32 | 29 | 62 | 75 | 75 | 66 | 47 | 35 | 75 | 72 | 82 |
| 9 | 53 | 32 | 29 | 62 | 75 | 75 | 66 | 44 | 35 | 75 | 72 | 88 |
| 10 | 50 | 29 | 29 | 62 | 75 | 75 | 66 | 44 | 35 | 72 | 75 | 92 |
| 11 | 62 | 29 | 29 | 62 | 75 | 75 | 66 | 44 | 35 | 72 | 78 | 78 |
| 12 | 53 | 32 | 29 | 62 | 75 | 75 | 66 | 44 | 35 | 72 | 78 | 78 |
| 13 | 50 | 32 | 29 | 66 | 69 | 75 | 66 | 41 | 35 | 72 | 78 | 75 |
| 14 | 53 | 35 | 29 | 66 | 69 | 75 | 66 | 41 | 35 | 72 | 78 | 75 |
| 15 | 41 | 35 | 29 | 69 | 69 | 75 | 66 | 41 | 35 | 72 | 78 | 72 |
| 16 | 41 | 35 | 29 | 69 | 69 | 75 | 62 | 41 | 35 | 72 | 78 | 72 |
| 17 | 38 | 35 | 69 | 69 | 69 | 69 | 62 | 38 | 35 | 72 | 78 | 69 |
| 18 | 35 | 35 | 69 | 69 | 69 | 69 | 62 | 38 | 35 | 72 | 78 | 69 |
| 19 | 22 | 32 | 69 | 75 | 69 | 75 | 62 | 38 | 35 | 69 | 78 | 69 |
| 20 | 35 | 32 | 69 | 72 | 69 | 75 | 82 | 38 | 35 | 69 | 78 | 69 |
| 21 | 38 | 32 | 69 | 72 | 69 | 75 | 75 | 38 | 35 | 69 | 88 | 69 |
| 22 | 41 | 32 | 69 | 72 | 69 | 75 | 69 | 35 | 35 | 69 | 120 | 69 |
| 23 | 35 | 32 | 69 | 69 | 69 | 75 | 69 | 35 | 35 | 69 | 75 | 69 |
| 24 | 17 | 32 | 69 | 69 | 69 | 75 | 69 | 35 | 35 | 69 | 82 | 69 |
| 25 | 35 | 32 | 69 | 69 | 69 | 75 | 69 | 35 | 35 | 69 | 82 | 69 |
| 26 | 35 | 29 | 69 | 69 | 69 | 75 | 69 | 35 | 35 | 69 | 82 | 69 |
| 27 | 32 | 29 | 69 | 69 | 69 | 69 | 66 | 35 | 35 | 69 | 82 | 69 |
| 28 | 35 | 29 | 69 | 69 | 69 | 69 | 62 | 35 | 35 | 69 | 82 | 69 |
| 29 | 32 | ..... | 69 | 69 | 69 | 69 | 59 | 35 | 38 | 69 | 82 | 69 |
| 30 | 32 | ..... | 69 | 69 | 69 | 69 | 53 | 35 | 38 | 69 | 82 | 69 |
| 31 | 32 | ..... | 69 | ..... | 69 | ..... | 62 | 35 | ..... | 69 | ..... | 75 |

NOTE.—These discharges are based on a fairly well-defined rating curve.

*Monthly discharge of Carson River near Empire, Nev., for 1909.*

[Drainage area, 988 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | |
|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. |
| January | 2,930 | 89 | 957 | 0.969 | 1.12 | 58,800 |
| February | 1,020 | 344 | 533 | .539 | .56 | 29,600 |
| March | 474 | 374 | 385 | .390 | .45 | 23,700 |
| April | 1,820 | 414 | 970 | .982 | 1.10 | 57,700 |
| May | 2,000 | 1,120 | 1,510 | 1.53 | 1.76 | 92,800 |
| June | 2.570 | 1,490 | 1,870 | 1.89 | 2.11 | 111,000 |
| July | 1.410 | 135 | 600 | .607 | .70 | 36,900 |
| August | 148 | 67 | 93.0 | .094 | .11 | 5,720 |
| September | 70 | 67 | 67.2 | .068 | .08 | 4,000 |
| October | 218 | 70 | 165 | .167 | .19 | 10,100 |
| November | 1,280 | 178 | 436 | .441 | .49 | 25,900 |
| December | 1,430 | 354 | 550 | .557 | .64 | 33,800 |
| The year | 2,930 | 67 | 678 | .686 | 9.31 | 490,000 |

NOTE.—These discharges include those of the Brunswick mill power canal and represent the total flow of the river.

## CARSON RIVER NEAR HAZEN, NEV.

This station, which is located about 8 miles south of Hazen and above Truckee canal chute, was established January 12, 1908, to determine the amount of water from Carson River available for storage in connection with the Truckee-Carson project of the United States Reclamation Service. A reservoir of about 100,000 acre-feet capacity will be erected at this point to conserve the flood waters of the Carson and also the water delivered by the Truckee canal.

To avoid the effect of backwater from the canal chute the gage was moved upstream on April 28, 1908. Gage heights prior to that time are of no value. Discharge measurements are made by wading and from the cable, which is about 1,500 feet upstream from the chute at the end of the canal. An inclined gage is located on the left bank just below the cable.

The plotting of the discharge measurements indicates some shift in the channel. Well-defined ratings for 1908 and 1909 have been developed, however. The 1908 gage heights are given in Water-Supply Paper 250, page 128.

*Discharge measurements of Carson River near Hazen, Nev., in 1908–9.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1908. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 7 | E. A. Porter | 73 | 112 | 4.70 | 324 |
| March 31 | do | 70 | 112 | 4.70 | 394 |
| April 28 | do | 81 | 180 | 3.35 | 411 |
| July 17 | M. B. Kennedy | ..... | 100 | 2.60 | 134 |
| October 21 | E. A. Porter | 96 | 91 | 2.40 | 73 |
| 1909. | | | | | |
| January 21 | E. A. Porter | ..... | 253 | 4.10 | 1,080 |
| January 22 | do | ..... | 341 | 4.80 | 1,590 |
| February 2 | do | ..... | 187 | 3.40 | 539 |
| February 28 | do | ..... | 152 | 3.10 | 341 |
| June 7 | L. J. Towne | ..... | 550 | 6.05 | 2,950 |
| June 23 | do | ..... | 346 | 4.68 | 1,670 |
| July 5 | do | ..... | 334 | 4.50 | 1,430 |
| July 19 | do | ..... | 182 | 3.10 | 396 |
| August 13 | H. W. and S. R. Marean | ..... | 82 | 2.03 | 47 |
| September 24 | Marean and Schafer | ..... | 44 | 1.70 | 17 |

NOTE.—Gage heights of March 7 and 31, 1908, refer to old gage and were affected by backwater. Gage heights of other measurements refer to new gage established April 28, 1908. Channel was cleared of rocks on October 21, 1908.

*Daily gage height, in feet, of Carson River near Hazen, Nev., for 1909.*

[Fred Foster, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.7 | 3.5 | 3.1 | 3.0 | 4.25 | 4.35 | 4.55 | 2.45 | 1.7 | 1.95 | 2.45 | 3.25 |
| 2 | 2.8 | 3.4 | 3.1 | 3.0 | 4.3 | 4.7 | 4.5 | 2.4 | 1.7 | 1.95 | 2.5 | 3.2 |
| 3 | 2.8 | 3.4 | 3.1 | 3.0 | 4.3 | 5.05 | 4.4 | 2.35 | 1.7 | 1.95 | 2.5 | 3.6 |
| 4 | 2.85 | 3.35 | 3.1 | 3.15 | 4.4 | 5.3 | 4.45 | 2.35 | 1.7 | 1.95 | 2.55 | 4.1 |
| 5 | 2.95 | 3.35 | 3.2 | 3.25 | 4.7 | 5.55 | 4.5 | 2.3 | 1.7 | 2.0 | 2.55 | 3.8 |
| 6 | 2.9 | 3.3 | 3.3 | 3.4 | 4.9 | 5.8 | 4.4 | 2.3 | 1.7 | 2.15 | 2.55 | 3.4 |
| 7 | 2.9 | 2.25 | 3.3 | 3.35 | 5.0 | 6.05 | 4.15 | 2.2 | 1.7 | 2.4 | 2.55 | 3.3 |
| 8 | 2.5 | 3.3 | 3.1 | 3.3 | 5.05 | 6.2 | 3.85 | 2.2 | 1.7 | 2.5 | 2.55 | 3.3 |
| 9 | 2.4 | 3.2 | 3.1 | 3.3 | 5.1 | 6.05 | 3.75 | 2.15 | 1.7 | 2.5 | 2.55 | 3.4 |
| 10 | 3.35 | 3.2 | 3.05 | 3.3 | 5.15 | 5.7 | 3.65 | 2.1 | 1.7 | 2.5 | 2.55 | 3.6 |
| 11 | 3.35 | 3.15 | 3.0 | 3.3 | 5.15 | 5.55 | 3.6 | 2.05 | 1.7 | 2.5 | 2.6 | 4.0 |
| 12 | 3.0 | 3.3 | 3.0 | 3.35 | 5.05 | 5.3 | 3.45 | 2.05 | 1.7 | 2.5 | 2.6 | 3.8 |
| 13 | 3.05 | 3.45 | 3.0 | 3.35 | 5.75 | 5.2 | 3.5 | 2.05 | 1.7 | 2.5 | 2.6 | 3.5 |
| 14 | 3.05 | 3.6 | 3.0 | 3.4 | 4.65 | 5.2 | 3.5 | 2.0 | 1.7 | 2.5 | 2.65 | 3.4 |
| 15 | 3.05 | 3.7 | 3.0 | 3.4 | 4.35 | 5.2 | 3.5 | 1.95 | 1.7 | 2.5 | 2.7 | 3.4 |
| 16 | 5.7 | 3.7 | 3.0 | 3.4 | 4.25 | 5.2 | 3.5 | 1.95 | 1.7 | 2.45 | 2.7 | 3.4 |
| 17 | 7.15 | 3.7 | 3.0 | 3.45 | 4.25 | 5.05 | 3.3 | 1.95 | 1.7 | 2.45 | 2.7 | 3.2 |
| 18 | 6.65 | 3.8 | 3.05 | 3.85 | 4.2 | 5.0 | 3.2 | 1.9 | 1.7 | 2.45 | 2.7 | 3.1 |
| 19 | 5.65 | 3.9 | 3.05 | 4.05 | 4.2 | 4.95 | 3.1 | 1.9 | 1.7 | 2.5 | 2.7 | 3.05 |
| 20 | 4.5 | 3.7 | 3.1 | 4.2 | 4.2 | 4.85 | 2.95 | 1.9 | 1.7 | 2.45 | 2.75 | 3.05 |
| 21 | 4.15 | 3.6 | 3.1 | 4.35 | 4.2 | 4.75 | 2.9 | 1.9 | 1.7 | 2.45 | 2.75 | 3.05 |
| 22 | 5.05 | 3.4 | 3.1 | 4.1 | 4.35 | 4.65 | 2.85 | 1.85 | 1.7 | 2.4 | 2.8 | 3.05 |
| 23 | 5.65 | 3.35 | 3.1 | 3.9 | 4.5 | 4.6 | 2.75 | 1.85 | 1.7 | 2.45 | 3.8 | 3.05 |
| 24 | 4.95 | 3.3 | 3.1 | 3.8 | 4.3 | 4.65 | 2.7 | 1.85 | 1.7 | 2.45 | 3.7 | 3.15 |
| 25 | 4.05 | 3.3 | 3.05 | 3.75 | 4.2 | 4.85 | 2.65 | 1.85 | 1.7 | 2.45 | 3.65 | 3.1 |
| 26 | 3.85 | 3.25 | 3.05 | 3.75 | 4.05 | 4.95 | 2.65 | 1.8 | 1.7 | 2.45 | 3.55 | 3.05 |
| 27 | 3.8 | 3.15 | 3.0 | 3.8 | 4.05 | 4.95 | 2.6 | 1.8 | 1.7 | 2.45 | 3.6 | 2.95 |
| 28 | 3.7 | 3.1 | 3.0 | 3.95 | 4.4 | 4.9 | 2.6 | 1.8 | 1.7 | 2.45 | 3.45 | 3.05 |
| 29 | 3.65 | ..... | 3.0 | 4.15 | 4.6 | 4.75 | 2.6 | 1.75 | 1.7 | 2.45 | 3.3 | 2.95 |
| 30 | 3.6 | ..... | 3.0 | 4.25 | 4.65 | 4.65 | 2.55 | 1.75 | 1.8 | 2.45 | 3.15 | 2.95 |
| 31 | 3.5 | ..... | 3.0 | ..... | 4.4 | ..... | 2.5 | 1.75 | ..... | 2.45 | ..... | 3.0 |

NOTE.—Gage heights for 1908 are given in Water-Supply Paper 250, p. 128.

*Daily discharge, in second-feet, of Carson River near Hazen, Nev., for 1908–9.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1908. | | | | | | | | | | | | |
| 1 | ..... | ..... | ..... | ..... | 520 | 586 | 228 | ..... | ..... | ..... | 98 | 100 |
| 2 | ..... | ..... | ..... | ..... | 520 | 553 | 228 | ..... | ..... | ..... | 98 | 126 |
| 3 | ..... | ..... | ..... | ..... | 586 | 520 | 192 | ..... | ..... | ..... | 98 | 126 |
| 4 | ..... | ..... | ..... | ..... | 622 | 490 | 158 | ..... | ..... | ..... | 98 | 126 |
| 5 | ..... | ..... | ..... | ..... | 657 | 432 | 158 | ..... | ..... | 7 | 98 | 126 |
| 6 | ..... | ..... | ..... | ..... | 586 | 404 | 158 | ..... | ..... | 7 | 98 | 126 |
| 7 | ..... | ..... | ..... | ..... | 520 | 432 | 158 | ..... | ..... | 7 | 98 | 126 |
| 8 | ..... | ..... | ..... | ..... | 553 | 404 | 158 | ..... | ..... | 7 | 98 | 126 |
| 9 | ..... | ..... | ..... | ..... | 586 | 404 | 158 | ..... | ..... | 18 | 98 | 126 |
| 10 | ..... | ..... | ..... | ..... | 657 | 404 | 158 | ..... | ..... | 18 | 98 | 126 |
| 11 | ..... | ..... | ..... | ..... | 553 | 404 | 158 | ..... | ..... | 18 | 98 | 100 |
| 12 | ..... | ..... | ..... | ..... | 520 | 432 | 126 | ..... | ..... | 32 | 86 | 100 |
| 13 | ..... | ..... | ..... | ..... | 460 | 460 | 126 | ..... | ..... | 32 | 86 | 100 |
| 14 | ..... | ..... | ..... | ..... | 460 | 520 | 158 | ..... | ..... | 32 | 86 | 100 |
| 15 | ..... | ..... | ..... | ..... | 520 | 520 | 126 | ..... | ..... | 32 | 86 | 100 |
| 16 | ..... | ..... | ..... | ..... | 520 | 520 | 126 | ..... | ..... | 32 | 86 | 100 |
| 17 | ..... | ..... | ..... | ..... | 520 | 520 | 126 | ..... | ..... | 32 | 86 | 100 |
| 18 | ..... | ..... | ..... | ..... | 460 | 520 | 126 | ..... | ..... | 50 | 98 | 100 |
| 19 | ..... | ..... | ..... | ..... | 432 | 490 | 98 | ..... | ..... | 50 | 98 | 100 |
| 20 | ..... | ..... | ..... | ..... | 404 | 490 | 98 | ..... | ..... | 50 | 98 | 100 |
| 21 | ..... | ..... | ..... | ..... | 404 | 432 | 98 | ..... | ..... | 73 | 98 | 100 |
| 22 | ..... | ..... | ..... | ..... | 460 | 378 | 73 | ..... | ..... | 73 | 98 | 100 |
| 23 | ..... | ..... | ..... | ..... | 460 | 307 | 73 | ..... | ..... | 50 | 98 | 100 |
| 24 | ..... | ..... | ..... | ..... | 520 | 520 | 50 | ..... | ..... | 50 | 98 | 100 |
| 25 | ..... | ..... | ..... | ..... | 520 | 266 | 50 | ..... | ..... | 50 | 90 | 100 |
| 26 | ..... | ..... | ..... | ..... | 586 | 266 | 41 | ..... | ..... | 50 | 90 | 100 |
| 27 | ..... | ..... | ..... | ..... | 657 | 266 | 32 | ..... | ..... | 73 | 90 | 100 |
| 28 | ..... | ..... | ..... | 520 | 586 | 266 | 18 | ..... | ..... | 73 | 90 | 100 |
| 29 | ..... | ..... | ..... | 460 | 553 | 266 | 7 | ..... | ..... | 73 | 90 | 100 |
| 30 | ..... | ..... | ..... | 460 | 490 | 266 | 4 | ..... | ..... | 98 | 90 | 100 |
| 31 | ..... | ..... | ..... | ..... | 520 | ..... | 1 | ..... | ..... | 98 | ..... | 100 |

*Daily discharge, in second-feet, of Carson River near Hazen, Nev., for 1908–9*—Cont'd.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909. | | | | | | | | | | | | |
| 1 | 158 | 610 | 380 | 330 | 1,200 | 1,280 | 1,460 | 132 | 17 | 39 | 132 | 460 |
| 2 | 192 | 550 | 380 | 330 | 1,240 | 1,600 | 1,420 | 120 | 17 | 39 | 145 | 430 |
| 3 | 192 | 550 | 380 | 330 | 1,240 | 1,930 | 1,330 | 109 | 17 | 39 | 145 | 680 |
| 4 | 210 | 520 | 380 | 405 | 1,330 | 2,180 | 1,380 | 109 | 17 | 39 | 160 | 1,060 |
| 5 | 247 | 520 | 430 | 460 | 1,600 | 2,430 | 1,420 | 98 | 17 | 45 | 160 | 820 |
| 6 | 228 | 490 | 490 | 550 | 1,780 | 2,680 | 1,330 | 98 | 17 | 69 | 160 | 550 |
| 7 | 228 | 88 | 490 | 520 | 1,880 | 2,940 | 1,100 | 78 | 17 | 120 | 160 | 490 |
| 8 | 98 | 490 | 380 | 490 | 1,930 | 3,110 | 860 | 78 | 17 | 145 | 160 | 490 |
| 9 | 73 | 430 | 380 | 490 | 1,980 | 2,940 | 785 | 69 | 17 | 145 | 160 | 550 |
| 10 | 432 | 430 | 355 | 490 | 2,030 | 2,580 | 715 | 60 | 17 | 145 | 160 | 680 |
| 11 | 432 | 405 | 330 | 490 | 2,030 | 2,430 | 680 | 52 | 17 | 145 | 175 | 980 |
| 12 | 266 | 490 | 330 | 520 | 1,930 | 2,180 | 580 | 52 | 17 | 145 | 175 | 820 |
| 13 | 286 | 580 | 330 | 520 | 2,630 | 2,080 | 610 | 52 | 17 | 145 | 175 | 610 |
| 14 | 286 | 680 | 330 | 550 | 1,560 | 2,080 | 610 | 45 | 17 | 145 | 192 | 550 |
| 15 | 286 | 750 | 330 | 550 | 1,280 | 2,080 | 610 | 39 | 17 | 145 | 210 | 550 |
| 16 | 2,580 | 750 | 330 | 550 | 1,200 | 2,080 | 610 | 39 | 17 | 132 | 210 | 550 |
| 17 | 4,180 | 750 | 330 | 580 | 1,200 | 1,930 | 490 | 39 | 17 | 132 | 210 | 430 |
| 18 | 3,600 | 820 | 355 | 860 | 1,150 | 1,880 | 430 | 33 | 17 | 132 | 210 | 380 |
| 19 | 2,530 | 900 | 355 | 1,020 | 1,150 | 1,830 | 380 | 33 | 17 | 145 | 210 | 355 |
| 20 | 1,420 | 750 | 380 | 1,150 | 1,150 | 1,740 | 310 | 33 | 17 | 132 | 230 | 355 |
| 21 | 1,100 | 680 | 380 | 1,280 | 1,150 | 1,640 | 290 | 33 | 17 | 132 | 230 | 355 |
| 22 | 1,930 | 550 | 380 | 1,060 | 1,280 | 1,560 | 270 | 28 | 17 | 120 | 250 | 355 |
| 23 | 2,530 | 520 | 380 | 900 | 1,420 | 1,510 | 230 | 28 | 17 | 132 | 820 | 355 |
| 24 | 1,830 | 490 | 380 | 820 | 1,240 | 1,560 | 210 | 28 | 17 | 132 | 750 | 405 |
| 25 | 1,830 | 490 | 355 | 785 | 1,150 | 1,740 | 192 | 28 | 17 | 132 | 715 | 380 |
| 26 | 860 | 460 | 355 | 785 | 1,020 | 1,830 | 192 | 24 | 17 | 132 | 645 | 355 |
| 27 | 820 | 405 | 330 | 820 | 1,020 | 1,830 | 175 | 24 | 17 | 132 | 680 | 310 |
| 28 | 750 | 380 | 330 | 940 | 1,330 | 1,780 | 175 | 24 | 17 | 132 | 580 | 355 |
| 29 | 715 | ..... | 330 | 1,100 | 1,510 | 1,640 | 175 | 20 | 17 | 132 | 490 | 310 |
| 30 | 680 | ..... | 330 | 1,200 | 1,560 | 1,560 | 160 | 20 | 24 | 132 | 405 | 310 |
| 31 | 610 | ..... | 330 | ..... | 1,330 | ..... | 145 | 20 | ..... | 132 | ..... | 330 |

NOTE.—The daily discharges from April 28, 1908, to January 15, 1909, are based on a rating curve that is fairly well defined above 73 second-feet. From January 16 to December 31 discharges are based on a rating curve well defined between 17 and 3,000 second-feet. The river was dry or water standing in pools August 1 to October 4, 1908. Discharges November 25–December 1 and December 11–31, 1908, estimated.

*Monthly discharge of Carson River near Hazen, Nev., for 1908–9.*

| Month. | Discharge in second-feet. | | | Run-off (total in acre-feet). | Accuracy. |
|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | | |
| 1908. | | | | | |
| May | 657 | 404 | 529 | 32,500 | B. |
| June | 586 | 266 | 425 | 25,300 | B. |
| July | 228 | ..... | 112 | 6,890 | B. |
| August | ..... | ..... | 0 | 0 | |
| September | ..... | ..... | 0 | 0 | |
| October | 98 | 0 | 38.2 | 2,350 | C. |
| November | 98 | 86 | 94.0 | 5,590 | C. |
| December | 126 | ..... | 108 | 6,640 | D. |
| The period | ..... | ..... | ..... | 79,300 | |
| 1909. | | | | | |
| January | 4,180 | 73 | 1,020 | 62,700 | C. |
| February | 900 | 88 | 554 | 30,800 | B. |
| March | 490 | 330 | 365 | 22,400 | A. |
| April | 1,280 | 330 | 696 | 41,400 | A. |
| May | 2,630 | 1,020 | 1,470 | 90,400 | A. |
| June | 3,110 | 1,280 | 2,020 | 120,000 | A. |
| July | 1,460 | 145 | 623 | 38,300 | A. |
| August | 132 | 20 | 53.1 | 3,260 | A. |
| September | 24 | 17 | 17.2 | 1,020 | B. |
| October | 145 | 39 | 118 | 7,260 | A. |
| November | 820 | 132 | 303 | 18,000 | A. |
| December | 1,060 | 310 | 504 | 31,000 | C. |
| The year | 4,180 | 17 | 645 | 467,000 | |

NOTE.—Monthly estimates for 1909 are based on an open-channel rating. There is a possibility of ice effect during portions of January and December, 1909, and that the means as computed for these months are too great.

## WEST FORK OF CARSON RIVER AT WOODFORDS, CAL.

West Fork of Carson River in Alpine County, Cal., flows in a general northerly direction and unites with East Fork in Douglas County, Nev.

The gaging station, which is located about three-fourths mile above the post-office at Woodfords, Cal., and 200 feet from the main road between Woodfords and Blue Lake, was established October 18, 1900, to determine the flow of the stream available for storage. On May 18, 1907, the gage and bench mark were washed out, and on June 8 the gage was reestablished at the same location at a different datum.

The stream bed is permanent, but is very uneven and the current is very rough. The measurements prior to 1907, though scattering, give a fairly well-defined curve. A fairly well-defined rating, applicable since June 8, 1907, has been developed. The extent of ice conditions during the winter is not definitely known.

*Discharge measurements of West Fork of Carson River at Woodfords, Cal., in 1907–1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1907. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| June 8 | E. A. Porter | 40 | 137 | 4.30 | 684 |
| July 9 | do | 38 | 131 | 4.00 | 578 |
| August 3 | do | 29 | 80 | 2.90 | 229 |
| 1908. | | | | | |
| June 26 | E. A. Porter | 29 | 68 | 2.07 | 137 |
| July 25 | do | 27 | 44 | 1.00 | 55 |
| August 31 | M. B. Kennedy | 26 | 45 | a1.40 | 46 |
| October 12 | E. A. Porter | 25 | 31 | .90 | 31 |
| 1909. | | | | | |
| June 16 | L. J. Towne | 38 | 114 | 3.75 | 467 |
| July 8 | do | 31 | 74.5 | 2.45 | 203 |
| August 10 | do | 29 | 37 | 1.52 | 60 |
| September 10 | F. C. Schafer | 28 | 35 | .85 | 31 |
| October 28 | do | 26 | 32 | .85 | 28 |

a Gage height uncertain; may have been 1.04 feet.

NOTE.—Gage heights of all measurements refer to the datum of gage used after June 8, 1907.

*Daily gage height, in feet, of West Fork of Carson River at Woodfords, Cal., for 1909.*

[Miss Bernice Merrill, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.0 | 2.1 | 1.65 | 1.8 | 4.7 | 4.8 | 3.0 | 1.95 | 0.7 | 1.2 | 1.3 | 4.7 |
| 2 | 1.0 | 1.9 | 1.7 | 1.8 | 5.0 | 5.0 | 3.0 | 1.9 | .8 | 1.3 | 1.35 | 2.4 |
| 3 | .95 | 1.95 | 1.7 | 1.85 | 5.2 | 5.0 | 2.9 | 1.8 | .8 | 1.25 | 1.4 | 2.1 |
| 4 | 1.2 | 1.8 | 1.8 | 1.85 | 5.6 | 4.7 | 2.8 | 1.8 | .8 | 1.2 | 1.3 | 2.0 |
| 5 | 1.8 | 1.9 | 1.8 | 1.95 | 5.7 | 5.0 | 2.0 | 1.9 | .85 | 1.2 | 1.25 | 2.6 |
| 6 | 1.6 | 2.0 | 1.8 | 1.9 | 5.5 | 4.8 | 2.2 | 1.8 | .8 | 1.25 | 1.25 | 2.8 |
| 7 | 1.1 | 2.0 | 1.8 | 2.0 | 5.1 | 4.55 | 2.4 | 1.8 | .7 | 1.3 | 1.2 | 2.7 |
| 8 | 1.0 | 1.9 | 1.8 | 2.1 | 4.9 | 4.3 | 2.4 | 1.7 | .8 | 1.35 | 1.2 | 2.4 |
| 9 | 1.0 | 1.8 | 1.9 | 2.2 | 4.1 | 4.0 | 2.45 | 1.75 | .7 | 1.35 | 1.2 | 2.2 |
| 10 | 1.1 | 1.8 | 1.95 | 2.45 | 3.8 | 3.8 | 2.5 | 1.7 | .7 | 1.3 | 1.2 | 2.0 |

*Daily gage height, in feet, of West Fork of Carson River at Woodfords, Cal., for 1909.*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 1.55 | 1.9 | 1.8 | 2.65 | 3.7 | 4.0 | 2.45 | 1.65 | 0.65 | 1.3 | 1.1 | 1.8 |
| 12 | 1.95 | 1.9 | 1.8 | 2.7 | 3.5 | 4.2 | 2.4 | 1.6 | .6 | 1.3 | 1.1 | 1.8 |
| 13 | 2.3 | 2.0 | 1.8 | 2.8 | 3.4 | 4.3 | 2.4 | 1.6 | .65 | 1.25 | 1.1 | 1.6 |
| 14 | 2.7 | 1.95 | 1.75 | 3.0 | 3.55 | 4.2 | 2.4 | 1.6 | .7 | 1.2 | 1.15 | 1.2 |
| 15 | 3.1 | 1.8 | 1.7 | 3.1 | 3.2 | 4.2 | 2.35 | 1.55 | .7 | 1.2 | 1.2 | 1.0 |
| 16 | 3.2 | 1.95 | 1.7 | 3.1 | 3.3 | 4.0 | 2.3 | 1.55 | .75 | 1.2 | 1.1 | 1.2 |
| 17 | 3.0 | 1.9 | 1.7 | 3.2 | 3.4 | 4.0 | 2.3 | 1.5 | .8 | 1.2 | 2.0 | 1.3 |
| 18 | 3.05 | 2.0 | 1.75 | 3.4 | 3.4 | 3.8 | 2.3 | 1.4 | .8 | 1.2 | 2.0 | 1.2 |
| 19 | 3.0 | 1.9 | 1.8 | 3.4 | 3.5 | 3.7 | 2.3 | 1.45 | .8 | 1.25 | 4.0 | 1.2 |
| 20 | 3.0 | 1.7 | 1.85 | 3.5 | 3.55 | 3.6 | 2.3 | 1.4 | .75 | 1.3 | 3.7 | 1.2 |
| 21 | 2.9 | 1.6 | 1.9 | 3.6 | 3.65 | 3.6 | 2.2 | 1.35 | .8 | 1.3 | 3.2 | 1.3 |
| 22 | 2.8 | 1.65 | 1.8 | 3.65 | 3.6 | 3.8 | 2.15 | 1.3 | .85 | 1.4 | 3.0 | 1.3 |
| 23 | 2.7 | 1.7 | 1.8 | 3.7 | 3.55 | 3.9 | 2.1 | 1.2 | .9 | 1.35 | 3.0 | 1.3 |
| 24 | 2.6 | 1.7 | 1.7 | 3.6 | 3.7 | 4.0 | 2.1 | 1.1 | .9 | 1.3 | 2.8 | 1.4 |
| 25 | 2.65 | 1.8 | 1.7 | 3.55 | 3.8 | 4.0 | 1.9 | 1.1 | .9 | 1.35 | 2.5 | 1.6 |
| 26 | 2.5 | 1.75 | 1.65 | 3.9 | 3.9 | 4.0 | 1.9 | 1.0 | .9 | 1.35 | 2.2 | 1.4 |
| 27 | 2.6 | 1.7 | 1.6 | 4.2 | 4.2 | 3.85 | 1.85 | .9 | .85 | 1.35 | 2.0 | 1.9 |
| 28 | 2.7 | 1.6 | 1.65 | 4.6 | 4.2 | 3.8 | 1.8 | .85 | .85 | 1.3 | 1.9 | 1.8 |
| 29 | 2.5 | ..... | 1.6 | 4.8 | 3.9 | 3.7 | 1.8 | .8 | .9 | 1.25 | 1.9 | 1.8 |
| 30 | 2.4 | ..... | 1.6 | 4.4 | 3.9 | 3.6 | 2.0 | .8 | 1.0 | 1.2 | 2.7 | 1.7 |
| 31 | 2.2 | ..... | 1.75 | ..... | 4.2 | ..... | 2.1 | .7 | ..... | 1.2 | ..... | 1.75 |

NOTE.—The 1907–8 gage heights are given in Water-Supply Paper 250, pp. 129–130.

*Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Cal., for 1907–1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907. | | | | | | | | | | | | |
| 1 | 84 | 84 | 129 | 172 | 610 | 740 | 920 | 321 | 145 | 79 | 74 | 50 |
| 2 | 84 | 145 | 122 | 182 | 570 | 720 | 865 | 347 | 145 | 79 | 70 | 47 |
| 3 | 84 | 145 | 115 | 192 | 570 | 700 | 815 | 347 | 130 | 79 | 70 | 47 |
| 4 | 84 | 154 | 129 | 192 | 610 | 680 | 765 | 347 | 130 | 79 | 70 | 54 |
| 5 | 90 | 163 | 129 | 203 | 610 | 660 | 720 | 296 | 130 | 70 | 70 | 58 |
| 6 | 90 | 182 | 129 | 226 | 650 | 640 | 675 | 296 | 117 | 70 | 70 | 70 |
| 7 | 90 | 172 | 129 | 238 | 650 | 620 | 630 | 296 | 117 | 70 | 70 | 84 |
| 8 | 90 | 145 | 129 | 238 | 610 | 611 | 590 | 296 | 117 | 70 | 79 | 79 |
| 9 | 90 | 129 | 129 | 264 | 630 | 643 | 549 | 273 | 117 | 70 | 74 | 88 |
| 10 | 79 | 129 | 127 | 291 | 650 | 710 | 489 | 273 | 117 | 70 | 74 | 97 |
| 11 | 79 | 145 | 125 | 395 | 650 | 580 | 549 | 250 | 117 | 66 | 70 | 92 |
| 12 | 84 | 154 | 122 | 500 | 650 | 549 | 519 | 250 | 107 | 70 | 74 | 88 |
| 13 | 79 | 154 | 115 | 570 | 650 | 611 | 460 | 250 | 107 | 70 | 74 | 79 |
| 14 | 79 | 145 | 115 | 650 | 730 | 580 | 431 | 250 | 107 | 70 | 74 | 70 |
| 15 | 79 | 145 | 102 | 590 | 910 | 549 | 403 | 230 | 107 | 70 | 70 | 70 |
| 16 | 74 | 145 | 108 | 650 | 1,010 | 519 | 403 | 240 | 107 | 74 | 70 | 74 |
| 17 | 69 | 145 | 305 | 610 | 1,450 | 549 | 403 | 210 | 107 | 74 | 66 | 70 |
| 18 | 69 | 129 | 552 | 570 | 1,400 | 580 | 431 | 210 | 97 | 70 | 62 | 70 |
| 19 | 69 | 122 | 535 | 730 | 1,300 | 643 | 460 | 192 | 97 | 74 | 62 | 70 |
| 20 | 74 | 115 | 430 | 690 | 1,200 | 611 | 460 | 175 | 97 | 79 | 54. | 70 |
| 21 | 74 | 129 | 365 | 610 | 1,100 | 580 | 519 | 175 | 97 | 79 | 50 | 74 |
| 22 | 74 | 137 | 335 | 650 | 1,050 | 549 | 549 | 175 | 97 | 74 | 54 | 74 |
| 23 | 69 | 129 | 293 | 690 | 1,000 | 580 | 489 | 160 | 97 | 70 | 62 | 70 |
| 24 | 69 | 129 | 293 | 798 | 960 | 643 | 460 | 160 | 88 | 88 | 62 | 74 |
| 25 | 69 | 137 | 251 | 910 | 920 | 676 | 460 | 145 | 88 | 92 | 70 | 79 |
| 26 | 74 | 129 | 251 | 730 | 890 | 710 | 403 | 130 | 88 | 97 | 70 | 79 |
| 27 | 84 | 129 | 226 | 650 | 860 | 745 | 375 | 130 | 88 | 92 | 62 | 107 |
| 28 | 84 | 129 | 214 | 610 | 830 | 935 | 431 | 130 | 88 | 79 | 54 | 102 |
| 29 | 79 | ..... | 182 | 650 | 800 | 1,020 | 403 | 130 | 88 | 79 | 47 | 102 |
| 30 | 74 | ..... | 182 | 610 | 780 | 975 | 347 | 117 | 79 | 74 | 47 | 97 |
| 31 | 74 | ..... | 172 | ..... | 760 | ..... | 296 | 117 | ..... | 74 | ..... | 97 |

NOTE.—The discharges from January 1 to May 17, 1907 are based on a well-defined rating curve. Discharges June 8 to December 31, 1907, are based on a rating curve fairly well defined between 26 and 676 second-feet. Discharges for missing gage heights have been interpolated or estimated.

*Daily discharge, in second-feet, of West Fork of Carson River at Woodfords, Cal., for 1907–1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1908.** | | | | | | | | | | | | |
| 1 | 97 | 70 | 70 | 130 | 296 | 192 | 107 | 643 | 36 | 36 | 44 | 36 |
| 2 | 88 | 70 | 66 | 130 | 296 | 192 | 107 | 431 | 36 | 36 | 47 | 36 |
| 3 | 92 | 66 | 62 | 145 | 308 | 201 | 107 | 70 | 36 | 34 | 41 | 36 |
| 4 | 66 | 66 | 62 | 145 | 296 | 210 | 97 | 54 | 34 | 36 | 41 | 41 |
| 5 | 70 | 66 | 62 | 145 | 273 | 192 | 97 | 54 | 34 | 36 | 41 | 36 |
| 6 | 70 | 70 | 66 | 152 | 273 | 192 | 97 | 47 | 36 | 41 | 36 | 41 |
| 7 | 66 | 66 | 66 | 145 | 250 | 192 | 88 | 47 | 31 | 36 | 36 | 41 |
| 8 | 66 | 62 | 70 | 152 | 273 | 192 | 84 | 47 | 31 | 38 | 36 | 38 |
| 9 | 70 | 62 | 74 | 160 | 250 | 184 | 70 | 50 | 34 | 38 | 41 | 36 |
| 10 | 66 | 62 | 74 | 168 | 250 | 192 | 70 | 47 | 36 | 41 | 36 | 36 |
| 11 | 66 | 62 | 70 | 168 | 230 | 192 | 62 | 44 | 41 | 41 | 34 | 36 |
| 12 | 70 | 62 | 74 | 175 | 240 | 192 | 58 | 41 | 41 | 44 | 31 | 41 |
| 13 | 62 | 62 | 74 | 184 | 220 | 192 | 62 | 41 | 41 | 47 | 31 | 41 |
| 14 | 62 | 62 | 79 | 175 | 220 | 184 | 58 | 41 | 34 | 47 | 36 | 38 |
| 15 | 62 | 66 | 88 | 184 | 220 | 175 | 54 | 36 | 36 | 54 | 36 | 36 |
| 16 | 62 | 62 | 97 | 192 | 210 | 168 | 47 | 36 | 36 | 107 | 34 | 34 |
| 17 | 62 | 62 | 97 | 192 | 210 | 160 | 36 | 44 | 36 | 70 | 31 | 34 |
| 18 | 62 | 58 | 97 | 192 | 201 | 160 | 36 | 41 | 36 | 50 | 31 | 36 |
| 19 | 62 | 58 | 97 | 201 | 192 | 168 | 31 | 41 | 38 | 50 | 31 | 34 |
| 20 | 66 | 62 | 107 | 210 | 192 | 168 | 26 | 41 | 38 | 47 | 34 | 34 |
| 21 | 62 | 66 | 107 | 210 | 201 | 160 | 26 | 36 | 36 | 50 | 36 | 36 |
| 22 | 66 | 66 | 112 | 210 | 192 | 160 | 26 | 41 | 34 | 50 | 36 | 36 |
| 23 | 66 | 70 | 107 | 230 | 210 | 145 | 31 | 41 | 34 | 50 | 41 | 36 |
| 24 | 62 | 70 | 112 | 250 | 201 | 130 | 34 | 44 | 31 | 47 | 36 | 41 |
| 25 | 62 | 70 | 112 | 230 | 192 | 117 | 36 | 44 | 31 | 47 | 34 | 44 |
| 26 | 62 | 70 | 112 | 220 | 192 | 112 | 36 | 41 | 31 | 47 | 26 | 44 |
| 27 | 66 | 79 | 117 | 230 | 192 | 107 | 41 | 41 | 34 | 41 | 26 | 41 |
| 28 | 70 | 84 | 117 | 250 | 192 | 107 | 47 | 41 | 31 | 41 | 31 | 36 |
| 29 | 70 | 79 | 117 | 273 | 201 | 102 | 47 | 41 | 34 | 44 | 31 | 36 |
| 30 | 70 | ..... | 117 | 296 | 210 | 107 | 41 | 38 | 34 | 47 | 34 | 36 |
| 31 | 70 | ..... | 117 | ..... | 192 | ..... | 41 | 36 | ..... | 44 | ..... | 41 |
| **1909.** | | | | | | | | | | | | |
| 1 | 36 | 180 | 84 | 97 | 818 | 856 | 296 | 112 | 21 | 47 | 54 | 818 |
| 2 | 36 | 107 | 88 | 97 | 935 | 935 | 296 | 107 | 26 | 54 | 58 | 175 |
| 3 | 34 | 112 | 88 | 102 | 1,020 | 935 | 273 | 97 | 26 | 50 | 62 | 130 |
| 4 | 47 | 97 | 97 | 102 | 1,180 | 818 | 250 | 97 | 26 | 47 | 54 | 117 |
| 5 | 97 | 107 | 97 | 112 | 1,230 | 935 | 117 | 107 | 28 | 47 | 50 | 210 |
| 6 | 79 | 117 | 97 | 107 | 1,140 | 856 | 145 | 97 | 26 | 50 | 50 | 250 |
| 7 | 41 | 117 | 97 | 117 | 975 | 763 | 175 | 97 | 21 | 54 | 47 | 230 |
| 8 | 36 | 107 | 97 | 130 | 895 | 676 | 175 | 88 | 26 | 58 | 47 | 175 |
| 9 | 36 | 97 | 107 | 145 | 611 | 580 | 184 | 92 | 21 | 58 | 47 | 145 |
| 10 | 41 | 97 | 112 | 184 | 519 | 519 | 192 | 88 | 21 | 54 | 47 | 117 |
| 11 | 74 | 107 | 97 | 220 | 489 | 580 | 184 | 83 | 19 | 54 | 41 | 97 |
| 12 | 112 | 107 | 97 | 230 | 431 | 643 | 175 | 79 | 17 | 54 | 41 | 97 |
| 13 | 160 | 117 | 97 | 250 | 403 | 676 | 175 | 79 | 19 | 50 | 41 | 79 |
| 14 | 230 | 112 | 92 | 296 | 446 | 643 | 175 | 79 | 21 | 47 | 44 | 47 |
| 15 | 321 | 97 | 88 | 321 | 347 | 643 | 168 | 74 | 21 | 47 | 47 | 36 |
| 16 | 347 | 112 | 88 | 321 | 375 | 580 | 160 | 74 | 24 | 47 | 41 | 47 |
| 17 | 296 | 107 | 88 | 347 | 403 | 580 | 160 | 70 | 26 | 47 | 117 | 54 |
| 18 | 308 | 117 | 92 | 403 | 403 | 519 | 160 | 62 | 26 | 47 | 117 | 47 |
| 19 | 296 | 107 | 97 | 403 | 431 | 489 | 160 | 66 | 26 | 50 | 580 | 47 |
| 20 | 296 | 88 | 102 | 431 | 446 | 460 | 160 | 62 | 24 | 54 | 489 | 47 |
| 21 | 273 | 79 | 107 | 460 | 474 | 460 | 145 | 58 | 26 | 54 | 347 | 54 |
| 22 | 250 | 84 | 97 | 474 | 460 | 519 | 138 | 54 | 28 | 62 | 296 | 54 |
| 23 | 230 | 88 | 97 | 489 | 446 | 549 | 130 | 47 | 31 | 58 | 296 | 54 |
| 24 | 210 | 88 | 88 | 460 | 489 | 580 | 130 | 41 | 31 | 54 | 250 | 62 |
| 25 | 220 | 97 | 88 | 446 | 519 | 580 | 107 | 41 | 31 | 58 | 192 | 79 |
| 26 | 192 | 92 | 84 | 549 | 549 | 580 | 107 | 36 | 31 | 58 | 145 | 62 |
| 27 | 210 | 88 | 79 | 643 | 643 | 534 | 102 | 31 | 28 | 58 | 117 | 107 |
| 28 | 230 | 79 | 84 | 781 | 643 | 519 | 97 | 28 | 28 | 54 | 107 | 97 |
| 29 | 192 | ..... | 79 | 856 | 549 | 489 | 97 | 26 | 31 | 50 | 107 | 97 |
| 30 | 175 | ..... | 79 | 710 | 549 | 460 | 117 | 26 | 36 | 47 | 230 | 88 |
| 31 | 145 | ..... | 92 | ..... | 643 | ..... | 130 | 21 | ..... | 47 | ..... | 92 |

NOTE.—The daily discharges for 1908–9 are based on a rating curve fairly well defined between 26 and 676 second-feet.

*Monthly discharge of West Fork of Carson River at Woodfords, Cal., for 1907–1909.*

[Drainage area, 70 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1907. | | | | | | | |
| January | 90 | 69 | 78.8 | 1.13 | 1.30 | 4,850 | C. |
| February | 182 | 84 | 139 | 1.99 | 2.07 | 7,720 | B. |
| March | 552 | 102 | 211 | 3.01 | 3.47 | 13,000 | B. |
| April | 910 | 172 | 502 | 7.17 | 8.00 | 29,900 | B. |
| May | 1,450 | 570 | 841 | 12.0 | 13.83 | 51,700 | C. |
| June | 1,020 | 519 | 664 | 9.49 | 10.59 | 39,500 | C. |
| July | 920 | 296 | 525 | 7.50 | 8.65 | 32,300 | C. |
| August | 347 | 117 | 223 | 3.19 | 3.68 | 13,700 | A. |
| September | 145 | 79 | 107 | 1.53 | 1.71 | 6,370 | C. |
| October | 97 | 66 | 75.8 | 1.08 | 1.24 | 4,660 | C. |
| November | 79 | 47 | 65.8 | .940 | 1.05 | 3,920 | A. |
| December | 107 | 47 | 76.8 | 1.10 | 1.27 | 4,720 | B. |
| The year | 1,450 | 47 | 292 | 4.18 | 56.86 | 212,000 | |
| 1908. | | | | | | | |
| January | 97 | 62 | 68.2 | 0.974 | 1.12 | 4,190 | C. |
| February | 84 | 58 | 66.6 | .951 | 1.03 | 3,830 | C. |
| March | 117 | 62 | 90.3 | 1.29 | 1.49 | 5,550 | B. |
| April | 296 | 130 | 191 | 2.73 | 3.05 | 11,400 | A. |
| May | 308 | 192 | 228 | 3.26 | 3.76 | 14,000 | A. |
| June | 210 | 102 | 165 | 2.36 | 2.63 | 9,820 | A. |
| July | 107 | 26 | 58.1 | .830 | .96 | 3,570 | A. |
| August | 643 | 36 | 75.5 | 1.08 | 1.24 | 4,640 | A. |
| September | 41 | 31 | 35.0 | .500 | .56 | 2,080 | A. |
| October | 107 | 34 | 46.4 | .663 | .76 | 2,850 | A. |
| November | 47 | 26 | 35.3 | .504 | .56 | 2,100 | A. |
| December | 44 | 34 | 37.7 | .539 | .62 | 2,320 | B. |
| The year | 643 | 26 | 91.4 | 1.31 | 17.78 | 66,400 | |
| 1909. | | | | | | | |
| January | 347 | 34 | 169 | 2.41 | 2.78 | 10,400 | C. |
| February | 130 | 79 | 102 | 1.46 | 1.52 | 5,660 | C. |
| March | 112 | 79 | 92.8 | 1.33 | 1.53 | 5,710 | B. |
| April | 856 | 97 | 343 | 4.90 | 5.47 | 20,400 | A. |
| May | 1,230 | 347 | 628 | 8.97 | 10.34 | 38,600 | B. |
| June | 935 | 460 | 632 | 9.03 | 10.08 | 37,600 | B. |
| July | 296 | 97 | 164 | 2.34 | 2.70 | 10,100 | A. |
| August | 112 | 21 | 68.4 | .977 | 1.13 | 4,210 | A. |
| September | 36 | 17 | 25.5 | .364 | .41 | 1,520 | B. |
| October | 62 | 47 | 52.1 | .744 | .86 | 3,200 | A. |
| November | 580 | 41 | 139 | 1.99 | 2.22 | 8,270 | A. |
| December | 818 | 36 | 123 | 1.76 | 2.03 | 7,560 | B. |
| The year | 1,230 | 17 | 212 | 3.02 | 41.07 | 153,000 | |

## HONEY LAKE BASIN.[a]

Honey Lake occupies a shallow depression in Honey Lake valley, in the southeastern part of Lassen County, Cal. It may be classed as a playa lake, as it is without outlet and becomes completely desiccated during seasons of unusual aridity. It is supplied principally by Susan River, which enters it from the northwest, but it receives also some tribute during the rainy season from Long Valley. The hot springs along its northern border also furnish considerable quantities of water. The area of the lake varies with the seasons as well as from year to year, as is common with all inclosed lakes. Its outline is indefinite, as its shores are usually low and marshy and in

[a] Russell, I. C., Geological history of Lake Lahontan: Mon. U. S. Geol. Survey, vol. 11, 1885, pp. 55–56.

places form broad tule swamps. Its waters are quite strongly alkaline, unfit for human use, and are always of a greenish-yellow color, due to the impalpable mud held in suspension.

The following stations have been maintained in Susan River basin:

Susan River near Susanville, Cal., 1900–1905.
Willow Creek at Merrillville, Cal., 1904–1905.
Willow Creek near Standish, Cal., 1900–1905.

The results of measurements at these stations were published in Water-Supply Paper 177, pages 42–49.

## MONO LAKE BASIN.[a]

Lake Mono is situated in east-central California, within a few miles of the California-Nevada boundary. The thirty-eighth parallel and the one hundred and nineteenth meridian intersect in the center of the lake. It lies at the eastern base of the Sierra Nevada, and its drainage area forms one of the many independent hydrographic basins into which the vast region included between the Rocky Mountains and the Sierra Nevada, known as the Great Basin, is divided. The western rim of its drainage area, formed by the crest line of the Sierra Nevada, coincides for 36 miles with the western margin of the Great Basin.

Situated at the junction of two well-defined and strongly contrasted geographic provinces, the Mono basin partakes of leading characteristics of each. It is remarkable for its diversity of topography, its varied and striking contrasts of scenery, its wide range of climate, and corresponding variations of flora.

Lake Mono is 6,380 feet above the sea. The lowest pass in the serrate mountain crest along its western border is 3,000 feet above its surface. The highest peaks that overshadow it rise more than 6,000 feet above the level of the lake. The eastern portion of the basin partakes of the character of the arid region of interior drainage of which it forms a part, and includes valleys covered with sagebrush and rugged mountain slopes, which are but scantly clothed with cedar and piñon. The tone of the landscape in this portion of the basin is gray and russet-brown, characteristic of the desert. Over its entire area no running water can be found during the greater part of the year, and the region is consequently silent and lifeless. To one reared under more humid skies this portion of the Mono basin would appear a veritable desert, but that it is not really a desert is shown by the fact that it produces nutritious bunch grass among the clumps of sagebrush in sufficient abundance to afford pasturage for a few cattle and horses.

The southwestern border of the basin includes magnificent mountains, that are clothed in favored places with forests of pine. The

[a] Russell, I. C., Quaternary history of Mono Valley, California: Eighth Ann. Rept. U. S. Geol. Survey, pt. 1, 1889, pp. 269–270, 287–288.

highest peaks reach far above the timber line and bear a varied and beautiful alpine flora. In the canyons that descend from the snow fields and miniature glaciers about the higher summits the rush of creeks and rills is heard throughout the year. The eastern and western portions of this single hydrographic basin are fragments of two distinct geographic provinces. One has the desolation and solitude of the Sahara, the other the rugged grandeur of the Pyrenees.

The lake derives the principal portion of its water supply from the creeks that descend the eastern slope of the Sierra and empty into it from the south and west. Supplementing the surface drainage are a number of springs, some of which are of considerable size.

The creeks tributary to Lake Mono are of clear, pellucid water, and flow through channels excavated for the most part in granite and metamorphosed sediments, but near their mouths they have eroded small gorges through lacustral marls and volcanic lapilli deposited during previous high-water stages of the lake. No chemical analyses of these waters have been made, but they have, without question, the normal purity of mountain streams. We may be sure, however, that like other streams they hold a small percentage of mineral matter in solution, which is left when evaporation takes place.

None of the springs of the basin are highly charged with mineral matter, but, on the contrary, some of the more copious are remarkable for their purity.

With the exception of a very small spring on the road between the town of Aurora and the valley of the same name, all springs of the basin are either in the bottom of the lake or quite near its shores, and they occur in greatest abundance near the base of the mountains. Only three of those that rise on the land have a temperature noticeably above the normal. The character of most of those rising in the bottom of the lake is uncertain. In some instances they reveal their presence in cold weather by the vapor to be seen on the lake surface above them, and are thus known to be thermal.

No gaging stations have been maintained on streams tributary to Mono Lake, but a few miscellaneous measurements have been made. These are recorded in Water-Supply Paper 251.

## OWENS RIVER BASIN.

The Owens River basin is situated in the eastern part of California in Mono and Inyo counties, east of the main crest of the Sierra, which for a distance of about 140 miles forms the watershed between it and the basin of San Joaquin, Kings, and Kern rivers. It is south of Mono Lake basin and north of the arid region separating it from the Mohave Desert at the south. Its eastern limit is determined by the White Mountains at the north and the Inyo Mountains at the south. The length of the basin is about 120 miles; its width is about 20

miles at the south and 30 miles at the north, and its total area, including Owens Lake, comprises approximately 2,800 square miles, of which about 1,100 square miles are east of the river.

Owens River rises among the high peaks of the Sierra, east of Mount Lyell and directly opposite the headwaters of San Joaquin River, at an altitude of nearly 12,000 feet above sea level. It flows eastward into Long Valley, thence southwestward through Owens River canyon into Owens Valley, thence eastward and southward through the trough of the valley to Owens Lake, about 20 miles southeast of Mount Whitney and directly opposite the northern part of the Kern River basin. The total length of the river is about 125 miles—45 miles above the lower end of the canyon and 80 miles in Owens Valley.

More than forty lateral streams, many of them, however, comparatively small, drain a part of the eastern slope of the Sierra and enter the main stream from the west. The principal tributaries, from north to south, are as follows: Rock, Pine, Horton, McGee, Birch, and Bishop creeks, opposite the San Joaquin basin; Coyote, Baker, Big Pine, Birch, Tinemaha, Taboose, Goodale, Division, Sawmill (Eightmile), Thibaut, Oak, Pine, and Symmes creeks, opposite Kings River basin; and Shepard, Bairs (Moffett), George, Hogback, Lone Pine, Tuttle, Richter, Cottonwood, and Ash creeks, opposite Kern River basin. No drainage enters Owens River from the east except during exceptionally heavy rainstorms, which are rare.

The basin is long and comparatively narrow and its topography is varied. It comprises a rough east-side mountain slope 5 or 6 miles wide, a valley floor about 6 miles wide, and a west-side slope ranging from 6 to 10 miles or more in width. The west-side area is made up of a very rugged and precipitious mountain slope 4 or 5 miles wide, and a sloping alluvial plain composed of delta-fan surfaces ranging from 1 to 5 miles in width and lying at the foot of the mountains and west of the western margin of the valley. Owens Valley is smooth and ranges in altitude from 3,600 feet at the south end to about 4,100 feet at the north end. The crest of the east-side range of mountains averages about 6,000 feet higher than the valley floor. The west-side plain consists of a porous granitic alluvium of considerable depth, and ranges in altitude from about 4,000 feet at the western valley margin to about 6,000 feet at the foot of the mountains. It has a fairly uniform slope of 400 to 600 feet to the mile. The eastern slope of the Sierra is very steep and rugged, and ranges in altitude from about 6,000 feet at the foot to 13,000 or 14,000 feet at the crest. The geologic formation is granitic.

The eastern slope of the basin is practically barren of vegetation, except for places of scanty desert growth. The western slope has a very slight soil covering and only a sparse timber growth, found

chiefly along the water courses. All the western slope, a large part of the eastern slope, and the central part of Owens Valley are included in national forests.

The mean annual precipitation in Owens River basin is very light, especially on the valley floor and the eastern slope. The only records available are for the valley and indicate that the mean annual precipitation there is about 5 inches. On the Sierra slope the precipitation probably increases with increase of latitude and certainly increases with increase of altitude. On the higher parts of the slope it is probably 30 or 40 inches and possibly more; and it occurs almost entirely as snow, whose melting feeds the numerous streams that issue from this slope. These streams usually have their minimum flow in February and their maximum in July. Their combined maximum is about ten times their combined minimum. There is about the same ratio of disparity in the monthly extremes of precipitation, but the seasons are reversed.

Owens Valley is extensively cultivated and particularly adapted to stock raising. Numerous diversions are made for irrigation at different points on Owens River and tributaries, particularly in the upper part of the valley. Considerable water is also used for irrigating meadow lands in Long Valley north of Owens River canyon, but it is returned to the river above the head of Owens Valley.

Many excellent reservoir sites exist on the main stream and on the upper reaches of its tributaries.

There are many opportunities for power development in this basin. The fall is so great and the minimum flow of the stream so large and reliably constant that many thousands of horsepower could be developed. It is estimated that a minimum of more than 100,000 horsepower could be obtained without storage, and this amount could be considerably more than doubled by utilizing all the possible storage. The Los Angeles aqueduct, when completed, will have a capacity of 400 second-feet and a total fall of more than 3,000 feet from its intake in Owens Valley to its outfall in San Fernando Valley near the city and will generate more than 100,000 horsepower. A full development of all the power opportunities in Owens River basin would probably yield more than 300,000 horsepower continuously.

Considered as a source of water supply, Owens River basin has other features of special interest. Nearly all the streams rise in glacial lakelets and marshes which are located at high altitudes near the crest of the Sierra, and serve to a certain extent as storage reservoirs in regulating the flow. The streams emerge from the mouths of their canyons upon the porous alluvial plain at the base of the Sierra, which is 1 to 5 miles in width and several hundred feet deep and across which they flow to the Owens River channel in the trough of the valley. This belt of débris is the source of a large and important loss,

part of which appears in numerous springs throughout the valley. Perhaps stronger evidence of the great loss by seepage is afforded by the broad belt of wet and somewhat boggy land which extends over a large part of the trough of the basin. Undoubtedly large quantities of water can be obtained by sinking wells within this area. Several artesian wells which have been sunk in the vicinity of Independence yield a strong flow and give convincing evidence of an artesian belt in the valley. With a view to the greatest ultimate utilization of the valley's water supply, the city of Los Angeles is conducting special investigations to determine the depth to and fluctuations in the ground-water plane and the rate of evaporation from free water surface and saturated gravels near Independence; also to determine the amount of precipitation on the alluvial plain at the base of the Sierra between the 4,000 and 6,000 feet contours and the seepage losses of creeks crossing it.

The longest run-off record in Owens River basin extends back to 1903, when stations were established on the main stream and on Rock and Pine creeks near Round Valley, and Bishop Creek near Bishop. The wettest year since that time was 1906 or 1907 and the driest 1905. The total flow during the wettest year was nearly double that during the driest.

The following gaging stations have been maintained in this basin:

Owens River near Round Valley, 1903–1909.
Owens River near Tinemaha, 1906–1909.
Owens River near Lone Pine, 1909.
Rock Creek near Round Valley, 1903–1909.
Pine Creek near Round Valley, 1903–1909.
Bishop Creek near Bishop, 1903–1909.
Baker Creek near Big Pine, 1908–9.
Big Pine Creek near Big Pine, 1903–1909.
Birch Creek near Tinemaha, 1907–1909.
Tinemaha Creek near Tinemaha, 1907–1909.
Taboose Creek near Tibbetts, 1906–1909.
Goodale Creek near Tibbetts, 1906–1909.
Division Creek near Independence, 1906–1909.
Sawmill Creek near Independence, 1906–1909.
Thibaut Creek near Independence, 1908–9.
Oak Creek near Independence, 1905–1909.
Independence Creek near Independence, 1905–1909.
Shepard Creek near Thebe, 1906–1909.
Bairs Creek near Thebe, 1906–1909.
George Creek near Thebe, 1906–1909.
Lone Pine Creek near Lone Pine, 1906–1909.
Tuttle Creek near Lone Pine, 1906–1909.
Cottonwood Creek near Olancha, 1906–1909.
Ash Creek near Olancha, 1906–1909.

The results of stream measurements at these stations for 1909 are published in Water-Supply Paper 271.

In the fall of 1903 stations were established on five or six of the principal streams in Owens Valley and on numerous diversion canals used for irrigation. These stations were maintained two or three years to obtain general statistical data on the water supply of Owens Valley, and also for the purpose of determining the quantity of water used for irrigation at that time and the suitability of the valley for a reclamation project. After the city of Los Angeles had acquired its extensive holdings in the valley and had taken active steps to utilize the flow of Owens River and tributaries for a municipal water supply, many other stations were established at the request of and in cooperation with the city. Since that time all stations in Owens Valley have been maintained in cooperation with the city of Los Angeles, the city paying all field and maintenance expenses and the National Government furnishing and paying an engineer to do the work.

All stations in Owens Valley, except those on Owens River, are located near the western margin of the valley, and most of them are below the delta fans which extend eastward from the mouths of the canyons and are above all diversions. Almost without exception measurements are made from footbridges or by wading. The current is swift at almost every station and the channel is subject to more or less change.

## GREAT BASIN DRAINAGE IN OREGON.

### DESCRIPTION.

In Oregon, as in other portions of the Great Basin, the surface waters collect in natural depressions in the ground. Where the flow into these depressions is sufficient perennial lakes are formed of such extent that the inflow balances evaporation; where the surface flow is insufficient, intermittent lakes or playas are formed. The principal lakes in Oregon are Harney, Malheur, Warner, Summer, Silver, Goose, and Abert. With the exception of Silver Lake in Lake County the waters of all these lakes are more or less alkaline.

## MALHEUR AND HARNEY LAKES DRAINAGE BASIN.

### DESCRIPTION.

Malheur and Harney lakes, which are in Harney County, occupy a large basin having a general elevation of 4,100 feet and rimmed by mountain ranges whose elevation is between 5,000 and 7,000 feet. They are connected by a small strait known as The Narrows, through which the water of Malheur flows into Harney Lake. For this reason the water of Malheur Lake is practically fresh while that of Harney Lake is alkaline. The average rainfall in the basin is about 10

inches; on the summit of the divide it is probably about 18 inches or more.

The agricultural lands in this basin comprise nearly 700,000 acres of flat alluvial soil forming a circular valley surrounding the lakes and extending like fingers into the valleys of tributary streams.

The lower lands are more or less swampy and have for years been utilized as hay flats. During the spring months, when water is abundant, small rock-and-brush dams sufficiently high to cause the streams to overflow their banks are constructed at convenient points. Much of the meadow lands may thus be covered by a foot or more of running water during five or six weeks of the season. As the stream flow diminishes the swamp and hay lands gradually drain until the middle of July, when they are sufficiently dry to permit the cutting of hay.

Comparatively small areas are cultivated, and on these the crops are limited to rye, oats, and barley. The principal industry of the region has been stock raising, and this has afforded a ready market for all grain and hay that could be raised. During recent years, however, much of the hay lands have been taken as homesteads and the better lands are rapidly being developed.

The principal streams in this basin are Donner und Blitzen River, from the south, and Silvies River, from the north, flowing into Malheur Lake; and Silver Creek, flowing from the northwest into Harney Lake. South of Silver Creek in a flat valley lies Silver Lake, a small playa which is supplied by overflow from Silver Creek. Donner und Blitzen River, with its principal tributaries Keiger, McCoy, and Mud creeks, drain the western slope of Steins Mountain. This mountain, which is the most prominent topographic feature in the area, is a long timberless ridge, extending northeast and southwest, with a crest length of 60 miles or more. The eastern slope forms an abrupt escarpment; the western slope, which forms a gradual ascent is deeply cut by canyons into which enormous quantities of snow are drifted each year, thus serving as efficient storage reservoirs for winter precipitation. The snows melt gradually and the flow of the streams draining the western slope of the mountain is therefore well maintained throughout the year.

Silvies River drains the northern part of the Malheur-Harney basin, rising in the heart of the Blue Mountains, flowing generally southward through a broken country to Harney Valley, which it traverses in a southeasterly direction, and emptying into swamp lands bordering the northern shores of Malheur Lake. A large part of its drainage area is heavily timbered. The stream is very "flashy," being subject to sudden floods which as suddenly subside. The summer flow is practically nothing.

Silver Creek heads in a spur of the Blue Mountains and flows southeastward through Silver Creek valley into Harney Basin. The upper portion of its drainage area is well timbered, but the lower portion is bare. The stream is subject to sudden floods and in summer its flow practically ceases.

Between Silvies River and Silver Creek and flowing in the same general direction is Sagehen Creek, a small stream heading in a spur of the Blue Mountains and draining a rough, broken country. It empties into the marsh surrounding the northern end of Malheur Lake near the point where Silvies Rivers enters this marsh.

The eastern rim of Harney Valley is broken by a low pass known as Malheur Gap. Through this gap a drainage canal could be excavated that at the deepest portion would not require a cut of more than 18 or 20 feet. This canal would carry the waters of the lakes into Malheur River by way of a tributary of the South Fork. Such a project was at one time begun, but riparian owners of the lake border feared that the absence of these large bodies of water would have an unwholesome effect on the climate of the basin. Accordingly an injunction was issued restraining the company from building the project.

Gaging stations have been maintained in this basin as follows:

Silvies River near Silvies, Oreg., 1903–1905, 1909.
Silvies River near Burns, Oreg., 1903–1906, 1908–9.
Donner und Blitzen River near Diamond, Oreg., 1909.
McCoy Creek near Diamond, Oreg., 1909.
Keiger Creek near Diamond, Oreg., 1909.
Silver Creek near Riley, Oreg., 1904–1906, 1908–9.

### SILVIES RIVER NEAR SILVIES, OREG.

This station, which is located at the proposed dam site about 3 miles southwest of Silvies, Oreg., in sec. 14, T. 19 S., R. 31 E., was established June 16, 1903. Observations were suspended from December 31, 1904, to January 8, 1909, for lack of funds.

An inclined gage is located on the left bank under the cable. The right bank is a berm over which the water flows for 400 feet at an elevation of 5 feet on the gage. The cable spans the entire channel.

The results obtained at the station are valuable in connection with storage development. At the site of the station a dam can be constructed which will impound all the annual run-off from the drainage area above it. The water so stored could be diverted from the stream for the irrigation of lands in Harney Valley. This project was under investigation at one time by the United States Reclamation Service.

The conditions at the station are not favorable for highly accurate results, as it is impossible to establish a permanent rating curve. The banks of the stream are covered with heavy brush which serves to create unstable conditions to a certain extent. The bed is sandy, and some changes occur at flood times. During the winter months ice interferes materially with the determination of flow, but due allowance for such conditions has been made.

*Discharge measurements of Silvies River near Silvies, Oreg., in 1908–9.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1908. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| August 2 | Joseph Jacobs | | | 1.7 | 2 |
| December 2[a] | R. B. Post | 36 | 7.2 | 2.11 | 13 |
| 1909. | | | | | |
| March 11 | R. B. Post | 41 | 104 | 2.91 | 58 |
| July 12 | do | 14.5 | 6.2 | 1.70 | 6.8 |

[a] Stream frozen over; ice 0.42 foot thick.

*Daily gage height, in feet, of Silvies River near Silvies, Oreg., for 1909.*

[David Craddock, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | ..... | 4.8 | 4.7 | 4.6 | 3.5 | 1.9 | 1.5 | 1.3 | 1.6 | ..... | 2.3 |
| 2 | ..... | ..... | 4.6 | 5.0 | 4.6 | 3.4 | 1.8 | 1.6 | 1.4 | 1.6 | ..... | 2.1 |
| 3 | ..... | 4.0 | 4.8 | 5.2 | 4.1 | 3.4 | 1.8 | 1.5 | 1.4 | 1.6 | 1.7 | 2.2 |
| 4 | ..... | ..... | 5.1 | 5.4 | 4.2 | 3.3 | 1.7 | 1.4 | 1.4 | 1.6 | 1.7 | 2.2 |
| 5 | ..... | ..... | 5.2 | 5.0 | 4.3 | 3.4 | 1.7 | 1.4 | 1.5 | 1.7 | 2.0 | 2.2 |
| 6 | ..... | ..... | 4.2 | 4.8 | 4.3 | 3.4 | 1.7 | 1.5 | 1.4 | 1.7 | 2.0 | 2.1 |
| 7 | ..... | ..... | 4.1 | 4.4 | 4.3 | 3.3 | 1.7 | 1.5 | 1.4 | 1.7 | 1.9 | 2.1 |
| 8 | 2.7 | ..... | 4.0 | 4.2 | 4.4 | 3.3 | 1.6 | 1.5 | 1.4 | 1.6 | 1.7 | 2.2 |
| 9 | 3.1 | ..... | 3.4 | 4.4 | 4.2 | 3.2 | 1.6 | 1.4 | 1.5 | 1.6 | 1.8 | 2.2 |
| 10 | ..... | 4.0 | 3.6 | 4.2 | 4.1 | 3.1 | 1.5 | 1.4 | 1.5 | 1.6 | 1.9 | ..... |
| 11 | ..... | ..... | 2.9 | 4.9 | 4.0 | 3.1 | 1.6 | 1.4 | 1.5 | 1.7 | 1.9 | 2.2 |
| 12 | ..... | ..... | 3.7 | 4.9 | 4.0 | 3.0 | 1.7 | 1.5 | 1.5 | 1.7 | 1.8 | 2.2 |
| 13 | ..... | ..... | 3.1 | 5.0 | 4.0 | 3.0 | 1.7 | 1.5 | 1.6 | 1.7 | 1.8 | 2.3 |
| 14 | ..... | ..... | 3.5 | 5.3 | 4.0 | 2.9 | 1.7 | 1.4 | 1.6 | 1.7 | 1.7 | 2.2 |
| 15 | 3.1 | ..... | 4.0 | 5.3 | 3.9 | 2.9 | 1.7 | 1.4 | 1.6 | 1.7 | 1.8 | 2.2 |
| 16 | 5.6 | 10.0 | 4.2 | 5.3 | 3.5 | 2.8 | 1.7 | 1.3 | 1.6 | 1.7 | 1.7 | 2.2 |
| 17 | 6.2 | 9.4 | 4.8 | 5.2 | 3.6 | 2.8 | 1.7 | 1.3 | 1.5 | 1.7 | 1.7 | 2.2 |
| 18 | 7.3 | 7.1 | 4.5 | 5.3 | 3.5 | 2.9 | 1.6 | 1.4 | 1.5 | 1.7 | 1.8 | 2.2 |
| 19 | 8.5 | 6.5 | 4.1 | 5.1 | 3.5 | 2.8 | 1.6 | 1.4 | 1.5 | 1.7 | 2.1 | 2.2 |
| 20 | 9.9 | 5.8 | 4.0 | 5.1 | 3.5 | 2.9 | 1.5 | 1.4 | 1.5 | 1.8 | 1.9 | 2.2 |
| 21 | 9.95 | 5.0 | 3.8 | 5.9 | 3.4 | 2.9 | 1.5 | 1.4 | 1.6 | 1.7 | ..... | 2.2 |
| 22 | 8.0 | 4.5 | 3.6 | 4.7 | 3.3 | 2.7 | 1.6 | 1.3 | 1.6 | 1.8 | 2.5 | 2.2 |
| 23 | 7.6 | 4.3 | 3.5 | 4.7 | 3.4 | 2.6 | 1.6 | 1.3 | 1.6 | 1.8 | 2.7 | 2.2 |
| 24 | 6.4 | 4.7 | 3.7 | 4.6 | 3.4 | 2.5 | 1.5 | 1.3 | 1.5 | 1.8 | 2.8 | 2.2 |
| 25 | 5.3 | 4.1 | 3.9 | 4.7 | 3.3 | 2.4 | 1.5 | 1.3 | 1.5 | 1.8 | 2.7 | 2.2 |
| 26 | 4.5 | 4.0 | 4.1 | 4.6 | 3.1 | 2.4 | 1.5 | 1.3 | 1.5 | 1.7 | 2.7 | 2.3 |
| 27 | 4.2 | 3.9 | 4.5 | 4.7 | 3.2 | 2.3 | 1.6 | 1.2 | 1.5 | 1.8 | 2.4 | 2.3 |
| 28 | ..... | 4.7 | 4.9 | 4.8 | 3.4 | 2.2 | 1.5 | 1.3 | 1.6 | 1.8 | 2.2 | 2.3 |
| 29 | 4.0 | ..... | 5.0 | 4.9 | 3.5 | 2.1 | 1.5 | 1.3 | 1.6 | 1.7 | 2.2 | 2.3 |
| 30 | ..... | ..... | 4.8 | 4.6 | 4.9 | 2.0 | 1.5 | 1.2 | 1.6 | 1.7 | 2.2 | 2.3 |
| 31 | 4.0 | ..... | 4.5 | ..... | 4.8 | ..... | 1.5 | 1.2 | ..... | 1.7 | ..... | 2.3 |

NOTE.—River reported frozen over January 28 to February 15 and December 2–31.

*Daily discharge, in second-feet, of Silvies River near Silvies, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 25 | 157 | 243 | 232 | 221 | 108 | 10 | 4 | 2 | 5 | 6 | 23 |
| 2 | 25 | 157 | 221 | 267 | 221 | 99 | 8 | 5 | 3 | 5 | 6 | 15 |
| 3 | 25 | 157 | 243 | 291 | 167 | 99 | 8 | 4 | 3 | 5 | 6 | 19 |
| 4 | 25 | 157 | 279 | 315 | 177 | 90 | 6 | 3 | 3 | 5 | 6 | 19 |
| 5 | 25 | 157 | 291 | 267 | 188 | 99 | 6 | 3 | 4 | 6 | 12 | 19 |
| 6 | 25 | 157 | 177 | 243 | 188 | 99 | 6 | 4 | 3 | 6 | 12 | 15 |
| 7 | 25 | 157 | 167 | 199 | 188 | 90 | 6 | 4 | 3 | 6 | 10 | 15 |
| 8 | 43 | 157 | 157 | 177 | 199 | 90 | 5 | 4 | 3 | 5 | 6 | 19 |
| 9 | 73 | 157 | 99 | 199 | 177 | 81 | 5 | 3 | 4 | 5 | 8 | 19 |
| 10 | 73 | 157 | 117 | 177 | 167 | 73 | 4 | 3 | 4 | 5 | 10 | 19 |
| 11 | 73 | 157 | 57 | 255 | 157 | 73 | 5 | 3 | 4 | 6 | 10 | 19 |
| 12 | 73 | 157 | 127 | 255 | 157 | 65 | 6 | 4 | 4 | 6 | 8 | 19 |
| 13 | 73 | 157 | 73 | 267 | 157 | 65 | 6 | 4 | 5 | 6 | 8 | 23 |
| 14 | 73 | 157 | 108 | 303 | 157 | 57 | 6 | 3 | 5 | 6 | 6 | 19 |
| 15 | 73 | 240 | 157 | 303 | 147 | 57 | 6 | 3 | 5 | 6 | 8 | 19 |
| 16 | 339 | 1,270 | 177 | 303 | 108 | 50 | 6 | 2 | 5 | 6 | 6 | 19 |
| 17 | 416 | 995 | 243 | 291 | 117 | 50 | 6 | 2 | 4 | 6 | 6 | 19 |
| 18 | 568 | 540 | 210 | 303 | 108 | 57 | 5 | 3 | 4 | 6 | 8 | 19 |
| 19 | 760 | 456 | 167 | 279 | 108 | 50 | 5 | 3 | 4 | 6 | 15 | 19 |
| 20 | 1,220 | 364 | 157 | 279 | 108 | 57 | 4 | 3 | 4 | 8 | 10 | 19 |
| 21 | 1,240 | 267 | 137 | 377 | 99 | 57 | 4 | 3 | 5 | 6 | 21 | 19 |
| 22 | 670 | 210 | 117 | 232 | 90 | 43 | 5 | 2 | 5 | 8 | 32 | 19 |
| 23 | 610 | 188 | 108 | 232 | 99 | 37 | 5 | 2 | 5 | 8 | 43 | 19 |
| 24 | 442 | 232 | 127 | 221 | 99 | 32 | 4 | 2 | 4 | 8 | 50 | 19 |
| 25 | 303 | 167 | 147 | 232 | 90 | 27 | 4 | 2 | 4 | 8 | 43 | 19 |
| 26 | 210 | 157 | 167 | 221 | 73 | 27 | 4 | 2 | 4 | 6 | 43 | 23 |
| 27 | 177 | 147 | 210 | 232 | 81 | 23 | 5 | 1 | 4 | 8 | 27 | 23 |
| 28 | 167 | 232 | 255 | 243 | 99 | 19 | 4 | 2 | 5 | 8 | 19 | 23 |
| 29 | 157 | ..... | 267 | 255 | 108 | 15 | 4 | 2 | 5 | 6 | 19 | 23 |
| 30 | 157 | ..... | 243 | 221 | 255 | 12 | 4 | 1 | 5 | 6 | 19 | 23 |
| 31 | 157 | ..... | 210 | ..... | 243 | ..... | 4 | 1 | ..... | 6 | ..... | 23 |

NOTE.—These discharges, except as noted, are based on a rating curve that is fairly well defined between 6 and 870 second-feet. Discharges January 1 to 7, February 11 to 15, and December 2–31 estimated. Discharges for other days on which gage was not read are interpolated.

*Monthly discharge of Silvies River near Silvies, Oreg., for 1909.*

[Drainage area, 450 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre feet. | |
| January | 1,240 | ..... | 268 | 0.596 | 0.69 | 16,500 | D. |
| February | 1,270 | 147 | 274 | .609 | .63 | 15,200 | D. |
| March | 291 | 57 | 176 | .391 | .45 | 10,800 | B. |
| April | 377 | 177 | 256 | .569 | .63 | 15,200 | B. |
| May | 255 | 73 | 147 | .327 | .38 | 9,040 | B. |
| June | 108 | 12 | 60.0 | .133 | .15 | 3,570 | B. |
| July | 10 | 4 | 5.4 | .012 | .01 | 332 | B. |
| August | 5 | 1 | 2.8 | .0062 | .007 | 172 | C. |
| September | 5 | 2 | 4.1 | .0091 | .01 | 244 | C. |
| October | 8 | 5 | 6.2 | .014 | .02 | 381 | C. |
| November | 50 | 6 | 16.1 | .036 | .04 | 958 | B. |
| December | 23 | 15 | 19.6 | .044 | .05 | 1,210 | D. |
| The year | 1,270 | 1 | 103 | .229 | 3.07 | 73,600 | |

### SILVIES RIVER NEAR BURNS, OREG.

This station was established August 14, 1903, but lack of funds caused suspension of observations from July 24, 1906, to December 11, 1908. The gage is located at a wagon bridge near Parker's house, 10 miles upstream from Burns. The cable from which gagings are made is at Lampshire's ranch, 1 mile above the gage.

The conditions at the cable are not favorable for accurate measurements. The stream flows through a flat, alluvial bottom. The banks are lined with a dense growth of willows and underbrush. The right bank is subject to overflow for about 600 feet. The left bank is high and will not overflow. A number of sloughs carry part of the water from Immigrant Creek around the gage and cable. On this account the discharge at the station is somewhat less than the actual run-off from the watershed.

The water of Silvies River is largely used for the flood irrigation of hay lands in Harney Valley. As even the flood discharge of the stream is used for this purpose, the development of an irrigation project that would contemplate the diversion of the water would involve the settlement of accrued water rights.

*Discharge measurements of Silvies River near Burns, Oreg., in 1908–9.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| 1908. | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| December 11 | R. B. Post | 25 | 17 | 2.45 | 18 |
| 1909. | | | | | |
| February 2 | R. B. Post | 48 | 69 | 3.42 | 95 |
| March 16 | do | 45 | 232 | 7.21 | 395 |
| March 30 | do | 48 | 265 | 7.88 | 488 |
| June 17 | do | 45 | 56 | 2.96 | 79 |
| July 10[a] | do | 45 | 28 | 2.49 | 25 |
| November 10[a] | do | 24 | 22 | 2.55 | 26 |

[a] Made by wading.

*Daily gage height, in feet, and discharge, in second-feet, of Silvies River near Burns, Oreg., for December, 1908.*

| Day. | Gage height. | Discharge. | Day. | Gage height. | Discharge. | Day. | Gage height. | Discharge. |
|---|---|---|---|---|---|---|---|---|
| | *Feet.* | *Sec.-ft.* | | *Feet.* | *Sec.-ft.* | | *Feet.* | *Sec.-ft.* |
| 1 | | | 11 | | | 21 | 2.3 | 8 |
| 2 | | | 12 | | | 22 | 2.3 | 8 |
| 3 | | | 13 | | | 23 | 2.25 | 6 |
| 4 | | | 14 | 2.45 | 18 | 24 | 2.25 | 6 |
| 5 | | | 15 | 2.45 | 18 | 25 | 2.25 | 6 |
| 6 | | | 16 | 2.45 | 18 | 26 | 2.25 | 6 |
| 7 | | | 17 | 2.4 | 14 | 27 | 2.25 | 6 |
| 8 | | | 18 | 2.4 | 14 | 28 | 2.25 | 6 |
| 9 | | | 19 | 2.4 | 14 | 29 | 2.25 | 6 |
| 10 | | | 20 | 2.3 | 8 | 30 | 2.25 | 6 |
| | | | | | | 31 | 2.25 | 6 |

NOTE.—The daily discharges are based on a rating curve that is fairly well defined.

*Daily gage height, in feet, of Silvies River near Burns, Oreg., for 1909.*

[Leonia Parker, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2.3 | 3.6 | 4.5 | 8.0 | 7.9 | 4.1 | 2.6 | 2.3 | 2.3 | 2.3 | 2.5 | 2.8 |
| 2 | 2.4 | 3.6 | 5.65 | 8.6 | 6.7 | 4.1 | 2.6 | 2.3 | 2.3 | 2.3 | 2.5 | 2.8 |
| 3 | 2.4 | 3.4 | 6.8 | 9.2 | 6.5 | 3.7 | 2.6 | 2.3 | 2.3 | 2.35 | 2.55 | 2.8 |
| 4 | 2.4 | 3.4 | 7.3 | 9.1 | 6.3 | 3.6 | 2.6 | 2.3 | 2.3 | 2.4 | 2.55 | 2.8 |
| 5 | 2.45 | 3.4 | 6.3 | 9.0 | 6.3 | 3.6 | 2.6 | 2.3 | 2.3 | 2.4 | 2.6 | 2.7 |
| 6 | 2.55 | 3.4 | 5.85 | 8.6 | 6.25 | 3.4 | 2.6 | 2.3 | 2.3 | 2.4 | 2.6 | 2.7 |
| 7 | 2.55 | 3.2 | 5.0 | 7.4 | 6.2 | 3.4 | 2.6 | 2.3 | 2.3 | 2.4 | 2.55 | 2.7 |
| 8 | 2.55 | 3.15 | 4.7 | 7.0 | 6.2 | 3.4 | 2.5 | 2.3 | 2.3 | 2.35 | 2.55 | 2.7 |
| 9 | 2.6 | 2.9 | 4.2 | 6.9 | 5.9 | 3.4 | 2.5 | 2.3 | 2.3 | 2.35 | 2.6 | 2.65 |
| 10 | 3.2 | 2.9 | 3.8 | 7.6 | 5.7 | 3.4 | 2.5 | 2.3 | 2.3 | 2.5 | 2.6 | 2.6 |
| 11 | 3.4 | 2.9 | 3.6 | 8.0 | 5.65 | 3.4 | 2.5 | 2.3 | 2.3 | 2.5 | 2.6 | 2.6 |
| 12 | 3.5 | 2.9 | 4.0 | 8.2 | 5.65 | 3.4 | 2.5 | 2.3 | 2.3 | 2.5 | 2.65 | 2.6 |
| 13 | 2.6 | 2.95 | 4.3 | 8.6 | 5.65 | 3.2 | 2.5 | 2.3 | 2.3 | 2.5 | 2.65 | 2.6 |
| 14 | 2.6 | 3.1 | 5.3 | 9.3 | 5.6 | 3.1 | 2.5 | 2.3 | 2.3 | 2.5 | 2.5 | 2.6 |
| 15 | 2.6 | 3.1 | 6.3 | 9.75 | 5.6 | 3.0 | 2.5 | 2.3 | 2.3 | 2.5 | 2.5 | 2.6 |
| 16 | 2.65 | 3.2 | 6.7 | 10.05 | 5.0 | 2.9 | 2.5 | 2.3 | 2.3 | 2.5 | 2.5 | 2.6 |
| 17 | 3.1 | 7.1 | 7.2 | 10.2 | 4.9 | 3.0 | 2.5 | 2.3 | 2.3 | 2.5 | 2.4 | 2.6 |
| 18 | 5.9 | 9.6 | 6.6 | 10.3 | 4.3 | 3.1 | 2.5 | 2.3 | 2.3 | 2.5 | 2.5 | 2.6 |
| 19 | 6.5 | 10.5 | 6.0 | 9.9 | 4.1 | 3.0 | 2.45 | 2.3 | 2.3 | 2.5 | 2.55 | 2.6 |
| 20 | 8.7 | 7.5 | 5.8 | 9.3 | 4.0 | 3.0 | 2.45 | 2.3 | 2.3 | 2.5 | 2.6 | 2.5 |
| 21 | 11.0 | 6.0 | 5.2 | 9.2 | 4.0 | 2.9 | 2.45 | 2.3 | 2.3 | 2.5 | 2.6 | 2.5 |
| 22 | 12.5 | 5.0 | 5.0 | 9.0 | 4.2 | 2.9 | 2.45 | 2.3 | 2.3 | 2.5 | 2.7 | 2.5 |
| 23 | 10.8 | 4.4 | 4.9 | 8.2 | 4.1 | 2.9 | 2.4 | 2.3 | 2.3 | 2.5 | 2.7 | 2.5 |
| 24 | 7.1 | 4.2 | 5.0 | 8.2 | 4.0 | 2.9 | 2.4 | 2.3 | 2.3 | 2.5 | 3.1 | 2.45 |
| 25 | 6.6 | 4.1 | 5.2 | 7.9 | 3.9 | 2.9 | 2.4 | 2.3 | 2.3 | 2.5 | 3.5 | 2.45 |
| 26 | 5.7 | 4.0 | 5.9 | 8.0 | 3.6 | 2.9 | 2.4 | 2.3 | 2.3 | 2.5 | 3.3 | 2.4 |
| 27 | 4.0 | 4.0 | 6.6 | 8.0 | 3.7 | 2.6 | 2.4 | 2.3 | 2.3 | 2.5 | 3.1 | 2.4 |
| 28 | 3.6 | 3.9 | 7.8 | 8.0 | 3.8 | 2.6 | 2.4 | 2.3 | 2.3 | 2.5 | 2.9 | 2.4 |
| 29 | 3.6 | ..... | 8.0 | 7.9 | 3.8 | 2.6 | 2.4 | 2.3 | 2.3 | 2.5 | 2.9 | 2.4 |
| 30 | 3.6 | ..... | 8.0 | 7.9 | 4.45 | 2.6 | 2.4 | 2.3 | 2.3 | 2.5 | 2.9 | 2.4 |
| 31 | 3.6 | ..... | 7.9 | ..... | 4.2 | ..... | 2.4 | 2.3 | ..... | ..... | ..... | 2.4 |

NOTE.—No ice reported. It is possible that the frozen periods coincide with those for the Silvies station, viz, January 28 to February 15, and December 2 to 31.

*Daily discharge, in second-feet, of Silvies River near Burns, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 115 | 189 | 484 | 475 | 158 | 30 | 8 | 8 | 8 | 22 | 47 |
| 2 | 14 | 115 | 282 | 538 | 369 | 158 | 30 | 8 | 8 | 8 | 22 | 47 |
| 3 | 14 | 98 | 377 | 592 | 352 | 123 | 30 | 8 | 8 | 11 | 26 | 47 |
| 4 | 14 | 98 | 421 | 583 | 336 | 115 | 30 | 8 | 8 | 14 | 26 | 47 |
| 5 | 18 | 98 | 336 | 574 | 336 | 115 | 30 | 8 | 8 | 14 | 30 | 38 |
| 6 | 26 | 98 | 298 | 538 | 332 | 98 | 30 | 8 | 8 | 14 | 30 | 38 |
| 7 | 26 | 81 | 229 | 430 | 327 | 98 | 30 | 8 | 8 | 14 | 26 | 38 |
| 8 | 26 | 77 | 205 | 394 | 327 | 98 | 22 | 8 | 8 | 11 | 26 | 38 |
| 9 | 30 | 56 | 165 | 386 | 302 | 98 | 22 | 8 | 8 | 11 | 30 | 34 |
| 10 | 81 | 56 | 132 | 448 | 286 | 98 | 22 | 8 | 8 | 22 | 30 | 30 |
| 11 | 98 | 56 | 115 | 484 | 282 | 98 | 22 | 8 | 8 | 22 | 30 | 30 |
| 12 | 106 | 56 | 150 | 502 | 282 | 98 | 22 | 8 | 8 | 22 | 34 | 30 |
| 13 | 30 | 60 | 173 | 538 | 282 | 81 | 22 | 8 | 8 | 22 | 34 | 30 |
| 14 | 30 | 73 | 253 | 601 | 278 | 73 | 22 | 8 | 8 | 22 | 22 | 30 |
| 15 | 30 | 73 | 336 | 645 | 278 | 65 | 22 | 8 | 8 | 22 | 22 | 30 |
| 16 | 34 | 81 | 369 | 675 | 229 | 56 | 22 | 8 | 8 | 22 | 22 | 30 |
| 17 | 73 | 403 | 412 | 691 | 221 | 65 | 22 | 8 | 8 | 22 | 14 | 30 |
| 18 | 302 | 630 | 361 | 702 | 173 | 73 | 22 | 8 | 8 | 22 | 22 | 30 |
| 19 | 352 | 724 | 311 | 660 | 158 | 65 | 18 | 8 | 8 | 22 | 26 | 30 |
| 20 | 547 | 439 | 294 | 601 | 150 | 65 | 18 | 8 | 8 | 22 | 30 | 22 |
| 21 | 779 | 311 | 245 | 592 | 150 | 56 | 18 | 8 | 8 | 22 | 30 | 22 |
| 22 | 980 | 229 | 229 | 574 | 165 | 56 | 18 | 8 | 8 | 22 | 38 | 22 |
| 23 | 757 | 181 | 221 | 502 | 158 | 56 | 14 | 8 | 8 | 22 | 38 | 22 |
| 24 | 403 | 165 | 229 | 502 | 150 | 56 | 14 | 8 | 8 | 22 | 73 | 18 |
| 25 | 361 | 158 | 245 | 475 | 141 | 56 | 14 | 8 | 8 | 22 | 106 | 18 |
| 26 | 286 | 150 | 302 | 484 | 115 | 56 | 14 | 8 | 8 | 22 | 89 | 14 |
| 27 | 150 | 150 | 361 | 484 | 123 | 30 | 14 | 8 | 8 | 22 | 73 | 14 |
| 28 | 115 | 141 | 466 | 484 | 132 | 30 | 14 | 8 | 8 | 22 | 56 | 14 |
| 29 | 115 | ..... | 484 | 475 | 132 | 30 | 14 | 8 | 8 | 22 | 56 | 14 |
| 30 | 115 | ..... | 484 | 475 | 185 | 30 | 14 | 8 | 8 | 22 | 56 | 14 |
| 31 | 115 | ..... | 475 | ..... | 165 | ..... | 14 | 8 | ..... | 22 | ..... | 14 |

NOTE.—These discharges are based on a fairly well-defined rating curve. Discharges may be considerably in error during periods of possible ice conditions.

*Monthly discharge of Silvies River near Burns, Oreg., for 1908–9.*

[Drainage area, 865 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1908. | | | | | | | |
| December 14–31 | 18 | 6 | 9.7 | 0.011 | 0.007 | 346 | B. |
| 1909. | | | | | | | |
| January | 980 | 8 | 195 | .225 | .26 | 12,000 | C. |
| February | 724 | 56 | 178 | .206 | .21 | 9,890 | C. |
| March | 484 | 115 | 295 | .341 | .39 | 18,100 | B. |
| April | 702 | 386 | 537 | .621 | .69 | 32,000 | B. |
| May | 475 | 115 | 238 | .275 | .32 | 14,600 | B. |
| June | 158 | 30 | 78.5 | .091 | .10 | 4,670 | B. |
| July | 30 | 14 | 21.0 | .024 | .03 | 1,290 | B. |
| August | 8 | 8 | 8.0 | .0092 | .01 | 492 | B. |
| September | 8 | 8 | 8.0 | .0092 | .01 | 476 | B. |
| October | 22 | 8 | 19.0 | .022 | .03 | 1,170 | B. |
| November | 106 | 14 | 38.0 | .044 | .05 | 2,260 | B. |
| December | 47 | 14 | 28.5 | .033 | .04 | 1,750 | C. |
| The year | 980 | 8 | 137 | .158 | 2.14 | 98,700 | |

## DONNER UND BLITZEN RIVER NEAR DIAMOND, OREG.

The waters of this stream are used for the irrigation of hay lands in the Donner und Blitzen swamp, which extends from P ranch to Narrows and embraces nearly 100,000 acres of land. The ranch is owned by the William Hanley Company, who has furnished observations of gage heights voluntarily.

This station was established January 27, 1909, on the P ranch, 25 miles southwest of Diamond.

Measurements were made from a private wagon bridge near the ranch buildings. A vertical staff gage is installed on the right bank just below the bridge.

Five irrigation ditches divert water from the stream above the bridge, and a brush and rock dam about 300 feet below the bridge is used to divert the water into another ditch. When water is to be diverted the dams are repaired and raised by the addition of more rock and brush. The ditches are not closed until the fall.

The dam below the station has had an unstable influence on the gage heights.

The records represent considerably less than the natural flow of the stream, particularly during the irrigation season. The normal combined capacity of the five ditches is about 35 second-feet. Two of these ditches run water during the entire year; three of them during the irrigation season only. No record has been kept of their actual time of operation.

The station was moved on May 23, 1910, to the mouth of the canyon 2 miles above the bridge above all irrigation ditches. The banks of the stream, from a point near the mouth of the canyon 5 miles above the P ranch to its mouth at Narrows, 30 miles below the P ranch, are subject to overflow during flood times. The immediate banks are covered with a dense growth of willows and underbrush. It is almost impossible to find a point where the stream can be measured in a single channel, even at moderate stages.

*Discharge measurements of Donner und Blitzen River near Diamond, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 27 | R. B. Post | 37 | 43 | 1.71 | 58 |
| June 23 | do | 38 | 92 | 2.91 | 212 |
| June 24 | do | 38 | 113 | 3.50 | 278 |
| November 6 | do | 35 | 38 | 1.50 | 53 |

*Daily gage height, in feet, of Donner und Blitzen River near Diamond, Oreg., for 1909.*

[A. M. Byrd, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 1.55 | 2.52 | 2.38 | 2.60 | 3.65 | 2.92 | 1.55 | 2.80 | 1.40 | 1.60 | 2.02 |
| 2 | ..... | 1.50 | 2.15 | 2.50 | 2.75 | 4.45 | 2.70 | 1.52 | 1.55 | 1.40 | 1.60 | 1.95 |
| 3 | ..... | 1.50 | 2.15 | 2.40 | 3.00 | 4.65 | 2.72 | 1.50 | 1.50 | 1.50 | 1.60 | 1.68 |
| 4 | ..... | 1.50 | 2.60 | 2.12 | 3.25 | 4.70 | 2.68 | 1.50 | 1.35 | 1.50 | 1.60 | 1.62 |
| 5 | ..... | 1.60 | 1.80 | 2.10 | 3.22 | 4.75 | 2.55 | 1.50 | 1.40 | 1.50 | 1.50 | 1.60 |
| 6 | ..... | 1.40 | 1.72 | 2.05 | 3.00 | 4.40 | 2.25 | 1.45 | 1.42 | 1.50 | 1.52 | 1.95 |
| 7 | ..... | 1.50 | 1.88 | 1.95 | 3.10 | 4.05 | 2.05 | 1.40 | 1.48 | 1.52 | 1.54 | 1.70 |
| 8 | ..... | 1.45 | 1.92 | 1.90 | 3.00 | 3.70 | 2.10 | 1.40 | 1.42 | 1.52 | 1.54 | 1.90 |
| 9 | ..... | 1.40 | 1.72 | 2.02 | 3.10 | 3.30 | 2.02 | 1.40 | 1.42 | 1.50 | 1.57 | 1.85 |
| 10 | ..... | 1.55 | 1.58 | 2.20 | 3.02 | 3.18 | 2.15 | 1.40 | 1.38 | 1.45 | 1.52 | 1.68 |
| 11 | ..... | 1.45 | 1.55 | 2.12 | 2.82 | 3.20 | 2.08 | 1.40 | 1.38 | 1.45 | 1.52 | 1.68 |
| 12 | ..... | 1.45 | 1.45 | 2.20 | 2.68 | 3.35 | 2.10 | 1.40 | 1.40 | 1.45 | 1.52 | 2.52 |
| 13 | ..... | 1.50 | 1.65 | 2.50 | 2.65 | 3.55 | 2.05 | 1.40 | ..... | 1.45 | 1.53 | 2.25 |
| 14 | ..... | 1.45 | 2.18 | 2.72 | 2.65 | 3.58 | 1.95 | 1.40 | ..... | 1.45 | 1.50 | 1.68 |
| 15 | ..... | 1.45 | 2.45 | 2.80 | 2.58 | 3.75 | 1.95 | 1.40 | ..... | 1.45 | 1.45 | 1.62 |
| 16 | ..... | 1.70 | 2.38 | 2.90 | 2.45 | ..... | 1.92 | 1.40 | ..... | 1.45 | 1.40 | 1.52 |
| 17 | ..... | 3.50 | 3.45 | 3.02 | 2.38 | ..... | 1.88 | 1.40 | ..... | 1.45 | 1.60 | 1.55 |
| 18 | ..... | 2.20 | 2.08 | 2.95 | 2.35 | 3.42 | 1.82 | 1.38 | ..... | 1.45 | 1.55 | 1.62 |
| 19 | ..... | 1.80 | 1.92 | 2.92 | 2.45 | 3.80 | 1.72 | 1.35 | ..... | 1.45 | 1.52 | 1.62 |
| 20 | ..... | 1.60 | 1.92 | 2.88 | 2.60 | 3.25 | 1.70 | 1.35 | ..... | 1.50 | 2.20 | 1.60 |
| 21 | ..... | 1.60 | 1.90 | 2.68 | 2.70 | 3.20 | 1.70 | 1.35 | ..... | ..... | ..... | 1.52 |
| 22 | ..... | 1.40 | 2.12 | 2.65 | 2.60 | 3.15 | 1.70 | 1.35 | ..... | ..... | ..... | 1.45 |
| 23 | ..... | 1.50 | 2.25 | 2.72 | 2.48 | 3.15 | 1.68 | 1.35 | ..... | ..... | ..... | 1.42 |
| 24 | ..... | 1.60 | 2.80 | 2.65 | 2.48 | 3.25 | 1.65 | 1.35 | 1.40 | 1.45 | ..... | 1.52 |
| 25 | ..... | 1.60 | 2.10 | 2.70 | 2.65 | 3.45 | 1.62 | 1.35 | 1.40 | 1.45 | ..... | 1.58 |
| 26 | ..... | 1.60 | 2.10 | 3.08 | 2.90 | 2.80 | 1.60 | 1.35 | 1.35 | 1.45 | ..... | 1.65 |
| 27 | ..... | 1.70 | 2.25 | 3.12 | 3.20 | 2.82 | 1.60 | 1.35 | 1.35 | 1.45 | ..... | 1.60 |
| 28 | ..... | 2.00 | 2.12 | 2.90 | 3.05 | 2.85 | 1.62 | 1.35 | 1.35 | 1.45 | 2.25 | 1.58 |
| 29 | ..... | ..... | 2.08 | 2.70 | 2.90 | 2.75 | 1.60 | 1.32 | 1.50 | 1.50 | 1.95 | 1.58 |
| 30 | ..... | ..... | 2.02 | 2.52 | 2.75 | 2.95 | 1.55 | 1.30 | 1.50 | 1.50 | 1.92 | 1.85 |
| 31 | ..... | ..... | 2.05 | ..... | 2.98 | ..... | 1.55 | 1.35 | ..... | 1.50 | ..... | 1.78 |

NOTE.—No ice conditions reported.

*Daily discharge, in second-feet, of Donner und Blitzen River near Diamond, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 52 | 148 | 133 | 158 | 313 | 202 | 52 | 185 | 43 | 56 | 94 |
| 2 | ..... | 49 | 108 | 146 | 178 | 442 | 171 | 50 | 52 | 43 | 56 | 87 |
| 3 | ..... | 49 | 108 | 135 | 214 | 476 | 174 | 49 | 49 | 49 | 56 | 62 |
| 4 | ..... | 49 | 158 | 104 | 252 | 484 | 168 | 49 | 40 | 49 | 56 | 58 |
| 5 | ..... | 56 | 73 | 102 | 247 | 492 | 152 | 49 | 43 | 49 | 49 | 56 |
| 6 | ..... | 43 | 66 | 97 | 214 | 433 | 118 | 46 | 44 | 49 | 50 | 87 |
| 7 | ..... | 49 | 80 | 87 | 229 | 377 | 97 | 43 | 48 | 50 | 52 | 64 |
| 8 | ..... | 46 | 84 | 82 | 214 | 321 | 102 | 43 | 44 | 50 | 52 | 82 |
| 9 | ..... | 43 | 66 | 94 | 229 | 259 | 94 | 43 | 44 | 49 | 54 | 78 |
| 10 | ..... | 52 | 55 | 113 | 217 | 241 | 108 | 43 | 42 | 46 | 50 | 62 |
| 11 | ..... | 46 | 52 | 104 | 188 | 244 | 100 | 43 | 42 | 46 | 50 | 62 |
| 12 | ..... | 46 | 46 | 113 | 168 | 266 | 102 | 43 | 43 | 46 | 50 | 148 |
| 13 | ..... | 49 | 60 | 146 | 164 | 297 | 97 | 43 | 43 | 46 | 51 | 118 |
| 14 | ..... | 46 | 111 | 174 | 164 | 302 | 87 | 43 | 43 | 46 | 49 | 62 |
| 15 | ..... | 46 | 140 | 185 | 156 | 329 | 87 | 43 | 43 | 46 | 46 | 58 |
| 16 | ..... | 64 | 133 | 199 | 140 | 312 | 84 | 43 | 43 | 46 | 43 | 50 |
| 17 | ..... | 289 | 282 | 217 | 133 | 294 | 80 | 43 | 43 | 46 | 56 | 52 |
| 18 | ..... | 113 | 100 | 206 | 130 | 277 | 75 | 42 | 43 | 46 | 52 | 58 |
| 19 | ..... | 73 | 84 | 202 | 140 | 337 | 66 | 40 | 43 | 46 | 50 | 58 |
| 20 | ..... | 56 | 84 | 196 | 158 | 252 | 64 | 40 | 43 | 49 | 113 | 56 |
| 21 | ..... | 56 | 82 | 168 | 171 | 244 | 64 | 40 | 43 | 48 | 200 | 50 |
| 22 | ..... | 43 | 104 | 164 | 158 | 236 | 64 | 40 | 43 | 48 | 200 | 46 |
| 23 | ..... | 49 | 118 | 174 | 144 | 236 | 62 | 40 | 43 | 47 | 200 | 44 |
| 24 | ..... | 56 | 185 | 164 | 144 | 252 | 60 | 40 | 43 | 46 | 200 | 50 |
| 25 | ..... | 56 | 102 | 171 | 164 | 282 | 58 | 40 | 43 | 46 | 200 | 55 |
| 26 | ..... | 56 | 102 | 226 | 199 | 185 | 56 | 40 | 40 | 46 | 200 | 60 |
| 27 | ..... | 64 | 118 | 232 | 244 | 188 | 56 | 40 | 40 | 46 | 200 | 56 |
| 28 | ..... | 92 | 104 | 199 | 222 | 192 | 58 | 40 | 40 | 46 | 118 | 55 |
| 29 | ..... | ..... | 100 | 171 | 199 | 178 | 56 | 38 | 49 | 49 | 87 | 55 |
| 30 | ..... | ..... | 94 | 148 | 178 | 206 | 52 | 37 | 49 | 49 | 84 | 78 |
| 31 | ..... | ..... | 97 | ..... | 211 | ..... | 52 | 40 | ..... | 49 | ..... | 71 |

NOTE.—These discharges are based on a rating curve that is fairly well defined between about 43 and 370 second-feet. Discharges for days having no gage record are interpolated. Discharges November 21–27 estimated.

*Monthly discharge of Donner und Blitzen River near Diamond, Oreg., for 1909.*

[Drainage area, 238 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| February | 289 | 43 | 63.9 | 0.268 | 0.28 | 3,550 | B. |
| March | 282 | 46 | 105 | .441 | .51 | 6,460 | B. |
| April | 232 | 82 | 155 | .651 | .73 | 9,220 | B. |
| May | 252 | 130 | 185 | .777 | .90 | 11,400 | B. |
| June | 492 | 178 | 298 | 1.25 | 1.40 | 17,700 | B. |
| July | 202 | 52 | 92.5 | .389 | .45 | 5,690 | B. |
| August | 52 | 37 | 42.7 | .179 | .21 | 2,630 | B. |
| September | 185 | 40 | 48.4 | .203 | .23 | 2,880 | B. |
| October | 50 | 43 | 47.1 | .198 | .23 | 2,900 | B. |
| November | ..... | 43 | 92.7 | .389 | .43 | 5,520 | B. |
| December | 148 | 44 | 66.8 | .281 | .32 | 4,110 | B. |
| The period | ..... | ..... | ..... | ..... | ..... | 72,100 | |

NOTE.—These estimates represent considerably less than the natural flow of the stream, as no records were kept on the five ditches diverting water above the station.

### McCOY CREEK NEAR DIAMOND, OREG.

This station was established January 27, 1909. It was first located three-fourths of a mile west of Diamond ranch house and 3 miles from Diamond post-office. Observations were suspended June 30, 1909, because of the lack of an observer.

Several irrigation ditches divert water above the station for hay lands in the Diamond swamp, but no estimate has been made of the flow in these ditches, and the results obtained during 1909 do not represent the natural flow of the stream. The discharges, therefore, are only of general interest.

The course of the stream is through an alluvial bottom, and the banks are densely covered with willows and brush. The grade is light, and the branches of the trees trailing in the water form obstructions by catching drift and débris, which produce unstable gage heights. The results do not possess a high degree of accuracy.

The station was moved on May 23, 1910, to Kesterson's ranch, 2½ miles above the old location and above all present irrigation ditches.

*Discharge measurements of McCoy Creek near Diamond, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 25 | R. B. Post | 13 | 13.3 | 1.80 | 12.1 |
| June 25 | do | 15 | 23 | 3.95 | 80 |

*Daily gage height, in feet, and daily discharge, in second-feet, of McCoy Creek near Diamond, Oreg., for 1909.*

[C. W. Frazier, observer.]

| Day. | February. | | March. | | April. | | May. | | June. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Gage height. | Discharge. | Gage height. | Discharge. | Gage height. | Discharge. | Gage height. | Discharge. | Gage height. | Discharge. |
| 1 | | | | | 1.96 | 15 | 3.06 | 45 | 4.42 | 101 |
| 2 | 1.85 | 13 | | | 1.82 | 12 | 3.42 | 60 | 4.34 | 97 |
| 3 | 1.70 | 10 | | | 1.82 | 12 | 3.06 | 45 | 4.36 | 98 |
| 4 | 1.62 | 9.2 | | | 1.93 | 15 | 3.84 | 77 | 4.04 | 85 |
| 5 | 1.63 | 9.3 | | | 1.42 | 7.2 | 3.71 | 71 | 4.91 | 126 |
| 6 | 1.22 | 5.2 | | | 1.60 | 9.0 | 3.71 | 71 | 4.62 | 111 |
| 7 | 1.20 | 5.0 | | | 2.48 | 27 | 3.64 | 69 | 4.61 | 110 |
| 8 | 1.60 | 9.0 | | | 2.40 | 25 | 4.02 | 84 | 4.48 | 104 |
| 9 | 1.40 | 7.0 | | | 2.51 | 28 | 3.71 | 71 | 4.41 | 100 |
| 10 | 1.70 | 10 | | | 2.04 | 17 | 3.60 | 67 | 4.34 | 97 |
| 11 | 1.40 | 7.0 | | | 2.08 | 18 | 3.84 | 77 | 4.14 | 89 |
| 12 | 1.20 | 5.0 | | | 2.03 | 17 | 3.91 | 79 | 4.68 | 114 |
| 13 | 1.04 | 3.4 | | | 2.03 | 17 | 3.48 | 62 | 3.82 | 76 |
| 14 | 1.02 | 3.2 | | | 2.06 | 17 | 4.02 | 84 | 3.64 | 69 |
| 15 | 1.05 | 3.5 | | | 3.01 | 43 | 4.43 | 102 | 3.63 | 68 |
| 16 | 2.05 | 17 | 1.95 | 15 | 3.42 | 60 | 4.01 | 83 | 3.65 | 69 |
| 17 | 1.86 | 13 | 2.02 | 16 | 3.06 | 45 | 4.02 | 84 | 3.81 | 75 |
| 18 | 2.00 | 16 | 3.00 | 43 | 1.94 | 15 | 4.62 | 111 | 3.74 | 73 |
| 19 | 3.05 | 45 | 2.41 | 25 | 1.48 | 7.8 | 4.34 | 97 | 3.92 | 80 |
| 20 | 2.14 | 19 | 2.64 | 32 | 2.93 | 41 | 4.08 | 86 | 4.02 | 84 |
| 21 | 1.94 | 15 | 1.82 | 12 | 2.97 | 42 | 4.43 | 102 | 3.87 | 78 |
| 22 | 1.42 | 7.2 | 1.90 | 14 | 2.81 | 37 | 4.81 | 120 | 3.92 | 80 |
| 23 | 1.95 | 15 | 1.41 | 7.1 | 2.46 | 27 | 4.01 | 83 | 3.78 | 74 |
| 24 | 4.02 | 84 | 1.64 | 9.4 | 3.41 | 59 | 3.92 | 80 | 3.62 | 68 |
| 25 | 3.04 | 45 | 1.48 | 7.8 | 3.04 | 45 | 3.84 | 77 | 3.64 | 69 |
| 26 | 2.42 | 26 | 2.00 | 16 | 3.02 | 44 | 3.72 | 72 | 3.42 | 60 |
| 27 | 2.05 | 17 | 3.10 | 47 | 3.41 | 59 | 4.04 | 85 | 3.04 | 45 |
| 28 | | | 2.81 | 37 | 4.06 | 85 | 4.04 | 85 | 3.04 | 45 |
| 29 | | | 2.04 | 17 | 4.01 | 83 | 4.00 | 83 | 3.02 | 44 |
| 30 | | | 1.90 | 14 | 3.72 | 72 | 4.02 | 84 | 3.07 | 46 |
| 31 | | | 1.94 | 15 | | | 4.03 | 84 | | |

NOTE.—The daily discharges are based on a rating curve that is not well defined on account of shifting and obstructed channel conditions. Daily discharge for February 28 to March 15 has been estimated equivalent to 15 second-feet per day.

*Monthly discharge of McCoy Creek near Diamond, Oreg., for 1909.*

[Drainage area, 56 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Rainfall. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | Inches. |
| February 2-28 | 84 | 3.2 | 16.1 | 0.288 | 0.29 | 862 | C. |
| March | | | 18.3 | .327 | .38 | 1,130 | C. |
| April | 85 | 7.2 | 33.4 | .596 | .66 | 1,990 | C. |
| May | 120 | 45 | 80.0 | 1.43 | 1.65 | 4,920 | C. |
| June | 126 | 44 | 81.2 | 1.45 | 1.62 | 4,830 | C. |

NOTE.—Discharge February 28 to March 15 estimated.

## KEIGER CREEK NEAR DIAMOND, OREG.

The waters of Keiger Creek are used for the irrigation of hay land in the Diamond swamp.

The gaging station, which was established January 26, 1909, is located 3 miles south of Diamond post-office, and is above all present irrigation ditches.

The gage is a vertical staff on the right bank. Measurements are made by wading at any convenient point near the gage. No facilities have been provided for making measurements at high stages.

The stream flows through an alluvial bottom on a flat grade. The banks are subject to overflow and are densely grown with willows and underbrush. The treetops, trailing in the water, catch débris and form obstructions which produce unstable conditions at the gage. For this reason the results do not possess a high degree of accuracy, but they are sufficient for a general study of the behavior of the stream.

*Discharge measurements of Keiger Creek near Diamond, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| March 24 | R. B. Post | 23 | 62 | 2.6 | 105 |
| June 24 | do | 41 | 45 | 2.3 | 132 |
| November 6 | do | 14 | 6 | .3 | 13 |

*Daily gage height, in feet, of Keiger Creek near Diamond, Oreg., for 1909.*

[H. D. Pugsley, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.9 | 0.4 | 1.5 | 2.3 | 3.5 | 2.1 | 0.3 | 0.05 | 0.1 | 0.2 | 0.55 |
| 2 | | .8 | .4 | 1.5 | 2.4 | 3.7 | 1.8 | .25 | .2 | .1 | .2 | .5 |
| 3 | | .56 | .4 | 1.8 | 2.8 | 3.8 | 1.6 | .2 | .3 | .2 | .2 | .5 |
| 4 | | .3 | .4 | 1.7 | 2.9 | 3.8 | 1.5 | .2 | .2 | .3 | .2 | .5 |
| 5 | | .26 | .4 | 1.5 | 2.9 | 3.75 | 1.4 | .2 | .1 | .3 | .25 | 1.5 |
| 6 | | .8 | .5 | 1.7 | 2.9 | 3.75 | 1.2 | .2 | .3 | .3 | .3 | 1.5 |
| 7 | | .56 | .56 | 1.4 | 2.9 | 3.2 | 1.1 | .2 | .1 | .3 | .2 | 1.4 |
| 8 | | .56 | .55 | 1.5 | 2.9 | 3.2 | 1.1 | .2 | .1 | .2 | .2 | 1.6 |
| 9 | | .26 | .2 | 1.5 | 2.9 | 3.15 | 1.1 | .2 | .2 | .2 | .3 | 1.7 |
| 10 | | .7 | .1 | 1.8 | 3.0 | 3.0 | 1.2 | .2 | .05 | .2 | .3 | .8 |

*Daily gage height, in feet, of Keiger Creek near Diamond, Oreg., in 1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | ..... | 0.6 | 0.3 | 1.75 | 2.8 | 3.0 | 1.15 | 0.2 | 0.05 | 0.2 | 0.3 | 0.55 |
| 12 | ..... | .3 | .3 | 1.5 | 2.8 | 2.7 | 1.1 | .15 | .10 | .1 | .3 | 1.4 |
| 13 | ..... | .3 | .5 | 1.9 | 2.7 | 2.8 | 1.05 | .15 | .2 | .1 | .3 | .5 |
| 14 | ..... | .2 | .6 | 2.0 | 2.6 | 2.9 | 1.0 | .1 | .05 | .1 | .3 | .5 |
| 15 | ..... | .2 | .5 | 2.2 | 2.5 | 2.9 | 1.0 | .1 | .1 | .1 | .4 | .4 |
| 16 | ..... | .56 | .5 | 2.6 | 2.4 | 2.9 | 1.0 | .1 | .1 | .1 | .4 | .4 |
| 17 | ..... | 1.04 | .9 | 2.5 | 2.45 | 2.8 | 1.0 | .1 | .05 | .1 | .4 | 1.4 |
| 18 | ..... | .8 | .9 | 2.5 | 2.4 | 2.8 | .95 | .05 | −.02 | .1 | .6 | 1.0 |
| 19 | ..... | .75 | .8 | 2.5 | 2.45 | 2.8 | .9 | .05 | .0 | .05 | .7 | 1.0 |
| 20 | ..... | .5 | .8 | 2.4 | 2.6 | 2.6 | .9 | .05 | .05 | .1 | .9 | 1.0 |
| 21 | ..... | .5 | .9 | 2.4 | 2.5 | 2.6 | .9 | .05 | .05 | .1 | 1.4 | 1.0 |
| 22 | ..... | 1.3 | .9 | 2.3 | 2.45 | 2.8 | .85 | .05 | .05 | .2 | 1.4 | 1.0 |
| 23 | ..... | .7 | .8 | 2.4 | 2.4 | 2.6 | .8 | .05 | .05 | .15 | 1.4 | 1.0 |
| 24 | ..... | .3 | 2.5 | 2.3 | 2.45 | 2.5 | .5 | .05 | .05 | .2 | 1.4 | .8 |
| 25 | ..... | .3 | 1.42 | 2.5 | 2.5 | 2.4 | .5 | .05 | .05 | .2 | 1.4 | .9 |
| 26 | ..... | .25 | 1.3 | 2.8 | 2.5 | 2.4 | .55 | .05 | .05 | .2 | 1.3 | .9 |
| 27 | ..... | .1 | 1.4 | 2.8 | 2.7 | 2.1 | .55 | .05 | .05 | .2 | 1.2 | .9 |
| 28 | ..... | .4 | 1.2 | 2.8 | 2.7 | 2.0 | .5 | .05 | .05 | .2 | .9 | .9 |
| 29 | ..... | ..... | 1.2 | 2.7 | 2.6 | 2.0 | .5 | .05 | .1 | .2 | .6 | .95 |
| 30 | ..... | ..... | 1.2 | 2.3 | 3.2 | 2.0 | .5 | .03 | .1 | .2 | .6 | 1.0 |
| 31 | ..... | ..... | 1.3 | ..... | 3.4 | ..... | .5 | .03 | ..... | .2 | ..... | 1.0 |

NOTE.—Stream entirely frozen over January 26. Ice too thick for gaging. No ice notes reported by observer, so extent of frozen period is not known.

## SILVER CREEK NEAR RILEY, OREG.

This station was established April 19, 1904. On account of insufficient funds observations were suspended from July 14, 1906, to January 14, 1909. On the latter date a cable was installed 200 feet above the bridges crossing Silver Creek on Cecil's ranch and about 12 miles north of Riley. These bridges are on the main stage road from Prineville to Burns.

One hundred feet below the cable is a brush and rock dam which diverts water into three channels. Stable relations between discharge and gage heights can be established only during the irrigating seasons and the time between first fall flood, when the dam is washed out, and the spring, when it is reconstructed. Usually only the brush, earth, and smaller stones are washed away. For this reason results at this station will be only approximate, but it is the only site that can be utilized that is within practicable distance of an observer.

When the station was reestablished January 14, 1909, it was practically impossible to install a permanent gage. Temporary gages have therefore been used, each being referenced to an iron post on the right bank 40 feet downstream from the gage. The elevation above gage datum is 11.80.

The waters of Silver Creek are now largely used for the irrigation of hay lands in Silver Creek valley. The Silver Creek reservoir site, which was investigated by the Reclamation Service, is 3 or 4 miles above the station. At this point a large quantity of water can be stored. Below the station on both sides of the stream are large areas of agricultural land which could be irrigated from stored water.

*Discharge measurements of Silver Creek near Riley, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 5 | R. B. Post | 32 | 191 | 6.20 | 240 |
| June 15 | do | 24 | 19 | 2.70 | 10.2 |

*Daily gage height, in feet, of Silver Creek near Riley, Oreg., for 1909.*

[Mrs. A. G. Gotchy, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | 3.0 | 5.9 | 4.0 | 3.1 | 2.2 | 1.95 | | | 2.6 | 2.4 |
| 2 | | | 3.15 | 6.5 | 3.9 | 3.1 | 2.15 | 1.9 | | | 2.6 | 2.4 |
| 3 | | | 3.25 | 6.9 | 3.8 | 3.0 | 2.15 | 1.9 | | 1.5 | 2.5 | 2.45 |
| 4 | | | 3.35 | 6.4 | 3.7 | 3.0 | 2.15 | 1.9 | | 2.0 | 2.5 | 2.5 |
| 5 | | | 3.0 | 6.3 | 3.75 | 2.9 | 2.1 | 1.9 | | 2.1 | 2.2 | 2.5 |
| 6 | | | 3.4 | 5.4 | 3.7 | 2.53 | 2.2 | 1.8 | | 2.1 | 2.4 | 2.5 |
| 7 | | | 3.3 | 5.1 | 3.6 | 2.63 | 2.2 | 1.75 | | 2.1 | 2.4 | 2.5 |
| 8 | | | 3.25 | 5.1 | 3.6 | 2.73 | 2.3 | 1.75 | | 2.1 | 2.4 | 2.5 |
| 9 | | | 3.2 | 5.6 | 3.5 | 2.63 | 2.35 | 1.7 | | 2.0 | 2.3 | 2.5 |
| 10 | | | 3.3 | 6.1 | 3.4 | 2.78 | 2.4 | 1.6 | | 2.0 | 2.3 | 2.5 |
| 11 | | | 3.25 | 5.9 | 3.4 | 2.73 | 2.8 | 1.55 | | 2.1 | 2.2 | 2.5 |
| 12 | | | 3.2 | 6.1 | 3.55 | 2.73 | 2.7 | 1.5 | | 2.1 | 2.2 | 2.5 |
| 13 | | | 3.2 | 6.7 | 3.55 | 2.7 | 2.5 | 1.5 | | 2.2 | 2.2 | |
| 14 | | | 3.4 | 6.9 | 3.5 | 2.7 | 2.4 | 1.5 | | 2.1 | 2.3 | |
| 15 | | 3.7 | 3.65 | 6.8 | 3.3 | 2.6 | 2.3 | 1.45 | | 2.1 | 2.3 | |
| 16 | | 5.7 | 4.0 | 6.5 | 3.6 | 2.6 | 2.1 | 1.45 | | 2.1 | 2.3 | |
| 17 | | 5.75 | 4.4 | 6.4 | 3.55 | 2.7 | 2.0 | 1.45 | | 2.1 | 2.3 | |
| 18 | | 4.0 | 4.2 | 5.9 | 3.4 | 2.7 | 2.0 | 1.45 | | 2.1 | 2.3 | |
| 19 | | 3.65 | 3.9 | 5.6 | 3.35 | 2.7 | 1.95 | 1.4 | | 2.1 | 2.3 | |
| 20 | | 3.8 | 3.85 | 5.3 | 3.3 | 2.7 | 1.95 | 1.4 | | 2.2 | 2.45 | |
| 21 | | 3.45 | 3.75 | 5.2 | 3.2 | 2.65 | 1.95 | 1.4 | | 2.2 | 2.45 | |
| 22 | | 3.1 | 3.7 | 5.0 | 3.2 | 2.55 | 1.9 | 1.4 | | 2.2 | 2.5 | |
| 23 | | 3.15 | 3.75 | 4.8 | 3.25 | 2.5 | 1.8 | | | 2.1 | 2.85 | |
| 24 | | 3.1 | 3.9 | 4.7 | 3.2 | 2.45 | 1.8 | | | 2.25 | 2.85 | |
| 25 | | 3.0 | 3.9 | 4.4 | 3.3 | 2.45 | 1.75 | | | 2.25 | 2.9 | |
| 26 | | 3.2 | 4.95 | 4.4 | 3.2 | 2.45 | 1.75 | | | 2.3 | 2.85 | |
| 27 | | 3.1 | 5.2 | 4.3 | 3.35 | 2.4 | 1.95 | | | 2.2 | 2.85 | |
| 28 | | 3.0 | 5.8 | 4.2 | 3.45 | 2.4 | 1.95 | | | 2.1 | 2.5 | |
| 29 | | | 5.9 | 4.2 | 3.45 | 2.3 | 1.95 | | | 2.2 | 2.35 | |
| 30 | | | 5.5 | 4.0 | 3.3 | 2.3 | 1.95 | | | 2.2 | 2.35 | |
| 31 | | | 5.5 | | 3.0 | | 1.95 | | | 2.3 | | |

NOTE.—Stream frozen November 14 to 20 and December 4 to 11.

## WARNER LAKE DRAINAGE BASIN.

### DESCRIPTION.

Warner Lake includes a chain of lakes and marshes extending in a general north and south direction between two high escarpments in the southeastern portion of Lake County. The waters of these lakes flow from south to north, and the lakes in the southern end of the valley are therefore fresh while those at the northern end are alkaline. The larger lakes in the area from north to south are Crump Lake, Hart Lake, Flagstaff Lake, and Bluejoint Lake. The general elevation of the water surface is 4,550 feet.

Protected by the high ridges that border it on both sides, this valley has reached a fairly high stage of agricultural development. At the base of the hills bordering the western shores of Hart and Crump lakes are a number of prosperous ranches, whose products include fruit, grains, and nearly all agricultural crops.

The principal streams in this basin are Twentymile Creek, flowing from the south; Warner Creek, or Deep Creek, as it is locally called, flowing from the west; and Honey Creek, flowing from the west. These streams drain a high, practically timberless, ridge, but the flow of the streams is well maintained during the summer months. Warner Creek is the most important of these streams and Honey Creek is the next, though Twentymile Creek furnishes about the same amount of water as Honey Creek. All three are used more or less for irrigation, and any additional development will require construction of storage reservoirs on their headwaters.

Around the west side and north end of the valley is a large area of agricultural land, which is now growing sagebrush. The Warner Lake Irrigation Company has under way the irrigation of these lands by water stored on the headwaters of Warner and Honey creeks. The project is to be developed under the provision of the Carey Act.

Gaging stations have been maintained in this basin as follows:

Honey Creek at Plush, Oreg., 1909.
Warner Creek at Adel, Oreg., 1909.

### HONEY CREEK AT PLUSH, OREG.

This station was established May 13, 1909, at a wagon bridge one-fourth mile north of Plush. The gage first used was a vertical staff fastened to the bridge, but the gage heights were affected by temporary dams used below the station to divert water into irrigation ditches. On November 1, 1909, the gage was moved to the canyon, 1 mile above the bridge, where its records should give a stable discharge curve. A cable was also installed at this point, from which discharge measurements can be made, except at extreme low water, at which time measurements are made by wading.

On Honey Creek are several favorable sites for the storage of water which can be used to irrigate lands lying to the north and west of Flagstaff and Bluejoint lakes. The Warner Lake Irrigation Company is investigating the feasibility of irrigating these lands under the provisions of the Carey Act, and the station was maintained in cooperation with this company.

Estimates of daily discharge for 1909 are withheld because of insufficient data and changing conditions of flow.

*Discharge measurements of Honey Creek at Plush, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 13 | R. B. Post | 25 | 68 | 4.40 | 137 |
| December 7 [a] | do | 23 | 42 | 4.00 | 23 |

[a] Measured through 4 inches of ice.

*Daily gage height, in feet, of Honey Creek at Plush, Oreg., for 1909.*

[Z. Moss, observer.]

| Day. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 5.35 | ..... | 3.6 | 2.9 | 2.8 | 3.6 | 4.3 |
| 2 | ..... | 5.55 | ..... | 3.5 | 2.8 | 2.8 | 3.6 | 4.0 |
| 3 | ..... | 5.5 | 3.65 | 3.5 | 2.8 | 3.1 | 3.5 | 3.8 |
| 4 | ..... | 5.35 | 3.65 | 3.4 | 2.8 | 3.1 | 3.5 | 3.8 |
| 5 | ..... | 5.2 | 3.65 | 3.35 | 2.8 | 3.2 | 3.5 | 3.1 |
| 6 | ..... | 5.2 | 3.6 | 3.2 | 2.8 | 3.2 | 3.5 | 3.1 |
| 7 | ..... | 4.95 | 3.6 | 3.2 | 2.8 | 3.2 | 3.4 | 4.0 |
| 8 | ..... | 4.8 | 3.55 | 3.2 | 2.8 | 3.2 | 3.4 | 4.1 |
| 9 | ..... | 4.75 | 3.65 | 3.2 | 2.8 | 3.2 | 3.4 | 4.1 |
| 10 | ..... | 4.6 | 3.6 | 3.2 | 2.8 | 3.2 | 3.3 | 4.5 |
| 11 | ..... | 4.35 | 3.6 | 3.2 | 2.8 | 3.2 | 3.3 | 4.5 |
| 12 | ..... | 4.4 | 3.6 | 3.2 | 2.8 | 3.2 | 3.3 | 4.5 |
| 13 | 4.4 | 4.3 | 3.6 | 3.2 | 2.8 | 3.2 | 3.3 | 4.3 |
| 14 | 4.5 | 4.4 | 3.6 | 3.2 | 2.8 | 3.2 | 3.3 | 4.3 |
| 15 | 4.5 | 4.35 | 3.6 | 3.2 | 2.8 | 3.25 | 3.3 | 4.3 |
| 16 | 4.5 | 4.3 | 3.6 | 3.2 | 2.8 | 3.3 | 3.3 | 4.3 |
| 17 | 4.35 | 4.35 | 3.6 | 3.2 | 2.8 | 3.3 | 3.4 | 4.0 |
| 18 | 4.6 | 4.4 | ..... | 3.2 | 2.8 | 3.3 | 3.4 | 3.1 |
| 19 | 5.15 | 5.3 | ..... | 3.2 | 2.8 | 3.3 | 3.5 | 3.1 |
| 20 | 5.15 | 5.2 | ..... | 3.2 | 2.8 | 3.35 | 4.2 | 3.9 |
| 21 | 5.2 | 4.85 | ..... | 3.2 | 2.8 | 3.4 | 4.9 | 3.9 |
| 22 | 5.35 | 4.35 | ..... | 3.2 | 2.8 | 3.4 | 4.8 | 3.9 |
| 23 | 5.15 | 4.0 | ..... | 3.2 | 2.8 | 3.4 | 6.1 | 3.9 |
| 24 | 5.2 | 4.15 | ..... | 3.2 | 2.8 | 3.5 | 6.35 | 3.9 |
| 25 | 4.95 | 4.25 | 3.6 | 3.2 | 2.8 | 3.5 | 5.5 | 3.9 |
| 26 | 5.2 | 3.7 | 3.6 | 3.2 | 3.25 | 3.6 | 5.2 | 3.9 |
| 27 | 6.05 | 3.65 | 3.6 | 3.2 | 3.0 | 3.6 | 4.1 | 3.9 |
| 28 | 5.9 | 3.7 | 3.55 | 3.2 | 2.95 | 3.6 | 4.7 | 3.9 |
| 29 | 5.5 | 3.7 | 3.5 | 3.1 | 2.9 | 3.5 | 4.5 | 3.9 |
| 30 | 5.1 | 3.7 | 3.5 | 3.05 | 2.85 | 3.5 | 4.3 | 3.9 |
| 31 | 5.2 | ..... | 3.5 | 3.0 | ..... | 3.6 | ..... | 5.2 |

NOTE.—Stream frozen over December 7. Ice conditions probably existed throughout the month. All gage heights for 1909 refer to gage at bridge.

## WARNER CREEK AT ADEL, OREG.

The station on Warner Creek (locally known as Deep Creek) was established May 11, 1909. Measurements are made from the county bridge 300 yards south of Adel post-office; the gage is located about 200 feet upstream from the bridge and above a series of rapids.

Below the bridge the grade of the stream is very flat, and the water is diverted by means of a temporary dam, which is repaired at the beginning of each irrigation season. The gage, however, is out of the influence of this dam. Two ditches that head several miles above the gage divert water around it. The combined discharge of these ditches on May 18, 1910, was estimated at 12 second-feet.

Several reservoir sites are available on Warner Creek above the station where water could be stored for the irrigation of lands along the borders of the chain of lakes in Warner Valley.

No estimates of discharge are possible for 1909 on account of insufficient data and changing conditions of flow.

The station is maintained in cooperation with the Warner Lake Irrigation Company, which furnishes gage heights and has made some of the current-meter measurements.

*Discharge measurements of Warner Creek at Adel, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| May 12 | R. B. Post | 49 | 183 | 4.30 | 510 |
| December 5 | do | 30.5 | 80 | 3.52 | 129 |

*Daily gage height, in feet, of Warner Creek at Adel, Oreg., for 1909.*

[G. L. Harris and J. J. Van Keulen, observers.]

| Day. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 4.5 | 3.2 | 2.5 | 2.3 | 2.6 | 2.7 | 4.3 |
| 2 | ..... | 4.7 | 3.2 | 2.5 | 2.3 | 2.6 | 3.0 | 3.5 |
| 3 | ..... | 4.8 | 3.2 | 2.4 | 2.3 | 2.6 | 2.8 | 3.5 |
| 4 | ..... | 4.8 | 3.0 | 2.4 | 2.3 | 2.6 | 2.7 | 3.5 |
| 5 | ..... | 4.8 | 3.0 | 2.4 | 5.5 | 2.6 | 2.7 | 3.4 |
| 6 | ..... | 4.6 | 3.2 | 2.4 | 2.5 | 2.6 | 2.8 | 3.4 |
| 7 | ..... | 4.4 | 3.2 | 2.4 | 2.3 | 2.6 | 2.75 | 3.4 |
| 8 | ..... | 4.3 | 3.1 | 2.4 | 2.4 | 2.5 | 2.7 | 3.5 |
| 9 | ..... | 4.2 | 3.0 | 2.4 | 2.4 | 2.5 | 2.8 | 3.8 |
| 10 | ..... | 4.1 | 3.0 | 2.4 | 2.4 | 2.5 | 2.7 | 3.6 |
| 11 | 4.4 | 4.1 | 3.0 | 2.4 | 2.4 | 2.5 | 2.7 | 3.5 |
| 12 | 4.3 | 4.1 | 2.9 | 2.4 | 2.5 | 2.5 | 2.6 | 3.5 |
| 13 | 4.3 | 4.1 | 2.9 | 2.3 | 2.5 | 2.5 | 2.5 | 3.7 |
| 14 | 4.3 | 4.1 | 2.9 | 2.3 | 2.5 | 2.5 | 2.5 | 3.4 |
| 15 | 4.3 | 4.0 | 2.8 | 2.3 | 2.5 | 2.5 | 2.5 | 3.3 |
| 16 | 4.2 | 4.0 | 2.8 | 2.3 | 2.5 | 2.5 | 2.7 | 3.3 |
| 17 | 4.2 | 3.9 | 2.7 | 2.3 | 2.5 | 2.5 | 2.8 | 3.3 |
| 18 | 4.2 | 3.8 | 2.7 | 2.3 | 2.5 | 2.5 | 2.7 | 3.2 |
| 19 | 4.3 | 3.9 | 2.6 | 2.3 | 2.5 | 2.5 | 2.9 | 3.2 |
| 20 | 4.3 | 4.0 | 2.6 | 2.3 | 2.5 | 2.55 | 4.8 | 3.2 |
| 21 | 4.4 | 3.8 | 2.6 | 2.3 | 2.5 | 2.55 | 6.3 | 3.2 |
| 22 | 4.3 | 3.7 | 2.6 | 2.3 | 2.5 | 2.55 | 5.6 | 3.3 |
| 23 | 4.3 | 3.6 | 2.5 | 2.3 | 2.5 | 2.5 | 6.4 | 3.3 |
| 24 | 4.0 | 3.6 | 2.5 | 2.3 | 2.5 | 2.5 | 6.2 | 3.3 |
| 25 | 4.0 | 3.5 | 2.5 | 2.3 | 2.5 | 2.5 | 5.5 | 3.4 |
| 26 | 4.2 | 3.5 | 2.5 | 2.3 | 2.5 | 2.5 | 4.6 | 3.4 |
| 27 | 4.6 | 3.4 | 2.5 | 2.3 | 2.5 | 2.5 | 4.4 | 3.4 |
| 28 | 4.7 | 3.4 | 2.5 | 2.3 | 2.6 | 2.5 | 4.2 | 3.4 |
| 29 | 4.5 | 3.3 | 2.5 | 2.3 | 2.6 | 2.5 | 4.2 | 3.3 |
| 30 | 4.2 | 3.2 | 2.5 | 2.3 | 2.6 | 2.5 | 4.3 | 3.3 |
| 31 | 4.3 | ..... | 2.5 | 2.3 | ..... | 2.6 | ..... | 3.2 |

NOTE.—Ice conditions probably existed from December 2 to 31.

## ABERT LAKE DRAINAGE BASIN.

### DESCRIPTION.

Abert Lake is a strongly alkaline body of water lying near the central part of Lake County. It has a surface area of 60 square miles at an elevation of 4,210 feet. The waters are largely supplied from Chewaucan River and Crooked Creek.

Chewaucan River rises on the high divide in the southern part of Lake County and flows northward into Chewaucan marsh, through which it meanders in a southeasterly direction and flows into Abert Lake at its southern extremity.

The principal agricultural development in the basin consists of the hay lands in the Chewaucan marsh and the area of irrigated lands

bordering the marsh on the south and along Chewaucan River in the vicinity of Paisley.

One gaging station has been maintained in this basin on Chewaucan River at Paisley, Oreg., 1905–1907, 1909.

### CHEWAUCAN RIVER AT PAISLEY, OREG.

This station, which is located in the SE. ¼ sec. 23, T. 33 S., R. 18 E., one-fourth mile upstream from Paisley, was established January 4, 1905. On account of insufficient funds observations were suspended from January 1, 1908, to January 17, 1909.

The gage is a vertical staff on the right bank 60 feet upstream from the cable, from which discharge measurements are made.

The left bank is high; the right bank is low and will overflow at high stages for a distance of 500 feet or more.

Near the station are several irrigation ditches. George Conn's ditch, which heads about 2½ miles above the station, diverts water around the gage. Conn's mill ditch diverts water from the left bank 250 feet below the gage, where a low timber dam has been constructed. This dam increases the gage heights artificially, but it is fairly permanent, and the accuracy of the records is not greatly affected by it. A short distance below Conn's mill ditch the Brattain ditch diverts water from the right bank. It follows the foothills for many miles down the river valley, and its water is used to irrigate land immediately around Paisley and large areas of hay land in Chewaucan marsh.

The waters of Chewaucan River at present are used for irrigation and for flooding hay lands in Chewaucan marsh. A segregation of 12,000 acres northeast of Paisley has been made for reclamation under the terms of the Carey Act. It is proposed to store water for these lands at a point 20 miles upstream from Paisley. The development of this project, however, has been hindered by certain water-right claims of the owners of hay lands in Chewaucan marsh. The general practice here has been to flood the lands during the spring and winter to a depth of several feet. As all the waters are claimed for this flooding no development work can proceed until the water rights have been settled. There is undoubtedly sufficient water for all interests if it is wisely used.

*Discharge measurements of Chewaucan River at Paisley, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 15 | R. B. Post | 46 | 150 | 6.56 | 841 |
| May 3 | do | 47 | 145 | 6.55 | 856 |
| May 16 | do | 45 | 122 | 6.05 | 571 |
| December 10 | do | 41 | 101 | 5.06 | 212 |

*Daily gage height, in feet, of Chewaucan River at Paisley, Oreg., for 1909.*

[Lulu Bannister, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 4.3 | 4.4 | 5.1 | ..... | 6.5 | 4.6 | 3.6 | ..... | 4.1 | 5.1 | 5.8 |
| 2 | ..... | 4.3 | 4.6 | 5.3 | 6.6 | 6.7 | 4.5 | 3.6 | 4.1 | 4.3 | 5.1 | 5.9 |
| 3 | ..... | 4.3 | 4.8 | 5.2 | 6.8 | 6.8 | 4.5 | 3.7 | 3.8 | 4.8 | 5.1 | 5.6 |
| 4 | ..... | 4.2 | 5.0 | 5.1 | 7.0 | 7.0 | 4.4 | 3.6 | 3.8 | 4.7 | 5.1 | 5.3 |
| 5 | ..... | 4.0 | 4.4 | 4.9 | 7.1 | 7.0 | 4.4 | 3.6 | 3.7 | 4.7 | 5.1 | 5.2 |
| 6 | ..... | 4.1 | 4.5 | 4.9 | 6.8 | 6.7 | 4.7 | 3.6 | 3.7 | 4.7 | 5.1 | 4.8 |
| 7 | ..... | 4.2 | 4.4 | 5.0 | 6.9 | 6.5 | 4.4 | 3.6 | 3.7 | 4.7 | 4.3 | 5.0 |
| 8 | ..... | 3.9 | 4.4 | ..... | 6.9 | 6.5 | 4.3 | 3.6 | 3.7 | 4.7 | 4.3 | 5.2 |
| 9 | ..... | 4.0 | 4.3 | 5.2 | 6.8 | 6.3 | 4.3 | ..... | 3.7 | 4.7 | 4.3 | 5.4 |
| 10 | ..... | 4.0 | 4.2 | 5.4 | 6.7 | 6.1 | 4.3 | 3.6 | 3.7 | 4.7 | 4.3 | 5.3 |
| 11 | ..... | 3.9 | 4.1 | 5.5 | 6.3 | 6.0 | 4.2 | 3.6 | 3.7 | 4.7 | 4.3 | 5.2 |
| 12 | ..... | 4.2 | 4.1 | 5.6 | 6.2 | 5.9 | 4.2 | 3.6 | 3.7 | 4.7 | 4.3 | 5.1 |
| 13 | ..... | 4.3 | 4.2 | 5.7 | 6.0 | 6.0 | 4.2 | 3.6 | 3.7 | 4.7 | 4.3 | 5.1 |
| 14 | ..... | 4.1 | 4.4 | 6.0 | 6.3 | 5.9 | 4.1 | 3.6 | 3.7 | 4.7 | 4.3 | 5.1 |
| 15 | ..... | 4.2 | 4.6 | 6.0 | 6.2 | 5.8 | 4.1 | 3.6 | 3.6 | 4.7 | 4.4 | 4.5 |
| 16 | ..... | 6.2 | 4.8 | 6.2 | 6.2 | 5.8 | 4.1 | 3.6 | 3.6 | 4.7 | 4.6 | 4.5 |
| 17 | 6.2 | 5.3 | 4.6 | 6.4 | 6.0 | 5.7 | 4.1 | 3.6 | 3.6 | 4.7 | 4.6 | 4.5 |
| 18 | 6.8 | 4.9 | 4.5 | 6.5 | 6.0 | 5.7 | 4.0 | 3.5 | 3.6 | 4.8 | 5.0 | 4.5 |
| 19 | 6.0 | 4.5 | 4.6 | 6.2 | 6.0 | 6.0 | 4.0 | 3.5 | 3.6 | 5.0 | 4.8 | 4.5 |
| 20 | 6.2 | ..... | 4.6 | 6.0 | ..... | 5.6 | 3.9 | 3.5 | 3.6 | 5.1 | 7.0 | 4.4 |
| 21 | 6.2 | 4.3 | 4.6 | 6.0 | 6.0 | 5.4 | 3.9 | 3.5 | 3.6 | 5.1 | 6.9 | 4.3 |
| 22 | 5.2 | 4.1 | 4.6 | 5.8 | 5.8 | 5.3 | 3.9 | 3.5 | 3.6 | 5.0 | 7.4 | 4.3 |
| 23 | 4.8 | 4.2 | 4.5 | 6.0 | 6.0 | 5.2 | 3.9 | 3.5 | 3.6 | 5.0 | 9.2 | 4.5 |
| 24 | 4.7 | 4.3 | 4.5 | 6.0 | 6.0 | 5.1 | 3.9 | 3.5 | 3.6 | 5.0 | 8.0 | 4.5 |
| 25 | 4.6 | 4.3 | 4.6 | 6.1 | 6.1 | 5.1 | 3.8 | 3.5 | 3.7 | 5.0 | 7.4 | 4.5 |
| 26 | 4.4 | 4.1 | 4.5 | 6.5 | 6.5 | 5.0 | 3.7 | 3.5 | 4.0 | 5.0 | 6.6 | 4.5 |
| 27 | 4.4 | 4.3 | 4.7 | 6.6 | 6.6 | 4.9 | 3.7 | 3.5 | 4.1 | 5.0 | 6.1 | 4.5 |
| 28 | 4.1 | 4.3 | 4.8 | 6.6 | 6.6 | ..... | 3.7 | ..... | 4.1 | 5.1 | 5.8 | 4.3 |
| 29 | 4.3 | ..... | 4.8 | 6.3 | 6.3 | 4.8 | 3.7 | 3.6 | 4.1 | 5.0 | 5.7 | 4.3 |
| 30 | 4.2 | ..... | 4.8 | 6.2 | 6.2 | 4.7 | 3.6 | 3.6 | 4.1 | 5.0 | 5.7 | 4.3 |
| 31 | 4.3 | ..... | 4.9 | ..... | ..... | ..... | 3.6 | 3.6 | ..... | 5.0 | ..... | ..... |

NOTE.—Floating ice January 15–17. The river was probably partially or entirely frozen over after this, but no notes were reported. River probably frozen part of the time from December 15–31. Anchor ice is likely to form at this station.

Gage heights for 1907 are given in Water-Supply Paper 250, p. 142.

*Daily discharge, in second-feet, of Chewaucan River at Paisley, Oreg., for 1907 and 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907.[a] | | | | | | | | | | | | |
| 1 | ..... | 254 | 232 | ..... | 820 | 1,060 | 301 | 56 | 36 | 45 | 45 | 23 |
| 2 | ..... | 1,280 | 168 | ..... | 765 | 994 | 254 | 56 | 45 | 36 | 36 | ..... |
| 3 | ..... | 1,060 | 148 | ..... | 765 | 876 | 254 | 56 | 29 | 29 | 36 | ..... |
| 4 | ..... | 1,560 | 168 | ..... | 765 | 934 | 254 | 56 | 36 | 29 | 29 | ..... |
| 5 | ..... | 1,120 | 168 | ..... | 713 | 876 | 254 | 56 | 45 | 29 | 29 | ..... |
| 6 | ..... | 765 | 168 | ..... | 765 | 994 | 254 | 45 | 36 | 29 | 29 | ..... |
| 7 | ..... | 570 | 168 | ..... | 713 | 1,060 | 232 | 36 | 29 | 29 | 29 | ..... |
| 8 | ..... | 385 | 168 | ..... | 713 | 934 | 189 | 32 | 23 | 23 | 29 | 29 |
| 9 | ..... | 355 | 168 | ..... | 876 | 876 | 168 | 29 | 23 | 23 | 29 | 29 |
| 10 | ..... | 301 | 168 | 1,120 | 994 | 570 | 148 | 29 | 23 | 23 | 29 | 29 |

[a] These discharges are based on a rating curve that is well defined below 1,000 second-feet. Discharges interpolated for days having no gage record. Ice conditions January 1 to February 1, 1907. Discharge estimated at 60 second-feet per day for January 1 to 25, 700 per day April 1 to 9, and 26 per day December 2 to 7.

*Daily discharge, in second-feet, of Chewaucan River at Paisley, Oreg., for 1907 and 1909*—Continued.

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1907.[a] | | | | | | | | | | | | |
| 11 | ..... | 254 | 148 | 1,120 | 994 | 1,060 | 148 | 29 | 23 | 29 | 29 | 36 |
| 12 | ..... | 254 | 112 | 1,120 | 820 | 1,060 | 148 | 29 | 23 | 45 | 29 | 45 |
| 13 | ..... | 232 | 112 | 1,120 | 820 | 886 | 129 | 23 | 23 | 36 | 29 | 45 |
| 14 | ..... | 232 | 96 | 1,120 | 765 | 713 | 120 | 23 | 23 | 29 | 29 | ..... |
| 15 | ..... | 232 | 112 | 1,060 | 713 | 528 | 112 | 23 | 23 | 29 | 29 | ..... |
| 16 | ..... | 232 | 129 | 994 | 994 | 489 | 96 | 23 | 23 | 29 | 29 | ..... |
| 17 | ..... | 232 | 254 | 876 | 994 | 452 | 88 | 19 | 23 | 29 | 23 | ..... |
| 18 | ..... | 232 | 994 | 820 | 1,120 | 417 | 81 | 19 | 23 | 29 | 29 | ..... |
| 19 | ..... | 232 | 934 | 820 | 1,450 | 385 | 81 | 19 | 29 | 23 | 29 | ..... |
| 20 | ..... | 232 | 452 | 765 | 1 120 | 570 | 68 | 19 | 29 | 29 | 29 | ..... |
| 21 | ..... | 232 | 385 | 765 | 994 | 528 | 68 | 19 | 29 | 29 | 29 | ..... |
| 22 | ..... | 254 | 327 | 820 | 820 | 489 | 81 | 19 | 29 | 29 | 36 | ..... |
| 23 | ..... | 277 | 327 | 876 | 820 | 417 | 96 | 19 | 29 | 29 | 36 | ..... |
| 24 | ..... | 301 | 327 | 934 | 820 | 355 | 81 | 19 | 23 | 29 | 36 | ..... |
| 25 | ..... | 301 | 327 | 876 | 765 | 355 | 68 | 23 | 23 | 45 | 36 | ..... |
| 26 | 129 | 327 | 301 | 934 | 820 | 327 | 68 | 23 | 23 | 45 | 36 | ..... |
| 27 | 148 | 189 | 254 | 876 | 876 | 327 | 68 | 23 | 23 | 45 | 36 | ..... |
| 28 | 130 | 232 | 327 | 820 | 934 | 327 | 68 | 23 | 40 | 56 | 36 | ..... |
| 29 | 112 | ..... | 327 | 876 | 1,060 | 301 | 68 | 23 | 56 | 56 | 36 | ..... |
| 30 | 129 | ..... | 355 | 765 | 1,060 | 254 | 56 | 23 | 45 | 45 | 29 | ..... |
| 31 | 168 | ..... | 327 | ..... | 876 | ..... | 56 | 29 | ..... | 45 | ..... | ..... |
| 1909.[b] | | | | | | | | | | | | |
| 1 | ..... | 112 | 129 | 277 | 770 | 820 | 168 | 29 | 55 | 81 | 277 | 489 |
| 2 | ..... | 112 | 168 | 327 | 876 | 934 | 148 | 29 | 81 | 112 | 277 | 528 |
| 3 | ..... | 112 | 210 | 301 | 994 | 994 | 148 | 36 | 45 | 210 | 277 | 417 |
| 4 | ..... | 96 | 254 | 277 | 1,120 | 1,120 | 129 | 29 | 45 | 189 | 277 | 327 |
| 5 | ..... | 68 | 129 | 232 | 1,180 | 1,120 | 129 | 29 | 36 | 189 | 277 | 301 |
| 6 | ..... | 81 | 148 | 232 | 994 | 934 | 189 | 29 | 36 | 189 | 277 | 210 |
| 7 | ..... | 96 | 129 | 254 | 1,060 | 820 | 129 | 29 | 36 | 189 | 112 | 254 |
| 8 | ..... | 56 | 129 | 278 | 1,060 | 820 | 112 | 29 | 36 | 189 | 112 | 301 |
| 9 | ..... | 68 | 112 | 301 | 994 | 713 | 112 | 29 | 36 | 189 | 112 | 355 |
| 10 | ..... | 68 | 96 | 355 | 934 | 615 | 112 | 29 | 36 | 189 | 112 | 327 |
| 11 | ..... | 56 | 81 | 385 | 713 | 570 | 96 | 29 | 36 | 189 | 112 | 301 |
| 12 | ..... | 96 | 81 | 417 | 663 | 528 | 96 | 29 | 36 | 189 | 112 | 277 |
| 13 | ..... | 112 | 96 | 452 | 570 | 570 | 96 | 29 | 36 | 189 | 112 | 277 |
| 14 | ..... | 81 | 129 | 570 | 713 | 528 | 81 | 29 | 36 | 189 | 112 | 277 |
| 15 | ..... | 96 | 168 | 570 | 663 | 489 | 81 | 29 | 29 | 189 | 129 | ..... |
| 16 | ..... | 663 | 210 | 663 | 663 | 489 | 81 | 29 | 29 | 189 | 168 | ..... |
| 17 | 663 | 327 | 168 | 765 | 570 | 452 | 81 | 29 | 29 | 189 | 168 | ..... |
| 18 | 994 | 232 | 148 | 820 | 570 | 452 | 68 | 23 | 29 | 210 | 254 | ..... |
| 19 | 570 | 148 | 168 | 663 | 570 | 570 | 68 | 23 | 29 | 254 | 210 | ..... |
| 20 | 663 | 130 | 168 | 570 | 570 | 417 | 56 | 23 | 29 | 277 | 1,120 | ..... |
| 21 | 663 | 112 | 168 | 570 | 570 | 355 | 56 | 23 | 29 | 277 | 1,060 | ..... |
| 22 | 301 | 81 | 168 | 489 | 489 | 327 | 56 | 23 | 29 | 254 | 1,380 | ..... |
| 23 | 210 | 96 | 148 | 570 | 570 | 301 | 56 | 23 | 29 | 254 | 3,500 | ..... |
| 24 | 189 | 112 | 148 | 570 | 570 | 277 | 56 | 23 | 29 | 254 | 1,820 | ..... |
| 25 | 168 | 112 | 168 | 615 | 615 | 277 | 45 | 23 | 36 | 254 | 1,380 | ..... |
| 26 | 129 | 81 | 148 | 820 | 820 | 254 | 36 | 23 | 68 | 254 | 876 | ..... |
| 27 | 129 | 112 | 189 | 876 | 876 | 232 | 36 | 23 | 81 | 254 | 615 | ..... |
| 28 | 81 | 112 | 210 | 876 | 876 | 221 | 36 | 26 | 81 | 277 | 489 | ..... |
| 29 | 112 | ..... | 210 | 713 | 713 | 210 | 36 | 29 | 81 | 254 | 452 | ..... |
| 30 | 96 | ..... | 210 | 663 | 663 | 189 | 29 | 29 | 81 | 254 | 452 | ..... |
| 31 | 112 | ..... | 232 | ..... | 742 | ..... | 29 | 29 | ..... | 254 | ..... | ..... |

[a] See note on p. 174.

[b] These discharges are based on a rating curve that is well defined below 1,000 second-feet. Discharges interpolated for days having no gage height. Discharge for December 15 to 31 estimated equivalent to 90 second-feet per day.

*Monthly discharge of Chewaucan River at Paisley, Oreg., for 1907 and 1909.*

[Drainage area, 272 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| 1907. | | | | | | | |
| January | 168 | ..... | 74.7 | 0.275 | 0.32 | 4,590 | C. |
| February | 1,560 | 189 | 433 | 1.59 | 1.66 | 24,000 | B. |
| March | 994 | 96 | 279 | 1.03 | 1.19 | 17,200 | A. |
| April | ..... | ..... | 859 | 3.16 | 3.53 | 51,100 | C. |
| May | 1,450 | 713 | 888 | 3.26 | 3.76 | 54,600 | A. |
| June | 1,060 | 254 | 647 | 2.38 | 2.66 | 38,500 | A. |
| July | 301 | 56 | 134 | .493 | .57 | 8,240 | A. |
| August | 56 | 19 | 29.7 | .109 | .13 | 1,830 | A. |
| September | 56 | 23 | 29.6 | .109 | .12 | 1,760 | A. |
| October | 56 | 23 | 34.0 | .125 | .14 | 2,090 | A. |
| November | 45 | 23 | 31.7 | .117 | .13 | 1,890 | A. |
| December 1–13 | 45 | 23 | 30.2 | .111 | .05 | 779 | C. |
| The period | ..... | ..... | ..... | ..... | ..... | 207,000 | |
| 1909. | | | | | | | |
| January 17–31 | 994 | 81 | 339 | 1.25 | .70 | 10,100 | C. |
| February | 663 | 56 | 130 | .478 | .50 | 7,220 | A. |
| March | 254 | 81 | 159 | .585 | .67 | 9,780 | A. |
| April | 876 | 232 | 516 | 1.90 | 2.12 | 30,700 | A. |
| May | 1,180 | 489 | 766 | 2.82 | 3.25 | 47,100 | B. |
| June | 1,120 | 189 | 553 | 2.03 | 2.26 | 32,900 | B. |
| July | 189 | 29 | 85.5 | .314 | .36 | 5,260 | A. |
| August | 36 | 23 | 27.2 | .100 | .12 | 1,670 | A. |
| September | 81 | 29 | 43.5 | .160 | .18 | 2,590 | A. |
| October | 277 | 81 | 214 | .787 | .91 | 13,200 | A. |
| November | [a] 3,500 | 112 | 554 | 2.04 | 2.28 | 33,000 | B. |
| December | 528 | ..... | 199 | .735 | .85 | 12,200 | C. |
| The period | ..... | ..... | ..... | ..... | ..... | 206,000 | |

[a] Maximum discharge approximate.

## SUMMER LAKE DRAINAGE BASIN.

### DESCRIPTION.

Summer Lake is a strongly alkaline body of water with a surface area of about 70 square miles, at an elevation of 4,300 feet. The water is supplied largely from Ana River, a stream 7 miles long, which heads in five large springs on the northern border of the valley. These springs supply a continuous flow of about 145 second-feet. The water has a nearly constant temperature of 65°.

The agricultural development in this basin is limited to a narrow strip lying at the foot of a high escarpment along the western shore of Summer Lake. This narrow strip is the most favored section in central Oregon and in it intensive agriculture has been practiced since 1848. The escarpment is effective protection against the cold winds from the west and north, which in passing over make an eddy drawing the warm air of the lake over the lands and serving to equalize the temperature. The region has long been famous for its fruit. Apples, pears, peaches, cherries, and berries of all kinds are grown in abundance and failures are practically unknown.

Along the eastern shore of the lake and extending eastward into the wide valley adjoining Chewaucan marsh is a large area of agricultural land, a portion of which could undoubtedly be watered from Ana River and another portion from Chewaucan River. Projects looking to the irrigation of these lands have been under consideration but nothing definite has yet been done.

The only gaging station maintained in this basin is the one on Ana River near Summer Lake, Oreg., 1905 and 1909.

### ANA RIVER NEAR SUMMER LAKE, OREG.

This station, which was established March 28, 1905, is located near the head of Ana River, in the NW. ¼ SE. ¼ sec. 6, T. 30 S., R. 17 E., about 6 miles northwest of the town of Summer Lake, Oreg. No continuous observations of gage heights were obtained until January 14, 1909. It was found, however, that the fluctuations in the gage heights were caused by temporary diversion dams in the stream about 3 miles below the gage. Discharge measurements indicate that the flow is practically constant and equal to 145 second-feet. On this account observations of gage heights were suspended February 9, 1910.

The waters of this stream are supplied from five large springs which lie along a fault line. The waters have a temperature throughout the year of 65° F. The water surface of the upper spring is 39.3 feet above normal water surface in Summer Lake; the water surface of the fifth or lower spring is 7.5 feet above that of Summer Lake. Below the second spring an attempt has been made to raise the water by an earth dam sufficiently high to divert it into a ditch for the irrigation of lands on the right, or south, side of the stream. This dam will raise the water 58 feet. The project is being developed by persons owning desert claims in the vicinity.

*Discharge measurements of Ana River near Summer Lake, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| January 14 | R. B. Post | 26.5 | 64 | 3.95 | [a] 134 |
| May 2 | do | 26.6 | 65 | 3.85 | 150 |

[a] Discharge doubtful.

## SILVER LAKE DRAINAGE BASIN.

### DESCRIPTION.

Silver Lake is a body of fresh water approximately 15 square miles in area, at an elevation of 4,340 feet. The western, southern, and eastern borders of the lake consist of high escarpments; to the northwest is Pauline marsh.

Silver Creek, Bridge Creek, and Bear Creek flow from Yamsay and Hagar mountains northward into Pauline marsh and thence southeastward into Silver Lake.

The water surface in the lake fluctuates considerably. During a succession of high-water years the water rises sufficiently to overflow into Thorn Lake and cover a small portion of the desert to the east. This fact perhaps accounts for the freshness of the lake. After a succession of dry years the lake surface diminishes and the waters become more and more alkaline, until freshened again by another overflow.

The principal agricultural development at the present consists of hay lands in Pauline marsh and small irrigated tracts bordering the streams. During recent years all land suitable for agriculture has been taken as homesteads, and dry farming has been practiced with more or less success.

To the northeast and practically connected with Summer Lake drainage basin is Christmas Lake Valley, a flat alluvial area comprising 300,000 acres. This valley has no surface streams, but contains two or three small lakes. Alkaline Flat, near the northeastern part of the valley, is an intermittent lake; south of it Christmas Lake is a perennial body of water, at an elevation of 4,296 feet. North of Christmas Lake is Fossil Lake, and in the extreme southwestern portion and practically connected with Silver Lake basin is Thorn Lake. Nearly all the lands of Christmas Lake Valley have been taken as homesteads. Dry farming is practiced extensively and good crops of grain and potatoes and other crops have been raised. Water for domestic purposes is found in comparatively shallow wells. Near the eastern border of the valley, however, wells 40 feet in depth have encountered salt water.

Gaging stations in this basin have been maintained as follows:

Silver Creek near Silver Lake, Oreg., 1904–1907, 1909.
Bridge Creek near Silver Lake, Oreg., 1905–6.
Bear Creek near Silver Lake, Oreg., 1905–6, 1909.

### SILVER CREEK NEAR SILVER LAKE, OREG.

This station was first established December 29, 1904. On March 31, 1907, it was abandoned for lack of funds, but the observations were resumed on January 11, 1909. It is located 1½ miles southwest of Silver Lake post-office, in sec. 28, T. 28 S., R. 14 E.

The bed and banks of the stream are fairly permanent. The gage is an inclined staff on the right bank near the cable from which discharge measurements are made. The elevation of the gage has been verified from time to time by means of a bench mark near it at elevation 18.12. The gage has maintained its datum to the present time.

The results obtained at this station are of considerable value. The country through which the creek flows is more or less arid, and the natural summer flow of nearly all the streams is appropriated for present irrigation requirements. Any additional development will require storage. Several fairly good storage sites are available on Silver Creek, and below it lie areas of agricultural land that could easily be irrigated from stored waters.

The conditions at the station are favorable for good results, and the records are believed to be reliable.

*Discharge measurements of Silver Creek near Silver Lake, Oreg., in 1909.*

| Date. | Hydrographer. | Width. | Area of section. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | *Feet.* | *Sq. ft.* | *Feet.* | *Sec.-ft.* |
| April 28 | R. B. Post | 45 | 94 | 3.48 | 292 |
| December 12 | do | 17 | 26 | 1.02 | 42 |

*Daily gage height, in feet, of Silver Creek near Silver Lake, Oreg., for 1909.*

[Henry Egli, observer.]

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 0.9 | 1.0 | 2.9 | 2.7 | 1.3 | 0.8 | 0.7 | 0.7 | 0.65 | 0.7 | 1.45 |
| 2 | ..... | .85 | .9 | 3.0 | 3.0 | 1.2 | .8 | .65 | .65 | .65 | .65 | 1.3 |
| 3 | ..... | 1.4 | 1.15 | 3.3 | 3.4 | 1.2 | .8 | .6 | .65 | .7 | .65 | 1.3 |
| 4 | ..... | 1.4 | 1.5 | 2.4 | 4.1 | 1.3 | .85 | .6 | .65 | .65 | .65 | 1.0 |
| 5 | ..... | 1.55 | 1.35 | 2.1 | 4.2 | 1.2 | .9 | .6 | .65 | .7 | .65 | 1.0 |
| 6 | ..... | 1.5 | 1.35 | 2.0 | 3.5 | 1.1 | .95 | .65 | .7 | .7 | .6 | 1.05 |
| 7 | ..... | 1.35 | 1.2 | 2.1 | 3.1 | 1.1 | .8 | .6 | .65 | .7 | .6 | 1.0 |
| 8 | ..... | 1.2 | 1.0 | 2.4 | 2.8 | 1.0 | .85 | .6 | .6 | .65 | .6 | 1.55 |
| 9 | ..... | 1.2 | .95 | 2.7 | 2.8 | 1.2 | .8 | .6 | .6 | .65 | .65 | 1.0 |
| 10 | ..... | 1.0 | 1.0 | 2.9 | 2.6 | 1.0 | .9 | .6 | .65 | .65 | .65 | .95 |
| 11 | 1.35 | .7 | .9 | 2.5 | 2.4 | .95 | .85 | .6 | .6 | .65 | .65 | .95 |
| 12 | 1.2 | .9 | .85 | 3.85 | 2.0 | .95 | .8 | .65 | .6 | .7 | .6 | .95 |
| 13 | 1.0 | .95 | .9 | 3.3 | 2.0 | .9 | .8 | .65 | .6 | .7 | .65 | .9 |
| 14 | .95 | .95 | 1.2 | 3.5 | 2.0 | 1.0 | .8 | .6 | .6 | .7 | .85 | .85 |
| 15 | 1.4 | .9 | 1.9 | 3.7 | 1.9 | .95 | .7 | .6 | .6 | .65 | 1.0 | .95 |
| 16 | 2.1 | 1.68 | 2.4 | 3.8 | 2.0 | 1.0 | .65 | .6 | .65 | .7 | 1.05 | 1.25 |
| 17 | 1.75 | 2.0 | 2.6 | 4.0 | 1.8 | 1.0 | .7 | .65 | .6 | .7 | .95 | 1.25 |
| 18 | 2.1 | 1.95 | 1.9 | 3.8 | 1.5 | 1.0 | .65 | .6 | .6 | .6 | 1.0 | 1.25 |
| 19 | 2.0 | 1.3 | 1.4 | 3.4 | 2.2 | 1.15 | .65 | .6 | .6 | .6 | 1.05 | .9 |
| 20 | 2.5 | 1.25 | 1.45 | 3.4 | 1.8 | 1.1 | .7 | .6 | .65 | .6 | 1.2 | .9 |
| 21 | 3.0 | 1.1 | 1.2 | 2.7 | 1.8 | 1.0 | .65 | .65 | .65 | .6 | 1.6 | .95 |
| 22 | 2.4 | .95 | 1.35 | 2.5 | 1.6 | .9 | .7 | .65 | .65 | .6 | 2.2 | 1.15 |
| 23 | 1.8 | .95 | 1.2 | 2.6 | 1.5 | .9 | .75 | .6 | .65 | .6 | 6.25 | 1.3 |
| 24 | 1.6 | .95 | 1.2 | 3.4 | 1.5 | .85 | .7 | .6 | .65 | .6 | 5.5 | 1.2 |
| 25 | 1.25 | .8 | 2.0 | 3.1 | 1.3 | .8 | .7 | .65 | .65 | .6 | 5.0 | 1.3 |
| 26 | 1.0 | .95 | 2.1 | 3.8 | 1.4 | .85 | .65 | .7 | .7 | .6 | 4.7 | 1.0 |
| 27 | 1.5 | .9 | 2.6 | 3.7 | 1.4 | .8 | .65 | .7 | .65 | .6 | 4.15 | .95 |
| 28 | 1.15 | 1.1 | 2.9 | 3.4 | 1.5 | .8 | .65 | .65 | .65 | .65 | 1.7 | .6 |
| 29 | .8 | ..... | 2.9 | 3.0 | 1.3 | .8 | .7 | .6 | .65 | .6 | 1.8 | .7 |
| 30 | .95 | ..... | 2.0 | 2.75 | 1.8 | .8 | .7 | .6 | .65 | .6 | 1.85 | .95 |
| 31 | .95 | ..... | 2.85 | ..... | 1.3 | ..... | .7 | .6 | ..... | .65 | ..... | .9 |

NOTE.—Creek frozen January 11 to 16, ice one foot thick; also December 16 to 31, ice from 0.45 to 1.15 feet thick.

*Daily discharge, in second-feet, of Silver Creek near Silver Lake, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 37 | 42 | 212 | 187 | 59 | 33 | 29 | 29 | 27 | 29 | 68 |
| 2 | ..... | 35 | 37 | 225 | 225 | 53 | 33 | 27 | 27 | 27 | 27 | 59 |
| 3 | ..... | 65 | 50 | 267 | 282 | 53 | 33 | 25 | 27 | 29 | 27 | 59 |
| 4 | ..... | 65 | 71 | 153 | 391 | 59 | 35 | 25 | 27 | 27 | 27 | 42 |
| 5 | ..... | 74 | 62 | 122 | 408 | 53 | 37 | 25 | 27 | 29 | 27 | 42 |
| 6 | ..... | 71 | 62 | 112 | 297 | 47 | 40 | 27 | 29 | 29 | 25 | 44 |
| 7 | ..... | 62 | 53 | 122 | 239 | 47 | 33 | 25 | 27 | 29 | 25 | 42 |
| 8 | ..... | 53 | 42 | 153 | 199 | 42 | 35 | 25 | 25 | 27 | 25 | 74 |
| 9 | ..... | 53 | 40 | 187 | 199 | 53 | 33 | 25 | 25 | 27 | 27 | 42 |
| 10 | ..... | 42 | 42 | 212 | 175 | 42 | 37 | 25 | 27 | 27 | 27 | 40 |
| 11 | 50 | 29 | 37 | 164 | 153 | 40 | 35 | 25 | 25 | 27 | 27 | 40 |
| 12 | 42 | 37 | 35 | 351 | 112 | 40 | 33 | 27 | 25 | 29 | 25 | 40 |
| 13 | 34 | 40 | 37 | 267 | 112 | 37 | 33 | 27 | 25 | 29 | 27 | 37 |
| 14 | 32 | 40 | 53 | 297 | 112 | 42 | 33 | 25 | 25 | 29 | 35 | 35 |
| 15 | 52 | 37 | 103 | 327 | 103 | 40 | 29 | 25 | 25 | 27 | 42 | 40 |
| 16 | 98 | 84 | 153 | 343 | 112 | 42 | 27 | 25 | 27 | 29 | 44 | 45 |
| 17 | 90 | 112 | 175 | 375 | 94 | 42 | 29 | 27 | 25 | 29 | 40 | 45 |
| 18 | 122 | 108 | 103 | 343 | 71 | 42 | 27 | 25 | 25 | 25 | 42 | 45 |
| 19 | 112 | 59 | 65 | 282 | 132 | 50 | 27 | 25 | 25 | 25 | 44 | 30 |
| 20 | 164 | 56 | 68 | 282 | 94 | 47 | 29 | 25 | 27 | 25 | 53 | 30 |
| 21 | 225 | 47 | 53 | 187 | 94 | 42 | 27 | 27 | 27 | 25 | 78 | 32 |
| 22 | 153 | 40 | 62 | 164 | 78 | 37 | 29 | 27 | 27 | 25 | 132 | 40 |
| 23 | 94 | 40 | 53 | 175 | 71 | 37 | 31 | 25 | 27 | 25 | 814 | 47 |
| 24 | 78 | 40 | 53 | 282 | 71 | 35 | 29 | 25 | 27 | 25 | 648 | 42 |
| 25 | 56 | 33 | 112 | 239 | 59 | 33 | 29 | 27 | 27 | 25 | 550 | 47 |
| 26 | 42 | 40 | 122 | 343 | 65 | 35 | 27 | 29 | 29 | 25 | 495 | 34 |
| 27 | 71 | 37 | 175 | 327 | 65 | 33 | 27 | 29 | 27 | 25 | 400 | 32 |
| 28 | 50 | 47 | 212 | 282 | 71 | 33 | 27 | 27 | 27 | 27 | 86 | 20 |
| 29 | 33 | ..... | 212 | 225 | 59 | 33 | 29 | 25 | 27 | 25 | 94 | 23 |
| 30 | 40 | ..... | 112 | 193 | 94 | 33 | 29 | 25 | 27 | 25 | 98 | 32 |
| 31 | 40 | ..... | 206 | ..... | 59 | ..... | 29 | 25 | ..... | 27 | ..... | 30 |

NOTE.—These discharges are based on a fairly well-defined rating curve. During periods of ice conditions the daily discharges have been reduced 20 per cent. Discharges January 1–10 estimated as equivalent to 45 second-feet per day.

*Monthly discharge of Silver Creek near Silver Lake, Oreg., for 1909.*

[Drainage area, 221 square miles.]

| Month. | Discharge in second-feet. | | | | Run-off. | | Accuracy. |
|---|---|---|---|---|---|---|---|
| | Maximum. | Minimum. | Mean. | Per square mile. | Depth in inches on drainage area. | Total in acre-feet. | |
| January | 225 | ..... | 68.6 | 0.310 | 0.36 | 4,220 | C. |
| February | 112 | 33 | 53.0 | .240 | .25 | 2,940 | B. |
| March | 212 | 35 | 87.2 | .395 | .46 | 5,360 | B. |
| April | 375 | 112 | 240 | 1.09 | 1.22 | 14,300 | B. |
| May | 408 | 59 | 145 | .656 | .76 | 8,920 | B. |
| June | 59 | 33 | 42.7 | .193 | .22 | 2,540 | B. |
| July | 40 | 27 | 31.1 | .141 | .16 | 1,910 | B. |
| August | 29 | 25 | 26.0 | .118 | .14 | 1,600 | B. |
| September | 29 | 25 | 26.5 | .120 | .13 | 1,580 | B. |
| October | 29 | 25 | 26.8 | .121 | .14 | 1,650 | B. |
| November | 814 | 25 | 135 | .611 | .68 | 8,030 | B. |
| December | 74 | ..... | 41.2 | .186 | .21 | 2,530 | C. |
| The year | 814 | ..... | 76.9 | .348 | 4.73 | 55,600 | |

### BEAR CREEK NEAR SILVER LAKE, OREG.

The station on Bear Creek (locally known as Buck Creek), was first established January 21, 1905. It was abandoned on July 21, 1906, but observations were again resumed January 11, 1909. It is located 3 miles southwest of Silver Lake post-office, at the county highway bridge.

The conditions at this station are not favorable for good results. Above the station a diversion dam has been constructed, and below it several brush dams are put in each year for the purpose of diverting water in small ditches or for flooding hay lands. These artificial conditions affect the height of the water, creating back-water influence on the gage, and for this reason it has been impossible to make reliable estimates of discharge.

The results at the station are chiefly of local interest. The waters of the stream are appropriated during the summer months for irrigation, and there has been considerable litigation over them.

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

April 28, 1909: Width, 34 feet; area, 83.4 square feet; gage height, 5.79 feet; discharge, 39.7 second-feet.

*Daily gage height, in feet, of Bear Creek near Silver Lake, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 4.6 | 4.1 | 4.4 | 5.7 | 6.1 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 2 | ..... | 4.4 | 4.1 | 4.4 | 5.7 | 6.3 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 3 | ..... | 6.1 | 4.2 | 4.5 | 5.7 | 6.3 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 4 | ..... | 4.8 | 4.3 | 4.6 | 5.8 | 6.3 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 5 | ..... | 4.5 | 4.0 | 4.5 | 5.9 | 6.3 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 6 | ..... | 4.2 | 4.1 | 4.5 | 5.9 | 6.3 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 7 | ..... | 4.3 | 4.1 | 4.4 | 5.9 | 6.2 | 5.9 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 8 | ..... | 4.3 | 4.2 | 4.3 | 5.9 | 6.1 | 5.8 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 9 | ..... | 4.2 | 4.0 | 4.3 | 5.9 | 6.1 | 5.8 | 3.9 | 3.8 | 3.8 | 3.9 | 4.7 |
| 10 | ..... | 4.2 | 4.0 | 4.5 | 5.9 | 6.1 | 5.8 | 3.9 | 3.8 | 3.8 | 3.9 | 4.6 |
| 11 | ..... | 4.3 | 4.0 | 4.6 | 5.9 | 6.1 | 5.8 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 12 | 3.9 | 4.3 | 4.0 | 4.6 | 5.9 | 6.1 | 5.8 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 13 | 3.9 | 4.3 | 4.0 | 4.6 | 5.8 | 6.2 | 5.7 | 3.9 | 3.8 | 3.8 | 3.9 | 4.4 |
| 14 | 3.9 | 4.2 | 4.0 | 4.7 | 5.8 | 6.2 | 5.7 | 3.9 | 3.8 | 3.8 | 3.9 | 4.2 |
| 15 | 4.2 | 4.2 | 4.6 | 4.7 | 5.8 | 6.2 | 5.7 | 3.8 | 3.8 | 3.8 | 3.9 | 4.0 |
| 16 | 4.7 | 5.3 | 4.6 | 4.7 | 5.8 | 6.2 | 5.7 | 3.8 | 3.8 | 3.8 | 3.9 | 4.0 |
| 17 | 5.2 | 7.5 | 4.6 | 5.9 | 5.9 | 6.2 | 5.7 | 3.8 | 3.8 | 3.8 | 4.0 | 4.0 |
| 18 | 6.0 | 5.9 | 4.1 | 5.8 | 5.9 | 6.2 | 4.3 | 3.8 | 3.8 | 3.8 | 4.0 | 4.0 |
| 19 | 5.7 | 4.9 | 4.0 | 5.8 | 5.9 | 6.2 | 4.2 | 3.8 | 3.8 | 3.8 | 4.0 | 4.2 |
| 20 | 7.6 | 4.5 | 4.0 | 5.8 | 5.9 | 6.2 | 4.1 | 3.8 | 3.8 | 3.8 | 4.3 | 4.2 |
| 21 | 8.0 | 4.0 | 4.0 | 5.7 | 5.9 | 6.2 | 4.1 | 3.8 | 3.8 | 3.8 | 4.5 | 4.2 |
| 22 | 6.2 | 4.0 | 4.0 | 5.7 | 5.9 | 6.0 | 4.1 | 3.8 | 3.8 | 3.8 | 5.0 | 4.2 |
| 23 | 6 4 | 3.9 | 4.0 | 5.7 | 5.9 | 6.0 | 4.1 | 3.8 | 3.8 | 3.8 | 8.4 | 4.2 |
| 24 | 5.6 | 4.1 | 4.0 | 5.7 | 5.9 | 6.0 | 4.1 | 3.8 | 3.8 | 3.9 | 7.1 | 4.2 |
| 25 | 4.9 | 3.8 | 4.4 | 5.7 | 5.9 | 6.0 | 4.0 | 3.8 | 3.8 | 3.9 | 6.1 | 4.2 |
| 26 | 4.6 | 4.0 | 4.4 | 5.8 | 6.0 | 6.0 | 4.0 | 3.8 | 3.8 | 3.9 | 5.4 | 4.3 |
| 27 | 4.2 | 4.1 | 4.3 | 5.8 | 6.0 | 6.0 | 4.0 | 3.8 | 3.8 | 3.9 | 5.0 | 4.3 |
| 28 | 4.6 | 4.0 | 4.4 | 5.8 | 6.0 | 5.9 | 4.0 | 3.8 | 3.8 | 3.9 | 4.9 | 4.4 |
| 29 | 4.2 | ..... | 4.6 | 5.7 | 6.0 | 5.9 | 4.0 | 3.8 | 3.8 | 3.9 | 4.7 | 4.5 |
| 30 | 4.1 | ..... | 4.4 | 5.7 | 6.0 | 5.9 | 4.0 | 3.8 | 3.8 | 3.9 | 4.6 | 4.5 |
| 31 | 4.4 | ..... | 4.2 | ..... | 6.1 | ..... | 4.0 | 3.8 | ..... | 3.9 | ..... | 4.5 |

## GOOSE LAKE DRAINAGE BASIN.

### DESCRIPTION.

Goose Lake lies partly in Oregon and partly in California. It has a total surface area of 190 square miles at an elevation of 4,750 feet. The lower two-thirds of the lake surface is in California, but the greater portion of the agricultural lands bordering it are in Oregon, at its northern end and along both sides. Immediately along the northern edge of the lake are considerable areas of marsh hay lands, but farther north the valley is an unreclaimed sagebrush desert except for a few homesteads which have recently been taken.

The water of Goose Lake is slightly alkaline, though considerably less so than that of other lakes in the vicinity. This is accounted for by the fact that the lake has overflowed into Pit River in comparatively recent times, the last overflow having occurred about 1862. The lower end of the lake is also bordered by lava beds, through which some water may be lost by percolation.

Drews Creek, Cottonwood Creek, and Thomas Creek, the principal streams flowing into this basin, drain the southeast slope of a high timbered ridge near the southern corner of Lake County. The water of Drews Creek is at present being utilized by the Oregon Valley Land Company for the reclamation of 40,000 acres of land in the Goose Lake Valley. A storage reservoir of 60,000 acre-feet capacity is being constructed on Drews Creek about 5 miles above the mouth of the river canyon. From this reservoir an irrigation ditch has been constructed which carries water along the borders of the valley, both north and south of Drews Creek. A northern branch wastes into Thomas Creek near the city of Lakeview. There is also a good storage site on Cottonwood Creek which undoubtedly will be utilized in the near future. The flow of Drews and Cottonwood creeks is well maintained throughout the year.

The following gaging station has been maintained in this basin: Cottonwood Creek, near Lakeview, Oreg., 1908–9.

### COTTONWOOD CREEK NEAR LAKEVIEW, OREG.

This station was first established November 22, 1908, at a proposed site for a storage dam in sec. 29, T. 38 S., R. 19 E., and about 10 miles west of Lakeview. On November 22 a trapezoidal weir was installed and a gage placed above it as an index to the head. The length of the weir was 10 feet. On January 19, 1909, the length of the weir was increased to 15 feet. During high stages there is considerable velocity of approach, and corrections therefor have been made.

On January 19 a footbridge was installed about 1,000 feet below the weir. An inclined gage was set on the left bank, and measurements were made by current meter from the bridge, as the weir had been so damaged by a flood that a certain amount of leakage developed in the abutments. This damage, however, was shortly repaired, but no estimates are possible with the data collected.

At the gaging station there is a small channel to the right which carries water at high stages. Both banks are wooded and overflow at flood times.

The results obtained at this station will be valuable in connection with the proposed irrigation of lands in Goose Lake valley. A dam at the proposed site will develop about 30,000 acre-feet storage. These waters used in connection with those of Drews Creek will be sufficient to irrigate 60,000 acres of land.

The station is maintained in cooperation with the Oregon Valley Land Company, which has furnished the weir data and gage heights.

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

May 7, 1909: Width, 26 feet; area, 41 square feet; gage height, 1.88 feet; discharge, 118 second-feet.

*Daily gage height, in feet, of Cottonwood Creek near Lakeview, Oreg., for 1909.*

| Day. | Jan. | Feb. | Mar. | Apr. | May. | June. | July. | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ..... | 0.60 | 0.79 | 1.75 | 1.65 | 1.65 | 0.72 | 0.32 | ..... | 0.20 | 0.25 | 0.85 |
| 2 | ..... | .60 | .89 | 1.80 | 1.80 | 1.80 | .72 | ..... | ..... | .20 | .25 | .80 |
| 3 | ..... | ..... | 1.38 | 1.68 | 2.00 | 1.85 | .72 | ..... | ..... | .25 | .30 | .85 |
| 4 | ..... | .60 | 1.30 | 1.41 | 2.20 | 1.85 | .68 | .30 | 0.15 | .22 | .25 | 1.10 |
| 5 | ..... | .60 | .96 | 1.40 | 2.25 | 1.82 | .65 | ..... | ..... | .20 | .25 | 1.00 |
| 6 | ..... | .60 | .82 | 1.48 | 1.95 | 1.70 | .65 | ..... | .15 | .18 | .25 | .90 |
| 7 | ..... | .55 | .83 | 1.40 | 1.88 | 1.52 | .70 | ..... | ..... | .18 | .25 | .80 |
| 8 | ..... | .52 | .72 | 1.45 | 1.80 | 1.52 | .62 | .25 | ..... | .18 | .22 | .75 |
| 9 | ..... | .48 | .65 | 1.60 | 1.85 | 1.42 | .62 | .25 | ..... | .15 | .25 | .75 |
| 10 | ..... | .50 | .66 | 1.48 | 1.75 | 1.35 | .62 | .25 | ..... | .15 | .25 | .70 |
| 11 | ..... | .50 | .65 | 1.65 | 1.60 | 1.30 | .60 | .22 | .10 | .15 | .35 | .65 |
| 12 | ..... | .55 | .62 | 1.65 | 1.55 | 1.30 | .55 | .20 | .12 | .12 | .35 | .65 |
| 13 | ..... | .64 | .80 | 2.00 | 1.50 | 1.22 | .50 | .20 | .12 | .15 | .35 | .62 |
| 14 | ..... | .55 | 1.12 | 2.00 | 1.45 | 1.25 | .52 | .20 | .12 | .20 | .60 | .45 |
| 15 | ..... | .58 | 1.42 | 1.92 | 1.45 | 1.20 | .50 | .20 | .12 | .20 | .78 | ..... |
| 16 | ..... | .82 | 1.54 | ..... | 1.45 | 1.22 | .48 | ..... | .12 | .18 | .88 | .55 |
| 17 | ..... | ..... | 1.49 | 2.10 | 1.42 | 1.20 | .48 | ..... | .12 | .18 | .50 | .52 |
| 18 | ..... | 1.22 | 1.26 | 2.05 | 1.40 | 1.15 | .45 | .18 | .10 | .15 | .52 | .50 |
| 19 | 2.50 | 1.12 | 1.15 | 1.90 | 1.38 | 1.28 | .45 | ..... | .10 | ..... | .70 | .50 |
| 20 | 2.98 | 1.00 | 1.05 | 1.80 | 1.42 | 1.20 | .42 | ..... | .10 | ..... | 1.90 | .52 |
| 21 | 3.10 | .75 | 1.05 | 1.72 | 1.40 | 1.10 | .40 | ..... | .12 | ..... | 2.00 | .60 |
| 22 | 2.12 | 1.02 | 1.02 | 1.72 | 1.40 | 1.00 | .42 | .15 | .15 | ..... | 2.00 | .65 |
| 23 | 1.62 | .85 | .92 | 1.68 | 1.38 | .98 | .40 | ..... | .15 | ..... | 3.40 | .68 |
| 24 | 1.41 | .62 | .96 | 1.65 | ..... | .90 | .38 | ..... | .15 | .15 | 3.00 | .70 |
| 25 | 1.18 | .59 | 1.06 | 1.72 | 1.40 | .88 | .40 | .15 | .20 | .15 | 1.60 | .75 |
| 26 | 1.08 | .65 | 1.16 | 2.00 | 1.40 | .82 | .40 | ..... | .20 | .15 | 1.20 | .70 |
| 27 | 1.10 | .65 | 1.20 | 2.08 | 1.60 | .80 | ..... | ..... | .20 | .15 | 1.00 | .70 |
| 28 | 1.22 | .66 | 1.28 | 1.90 | 1.60 | .80 | .35 | ..... | .22 | .20 | .90 | .60 |
| 29 | 1.65 | ..... | 1.22 | 1.80 | 1.50 | .82 | .35 | .15 | .22 | .20 | .90 | .55 |
| 30 | 1.50 | ..... | 1.22 | 1.75 | 1.42 | .80 | .32 | ..... | .22 | .22 | ..... | .50 |
| 31 | 1.00 | ..... | 1.55 | ..... | 1.40 | ..... | .32 | .15 | ..... | .22 | ..... | .90 |

## MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements were made in the Great Basin drainage area during 1909:

*Miscellaneous measurements in Great Basin drainage area in 1909.*

### SPANISH FORK BASIN.

| Date. | Stream. | Tributary to— | Locality. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | | | *Feet.* | *Sec.-ft.* |
| July 2 | Salem Canal | Spanish Fork | U. S. R. S. power house near Spanish Fork, Utah. | 2.50 | 41.9 |
| Do. | do | do | do | 2.17 | 33.3 |
| Do. | do | do | do | 1.88 | 29.6 |
| Do. | do | do | do | 1.40 | 21.2 |
| Do. | do | do | do | .80 | 12.2 |

### TRUCKEE RIVER BASIN.[a]

| Stream. | Tributary to— | Discharge. |
|---|---|---|
| | | *Sec.-ft.* |
| Ward Creek | Lake Tahoe | 136 |
| Blackwood Creek | do | 193 |
| Madden Creek | do | 38 |
| Three small streams between Madden and McKinney creeks | do | 19 |
| McKinney Creek | do | 29 |
| General Creek | do | 44 |
| Meeks Creek | do | [b] 50 |
| Three small streams between Meeks and Eagle creeks | do | [b] 35 |
| Eagle Creek | do | 128 |
| Cascade Creek | do | 69 |
| Taylor Creek | do | 200 |
| Upper Truckee River | do | 350 |
| Trout Creek | do | 172 |
| Stream between Trout Creek and Glenbrook Bay | do | [b] 5 |
| Two streams flowing into Glenbrook Bay | do | 5 |
| Streams between Glenbrook Bay and Tahoe outlet | do | [b] 40 |
| Total | | 1,513 |

[a] Measurements by S. Cox and L. Jorgensen, June 25–27, 1909. [b] Discharge estimated.

### GREAT BASIN DRAINAGE IN OREGON.

| Date. | Stream. | Tributary to— | Locality. | Gage height. | Discharge. |
|---|---|---|---|---|---|
| | | | | *Feet.* | *Sec.-ft.* |
| Jan. 26 | Donner und Blitzen River. | Malheur Lake | Narrows, Oreg | [a] 3.6 | 285 |
| Mar. 25 | do | do | do | [a] 3.9 | 91 |
| May 11 | Twentymile Creek | Warner Lake | Warner Lake | [a] 5.75 | 84 |
| May 15 | Schoolhouse Creek | Chewaucan River | Paisley, Oreg | [b] 0.42 | 5.4 |
| Apr. 28 | Bridge Creek | Silver Lake | Silver Lake, Oreg | 2.8 | 20 |
| May 8 | Thomas Creek | Goose Lake | Lakeview, Oreg | [c] 2.0 | 90 |

[a] Water surface below reference point.
[b] Mean stage.
[c] Water surface below nail in fence post left bank at Forks.

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