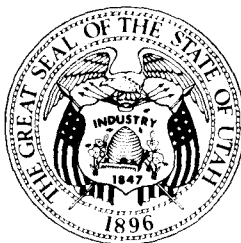


**STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES**

**Technical Publication No. 20**



**EXTENSIONS OF STREAMFLOW RECORDS IN UTAH**

**by**

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U. S. Geological Survey**

**Prepared by the U. S. Geological Survey  
in cooperation with the  
Utah Department of Natural Resources  
Division of Water Rights**

**1968**



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## DEFINITION OF TERMS

The terms relating to streamflow and statistics that are used in this report are defined as follows:

**Acre-foot**—The quantity of water required to cover 1 acre to a depth of 1 foot, and is equivalent to 43,560 cubic feet. Acre-feet per month is converted to mean daily flow in cubic feet per second by dividing by 1.98 and by the number of days in the month.

**Coefficient of correlation (r)**—A mathematical expression of the degree of association of two variables. The value of the coefficient ranges from 0 for no correlation to 1.00 for a perfect correlation. A plus sign usually is assigned if the line of regression slopes upward and a minus sign if it slopes downward.

**Correlation**—A process by which the degree of association between variables is defined.

**Correlation line (curve)**—A line (curve) of best fit through the points of a scatter diagram. The line is termed a regression line when used to estimate one variable on the basis of another, and a line of relation when it is drawn through the average tendency of the points.

**Cubic foot per second (cfs)**—The rate of discharge of a stream whose channel is 1 square foot in cross-sectional area and whose average velocity is 1 foot per second. It is equal to 1.98 acre-feet per day.

**Discharge**—The flow of water in a channel or from an opening. See Runoff and Streamflow.

**Drainage area**—That area, measured on a horizontal plane, which is so enclosed by a topographic divide that direct surface runoff from precipitation would normally drain by gravity into the stream above the specified point. Figures of drainage area given include all closed basins or usually noncontributing areas unless otherwise stated.

**Estimate (Y)**—The line of regression value corresponding to a given value of X.

**Equal-yield line**—A line of relation (45 degrees on logarithmic coordinate paper) between the flows at two stations, based on the assumption that the runoff at each station is directly proportional to its respective drainage area.

**Gaging station**—A particular site on a stream where continuous or periodic observations of a measurable parameter are obtained.

**Item**—See population.

**Latitude**—The angular distance of arc north or south of the equator measured in degrees.

**Log unit**—One cycle on logarithmic paper. Log units less than unity indicate the proportionate part of a cycle. For example, one-tenth of the length of a cycle is 0.10 log unit.

**Longitude**—The angular distance of arc in degrees of a great circle meridian through the point of determination measured west from the base meridian through Greenwich, England.

**Normal distribution**—A bell-shaped probability curve having the mean and median made equal. In such a distribution, 68.3 percent of the items lie within one standard deviation of the mean, 95.4 percent lie within two standard deviations, and 99.7 percent lie within three standard deviations of the mean.

**Population**—The total number of items having a common measurable characteristic such as a series of items of monthly flows of the entire life of a stream unaffected by changes in regulation or diversion. A 30-year record of monthly flows at a gaging station is a sample from the population or history of a stream, whereas one monthly runoff value is an item of data.

**Primary station**—A long-term streamflow gaging station that will be operated for an indefinite period to obtain a long-term record of discharge from an area (areal primary station) or at a site on a stream (mainstream primary station). An areal primary station must be an integral part of the areal hydrologic network and must provide records which are representative of flow from a significant area. Insofar as possible the flow at an areal station should be free from past and future regulation, diversion, or other developments affecting natural streamflow. The flow of a mainstream primary station, however, may be considerably affected by regulation or diversion because it serves as a record of flow at one site on the stream only and as an index of flow upstream or downstream.

**Range**—A series of townships aligned in a north-south direction and measured consecutively east or west from a principal meridian. See Township.

**Regression**—An expression of the distribution of one variable when another is held fixed at any of several different levels.

**Runoff**—That part of precipitation that appears in surface streams that shows no regulation or diversion. See Discharge and Streamflow.

**Sample**—See Population.

**Scatter diagram**—A group of points obtained by plotting one variable against another.

**Secondary station**—A short-term streamflow gaging station where streamflow information is desired or likely to be needed. The length of record depends on the number of years necessary to define a correlation with a nearby primary station. The areal and mainstream secondary stations should meet the same individual requirements as the primary stations.

**Section**—The unit of subdivision of a township; normally a quadrangle 1 mile square, with boundaries conforming to meridians and parallels within established limits, and usually containing 640 acres.

**Streamflow**—The discharge that occurs in a natural channel that may or may not have regulation or diversion. See Discharge and Runoff.

**Standard deviation (S)**—A measure of the scatter of the sample about its arithmetic mean and is sometimes called the root mean square of the deviations. Subscripts are used to identify the axis of the variable.

**Standard error of estimate (Se)**—A measure of the spread in a scatter diagram of the points about the line of relation. If the distribution of the scatter is normal, lines drawn a vertical distance equal to one standard error of estimate above and below the correlation line, and parallel to it, will encompass about two-thirds of the plotted points. It is similar to the standard deviation except that the curve of relation takes the place of the arithmetic mean.

**Standard error of graph (curve)**—A measure of the reliability of the graph. Both the position and the slope of the line of relation may be in error. Standard error of graph plots as bell-shaped curves about the line of relation more distant from the line as the extreme values of the items are approached.

**Standard error of forecast**—A measure of the reliability of estimates as read from the graph. This measure combines both the standard error of estimate and the standard error of graph.

**Township**—A unit of survey of the public lands of the United States. Normally a quadrangle approximately 6 miles on a side with boundaries conforming to meridians and parallels within established limits, containing 36 sections, each approximately 1 mile square, some of which are designed to compensate for the convergence of the east and west township boundary lines or range lines. Townships are numbered consecutively north or south from a base line.

**Water-management station**—A stream-gaging station operated to provide data for design or operation of a particular project. It may, or may not, have hydrologic significance.



# **EXTENSIONS OF STREAMFLOW RECORDS**

## **IN UTAH**

**By J. K. Reid, L. E. Carroon, and G. E. Pyper**

### **ABSTRACT**

This report provides long-term data on streamflow at selected short-term gaging stations in Utah. The records of streamflow at the short-term or secondary gaging stations are extended on the basis of a graphical correlation with concurrent records at long-term or primary gaging stations. The data presented consist of records of runoff at the short-term stations summarized on a monthly and yearly basis; these data include the actual short-term records and the correlative estimates of runoff. Methods and information are included to enable the reader to make further extensions of runoff records.

The standard error of estimate for correlations used is 30 percent or less, and the coefficient of correlation is at least 0.8. Streamflow information is thereby obtained that is believed to be more representative of the long-term runoff than is an actual short-term record.

This study shows that the optimum period of concurrent record needed in Utah for a reliable correlation is about 15-20 years. Extensions of record for low-flow and flood-frequency studies usually cannot be obtained from correlations. Much of this information could be collected economically by converting short-term stream-gaging stations to partial-record stations after a satisfactory correlation with a long-term station has been obtained.

## **INTRODUCTION**

### **Purpose and Scope**

This report is based on a study made from 1964 to 1967 by the U. S. Geological Survey in cooperation with the Utah Department of Natural Resources, Division of Water Rights. The purpose of the study was to provide long-term data on streamflow at selected short-term gaging stations in Utah. These data are needed to solve many water-management problems. The records extended in the study were for 30 stream-gaging stations that have been operated as part of the network (fig. 1) maintained by the Geological Survey in cooperation with Federal, State, and local agencies. The records of 18 other stations were analyzed, but these records were not extended for one or more reasons. The short-term stations for which records were extended included some water-management stations. No extensions of records have been made in the Utah part of the Snake River basin (Part 13 in fig. 1), because no secondary stations have been operated there.

J. K. Reid and G. E. Pyper made the extensions of streamflow records for the Great Basin in Utah specifically for this report. L. E. Carroon made extensions of streamflow records for the entire Colorado River Basin and those for Utah are included in this report. Special acknowledgment is made to M. T. Wilson, past District Chief, U. S. Geological Survey, Salt Lake City, Utah, under whose guidance this project was initiated.

**PART 13**  
**Snake River**  
**Basin**

**EXPLANATION**

- Primary station used in report
- Secondary station used in report
- ⊖ Primary station not used in report
- ⊙ Secondary station not used in report
- ⊕ Water-management station

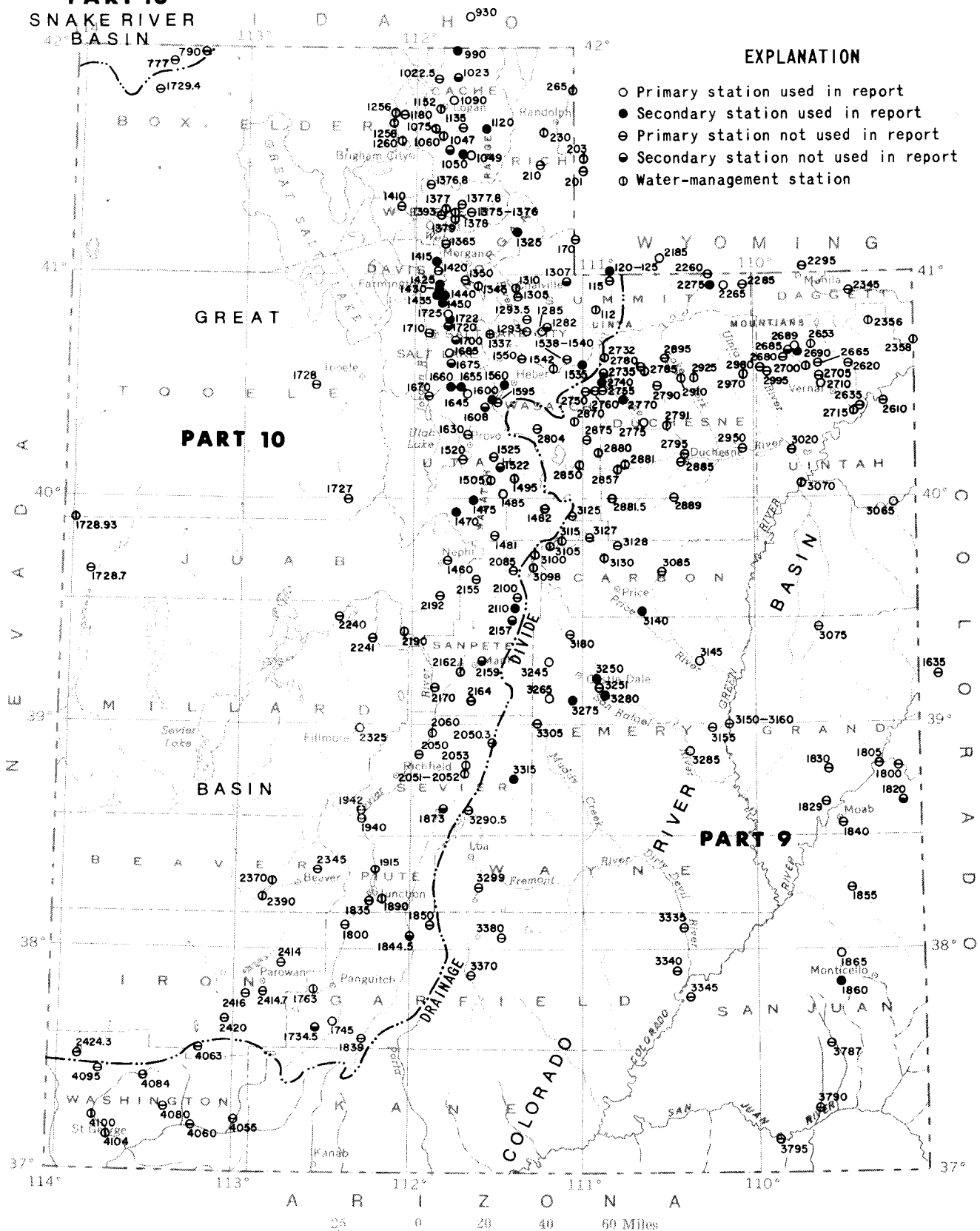


Figure 1.—Map showing locations of streamflow-gaging stations

### **Background of the Study**

The collection of complete streamflow data at all sites where it is, or may be, needed would require such an extensive effort that the cost would be prohibitive. In 1952, a Committee on Stream Gaging Program was appointed within the U. S. Geological Survey to analyze its stream-gaging activities and to determine criteria for a procedure to obtain the maximum amount of streamflow information for the effort expended. The committee reported that much of the needed information could be obtained most efficiently as follows:

1. Establish a network of long-term stream-gaging stations on streams in various homogeneous hydrologic areas. A base station, or primary station, should be located at a site suitable for the collection of representative data for the stream or area, and the record should serve as an index of streamflow.

2. Collect short-term streamflow data at secondary stations for several years. When a secondary station has been operated for a sufficient period to establish correlation with a primary station it should either be converted to a partial-record station or be discontinued. The streamflow data collection equipment should then be moved to another site and the process repeated to increase the areal coverage.

### **Criteria for Inclusion of Records**

The criteria used to select streamflow records for extension and inclusion in this report are:

1. The streamflow is relatively free from the effects of extensive regulation, storage, or diversion.

2. A suitable primary station is available for correlation.

3. The maximum standard error of estimate or the spread of two-thirds of the annual runoff values about the correlation line is less than about 30 percent.

4. The coefficient of correlation is at least 0.8. The significance of such a value is noted by Matalas and Jacobs (1964, p. D1).

For the Utah part of the Colorado River Basin (Part 9 in fig. 1), streamflow records have been extended for those stations that qualify as secondary stations, that have been discontinued since October 1, 1955, and that have 6 or more years of record concurrent with suitable primary stations. Streamflow records also have been extended for those gaging stations that have been discontinued prior to October 1, 1955, and that have 15 or more years of record collected since October 1, 1930. Streamflow data for currently active gaging stations in the Colorado River Basin have not been extended. In the Colorado River Basin, a 35-year base period from October 1930

to September 1965 was chosen as the period of extension for the secondary records. The records for some primary stations, however, were too short to allow extension of the secondary records to full 35-year base period, and in such cases the maximum possible extensions of records are provided. Nearly all the stations used for extension of records were classified as areal secondary and primary. A few of the stations correlated are classified as main stream secondary and primary. Although they are subject to extensive regulation and diversion, it was possible to develop suitable correlations in some cases.

For the Utah part of the Great Basin (Part 10 in fig. 1), streamflow records have been extended for active stations that are, or qualify as, secondary stations and those that have been discontinued since September 30, 1950, and have 6 or more years of record concurrent with a suitable primary station. Records from these stations have been extended to equal the periods of reliable record at the primary stations used for correlation.

### **Data on Streamflow in Utah**

The extensions of streamflow records in Utah are based on data in water-supply papers and State reports prepared by the U. S. Geological Survey. Water-supply papers, entitled "Surface water supply of the United States" were published by the U. S. Geological Survey annually through 1960 and will be published at 5-year intervals thereafter. From 1960 to 1964, surface-water records have been published in a series of annual State reports, entitled "Surface water records of Utah." Since 1965, the annual State reports have been entitled "Water resources data for Utah, Part 1, Surface water records."

Geological Survey water-supply papers containing condensed records of streamflow in Utah have also been published and are entitled "Compilation of records of surface waters of the United States through September 1950" and "Compilation of records of surface waters of the United States, October 1950 to September 1960." The compilation reports pertaining to Utah are as follows:

Area	Part	Water-Supply Paper	Period of Record
Colorado River Basin	9	1313	To September 1950
Colorado River Basin	9	1733	October 1950 to September 1960
Great Basin	10	1314	To September 1950
Great Basin	10	1734	October 1950 to September 1960
Snake River basin	13	1317	To September 1950
Snake River basin	13	1737	October 1950 to September 1960

## **DESCRIPTION OF THE AREA**

### **Physiography and Climate**

The State of Utah consists essentially of two major drainage basins—the Colorado River Basin on the east and the Great Basin on the west (fig. 1). A small part of the northwest corner of the State is in the Snake River basin.

The Colorado River Basin in Utah includes about 46,300 square miles. The altitudes in the basin are below 3,000 feet in the south and over 13,000 feet in the mountains in the northeast. The vegetation varies in type from desert growth in the lowlands to alpine in the highlands. The distribution of plantlife varies with the amount of precipitation and the temperature. Precipitation generally increases with the altitude and is materially affected by the location of mountain barriers, whereas temperature varies inversely with altitude and latitude. The mean annual precipitation varies from about 6 inches in the south to more than 40 inches in the Uinta Mountains.

The Great Basin covers about 38,600 square miles in Utah. Altitudes are below 4,200 feet in the northern Great Salt Lake basin and over 12,000 feet at the western end of the Uinta Mountains. The vegetation is similar to that in the Colorado River Basin and ranges from none in the salt beds and alkaline valleys to alpine in the high mountains. The mean annual precipitation varies from less than 5 inches in the lower parts of the basin to more than 60 inches in the Wasatch Range. Streams in the Utah portion of the Great Basin, an area of internal drainage, drain into Sevier Lake in the south and into the Great Salt Lake in the north.

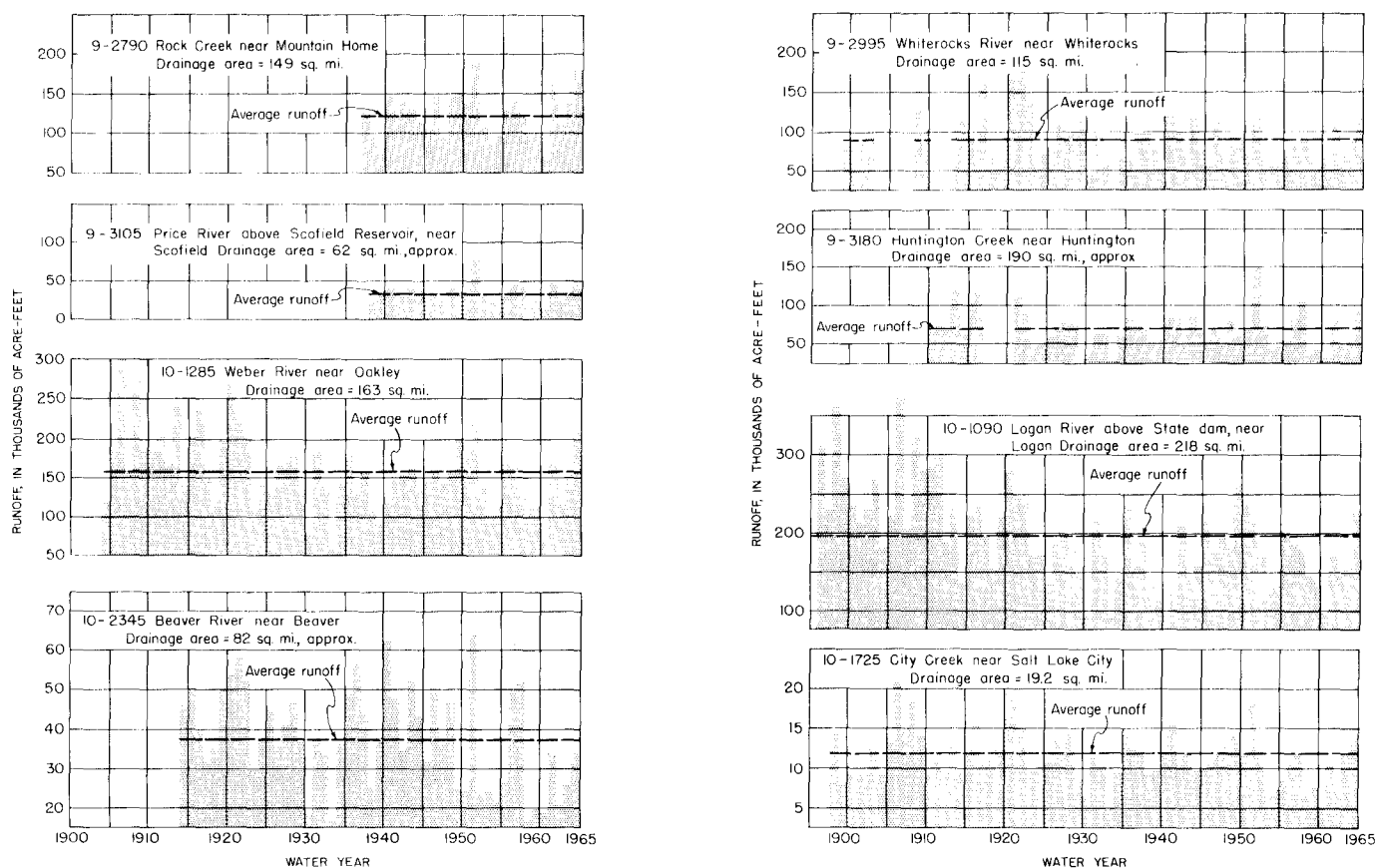
### **Streamflow**

The flow in stream channels throughout Utah fluctuates with changes in precipitation and is affected by vegetative cover, soil, altitude, and geologic conditions. Though precipitation varies widely over the State, streamflow varies even more for seemingly similar drainage areas.

The principal source of streamflow in Utah is snowfall in the mountains. The runoff from snowmelt increases to a peak in late spring or early summer and then decreases during the late summer and fall. Snowfall is usually negligible at lower altitudes in the southern part of the State. Streams rising in those areas derive most of their flow from summer and fall thunderstorms. The duration of such flows usually is from about 1 hour to less than 1 day, and the rates of flow are often large.

The measured mean annual runoff over the State varies from nearly 1,000 acre-feet per square mile from some of the higher snowmelt areas to less than 10 acre-feet per square mile from some of the lower areas. Hydrographs for eight long-term gaging stations showing representative variation in runoff are shown in figure 2.

**Figure 2.—Variation of annual runoff at eight primary gaging stations in Utah.**



## METHOD OF ANALYSIS

### Correlation analysis

A correlation shows the relation between two or more variables. The two variables in this study are runoff at a primary station and runoff at a secondary station. The recorded runoff for the primary station, which is the independent variable, is plotted on a graph on the horizontal (X) axis. The runoff for the secondary station, or the dependent variable for which estimates are desired, is plotted on the vertical (Y) axis. The plotted points generally form a pattern that is called a scatter diagram. A straight line is fitted to the points of a linear correlation, whereas a curved line is fitted to the points of a curvilinear correlation.

A correlation can be developed either by mathematical or by graphical methods. The mathematical correlation is useful when: many points are well distributed throughout the range of the data, the relationships are linear, and there are more than two variables. The graphical correlation is useful when few data are available, when it is necessary to use judgment to fit the relation line to the scatter diagram, and when there are two variables. The data correlated should be homogeneous and have a normal distribution. The graphical method was used to obtain the figures published in this report.

For this study, the runoff data were grouped by months (fig. 3) to attain better homogeneity, as suggested by H. C. Riggs (written commun., 1966). Geologic, orographic, and other drainage-basin differences affecting runoff cause both the position and the slope of the correlation line to change with the time of the year. The correlation methods of Searcy (1960) and Somers (1954) were modified because they assume that all the monthly correlation lines for any given pair of stations are parallel; this assumption is seldom valid in Utah.

The logarithms of runoff values tend to have a normal distribution, and therefore logarithmic transformations have been made directly by plotting the values (variables) on logarithmic coordinate paper. Individual correlations have been developed for each month to obtain the runoff estimates (fig. 3). In some instances the same line of relation applies for more than 1 month.

Data are insufficient in most cases to accurately define the lines of relation. In order to partially compensate for the small amount of data, all of the monthly lines of relation (correlation) for a given pair of station records were superimposed on one graph and judgment was used in fitting them to the scatter diagrams. This procedure maintained consistent changes in line slope and position from month to month as illustrated by the example in figure 4.

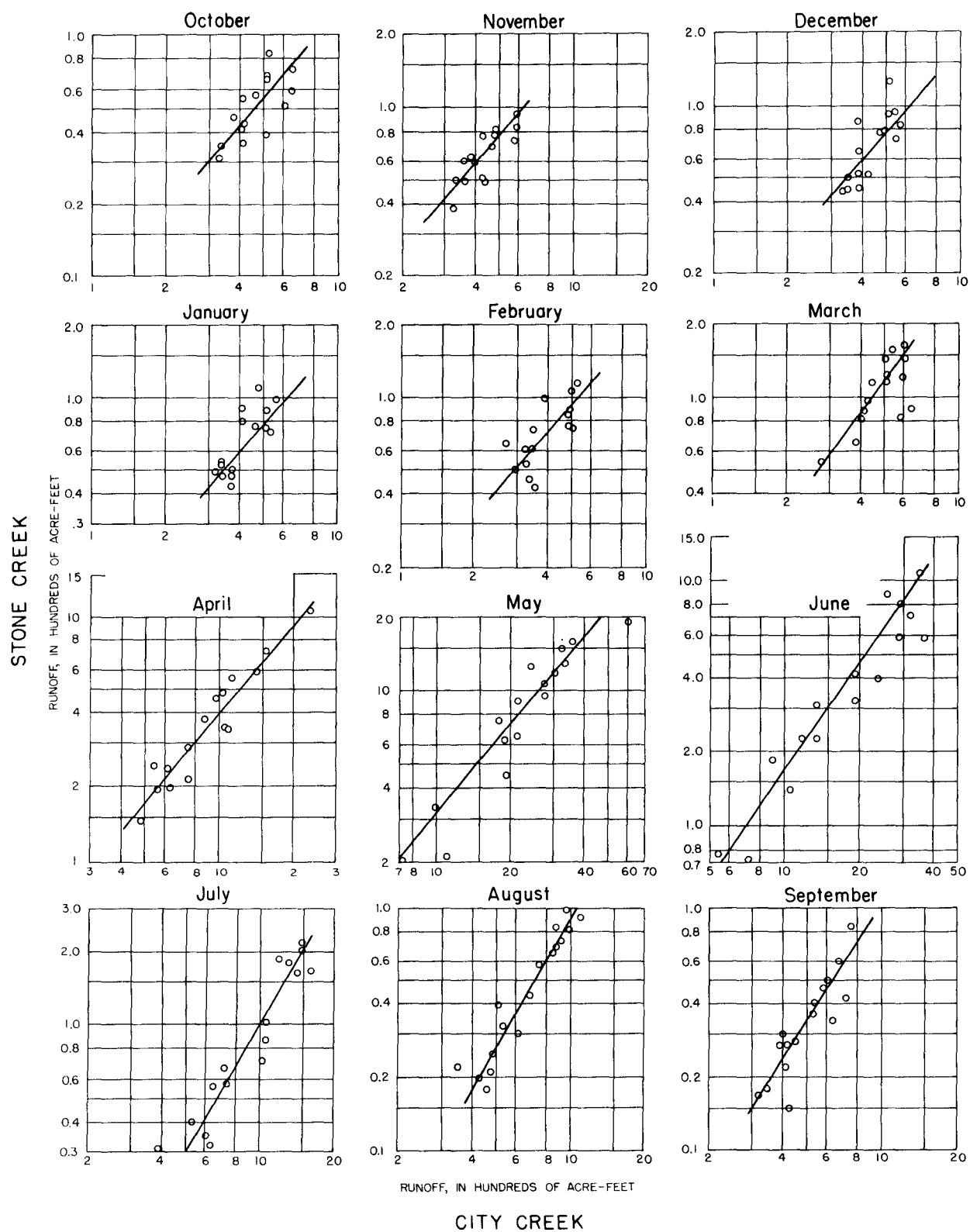
Estimates of monthly runoff for the short-term station were obtained by applying the actual runoff for the long-term primary station to the appropriate relation (regression) lines as illustrated in figure 3.

The annual values for runoff (sum of 12 monthly values) were also correlated. Figure 5 is a sample of these correlations. The estimated annual values were plotted on this graph as a reliability check. The variance of these values is no greater than that of the historic records and the estimates, therefore, appear to be satisfactory.

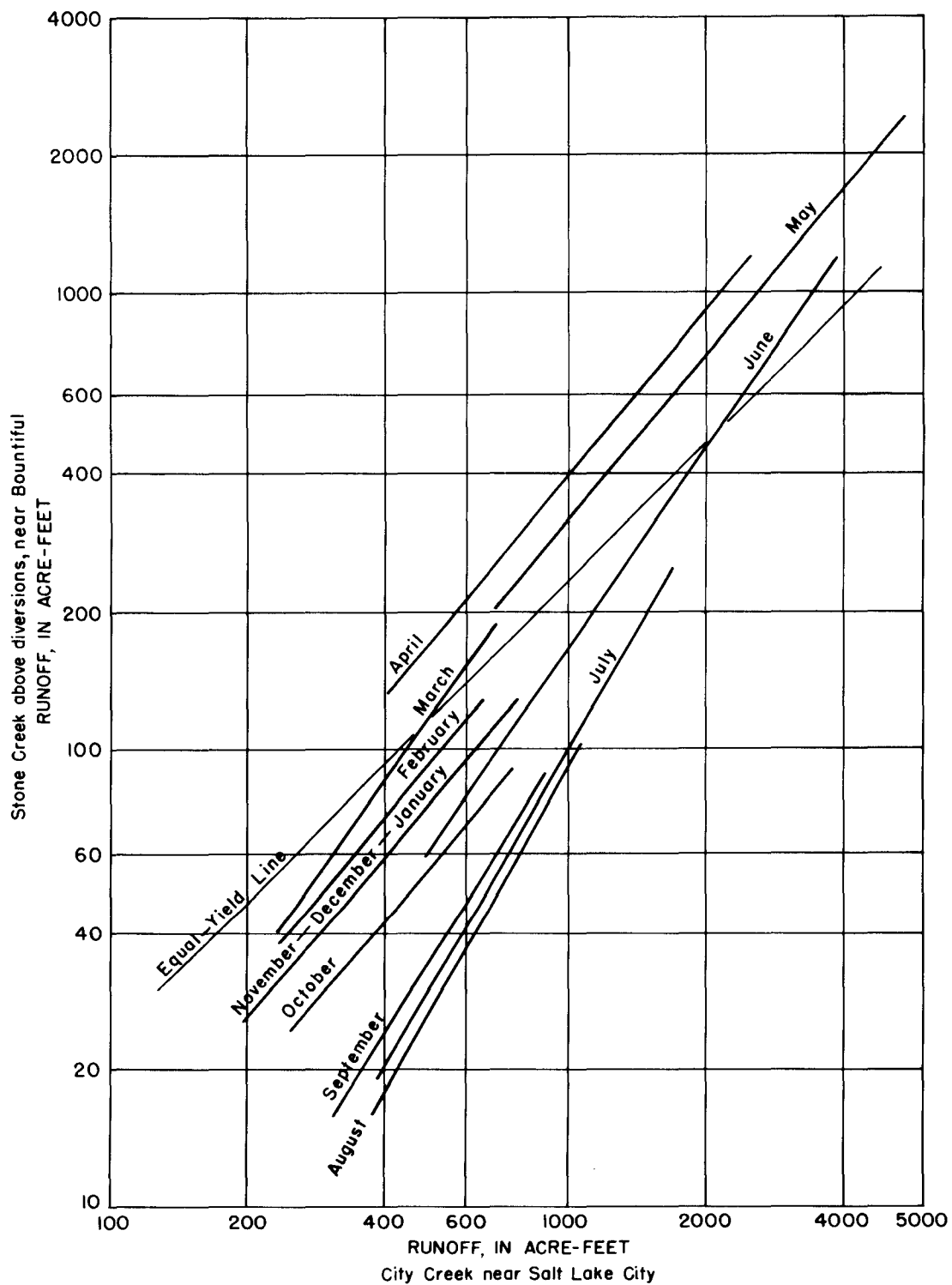
The equal-yield line, plotted in figures 4 and 5, has a 45-degree slope on logarithmic coordinate paper and is the line of equal runoff per square mile. For large flows the individual monthly regression lines should converge on this line.

Because logarithmic transformations of runoff values have been made, the standard deviation and the standard error of estimate are measured in log units. A log unit is one cycle on logarithmic coordinate paper and, thus, values of less than unity indicate a proportionate part of one cycle. The log-unit measurements of the standard error of estimate are changed to percentage of spread about the correlation line by converting the log units to arithmetic values. (See item 8 in this section "Information presented," p. 26)





**Figure 3.--Relation of monthly runoff between Stone Creek above diversions, near Bountiful, and City Creek near Salt Lake City**



**Figure 4.—Relation of correlation lines for monthly runoff between Stone Creek above diversions, near Bountiful, and City Creek near Salt Lake City**

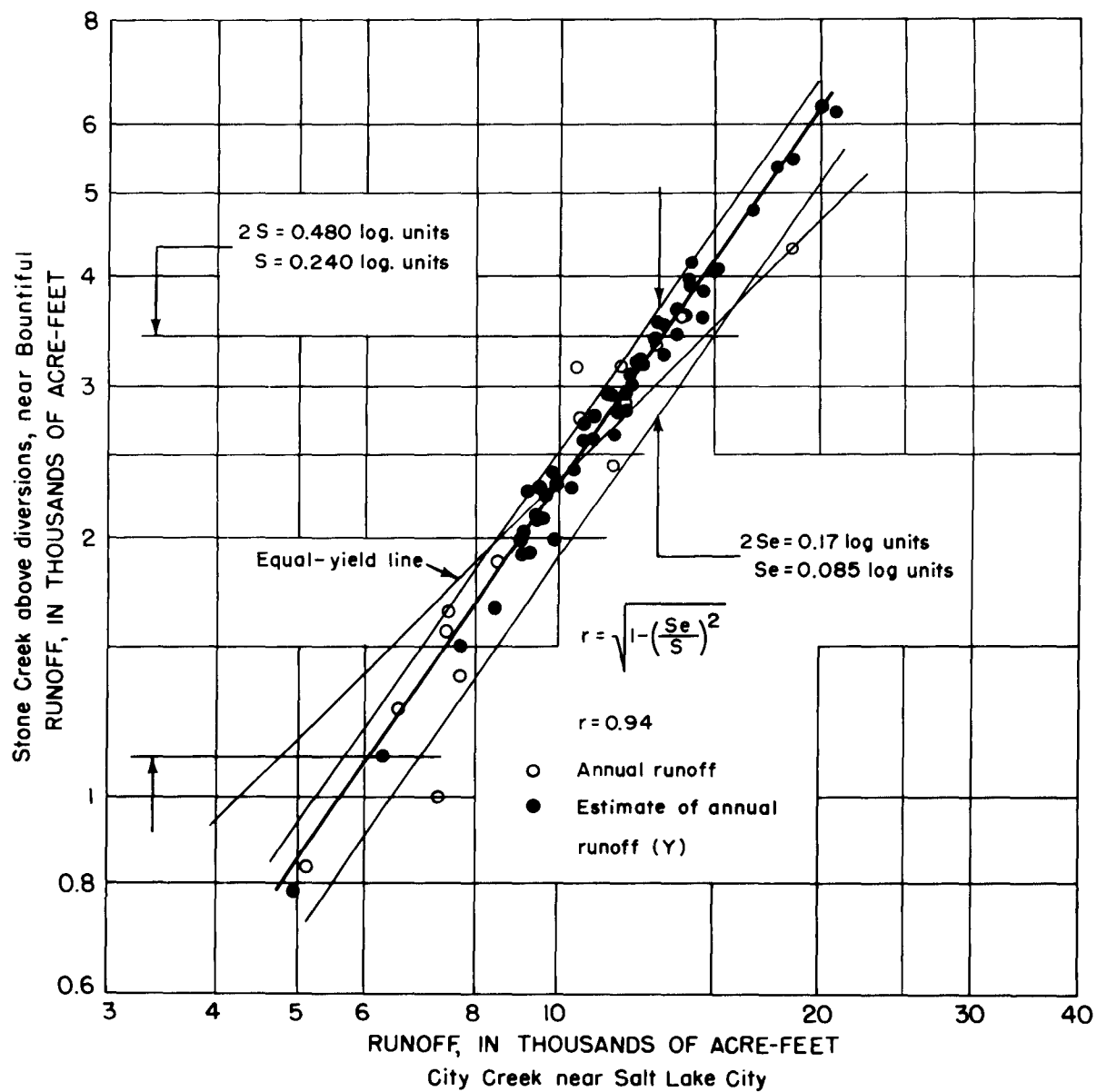


Figure 5.—Correlation of annual runoff values between Stone Creek above diversions, near Bountiful, and City Creek near Salt Lake City.

### **Regression Equations**

Logarithmic-coordinate plots of the concurrent runoff generally result in a straight regression line with the equation

$$\log Y = b \log x - c$$

where,  $Y$  = the estimated monthly runoff, in acre-feet,

at the short-term station corresponding to a

concurrent long-term runoff value.

$X$  = the corresponding monthly runoff, in acre-feet,

at the long-term station.

$b$  = a constant that represents the slope of the

regression line.

$c$  = a constant that represents the intercept of

the regression line on the  $Y$  axis.

In a few instances further transformation of the regression line has been accomplished by subtracting a constant ( $a$ ) in the equations

$$\log (Y-a) = b \log x - c$$

$$\text{or } \log Y = b \log (x-a) - c$$

In a few instances curvilinear relations have been found after runoff values were transformed by log-log plotting; however, these more complex equations have not been determined. Either the equations or graphical regression lines can be used to determine further estimates.

### **Reliability of Estimates**

The quality of a correlation is indicated by the coefficient of correlation which measures the spread of data about the regression line and the range of data about the mean for the secondary stations. The coefficient of correlation is dependent on the standard deviation and the standard error of estimate. Fiering (1963, p. C1, C8, and C9) cautions that the standard deviation, standard error of estimate, and the coefficient of correlation also depend upon the length of original record and the length of the proposed extension and that under certain conditions the parameters based on the extended record will be less reliable than those based on the original record.

The runoff values are seldom distributed uniformly throughout the range of data; they are usually centrally concentrated and sparsely distributed near the extremes, which results in a correlation less accurate near the extremes (fig. 6).

When the standard errors of estimate and of graph are combined, the result is the standard error of forecast (fig. 6). If a correlation is based on a relatively few years of record, or on an irregular distribution of plotted points, not only are the position and slope of the line of relation questionable, but the true standard error of estimate and coefficient of correlation are less accurate than indicated by the computed values (Ezekiel and Fox, 1959, figs. 17.1 and 17.2).

The reliability of estimates can also be influenced by random errors in data. When a value in a graphical correlation is considerably in error it has little effect on the positioning of the line of relation, or on the measurements of correlation quality. On the other hand, a large error in data can have considerable influence on the same factors for a mathematical correlation. The line of relation for a graphical correlation is positioned primarily on the tendency of the central two-thirds of the data forming the scatter diagram, and the correlation measurements minimize or disregard outliers. For a mathematical correlation the slope and position of the correlation line are based on the moments of all the runoff values. Thus, the effects of random errors tend to be exaggerated for such correlations. Outliers in runoff data often represent hydrologic peculiarities or unusual events and should be carefully examined before being discounted.

Graphical correlations provide estimates that are better than those obtained from mathematical correlations for streamflow extensions in Utah, because graphical correlations are adaptable to changes in line slope, curvilinearity, and judgment in placing of the line of relation. Graphical correlations were, therefore, used in this report.

### **ESTIMATES OF RUNOFF THAT WERE NOT USED**

Correlations for some stations were prepared, but were not sufficiently reliable. These stations and the reasons that estimates of runoff were unacceptable are listed in the table on the following page.

### **FURTHER EXTENSIONS OF RECORDS**

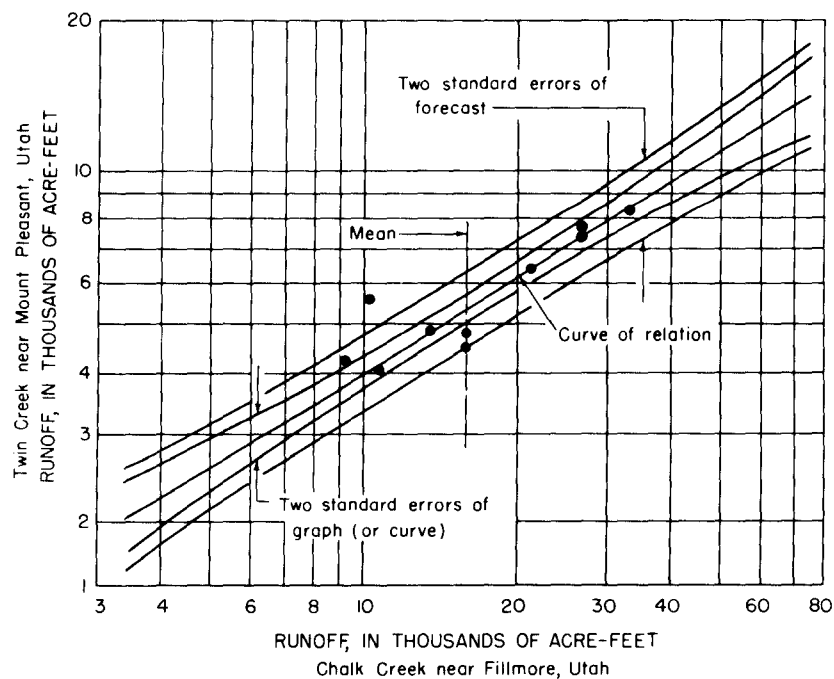
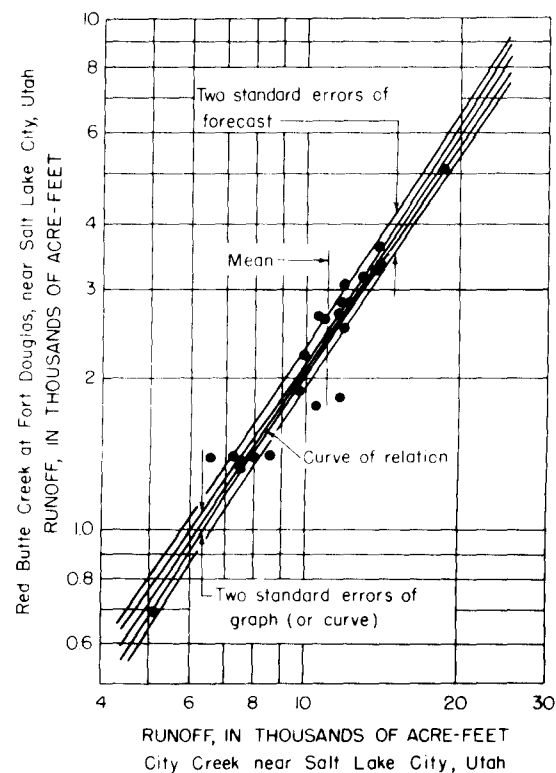
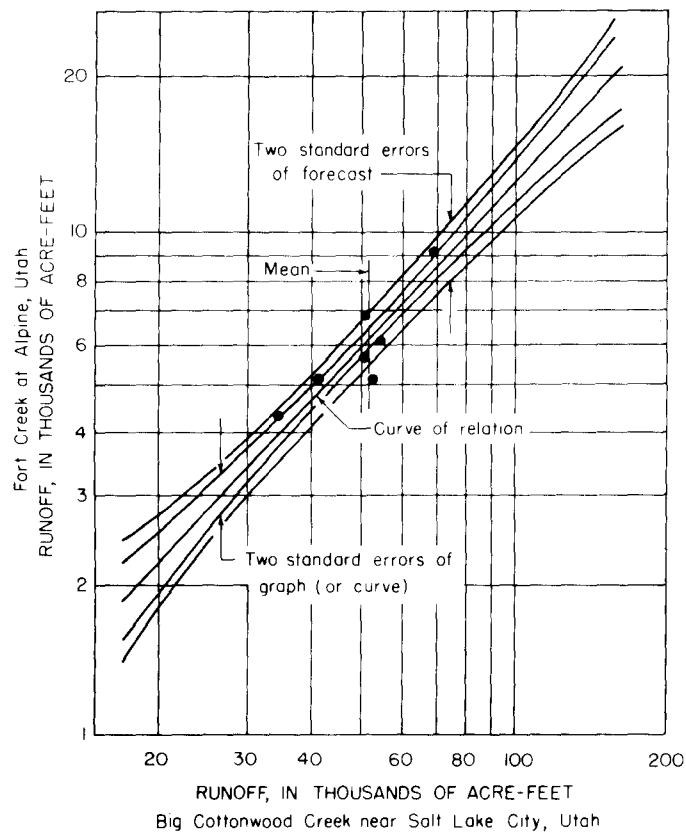
The estimates of runoff in this report were obtained from the graphical line of relation rather than from the equations. The use of either means should give results within the expected accuracy of the methods used.

Both graphical relations and formulas are provided so that additional extensions of runoff can be made by either method as more records from primary stations become available. Additional extensions can also be made using records now available for some stations in the Colorado River Basin for periods prior to 1930.

The graphical correlations of monthly runoff can be used directly to obtain estimates. For example, correlations for the short-term station 10-1722. Red Butte Creek at Fort Douglas, near Salt Lake City are based on the long-term station 10-1725. City Creek near Salt Lake City (see graphs for station 10-1722). An estimate of flow for Red Butte Creek for an assumed future month of May with runoff of 6,070 acre-feet on City Creek may be obtained as follows:

# Estimates of runoff that were not used

Secondary station	Primary station	Period of concurrent record	Standard error of estimate in log units	Coefficient of correlation	Reasons estimates were not used in report
9-1825 Castle Creek near Moab, Utah	9-1775 Taylor Creek near Gateway, Colo.	1950-55, 1957-58	0.44	<0.5	No correlation.
	9-1840 Mill Creek near Moab, Utah	1950-55, 1957-58	.15	<.5	Do.
	9-1865 Indian Creek above Cottonwood Creek, near Monticello, Utah	1950-55, 1957-58	.38	<.5	Do.
9-1830 Courthouse Wash near Moab, Utah	9-1840 Mill Creek near Moab, Utah	1949-55	.17	.7	Do.
	9-1775 Taylor Creek near Gateway, Colo.	1949-55	.44	<.5	Do.
9-1870 Cottonwood Creek near Monticello, Utah	9-1865 Indian Creek above Cottonwood Creek, near Monticello, Utah	1949-57	.22	.3	Poor correlation.
	9-1775 Taylor Creek near Gateway, Colo.	1949-57	.02	.1	Do.
9-1875 Indian Creek above Harts Draw, near Monticello, Utah	9-1865 Indian Creek above Cottonwood Creek, near Monticello, Utah	1949-57	.22	.85	No monthly correlation.
	9-1775 Taylor Creek near Gateway, Colo.	1949-57	.27	.81	Do.
	9-1755 San Miguel River at Naturita, Colo.	1949-57	.21	.88	Do.
9-2270 East Fork Beaver Creek near Lonetree, Wyo.	9-2265 Middle Fork Beaver Creek near Lonetree, Wyo.	1948-62	.15	.5	Poor correlation.
	9-2995 Whiterocks River near Whiterocks, Utah	1948-62	.13	<.5	Do.
	9-2275 West Fork Beaver Creek near Lonetree, Wyo.	1948-62	.16	<.5	Do.
	9-2285 Burnt Fork near Burnt Fork, Wyo.	1948-62	.13	<.5	Do.
	9-2980 Farm Creek near Whiterocks, Utah	1948-62	.23	.5	Do.
9-2330 Carter Creek near Manila, Utah	9-2995 Whiterocks River near Whiterocks, Utah	1948-54	.09	.92	Not enough years of record to fulfill initial criteria.
9-2730 Duchesne River at Provo River Trail, near Hanna, Utah	9-2775 Duchesne River near Tabiona, Utah	1929-33, 1936-53	.05	.91	Most of flow diverted for use in Great Basin after 1953.
9-2960 Uinta River above Clover Creek, near Neola, Utah	9-2995 White Rocks River near Whiterocks, Utah	1945-55	.03	.97	Not enough years of record to fulfill initial criteria.
9-3005 Uinta River at Fort Duchesne, Utah	9-2970 Uinta River near Neola, Utah	1942-58	.18	.83	Many diversions, poor monthly correlation.
	9-3020 Duchesne River near Randlett, Utah	1942-58	.18	.83	
	9-2795 Duchesne River at Duchesne, Utah	1942-58	.28	.78	
9-3295 Fremont River near Fremont, Utah	9-3300 Fremont River near Bicknell, Utah	1949-58	.11	.7	Many diversions Regulated; diversions and storage upstream from station. Do.
	9-3305 Muddy Creek near Emery, Utah	1949-58	.20	<.5	
	9-3375 Escalante River near Escalante, Utah	1949-55	.27	<.5	
9-3325 Muddy Creek below Ivie Creek, near Emery, Utah	9-3305 Muddy Creek near Emery, Utah	1950-61	.31	.84	Not within 25 percent of annual regression line. Do.
	9-3245 Cottonwood Creek near Orangeville, Utah	1950-61	.24	.88	
10-240 Randolph Creek near Randolph, Utah	10-1090 Logan River above State dam, near Logan, Utah	1949-56	.07	.2	Spring flow.
10-240 do	10-115 Bear River near Utah-Wyoming State line	1949-56	.10	0	Do.
10-990 High Creek near Richmond, Utah	10-1090 Logan River above State dam, near Logan, Utah	1944-52	.06	.52	Poor correlation.
10-1585 Round Valley Creek near Wallburg, Utah	10-1285 Weber River near Oakley, Utah	1939-50	.11	.72	Numerous diversions.
10-1615 South Fork Provo River at Vivian Park, Utah	10-1685 Big Cottonwood Creek near Salt Lake City, Utah	1911-62	.06	.70	Numerous diversions; flow by-passing South Fork Provo River station.
10-2415 Center Creek near Parowan, Utah	10-2345 Beaver River near Beaver, Utah	1942-50	.12	.28	No suitable areal primary station.
10-1740 Asay Creek above West Fork, near Hatch, Utah	10-1745 Sevier River at Hatch, Utah	1954-59	.15	.99	Spring flow; only 4 years of concurrent record.



**Figure 6.--Variation of the standard errors of graph and of forecast with the number of runoff items and with the distance from the mean**

1. Using the correlation for May, enter the graph at 6,070 acre-feet on the X axis and proceed vertically to the regression line.

2. Proceed horizontally from this point to the Y axis and read the estimated Red Butte Creek runoff of 1,800 acre-feet for May.

3. Repeat the above procedure for each monthly value available for the long-term station, using the graph for the corresponding month. The annual water-year estimate is the total of the 12 monthly estimates from October through September.

Using the same example, to obtain the estimate from the logarithmic equation (see "Estimates of streamflow" paragraph for station 10-1722),  $\log Y = b \log x - c$ , proceed as follows:

1. For the assumed May discharge of 6,070 acre-feet, the logarithm of X is 3.78319; the values for the constants are  $b = 1.40$  and  $c = 2.03$ .

2. Then,  $\log Y = 1.40 (3.78319) - 2.03 = 5.296 - 2.03 = 3.266$ .

3. The antilog of  $3.266 = Y = 1,840$  acre-feet, which is the estimated runoff for Red Butte Creek for May.

## CONCLUSIONS

The extensions of streamflow records in this study have been applied only to records from secondary stations which meet a rigid set of criteria. The resulting combination of monthly and annual figures for measured and estimated flow appears to more readily represent long-term runoff and variability of flow than does the short-term record of measurements alone. Quality checks of the estimates against correlations of annual values show that the estimates vary no more than does the actual record. The estimates of runoff, therefore, appear to be statistically satisfactory for providing a low-cost extension of streamflow data.

Langbein (1954, p. 19-26) suggests that extensions of streamflow records for some areas may be adequate with as few as 5 years of concurrent record. The results of this study, however, indicate that 5 or even 10 years of record is usually not enough to obtain a reliable correlation in Utah. On the basis of the correlations that have been made in this study, the optimum period that a secondary station should be operated is 15-20 years. The period of concurrent record should be long enough to include high- and low-flow values for each month. It can usually be determined whether a correlation will eventually be acceptable after about 10 years of concurrent record.

All significant information at a gaging-station site cannot be obtained by correlation. The extremes of flow cannot generally be determined by correlation because of variations in local geology, vegetative cover, and precipitation between drainage basins. These data are needed to lengthen the actual record of low flow and flood flow. Such information can be obtained only by continuing to systematically collect low-cost partial records.

Further work is needed to obtain the maximum extensions of streamflow records in Utah. This work includes the following steps:



1. Make further extensions of streamflow records for the Colorado River Basin in Utah by using the same criteria as were used for extending streamflow records for streams in the Great Basin.

2. Update correlative estimates every 10 years. The stream-gaging station records used in this report and those additional ones that qualify should be included in such an updating. The values of long-term mean annual runoff and average discharge should be recomputed, and the possibility of obtaining better correlations at sites where additional records have become available should be explored.

3. Consider the possibility of extending and publishing streamflow records for primary stations with shorter records. Correlations used should have standard errors of estimate smaller than those generally used in this report.

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- Ezekiel, Mordecai, and Fox, K. A., 1959, Methods of correlation and regression analysis: New York, John Wiley & Sons, Inc., 548 p.
- Fiering, M. B., 1963, Use of correlation to improve estimates of the mean and variance: U. S. Geol. Survey Prof. Paper 434-C.
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- Matalas, N. C., and Jacobs, Barbara, 1964, A correlation procedure for augmenting hydrologic data: U. S. Geol. Survey Prof. Paper 434-E.
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- Searcy, J. K., 1960, Graphical correlation of gaging-station records: U. S. Geol. Survey Water-Supply Paper 1541-C.
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## **APPENDIX**

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## **EXPLANATION OF DATA**

### **Downstream Order and Station Number**

The order of listing gaging stations herein is the same as that adopted in the annual series of reports on surface-water supply by the U. S. Geological Survey after the water year 1950. Each station is identified by an index number, the first part of which designates the river basin in which the gaging station is located. The prefix 9 is used to designate the Colorado River Basin, whereas prefix 10 designates the Great Basin (fig. 1). The latter part of the number signifies the downstream order of the station in sequence along the main stem of the stream. All stations on a tributary above a main stream station are listed before that station. If a tributary enters between two main stem stations, it is listed between them. A similar order is followed in listing and numbering stations of first, second, and other ranks of tributaries. To indicate the rank of any tributary on which a gaging station is located and the stream to which it is immediately tributary, each indention in the listing of gaging stations in the table of contents represents one rank. This downstream order and system of indention show which gaging stations are on tributaries between any two stations on a main stem and the rank of the tributary on which each gaging station is situated.

### **Information Presented**

The data for each secondary station in this report consist of a description, tabulations of measured and estimated streamflow (runoff or discharge), and graphs showing the streamflow relation lines.

The description consists of the following:

1. The river basin within which the gaging station is located, followed by the station number and the station name.
2. Location paragraph providing latitude and longitude, township and range, location on the stream, geographic features, distance to the nearest town, and altitude of the gage above sea level. If more than one site was used in the period of record, the location and altitude are that of the last site.
3. Drainage area of the basin above the gage site.
4. Records available paragraph listing the periods of published records for the station at or equivalent to those at the most recent site.
5. Estimates of streamflow paragraph listing the periods of estimated record, primary station(s) on which the estimates were based, regression equation(s) used, and the applicable monthly constants.

6. Average runoff paragraph giving the average of the total years of both actual and estimated flow.

7. Extremes paragraph listing the maximum and minimum discharges for the period of actual record.

8. Remarks paragraph providing information on factors that affect the runoff characteristics of the basin. These factors include regulation, diversion, storage, and utilization of water at or upstream from the station. A history of changes in these factors during the period of record is given when known. A statement on the accuracy of the estimated annual streamflow, based on the spread in percent of the maximum standard error of estimate is given.

The tabulations of measured and estimated streamflow consist of the following:

1. Table of actual monthly and annual (water year) runoff as published in prior reports. The water year is the 12-month period starting October 1 of the preceding calendar year and ending September 30.

2. Table of monthly and annual (water year) estimates of runoff. Monthly runoff values are subject to more individual error than are the annual values.

Graphs, following the tabulated data, show the runoff-relation lines and the concurrent runoff values for the 12 months of the water year.

# COLORADO RIVER BASIN

## TRIBUTARIES BETWEEN DOLORES RIVER AND GREEN RIVER

9-1860. Indian Creek near Monticello, Utah

Location.--Lat 37°50'40", long 109°31'05", in SW¼ sec.4, T.34 S., R.22 E. (unsurveyed), on left bank 1 mile northwest of Indian Creek guard station and 10 miles west of Monticello. Altitude of gage is 8,700 ft (from topographic map).

Drainage area.--4.70 sq mi.

Records available.--October 1949 to September 1957.

Estimates of streamflow.--October 1957 to September 1965, based on relation of monthly runoff to that of 9-1865., Indian Creek above Cottonwood Creek, near Monticello, Utah. The regression equation used is:

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Indian Creek near Monticello, Utah, and X is monthly runoff of Indian Creek above Cottonwood Creek near Monticello, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.49	1.46	1.44	1.44	1.35	1.16	1.02	1.06	1.02	0.91	0.99	0.80
c	1.44	1.47	1.22	1.22	1.11	.71	.28	.40	.24	-.03	.20	-1.02

Average runoff.--16 years (1949-65), 1,913 acre-feet per year (2.64 cfs).

Extremes.--1949-57: Maximum discharge, 122 cfs Aug. 6, 1955, from rating curve extended above 50 cfs on basis of logarithmic plotting; no flow for several days in September, October, and November 1956.

Remarks.--A tunnel diverts water about 1 mile above station (diversion began June 1952) to San Juan River basin for domestic use and irrigation in the vicinity of Blanding. Estimated values of annual runoff are probably accurate within 10 percent.

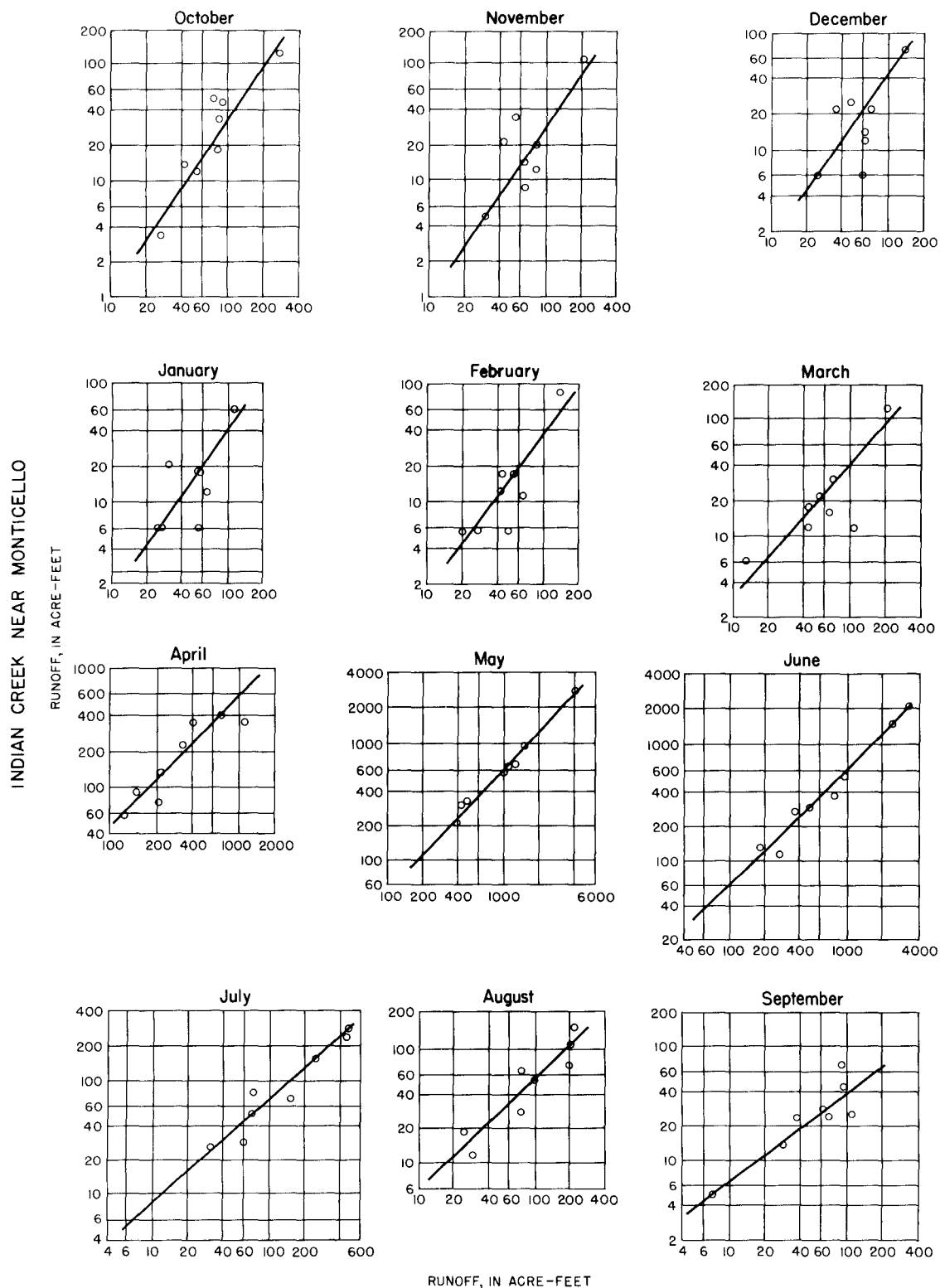
Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	123	104	71	61	83	123	410	638	557	158	67	46	2,440
1951	34	20	22	18	17	22	58	294	278	80	56	71	970
1952	50	34	25	18	17	31	354	2,770	1,580	243	74	25	5,220
1953	19	12	12	12	11	16	133	328	298	51	29	14	935
1954	12	8.5	6.1	6.1	5.6	12	234	663	117	29	12	26	1,130
1955	47	14	14	6.1	5.6	12	356	957	379	71	156	24	2,040
1956	14	21	22	21	12	18	91	212	134	26	19	5.0	595
1957	3.4	4.8	6.1	6.1	5.6	6.1	74	663	2,180	285	112	29	3,380

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1958	80	90	20	30	20	40	460	2,400	890	100	40	40	4,210
1959	20	30	10	10	7	10	70	90	30	6	7	4	294
1960	3	2	4	5	3	20	280	590	430	40	40	20	1,440
1961	50	20	30	10	6	20	200	580	300	40	60	60	1,380
1962	80	40	30	10	30	50	880	920	440	100	10	20	2,610
1963	30	20	20	20	20	50	140	360	80	6	70	70	886
1964	20	20	8	4	4	6	110	360	160	40	40	10	782
1965	7	9	10	10	10	20	110	570	1,000	310	130	100	2,290

**TRIBUTARIES BETWEEN DOLORES RIVER AND GREEN RIVER**  
**Indian Creek near Monticello, Utah.—Continued. Runoff relations**  
**for Indian Creek near Monticello versus Indian Creek above Cottonwood Creek**



GREEN RIVER BASIN

9-2275. West Fork Beaver Creek near Lonetree, Wyo.

Location.--Lat 40°56'50", long 110°13'00", in SW¼ sec. 35, T.3 N., R.15 E., Salt Lake meridian, on right bank at forest boundary, an eighth of a mile upstream from Fellow Creek, 3½ miles south of Utah-Wyoming State line, and 7½ miles southwest of Lonetree. Altitude of gage is 8,700 ft (from topographic map).

Drainage area.--23 sq mi, approximately.

Records available.--October 1948 to September 1962.

Estimates of streamflow.--July 1939 to September 1948, based on relation of monthly runoff to that of 9-2185., Blacks Fork near Millburne, Wyo.; October 1962 to September 1965, based on relation to that of 9-2265., Middle Fork Beaver Creek near Lonetree, Wyo. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of West Fork Beaver Creek near Lonetree, Wyo., and X is monthly runoff of Blacks Fork near Millburne, Wyo., or Middle Fork Beaver Creek near Lonetree, Wyo; b and c are constants for the individual months.

Monthly values for constants in above equation													
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
July 1939	b	1.03	1.03	0.98	0.84	0.87	0.90	0.97	1.10	1.10	1.14	1.04	1.03
to													
Sept. 1948	c	.93	.93	.83	.44	.57	.72	.97	1.53	1.47	1.50	.93	.89
Oct. 1962	b	0.89	1.04	1.02	1.00	1.00	1.07	1.07	0.89	0.84	0.86	0.97	0.99
to													
Sept. 1965	c	-.19	.20	.15	.14	.14	.28	.27	-.22	-.16	-.48	-.04	.05

Average runoff.--26 years (1939-65), 12,380 acre-feet per year (17.1 cfs).

Extremes.--1948-62: Maximum discharge, 417 cfs June 13, 1953, from rating curve extended above 250 cfs on basis of logarithmic plotting; minimum observed, 2.0 cfs Mar. 1, 1954 (discharge measurement).

Remarks.--No diversion above station. Estimated values of annual runoff are probably accurate within 5 percent.

Monthly and annual runoff, in acre-feet													
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1949	373	323	222	160	139	160	442	2,090	5,190	2,490	893	399	12,880
1950	559	439	305	215	167	200	456	1,900	3,460	1,900	781	511	10,890
1951	247	206	201	169	139	154	241	1,670	3,480	2,330	1,330	506	10,670
1952	499	323	246	188	167	263	614	3,680	6,200	3,010	1,550	655	17,400
1953	509	400	246	215	167	246	447	1,110	6,240	1,770	921	337	12,610
1954	277	316	241	154	111	149	423	1,690	1,210	1,210	529	507	6,820
1955	297	234	192	154	139	166	231	1,690	2,740	992	739	451	8,020
1956	374	292	227	215	184	206	374	2,060	2,400	1,070	420	236	8,060
1957	265	184	154	154	128	144	198	1,100	8,030	4,350	1,690	584	16,980
1958	429	285	246	215	167	184	270	3,780	3,270	1,030	757	663	11,300
1959	399	269	219	175	139	170	281	1,390	4,440	1,570	909	546	10,510
1960	534	320	194	174	144	205	377	2,430	4,300	1,290	488	484	10,940
1961	459	280	246	215	167	184	299	2,110	2,750	1,160	1,440	1,630	10,940
1962	1,140	764	389	307	232	221	879	3,080	5,110	2,790	964	524	16,400

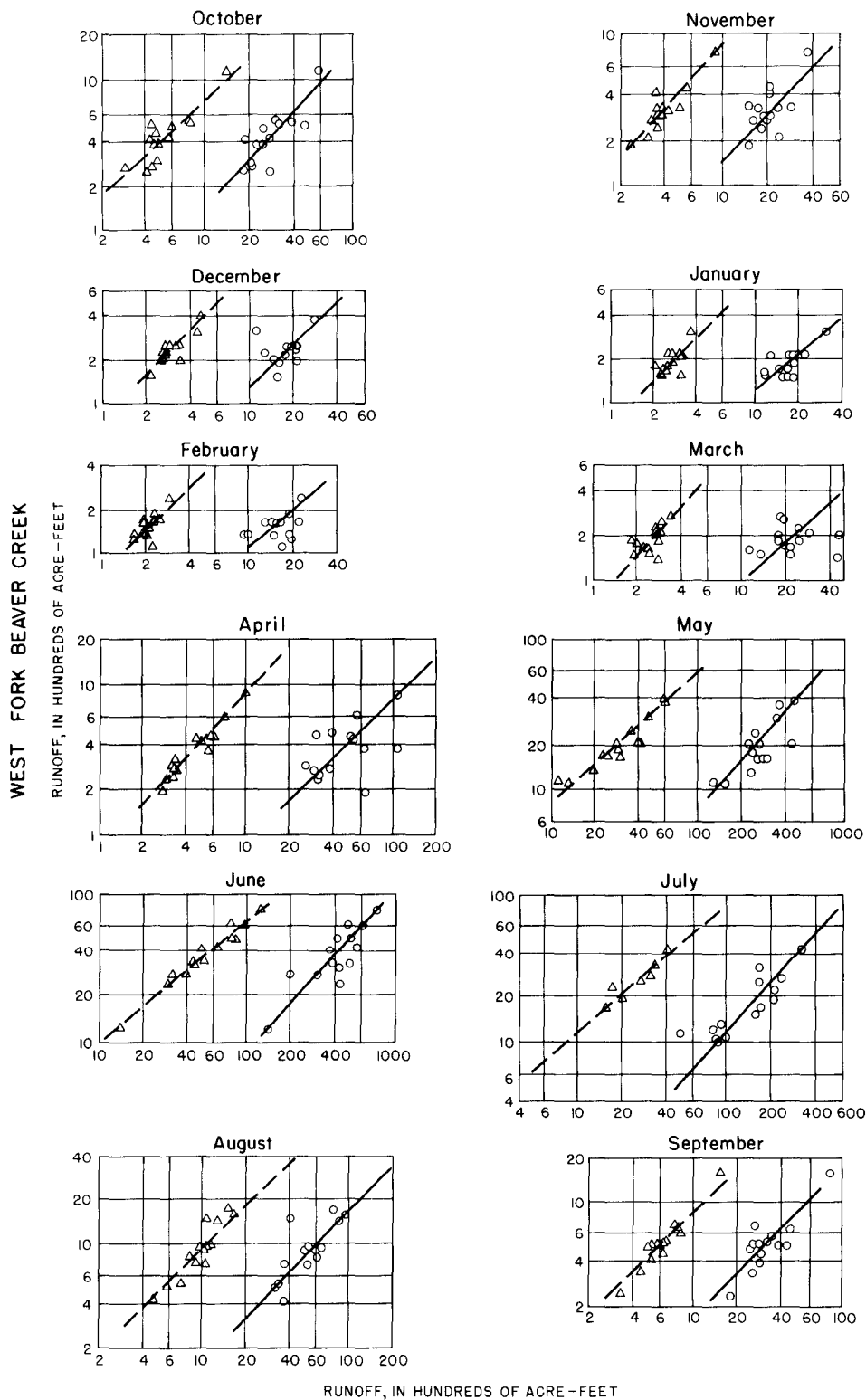
Estimated monthly and annual runoff, in acre-feet													
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1939	-	-	-	-	-	-	-	-	-	+900	570	560	-
1940	430	250	170	150	130	160	370	3,200	1,500	420	330	660	7,770
1941	800	370	260	210	130	160	280	3,400	4,700	2,500	1,300	680	14,790
1942	600	460	+ 350	+ 230	+170	+190	+250	2,300	4,600	2,000	660	440	12,250
1943	360	+ 320	+ 270	+ 210	+160	+260	+1,200	2,600	3,100	2,000	1,000	420	11,900
1944	370	+ 310	+ 240	+ 170	+180	+210	+ 300	+ 2,500	4,600	2,800	800	380	12,860
1945	440	+ 270	+ 160	+ 150	+140	+170	+ 200	1,800	3,700	3,500	1,900	710	13,140
1946	440	400	290	220	170	210	1,400	2,200	2,800	1,100	620	300	10,150
1947	320	280	230	110	110	170	260	3,700	3,900	3,000	1,400	770	14,250
1948	680	470	300	230	180	180	350	3,800	2,800	630	600	370	10,590
1963	430	310	190	150	130	140	190	2,100	2,000	1,400	700	580	8,420
1964	420	340	230	150	140	140	190	3,300	5,800	3,300	1,100	500	15,610
1965	360	330	310	270	200	190	350	1,300	9,400	8,100	3,500	1,500	25,810

† Based on estimates at 9-2185 for 1950 compilation (Water-Supply Paper 1313).



# GREEN RIVER BASIN

West Fork Beaver Creek near Lonetree, Wyo.--Continued. Runoff relations  
for West Fork Beaver Creek versus Middle Fork Beaver Creek and Blacks Fork



## GREEN RIVER BASIN

9-2690. East Fork of Dry Fork, near Dry Fork, Utah

Location.--Lat 40°39'00", long 109°45'40", in sec.14, T.2 S., R.19 E. (unsurveyed), on right bank 3½ miles upstream from mouth and 8 miles northwest of town of Dry Fork. Altitude of gage is 8,150 ft (by barometer).

Drainage area.--12 sq mi, approximately.

Records available.--May 1946 to September 1963.

Estimates of streamflow.--May 1939 to September 1942, October 1963 to September 1965, based on relation of monthly runoff to that of 9-2680., Dry Fork above sinks, near Dry Fork, Utah adjusted for diversion through Mosby Canal. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of East Fork of Dry Fork, near Dry Fork, Utah, and X is sum of monthly runoff of Dry Fork above sinks, near Dry Fork, Utah and Mosby Canal near Lapoint, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.83	1.34	-	-	-	-	-	1.63	0.97	1.13	1.18	0.78
c	.29	1.79	-	-	-	-	-	3.06	.47	1.00	1.38	.17

Average runoff.--22 years (1939-42, 1946-65), 6,225 acre-feet per year (8.60 cfs).

Extremes.--1946-63: Maximum discharge, 240 cfs June 18, 1949, from rating curve extended above 100 cfs on basis of slope-area measurements of peak flow; no flow at times.

Remarks.--No diversion above station. Estimated values of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

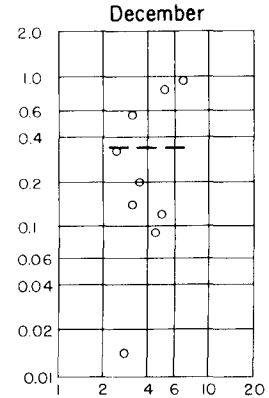
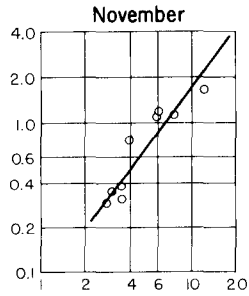
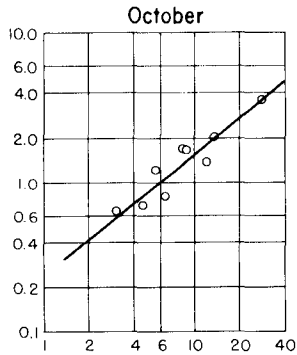
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1946	-	-	-	-	-	-	-	783	483	197	254	391	-
1947	230	176	150	123	111	140	282	5,140	3,570	1,250	412	291	11,840
1948	103	52	39	37	29	31	35	2,310	1,570	261	84	91	4,640
1949	89	44	25	18	11	15	69	1,800	3,630	834	202	131	6,870
1950	141	129	47	37	28	31	186	2,340	4,320	1,170	185	70	8,680
1951	38	5.4	0	0	0	0	0	1,280	2,190	609	283	203	4,610
1952	136	12	0	0	0	0	14	2,840	3,810	979	554	197	8,540
1953	31	9.9	0	0	0	0	0	161	2,260	374	205	116	3,160
1954	111	52	0	0	0	0	3.2	2,120	810	624	249	156	4,130
1955	167	109	8.9	0	0	0	1.0	1,390	1,070	285	310	236	3,580
1956	122	37.9	20.0	0	0	0	23.4	3,000	1,850	379	156	74.4	5,660
1957	64	35	1.4	0	0	0	0	111	4,090	1,350	407	320	6,380
1958	202	122	81	24	0	0	2.0	2,980	2,580	493	155	115	6,750
1959	70	29	32	0	0	0	0	447	799	431	279	172	2,260
1960	138	114	12	0	0	0	97	1,420	1,210	271	66	67	3,400
1961	80	31	14	2.0	0	0	0	1,160	1,480	223	113	275	3,380
1962	359	169	92	41	28	30	581	3,040	4,060	1,470	405	195	10,470
1963	170	77	55	7.0	0	0	0	1,810	984	293	160	198	3,750

Estimated monthly and annual runoff, in acre-feet

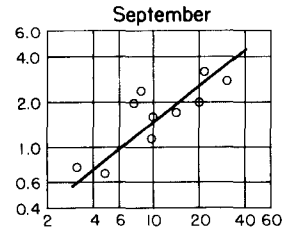
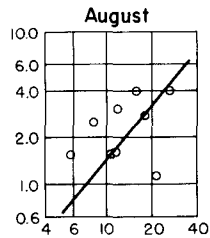
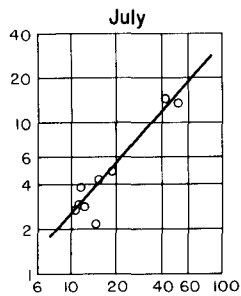
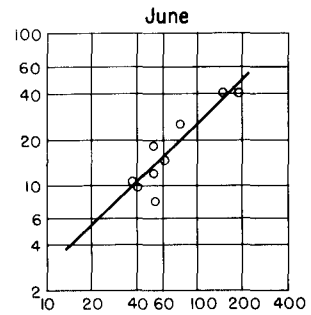
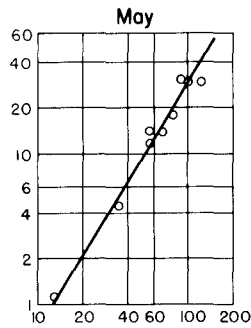
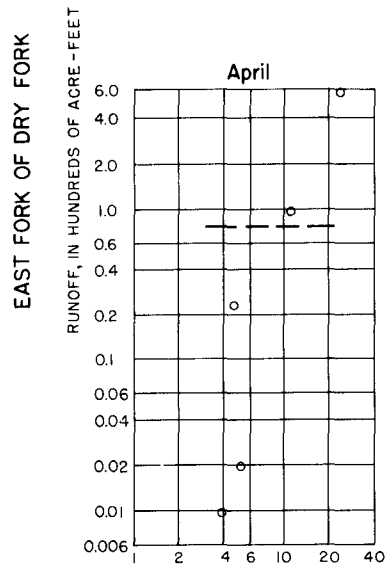
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1939	-	-	-	-	-	-	-	2,300	670	300	120	440	-
1940	300	170	e34	e17	e12	e15	e76	1,700	410	180	80	240	3,234
1941	420	370	e34	e17	e12	e15	e76	5,600	3,700	1,100	380	250	11,974
1942	400	340	e34	e17	e12	e15	e76	1,800	3,700	1,000	210	140	7,744
1964	190	90	e34	e17	e12	e15	e76	2,400	2,300	860	240	110	6,344
1965	80	40	e34	e17	e12	e15	e76	500	5,000	2,800	640	330	9,544

e Flat estimate based on average discharge for month for period 1947-63.

# **GREEN RIVER BASIN** **East Fork of Dry Fork near Dry Fork, Utah-- Continued.** **Runoff relations for East Fork of Dry Fork versus Dry Fork above sinks**



January to March—No flow most years.



RUNOFF, IN HUNDREDS OF ACRE- FEET

DRY FORK ABOVE SINKS

GREEN RIVER BASIN

9-2710. Ashley Creek at Sign of the Maine, near Vernal, Utah

Location.--Lat 40°31'00", long 109°35'40", in NE¼ sec.31, T.3 S., R.21 E., on left bank three-quarters of a mile downstream from Dry fork and 4½ miles northwest of Vernal. Altitude of gage is 5,750 ft (from topographic map).

Drainage area.--241 sq mi.

Records available.--March 1900 to December 1904 (published as "near Vernal"), June 1939 to September 1965.

Estimates of streamflow.--October 1930 to June 1939, based on relation of monthly runoff to that of Ashley Creek near Vernal, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Ashley Creek at Sign of the Maine, near Vernal, Utah, and X is monthly runoff of Ashley Creek near Vernal, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.97	0.87	0.95	0.95	0.95	0.95	0.92	1.30	1.34	1.64	1.20	1.11
c	-.12	-.48	-.22	-.22	-.25	-.25	-.30	1.18	1.26	2.43	.74	.40

Average runoff.--35 years (1930-65), 82,585 acre-feet per year (115 cfs).

Extremes.--1900-04, 1939-65: Maximum discharge, 4,110 cfs June 11, 1965; minimum recorded, 10 cfs Feb. 24, 1961, Jan. 19, Mar. 5, 1963.

Remarks.--Flow increased since July 1940 by water released from Oaks Park Reservoir (capacity, 6,250 acre-feet) on Big Brush Creek and diverted to Ashley Creek basin for irrigation. Diversions above station for irrigation and municipal supply. Estimated values of annual runoff are probably accurate within about 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1939	-	-	-	-	-	-	-	-	-	3,190	1,990	5,830	-
1940	5,420	3,440	2,370	1,810	1,400	1,460	4,280	21,150	6,120	3,720	1,710	2,370	55,250
1941	4,470	3,300	2,420	2,030	1,590	1,640	1,650	45,170	40,340	11,930	6,690	7,050	128,300
1942	11,290	6,920	4,370	2,910	2,090	2,180	6,060	29,870	41,060	10,520	5,880	4,610	127,800
1943	3,250	2,370	2,130	1,810	1,470	1,630	9,280	24,740	16,730	8,650	5,610	3,220	80,890
1944	2,360	2,020	1,780	1,520	1,250	1,410	1,790	33,700	65,400	18,600	8,270	4,210	142,300
1945	2,840	2,160	1,840	1,690	1,480	1,580	1,550	19,200	24,090	10,900	7,240	5,250	79,820
1946	3,770	2,480	2,020	1,680	1,420	1,430	6,830	10,630	7,900	4,440	3,220	3,240	49,060
1947	3,210	3,240	2,850	2,360	1,740	2,090	3,430	52,120	34,930	14,800	7,760	5,510	134,000
1948	4,330	2,610	2,260	1,870	1,550	1,570	2,000	32,510	17,860	6,940	5,270	2,330	81,100
1949	2,020	1,690	1,550	1,420	1,180	1,330	2,490	30,500	41,070	10,840	6,980	3,480	104,600
1950	3,590	2,780	2,200	1,980	1,730	1,960	4,480	36,010	37,710	13,690	7,800	4,330	118,300
1951	3,230	2,230	2,030	1,790	1,380	1,520	1,340	21,710	22,350	7,470	6,450	4,340	75,840
1952	3,630	2,250	1,900	1,790	1,530	1,550	4,100	46,570	38,240	11,460	13,050	6,130	132,200
1953	4,420	2,920	2,300	2,190	1,780	1,950	2,140	8,820	22,600	8,370	5,300	2,330	65,120
1954	1,820	2,000	2,020	1,830	1,350	1,360	3,230	23,250	8,720	6,810	3,730	2,480	58,600
1955	2,560	2,120	1,770	1,600	1,260	1,360	1,550	17,460	11,140	5,160	3,980	2,470	52,430
1956	2,400	1,740	1,780	1,620	1,350	1,370	2,170	31,630	14,400	6,260	3,260	1,720	69,700
1957	1,470	1,460	1,380	1,390	1,300	1,210	1,060	6,440	51,010	13,250	7,560	5,420	92,950
1958	3,340	2,860	2,370	1,950	1,600	1,590	2,110	37,910	22,990	8,260	4,530	2,710	92,220
1959	2,070	1,730	1,640	1,270	1,200	1,170	1,080	10,150	10,660	5,760	3,670	2,410	42,810
1960	2,230	1,800	1,270	1,060	928	1,080	3,600	14,810	11,630	5,310	1,910	1,060	46,690
1961	1,490	1,340	1,120	988	855	829	946	16,290	17,680	6,610	4,550	5,630	58,330
1962	6,540	4,460	2,780	1,950	1,650	1,950	10,370	38,940	40,110	12,780	6,800	4,170	132,500
1963	2,900	1,410	1,150	966	795	871	776	19,850	8,700	5,160	2,570	2,910	48,060
1964	2,790	1,690	1,420	1,340	1,190	1,140	1,000	28,400	23,540	8,880	4,910	3,290	79,590
1965	2,430	1,700	1,510	1,350	1,090	1,210	1,420	18,400	73,500	19,540	10,510	7,260	139,900

Estimated monthly and annual runoff, in acre-feet

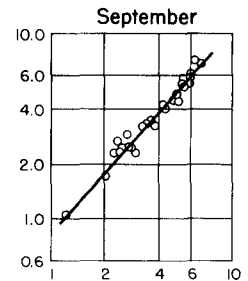
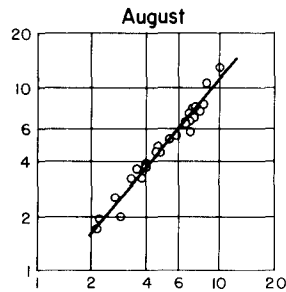
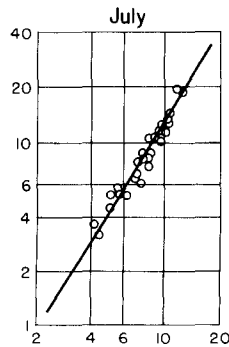
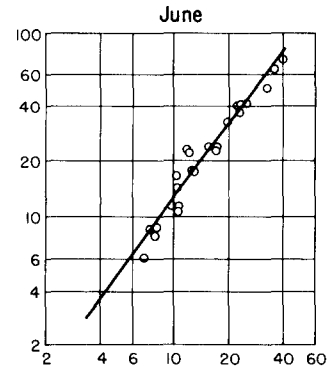
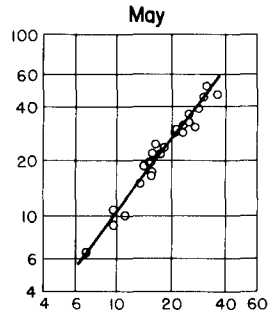
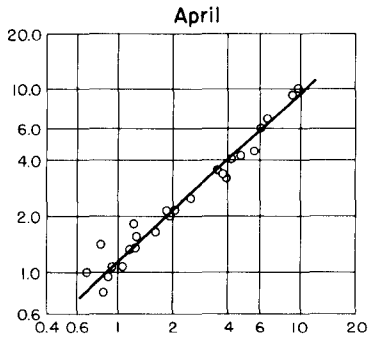
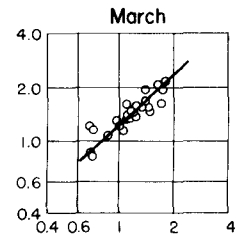
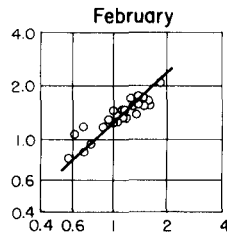
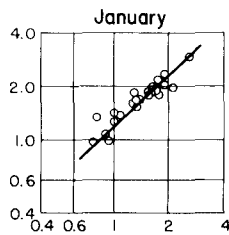
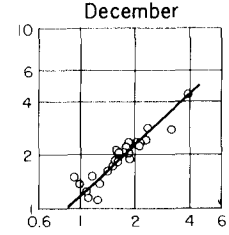
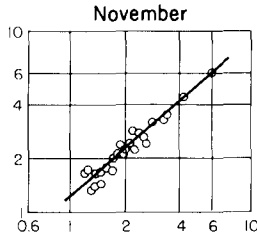
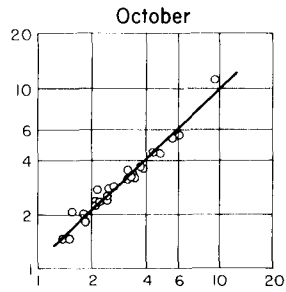
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1931	5,600	3,600	3,200	2,800	2,300	2,400	2,800	9,500	5,600	1,700	2,000	1,700	43,200
1932	2,100	2,100	2,100	2,000	2,000	2,000	2,200	33,500	28,300	10,000	5,600	4,300	96,200
1933	3,800	2,600	2,000	1,800	1,600	1,600	1,500	9,600	22,800	3,800	3,300	2,000	56,400
1934	1,900	1,700	1,500	1,500	1,400	1,500	3,900	7,600	3,100	1,300	2,700	2,300	20,400
1935	2,200	2,200	2,000	1,800	1,700	1,900	1,900	13,000	48,000	6,700	3,800	2,200	87,400
1936	2,000	1,900	1,600	1,400	1,300	1,300	2,300	12,400	7,400	3,300	4,600	4,000	43,500
1937	3,400	2,700	1,900	1,600	1,200	1,400	2,400	46,200	23,200	10,600	5,800	3,800	104,200
1938	3,100	2,300	1,900	1,600	1,500	1,600	2,600	26,300	42,000	11,000	5,600	4,800	104,300
1939	6,800	4,800	3,700	2,800	2,300	2,500	7,500	22,000	8,100	-	-	-	71,510

# GREEN RIVER BASIN

Ashley Creek at Sign of the Maine, near Vernal, Utah.— Continued. Runoff relations for Ashley Creek at Sign of the Maine versus Ashley Creek near Vernal

ASHLEY CREEK AT SIGN OF THE MAINE

RUNOFF, IN THOUSANDS OF ACRE-Feet



RUNOFF, IN THOUSANDS OF ACRE-Feet

ASHLEY CREEK NEAR VERNAL

GREEN RIVER BASIN

9-2740. Duchesne River near Hanna, Utah

Location.--Lat 40°32'00", long 110°52'00", in NE¼ sec.35, T.2 N., R.9 W., Uintah meridian, on right bank 100 ft downstream from Hades Creek and 11 miles northwest of Hanna. Altitude of gage is 7,380 ft (from river-profile map).

Drainage area.--78 sq mi, approximately.

Records available.--September 1921 to September 1923, July 1929 to September 1930 (fragmentary), April 1946 to September 1963. Prior to 1946, published as North Fork Duchesne River near Hanna.

Estimates of streamflow.--October 1930 to March 1946, October 1963 to September 1965, based on relation of monthly runoff to that of 9-2775., Duchesne River near Tabiona, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Duchesne River near Hanna, Utah, and X is monthly runoff of Duchesne River near Tabiona, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	*Apr.	May	June	July	Aug.	Sept.
Oct. 1930	b	2.36	1.48	1.56	1.36	1.39	2.01	2.22	0.96	0.85	1.16	1.20	1.03
Sept. 1953	c	6.01	2.67	2.95	2.17	2.28	4.60	5.33	.04	-.53	.93	1.21	.75
Oct. 1953	b	2.36	1.48	1.56	1.36	1.39	2.01	2.22	0.96	0.85	1.29	1.20	2.44
Sept. 1965	c	6.01	2.91	3.26	2.49	2.61	4.90	5.33	.16	-.37	1.60	1.42	6.10

\* Compound curve: where  $X > 3,500$  acre-feet, use  $\log Y = 1.28 \log X - 1.58$ .

Average runoff.--23 years (1930-53), 67,190 acre-feet per year (92.6 cfs); 12 years (1953-65) 35,860 acre-feet per year (49.5 cfs).

Extremes.--1921-23, 1929-30, 1946-63: Maximum discharge, about 17,500 cfs June 16, 1963, caused by failure of Little Deer Creek Dam 8 miles upstream; minimum recorded, 4.6 cfs Nov. 14, 1956, Mar. 1, 1961.

Remarks.--Diversions for irrigation of about 60 acres above station. Water is also diverted above station through Duchesne tunnel (capacity exceeds 700 cfs) to Provo River for use in the Great Basin; diversion begun Oct. 20, 1953. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	-	-	-	-	-	-	-	-	-	-	-	3,250	-
1922	1,830	1,400	1,360	1,230	1,110	1,350	2,390	23,500	56,000	16,600	7,440	2,080	116,000
1923	1,430	1,270	1,340	1,410	1,390	1,670	3,570	25,400	40,600	14,900	4,100	2,040	99,100
1929	-	-	-	-	-	-	-	-	-	10,100	4,250	2,630	-
1930	-	-	-	-	-	-	-	-	-	4,890	5,040	3,170	-
1946	-	-	-	-	-	-	9,930	23,850	20,520	4,310	1,980	1,220	-
1947	1,460	1,240	1,110	984	944	1,650	3,680	32,490	28,440	8,930	3,360	1,670	85,960
1948	1,310	1,220	1,080	984	920	1,050	2,200	24,710	16,970	3,300	1,680	936	56,360
1949	932	982	922	827	774	1,300	5,830	22,550	38,050	9,850	2,430	1,250	85,700
1950	1,420	1,290	1,130	984	833	1,110	5,670	19,530	45,600	10,570	2,520	1,850	92,510
1951	1,370	1,460	1,410	1,250	1,170	1,290	4,450	24,150	36,240	11,110	4,890	1,920	90,710
1952	1,860	1,230	1,110	984	863	922	5,655	33,320	44,180	10,720	4,650	2,390	107,900
1953	1,450	1,070	1,050	984	833	994	2,430	7,080	34,410	7,010	3,280	1,270	61,860
1954	853	570	515	453	399	451	1,660	6,590	2,280	1,220	692	510	16,190
1955	499	476	416	382	305	338	738	9,580	7,010	2,120	1,130	656	23,650
1956	644	504	563	451	403	585	2,860	16,080	22,820	2,360	1,050	540	48,860
1957	542	429	409	372	333	486	1,020	4,670	38,270	5,890	1,900	1,050	55,370
1958	845	648	561	469	389	391	1,430	25,230	14,350	2,060	885	622	47,880
1959	564	585	474	370	293	383	1,410	4,850	7,400	2,370	1,580	863	21,140
1960	980	902	594	484	422	742	2,210	6,110	5,910	2,340	1,430	1,110	23,230
1961	811	562	440	369	278	337	722	3,320	5,040	2,170	1,670	1,640	17,360
1962	1,610	1,200	930	756	702	774	5,100	11,250	11,500	4,880	1,540	833	41,080
1963	694	572	479	394	347	493	968	7,710	10,140	2,546	2,360	2,380	29,080

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1931	3,400	1,000	800	820	700	760	800	9,800	7,000	2,100	1,300	860	29,340
1932	260	760	920	960	900	850	2,700	17,800	31,200	9,000	2,200	1,500	69,050
1933	760	870	900	1,100	740	730	1,000	7,200	27,100	4,100	1,200	940	46,640
1934	400	600	680	730	590	680	1,500	4,800	3,500	1,600	1,100	670	16,850
1935	90	350	520	460	350	310	890	8,300	27,800	3,600	1,400	1,000	45,070
1936	330	630	550	640	580	570	4,000	37,400	23,000	8,800	4,100	1,600	82,200
1937	800	850	880	880	730	900	2,900	34,300	21,000	8,700	1,600	1,400	74,940
1938	1,000	980	880	880	760	1,000	4,800	24,600	30,800	5,700	2,000	2,100	75,500
1939	1,900	1,200	1,100	880	730	1,800	4,700	20,300	10,600	2,800	1,400	1,100	48,510
1940	1,200	700	700	750	670	800	1,400	19,500	7,800	2,100	1,200	1,500	38,320

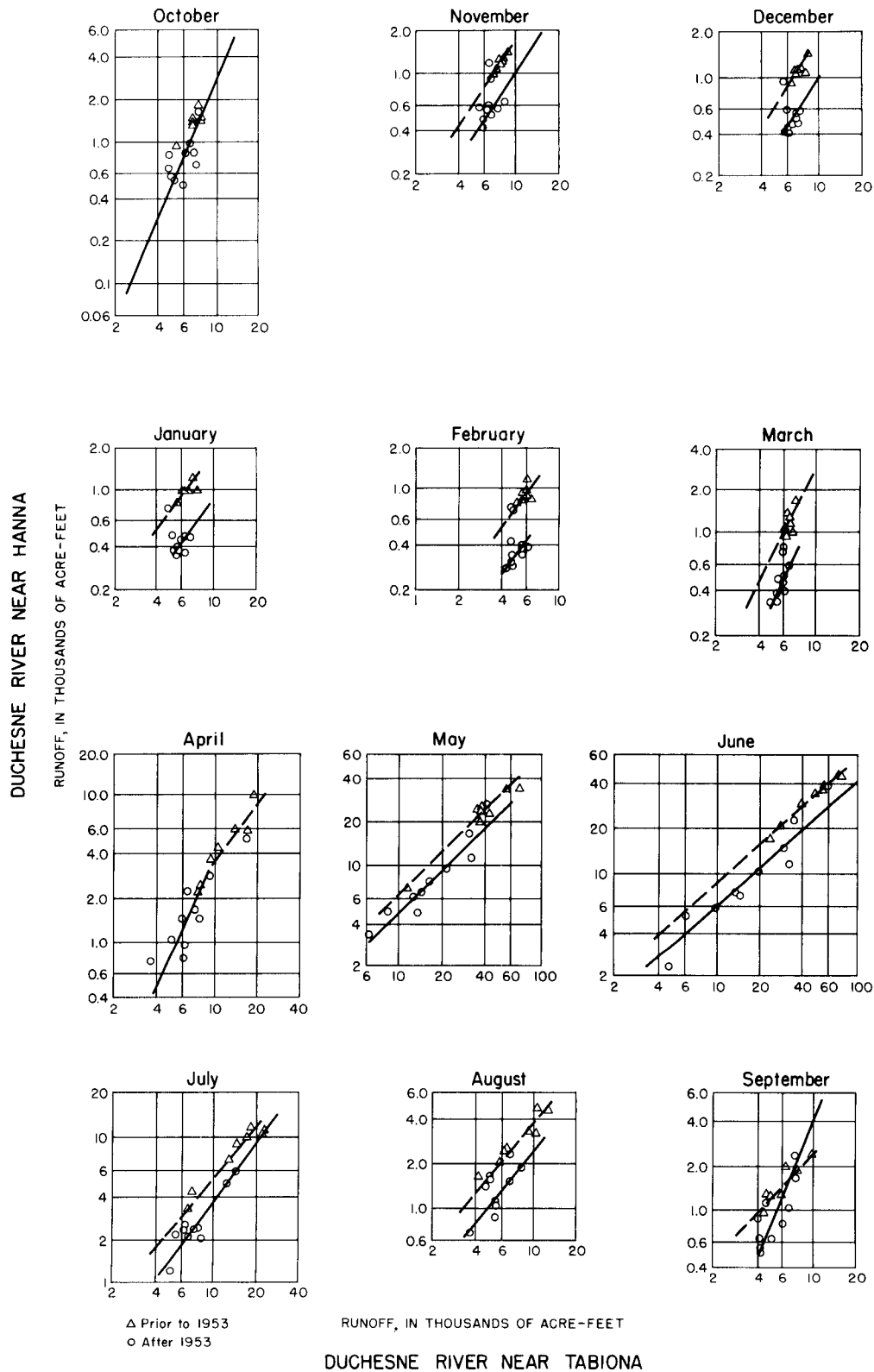
GREEN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, of Duchesne River near Hanna, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1941	2,100	940	760	760	660	920	1,600	25,800	27,800	6,000	2,000	1,400	70,740
1942	2,200	1,100	1,000	900	760	1,100	5,400	17,500	28,100	5,100	1,400	1,400	65,960
1943	1,100	900	860	840	840	1,400	8,800	27,000	31,000	9,700	3,400	1,200	87,040
1944	1,500	1,200	1,000	1,000	880	1,300	2,800	22,000	33,800	8,600	1,800	1,300	77,180
1945	1,300	1,000	900	880	740	940	1,500	18,800	26,000	7,800	3,700	1,500	65,660
1946	1,600	1,100	1,100	1,000	840	1,300	-	-	-	-	-	-	68,750
1964	680	660	500	430	370	410	1,400	11,700	16,000	4,400	1,700	920	39,170
1965	500	490	540	480	350	390	2,800	10,400	29,000	13,300	3,000	6,000	67,250

# GREEN RIVER BASIN

Duchesne River near Hanna, Utah.—Continued. Runoff relations  
for Duchesne River near Hanna versus Duchesne River near Tabiona





## GREEN RIVER BASIN

9-2770. Duchesne River at Hanna, Utah

Location (revised).--Lat 40°24'55", long 110°46'55", at SW corner of sec.3, T.1 S., R.8 W., Uintah meridian, at downstream side of left abutment of road bridge, 1 mile downstream from Sand Creek and 1.2 miles northwest of Hanna. Altitude of gage is 6,780 ft (from topographic map).

Drainage area.--230 sq mi, approximately.

Records available.--August 1953 to September 1960.

Estimates of streamflow.--October 1930 to July 1953, October 1960 to September 1965, based on relation of monthly runoff to that of 9-2775, Duchesne River near Tabiona, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Duchesne River at Hanna, Utah; X is monthly runoff of Duchesne River near Tabiona, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.77	0.84	1.12	0.68	0.46	0.89	1.05	0.82	0.82	0.96	0.79	0.78
c	-.83	-.50	-.47	-1.13	-1.93	-.33	-.23	-.88	-.86	-.24	-.83	-.84

Average runoff.--23 years (1930-53) 151,900 acre-feet per year (210 cfs); 12 years (1953-65) 118,700 acre-feet per year (164 cfs).

Extremes.--1953-60: Maximum discharge, 2,260 cfs June 7, 1957; minimum, 52 cfs Mar. 12, 15, 1956.

Remarks.--Several diversions above station for irrigation, including a transmountain diversion through Duchesne Tunnel (capacity exceeds 700 cfs) to Provo River for use in the Great Basin; diversion begun Oct. 20, 1953. Estimated values of annual runoff are probably accurate within 5 percent.

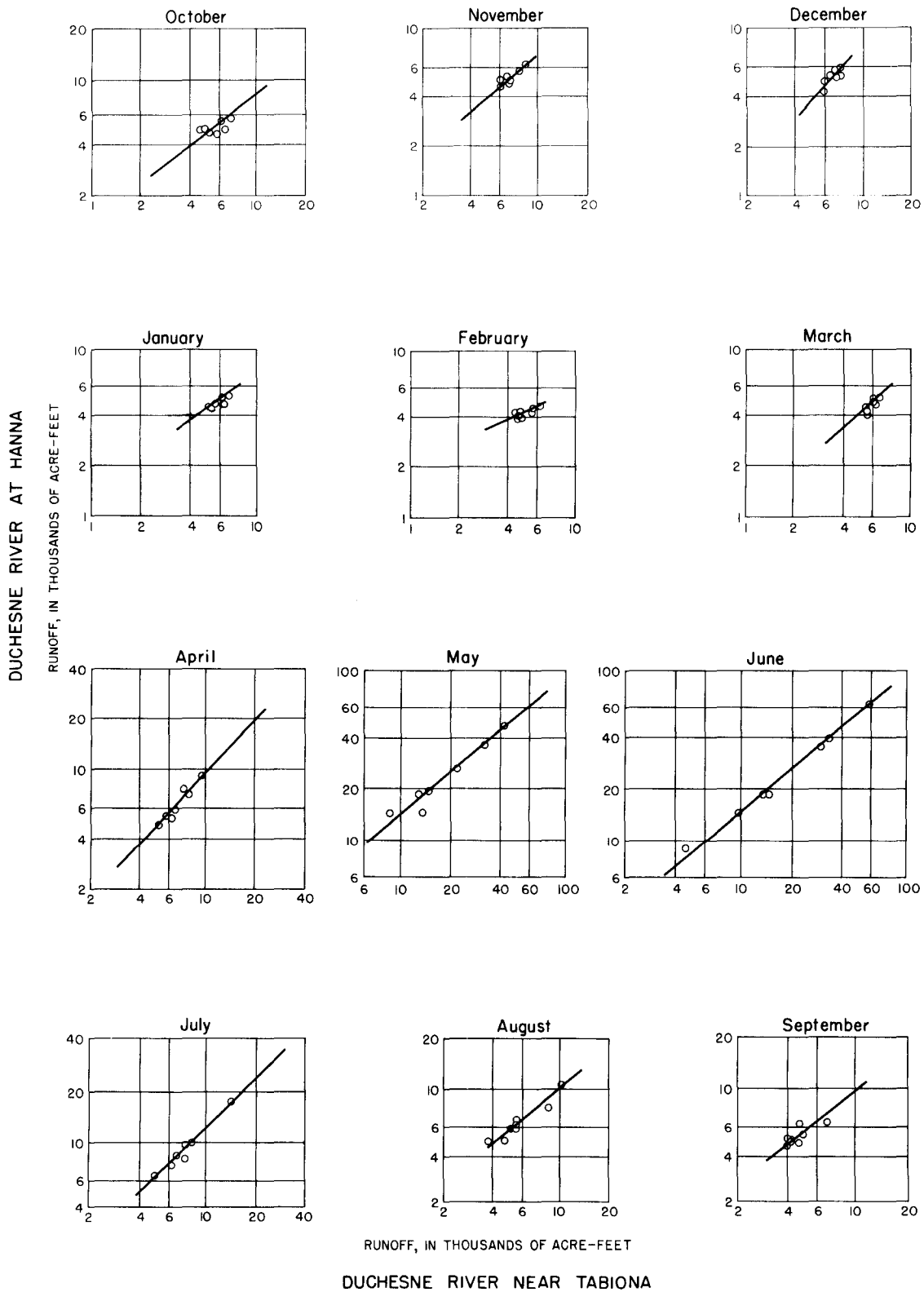
Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1953	-	-	-	-	-	-	-	-	-	-	10,520	6,090	-
1954	5,750	5,620	5,420	5,180	4,600	5,100	7,660	19,320	8,810	6,290	4,920	4,560	83,230
1955	4,860	4,660	4,830	4,720	3,980	4,340	5,360	25,740	18,980	8,570	5,930	4,820	96,800
1956	5,140	4,900	5,280	4,700	4,400	5,300	9,110	36,080	39,900	9,640	6,520	4,850	135,800
1957	4,900	5,030	5,220	4,570	4,030	4,470	4,820	14,970	63,710	17,690	7,720	6,280	143,400
1958	5,950	6,110	5,910	5,340	4,640	4,850	7,270	47,670	35,810	10,000	6,130	5,350	145,000
1959	5,060	5,210	5,250	4,730	4,250	4,670	5,580	14,360	18,780	7,920	5,820	4,820	86,450
1960	5,090	4,750	4,420	4,530	4,090	4,900	6,990	18,820	14,860	7,170	4,930	4,710	85,260

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1931	9,000	5,400	4,600	4,600	4,300	4,500	4,800	20,800	12,200	5,400	4,800	4,300	84,700
1932	3,800	4,600	5,000	5,100	4,600	4,700	8,300	34,400	51,800	18,400	6,800	6,600	154,100
1933	5,500	5,000	5,000	5,400	4,300	4,300	5,400	16,100	45,000	9,700	4,600	4,500	114,800
1934	4,400	4,000	4,100	4,400	4,000	4,200	6,400	11,500	6,400	4,500	4,400	3,600	61,900
1935	2,700	3,000	3,300	3,500	3,400	2,900	5,000	18,200	45,500	8,800	5,100	4,800	106,200
1936	4,200	4,100	3,500	4,200	4,000	3,900	10,800	66,000	38,000	18,200	10,600	6,700	174,200
1937	5,600	4,900	4,800	4,800	4,300	4,800	8,800	60,000	34,800	18,000	5,500	6,300	162,600
1938	6,000	5,300	4,900	4,900	4,400	5,000	12,300	45,500	50,500	12,900	6,500	8,400	166,300
1939	7,300	6,000	5,600	4,800	4,300	6,500	12,200	38,900	18,200	7,100	5,200	5,200	121,300
1940	6,400	4,400	4,200	4,500	4,200	4,500	6,200	37,300	13,600	5,700	4,500	6,300	101,800
1941	7,600	5,200	4,400	4,500	4,200	4,800	6,700	48,000	45,500	13,400	6,400	6,200	156,900
1942	7,800	5,600	5,400	4,900	4,400	5,200	13,900	34,200	46,800	11,700	5,100	6,200	151,200
1943	6,200	5,000	4,700	4,700	4,500	5,800	20,300	49,500	51,000	20,000	9,200	5,600	186,500
1944	6,800	6,000	5,600	5,200	4,600	5,600	8,600	41,800	55,000	18,000	6,000	5,800	169,000
1945	6,600	5,400	5,000	4,900	4,300	4,900	6,400	36,200	44,000	16,500	9,800	6,600	150,600
1946	7,000	5,700	5,800	5,300	4,500	5,500	18,800	42,000	34,000	8,600	6,300	5,400	148,900
1947	6,800	6,000	5,700	5,000	4,600	6,000	9,200	56,500	46,000	17,300	9,500	7,500	180,100
1948	6,200	6,000	5,700	5,100	4,600	5,000	7,300	42,000	30,500	8,000	5,700	5,000	131,000
1949	5,000	5,300	5,300	4,800	4,300	5,200	13,800	48,000	62,200	20,300	6,900	6,200	187,300
1950	6,900	6,100	5,600	5,100	4,600	5,300	14,200	42,000	74,000	25,500	7,100	7,700	204,100
1951	6,400	6,400	6,700	5,500	4,700	5,400	10,400	42,000	61,000	21,200	10,700	6,600	187,000
1952	6,800	5,800	5,800	5,200	4,700	5,200	17,500	71,800	78,500	25,800	12,200	9,400	248,700
1953	6,200	5,600	6,500	5,800	4,800	5,600	7,700	16,200	55,000	15,500	-	-	145,500
1961	4,600	4,400	4,800	4,500	4,000	4,100	3,400	9,900	10,000	6,600	5,000	7,200	68,500
1962	6,400	5,000	4,400	4,200	4,900	4,900	18,000	38,000	39,000	14,800	7,400	6,400	152,700
1963	6,400	4,900	5,400	4,700	4,500	4,900	6,000	21,600	26,100	7,700	7,500	7,500	107,200
1964	5,200	5,600	5,200	4,900	4,400	4,500	6,300	31,000	38,900	13,700	7,800	5,800	133,300
1965	4,800	4,900	5,500	5,200	4,400	4,500	8,500	28,000	68,200	31,000	11,500	10,500	187,000

# **GREEN RIVER BASIN** **Duchesne River at Hanna, Utah. Continued. Runoff relations** **for Duchesne River at Hanna versus Duchesne River near Tabiona**



GREEN RIVER BASIN

9-3140. Price River near Wellington, Utah

Location.--Lat 39°30'40", long 110°40'50", in NW¼ sec.22, T.15 S., R.11 E., on left bank, 0.3 mile upstream from Miller Creek and 3.5 miles southeast of Wellington. Altitude of gage is 5,300 ft (by barometer).

Drainage area.--850 sq mi, approximately.

Records available.--October 1949 to September 1958.

Estimates of streamflow.--December 1945 to September 1949, October 1958 to September 1965, based on relation of monthly discharge to that of 9-3145., Price River at Woodside, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Price River near Wellington, Utah; X is monthly runoff of Price River at Woodside, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	*Apr.	*May	*June	*July	*Aug.	Sept.
b	0.60	0.56	0.83	0.94	1.04	1.04	1.21	1.14	1.11	0.83	0.83	0.62
c	-1.13	-1.21	-.35	.05	.45	.44	.98	.74	.58	-.41	-.35	-1.08
X<	-	-	-	-	-	-	1,800	1,700	1,400	600	1,300	-

\* Compound curve: when X< values shown, use  $\log Y = 0.56 \log X + 1.15$

Average runoff.--19 years (1946-65), 42,580 acre-feet per year (58.8 cfs).

Extremes.--1949-58: Maximum discharge, 4,190 cfs Aug. 28, 1953, from rating curve extended above 1,800 cfs on basis of slope-area measurements; minimum, 2.4 cfs Nov. 19, 1956.

Remarks.--Many diversions for irrigation above and below station. Flow affected by storage in Scofield Reservoir (capacity, 65,780 acre-feet). Estimated values of annual runoff are probably accurate within 25 percent.

Monthly and annual runoff, in acre-feet

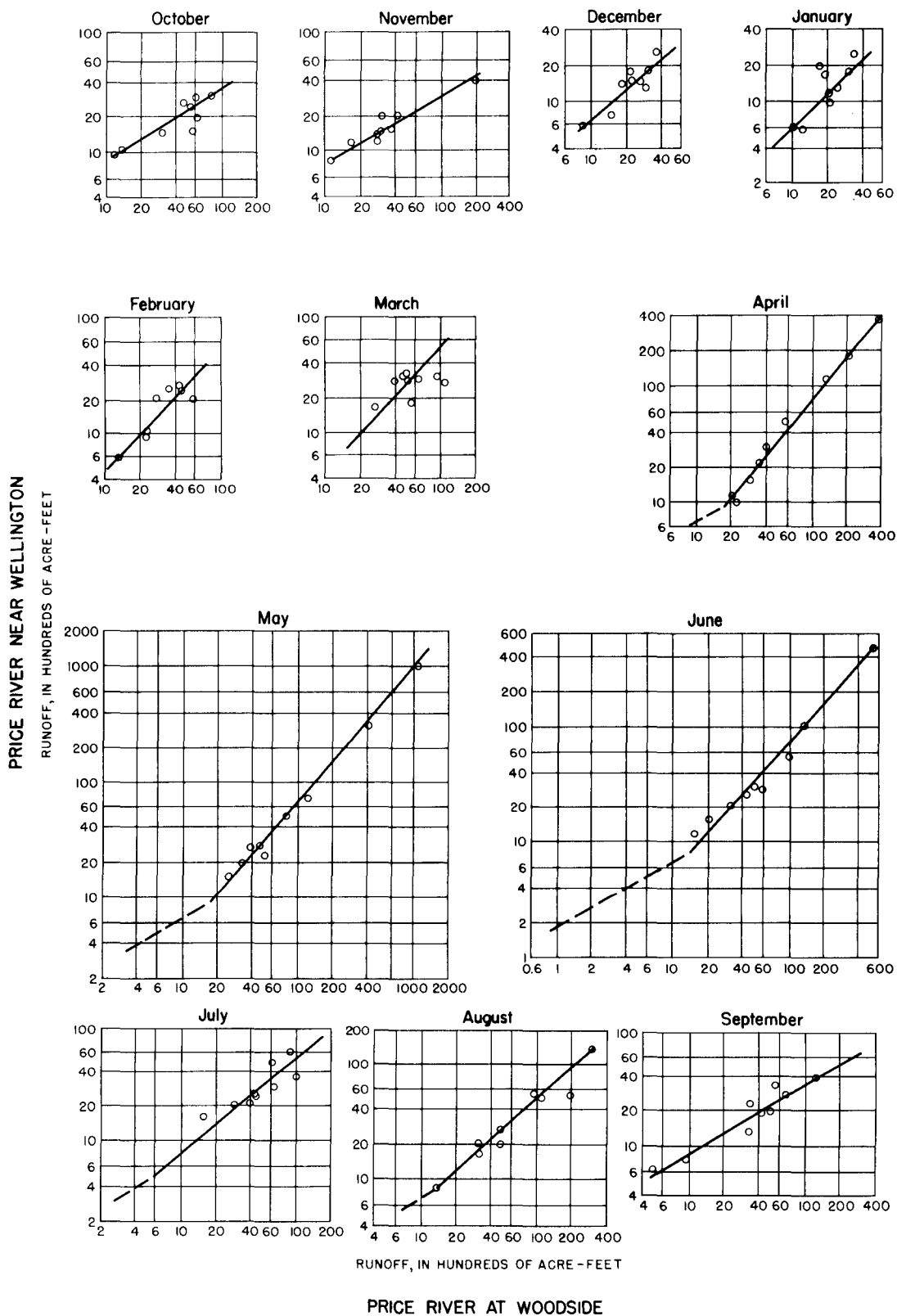
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	2,890	1,380	1,740	1,970	1,960	2,850	11,250	5,020	2,600	3,590	1,660	1,980	38,890
1951	1,440	1,430	1,270	1,150	1,280	3,180	1,510	2,340	2,870	2,680	5,330	1,350	25,830
1952	1,500	1,940	1,390	1,680	2,010	2,990	36,230	99,510	46,440	6,150	5,490	3,490	208,800
1953	2,600	1,970	2,560	2,460	2,430	2,710	2,960	2,820	3,070	4,890	5,040	2,340	35,850
1954	2,340	1,470	1,490	1,300	2,540	3,010	2,130	2,710	2,040	2,150	2,010	4,070	27,260
1955	2,920	1,160	756	573	613	2,650	4,950	1,980	1,580	1,600	2,630	779	22,090
1956	1,040	1,160	1,470	964	914	2,760	970	1,540	1,150	2,060	840	617	15,480
1957	932	801	615	615	1,060	1,640	1,120	7,120	5,490	2,920	13,440	2,050	37,800
1958	1,950	3,750	1,770	1,720	2,270	1,820	17,670	31,300	10,160	2,580	1,970	2,740	79,700

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1946	-	-	740	600	930	2,400	2,200	1,400	650	940	2,700	730	-
1947	2,000	1,300	1,300	660	1,400	2,400	3,000	4,100	2,100	1,500	6,400	1,400	27,560
1948	1,700	1,200	1,500	990	1,400	2,200	2,700	1,700	1,600	1,800	3,000	630	20,420
1949	1,300	1,000	1,100	980	1,300	5,400	10,400	9,000	11,000	6,700	2,500	2,500	53,180
1959	1,600	1,300	1,700	1,400	1,200	1,400	900	880	790	520	3,300	2,100	17,090
1960	1,300	1,100	1,000	920	840	3,300	1,200	760	630	320	700	1,500	13,570
1961	3,700	940	800	400	600	760	620	350	170	470	3,100	6,700	18,800
1962	920	980	860	550	3,800	4,400	25,900	8,800	1,800	5,300	540	4,600	58,450
1963	2,500	1,000	930	490	1,200	3,500	840	780	890	1,100	6,700	4,000	23,830
1964	1,000	920	650	420	490	940	1,900	3,600	1,800	1,400	4,800	1,300	19,220
1965	910	980	1,000	1,300	1,500	1,600	7,000	21,800	14,300	8,200	40,000	2,600	65,190

Note.--Downward extension of regressions April to August in the direction indicated by each set of monthly data would give estimates at Wellington substantially below anything observed, and would suggest inflow per unit area below Wellington equal, or nearly equal, to that occurring above. This is not probable because of the difference in basin altitudes, hence a common regression is used below about 1,000 acre-feet.

# **GREEN RIVER BASIN** **Price River near Wellington, Utah. Continued. Runoff** **relations for Price River near Wellington versus Price River at Woodside**



## GREEN RIVER BASIN

9-3250. Cottonwood Creek near Castle Dale, Utah

Location.--Lat 39°10', long 110°56', in sec.8, T.19 S., R.9 E., on right bank half a mile upstream from Rock Canyon and 6 miles east of Castle Dale. Altitude of gage is 5,400 ft (from river-profile map).

Drainage area.--261 sq mi.

Records available.--July 1947 to September 1958.

Estimates of streamflow.--May 1932 to June 1947, October 1958 to September 1965, based on relation of monthly runoff to that of 9-3245., Cottonwood Creek near Orangeville, Utah. The regression equation used is

$$\log Y = b \log (X-a) - c$$

where: Y is monthly runoff of Cottonwood Creek near Castle Dale, Utah; X is monthly runoff of Cottonwood Creek near Orangeville, Utah; and a, b, and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	*May	*June	July	Aug.	Sept.
a	0	0	0	0	0	0	0	6,000	6,000	0	0	0
b	2.09	1.70	1.33	1.00	1.00	1.23	1.70	1.21	1.21	2.12	4.13	5.98
c	4.01	2.52	1.34	.22	.13	.99	2.99	1.00	1.00	5.07	11.70	17.26

\* Compound curve: where  $X < 11,000$  acre-feet, use  $\log Y = 2.49 \log X - 6.58$

Average runoff.--33 years (1932-65), 33,776 acre-feet per year (46.7 cfs).

Extremes.--1947-58: Maximum discharge, 1,660 cfs about June 3, 1952, from rating curve extended above 820 cfs by logarithmic plotting; no flow for part of Aug. 31, 1954, and for several days during August and September 1956.

Remarks.--Many diversions above station for irrigation and several transmountain diversions from headwaters to the Great Basin for irrigation in San Pitch River basin. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1947	-	-	-	-	-	-	-	-	-	1,250	2,580	620	-
1948	578	588	799	676	1,160	1,220	486	9,600	5,480	602	276	182	21,650
1949	447	607	583	523	682	1,280	2,660	16,330	17,960	3,050	632	337	45,090
1950	727	740	559	736	1,130	750	734	5,660	5,020	1,410	379	359	18,200
1951	552	700	619	553	520	442	346	7,640	10,960	992	2,520	439	26,280
1952	870	920	968	1,020	1,280	1,400	4,570	34,370	52,430	8,590	2,350	1,410	110,200
1953	881	789	1,410	1,290	1,360	780	585	965	20,830	1,300	1,830	466	32,490
1954	830	544	594	633	980	631	777	5,350	589	320	137	1,070	12,460
1955	484	602	1,170	1,230	1,170	1,330	430	2,370	3,940	278	580	72	13,660
1956	343	502	756	1,470	1,240	567	516	9,480	4,500	281	27.6	22.4	19,700
1957	260	414	492	492	595	464	340	2,800	47,390	9,680	2,810	884	66,620
1958	1,460	2,110	1,300	1,230	1,530	1,360	4,390	28,680	26,100	419	319	1,100	70,010

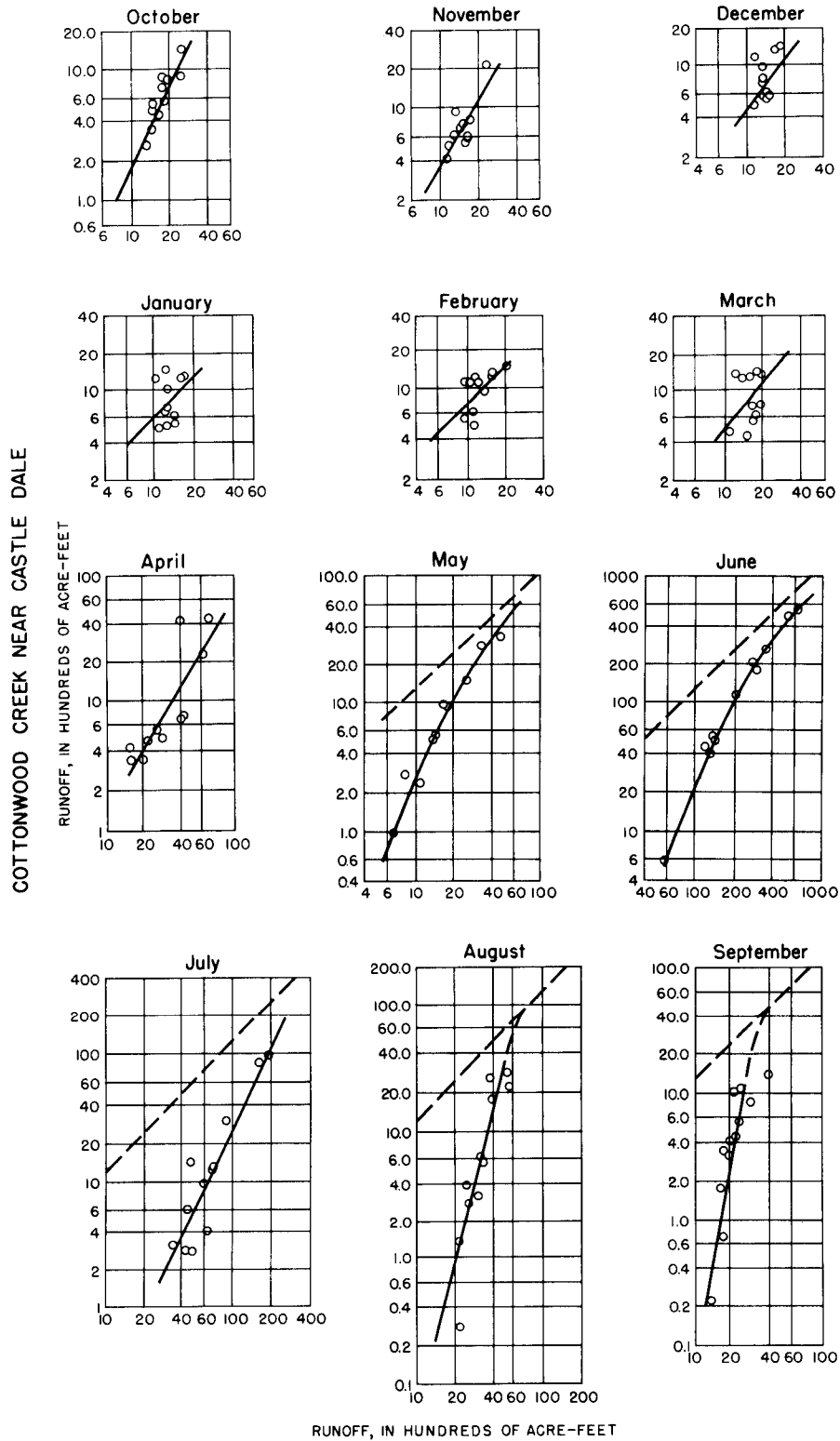
Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1932	-	-	-	-	-	-	-	9,000	10,800	860	310	70	-
1933	330	570	410	380	410	520	390	910	22,500	2,300	1,300	70	30,090
1934	140	370	530	570	600	620	2,300	910	70	30	20	0	6,160
1935	100	230	340	500	580	560	480	1,800	39,300	950	170	20	45,030
1936	210	500	380	540	640	580	2,400	29,500	11,000	1,200	1,200	320	48,470
1937	410	760	610	610	740	730	1,100	19,700	7,500	1,100	430	1,400	35,090
1938	470	500	620	720	810	850	2,100	13,800	12,800	440	280	300	33,690
1939	420	690	610	690	660	2,000	3,200	13,800	3,000	240	60	180	25,550
1940	440	450	470	570	710	700	790	22,300	4,200	210	20	380	31,240
1941	390	530	610	650	720	810	490	20,500	21,300	1,300	770	500	48,570
1942	1,600	1,500	1,100	1,000	1,000	1,400	4,300	14,700	20,900	1,100	280	140	49,020
1943	480	660	780	840	930	930	3,800	6,300	4,500	400	500	60	20,180
1944	440	570	630	610	780	750	530	15,600	30,700	2,800	370	160	53,940
1945	510	690	710	750	810	620	370	8,200	11,800	1,400	1,200	280	27,340
1946	570	900	750	800	820	1,100	4,300	9,500	3,300	330	120	30	22,520
1947	420	460	490	700	940	1,200	1,300	16,300	7,700	-	-	-	33,960
1959	570	600	640	710	790	700	440	680	1,800	200	50	20	7,200
1960	340	410	350	450	600	850	1,000	5,300	5,000	310	60	150	14,820
1961	510	590	640	650	660	750	530	2,700	1,300	170	400	420	9,320
1962	1,000	1,200	830	770	1,100	1,300	3,600	7,800	9,100	1,500	690	420	29,310
1963	760	750	520	410	780	680	300	2,100	2,700	330	470	820	10,620
1964	480	540	430	550	620	440	270	5,900	8,500	980	* 420	* 80	19,210
1965	270	500	470	700	860	760	770	3,400	32,300	19,400	12,000	5,500	76,930

\* Monthly regression not used. Estimated on basis of equal runoff per unit area.

# GREEN RIVER BASIN

Cottonwood Creek near Castle Dale, Utah.- Continued. Runoff relations  
for Cottonwood Creek near Castle Dale versus Cottonwood Creek near Orangeville



COTTONWOOD CREEK NEAR ORANGEVILLE

GREEN RIVER BASIN

9-3275. Ferron Creek near Castle Dale, Utah

Location.--Lat 39°06'20", long 111°01'25", in SE¼ sec.4, T.20 S., R.8 E., on left bank 6 miles east of Ferron and 7 miles south of Castle Dale. Altitude of gage is 5,550 ft (from topographic map).

Drainage area.--210 sq mi, approximately.

Records available.--July 1911 to September 1914, December 1947 to September 1958.

Estimates of streamflow.--October 1958 to September 1965, based on relation of monthly runoff to that of 9-3265., Ferron Creek (upper station) near Ferron, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Ferron Creek near Castle Dale, Utah; X is monthly runoff of Ferron Creek (upper station) near Ferron, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.69	1.30	1.40	1.40	1.40	1.40	1.55	2.13	2.14	2.33	2.25	1.76
c	2.39	1.00	1.18	1.13	1.11	1.20	2.21	5.17	5.23	5.80	5.01	3.04

Average runoff.--17 years (1948-65), 19,840 acre-feet per year (27.4 cfs).

Extremes.--1947-58: Maximum discharge, 1,630 cfs Aug. 3, 1951, from rating curve extended above 650 cfs on basis of slope-area measurements; no flow for several days in September and October 1955.

Remarks.--Flow slightly regulated by small reservoir in mountains (capacity unknown). Many diversions for irrigation above station. Estimated values of annual runoff are probably accurate within 10 percent.

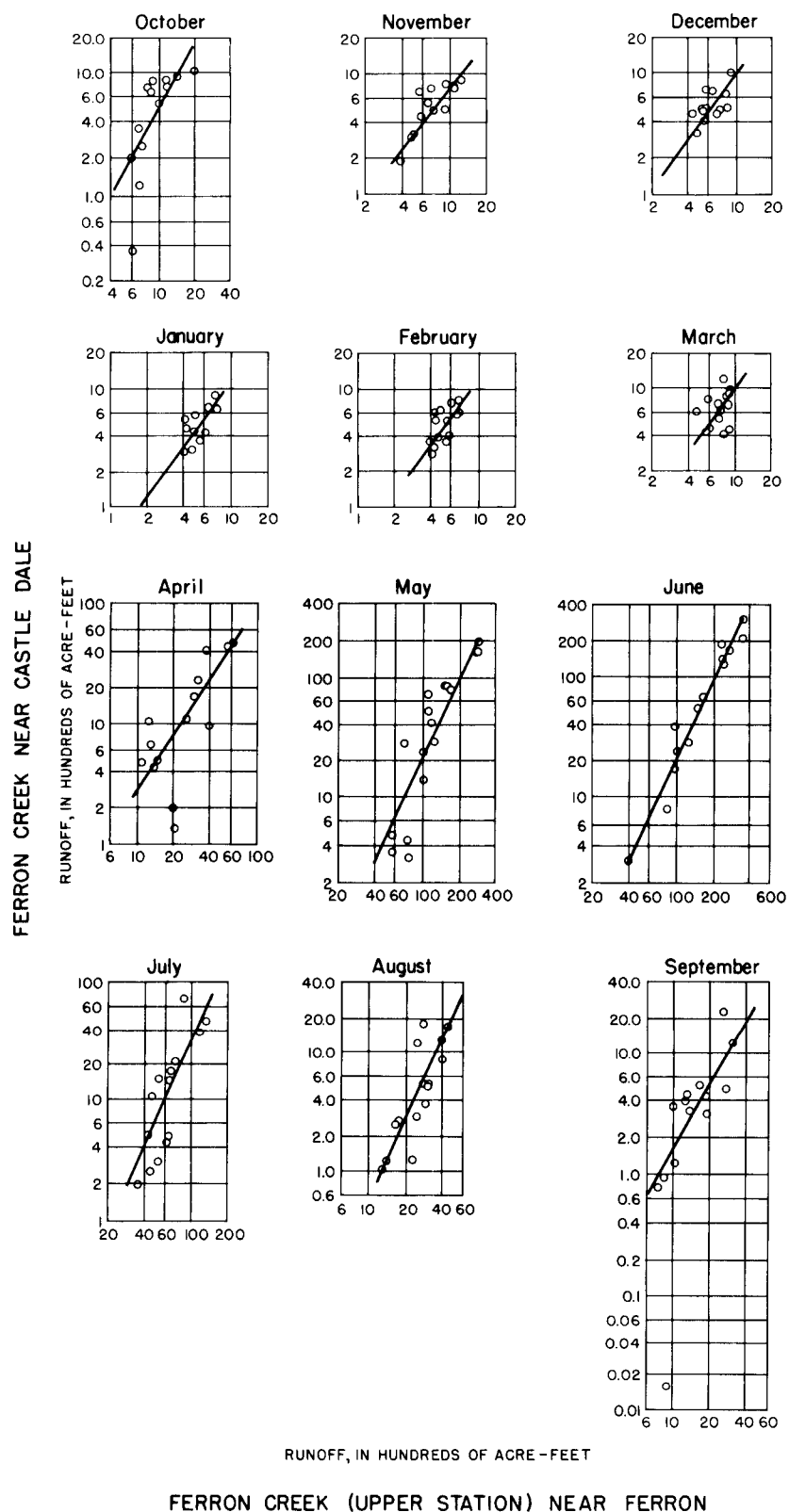
Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1911	-	-	-	-	-	-	-	-	-	258	529	994	-
1912	738	750	92	307	288	806	666	8,480	16,700	2,070	283	393	31,600
1913	750	774	516	553	555	738	2,310	8,480	2,890	1,080	240	2,340	21,200
1914	861	565	504	738	666	885	1,710	16,700	18,600	7,440	535	524	49,700
1948	-	-	492	430	403	466	1,050	4,200	3,870	509	262	90	-
1949	247	444	399	307	362	1,190	4,340	7,840	13,110	1,450	862	324	30,880
1950	547	494	492	544	550	556	1,110	2,380	2,400	1,500	128	119	10,820
1951	342	509	462	369	359	408	202	5,260	5,550	442	1,760	424	16,090
1952	695	716	732	619	760	865	4,600	19,780	29,600	3,800	1,710	1,210	65,090
1953	900	817	676	676	635	735	487	371	6,790	1,730	1,180	307	15,300
1954	837	758	714	700	609	640	967	1,420	291	202	104	349	7,590
1955	196	311	486	430	395	646	473	330	802	15	496	1.6	4,580
1956	34	189	314	292	325	450	134	2,890	1,740	322	121	76	6,890
1957	118	296	461	461	653	425	433	2,800	21,170	4,850	1,310	488	33,460
1958	1,020	889	1,020	861	807	958	4,010	16,490	14,340	506	356	443	41,700

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1959	300	410	350	280	380	430	750	620	560	230	90	90	4,490
1960	130	230	160	140	210	870	1,200	2,400	2,300	590	80	150	8,460
1961	340	300	240	220	230	410	390	1,100	550	290	300	280	4,650
1962	510	670	580	540	660	980	5,800	7,500	11,700	1,900	840	300	31,980
1963	540	290	160	110	230	390	260	2,900	2,500	420	710	440	8,950
1964	250	370	260	280	310	390	260	2,300	3,600	590	540	180	9,330
1965	260	460	520	590	540	400	860	2,100	21,000	8,000	1,600	740	37,070

# **GREEN RIVER BASIN** **Ferron Creek near Castle Dale, Utah.- Continued. Runoff relations** **for Ferron Creek near Castle Dale versus Ferron Creek (upper station) near Ferron**





## GREEN RIVER BASIN

9-3280. San Rafael River near Castle Dale, Utah

Location.--Lat 39°08'40", long 110°54'15", in NW¼ sec.27, T.19 S., R.9 E., on left bank 1 mile downstream from Ferron Creek and 8 miles southeast of Castle Dale. Altitude of gage is 5,320 ft (from river-profile map).

Drainage area.--927 sq mi.

Records available.--October 1947 to September 1964.

Estimates of streamflow.--October 1945 to September 1947, October 1964 to September 1965, based on relation of monthly runoff to that of 9-3285., San Rafael River near Green River, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of San Rafael River near Castle Dale, Utah; X is monthly runoff of San Rafael River near Green River, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	*July	Aug.	Sept.
b	0.59	0.83	0.94	1.02	1.02	1.05	0.94	0.94	0.95	0.86	0.80	0.48
c	-1.34	-.57	-.16	.13	.13	.26	-.20	-.32	-.21	-.49	-.54	-1.73

\* Compound curve: where  $X < 1,000$  acre-feet, use  $\log Y = 0.40 \log X + 1.78$ .

Average runoff.--20 years (1945-65), 85,680 acre-feet per year (118 cfs).

Extremes.--1947-64: Maximum discharge, 4,510 cfs June 3, 1952; minimum recorded, 1.3 cfs Sept. 4, 6, 1956.

Remarks.--Diversions for irrigation above station, including transmountain diversions to Sevier Lake basin. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1948	1,640	3,490	3,610	2,770	5,640	5,420	3,570	19,720	13,230	1,800	1,020	327	62,240
1949	1,180	1,830	1,890	1,710	2,110	7,380	10,770	30,730	44,550	8,800	4,390	1,340	116,700
1950	2,280	2,950	2,180	2,140	4,860	4,230	3,060	10,480	10,670	5,470	1,210	1,410	50,940
1951	1,360	2,250	2,960	2,150	2,040	1,920	1,410	15,510	23,020	3,390	8,800	1,850	66,660
1952	3,770	3,010	2,540	2,490	4,590	10,330	20,980	98,400	125,900	18,660	6,200	4,200	301,100
1953	3,540	3,630	3,840	5,180	5,270	5,130	2,900	3,150	32,020	5,490	6,830	1,830	78,810
1954	3,260	3,620	2,710	3,050	4,710	3,220	3,140	8,590	1,860	884	541	1,780	37,360
1955	1,320	1,730	2,120	1,840	1,740	6,620	2,360	4,190	5,680	786	3,370	334	32,090
1956	711	1,030	2,010	2,730	2,510	2,410	1,320	13,840	7,520	1,150	438	171	35,840
1957	594	950	924	1,360	3,260	1,840	1,460	8,460	86,280	19,420	9,080	3,460	137,100
1958	7,350	11,270	3,940	3,810	7,080	5,910	14,490	69,280	55,290	2,350	1,740	2,470	185,000
1959	1,540	2,390	3,390	2,550	3,630	2,550	1,670	1,510	2,710	367	506	644	23,460
1960	752	1,370	1,340	1,350	1,650	6,370	3,160	9,020	9,800	456	119	615	36,010
1961	4,380	1,900	1,390	1,390	1,470	1,960	1,800	3,530	2,110	354	3,100	9,970	33,350
1962	2,640	3,350	2,490	2,450	5,620	5,010	12,610	27,480	37,800	7,080	1,600	1,510	109,600
1963	2,980	2,360	1,950	1,850	3,550	1,630	873	7,860	9,930	805	4,190	4,310	42,290
1964	1,360	1,540	1,470	1,240	2,100	2,750	1,220	15,530	18,610	2,980	2,680	438	51,920

Estimated monthly and annual runoff, in acre-feet

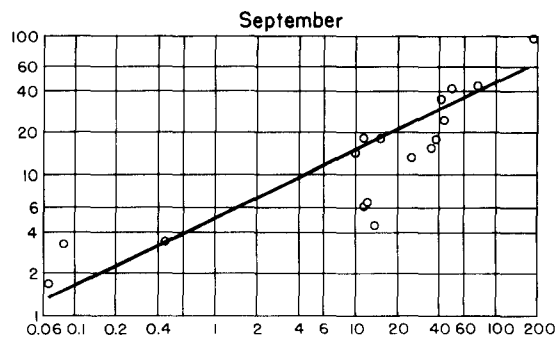
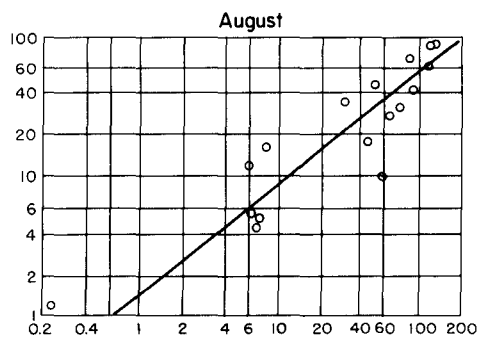
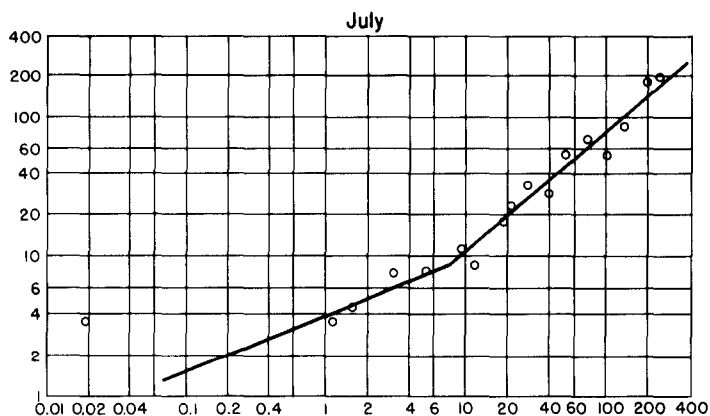
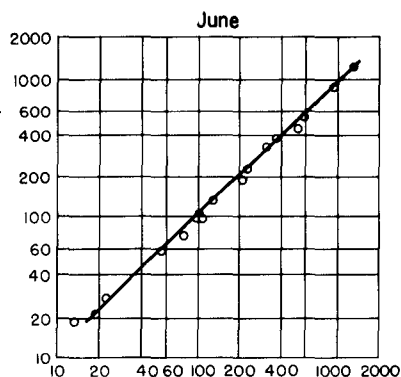
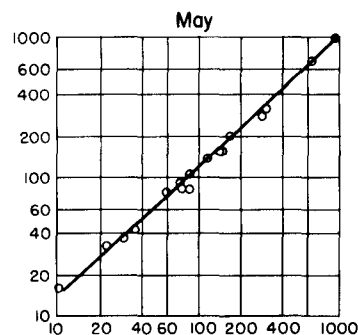
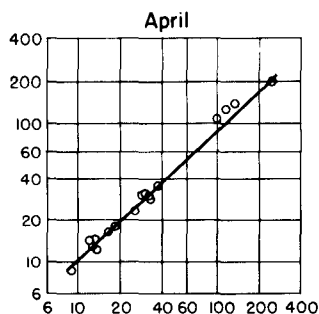
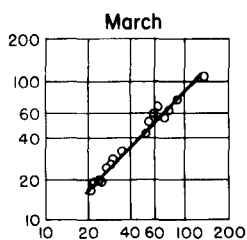
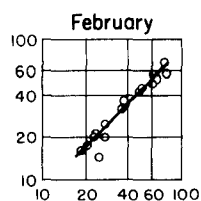
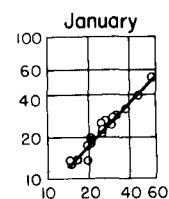
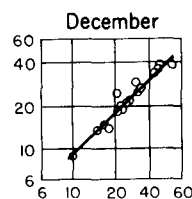
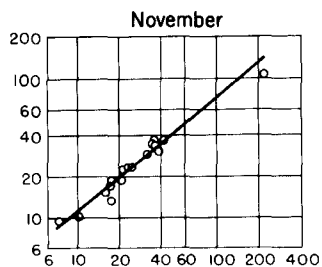
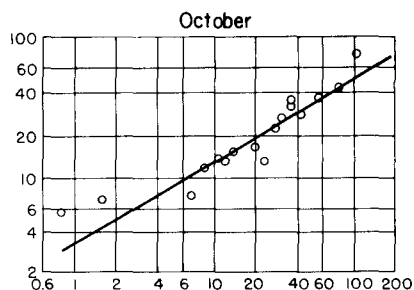
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1946	2,500	2,700	1,900	1,600	3,500	5,100	9,600	22,600	8,300	1,200	4,200	920	64,120
1947	2,300	4,100	3,100	2,000	4,800	3,500	3,200	36,300	25,500	4,300	9,500	2,400	101,000
1965	410	1,300	2,700	3,100	2,800	2,700	5,100	20,500	72,000	26,300	8,000	3,100	148,000

# GREEN RIVER BASIN

San Rafael River near Castle Dale, Utah.- Continued. Runoff relations  
for San Rafael River near Castle Dale versus San Rafael River near Green River

SAN RAFAEL RIVER NEAR CASTLE DALE

RUNOFF, IN HUNDREDS OF ACRE- FEET



RUNOFF, IN HUNDREDS OF ACRE- FEET

SAN RAFAEL RIVER NEAR GREEN RIVER

DIRTY DEVIL RIVER BASIN

9-3315. Ivie Creek above diversions, near Emery, Utah

Location.--Lat 38°45'30", long 111°25'15", in NW¼NW¼ sec.1, T.24 S., R.4 E., on right bank 1½ miles downstream from Clear Creek and 14 miles southwest of Emery. Altitude of gage is 7,100 ft (by barometer).

Drainage area.--50 sq mi, approximately.

Records available.--September 1950 to September 1961.

Estimates of streamflow.--May 1932 to August 1950, October 1961 to September 1965, based on relation of monthly runoff to that of 9-3245., Cottonwood Creek near Orangeville, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Ivie Creek above diversions, near Emery, Utah; X is monthly runoff of Cottonwood Creek near Orangeville, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.77	1.77	1.67	1.30	1.10	1.60	1.50	1.53	1.39	1.39	1.39	1.60
c	3.59	3.48	3.12	1.98	1.26	2.79	2.73	3.73	2.50	2.68	2.39	3.17

Average runoff.--33 years (1932-65), 3,199 acre-feet per year (4.42 cfs).

Extremes.--1950-61: Maximum discharge, about 700 cfs Aug. 16, 1955, from rating curve extended above 70 cfs by logarithmic plotting; no flow at times.

Remarks.--Flow partly regulated by Sheep Valley Reservoir (capacity, 482 acre-feet). Small diversion for irrigation of 200 acres of meadow above station. Estimated values of annual runoff are probably accurate within 25 percent.

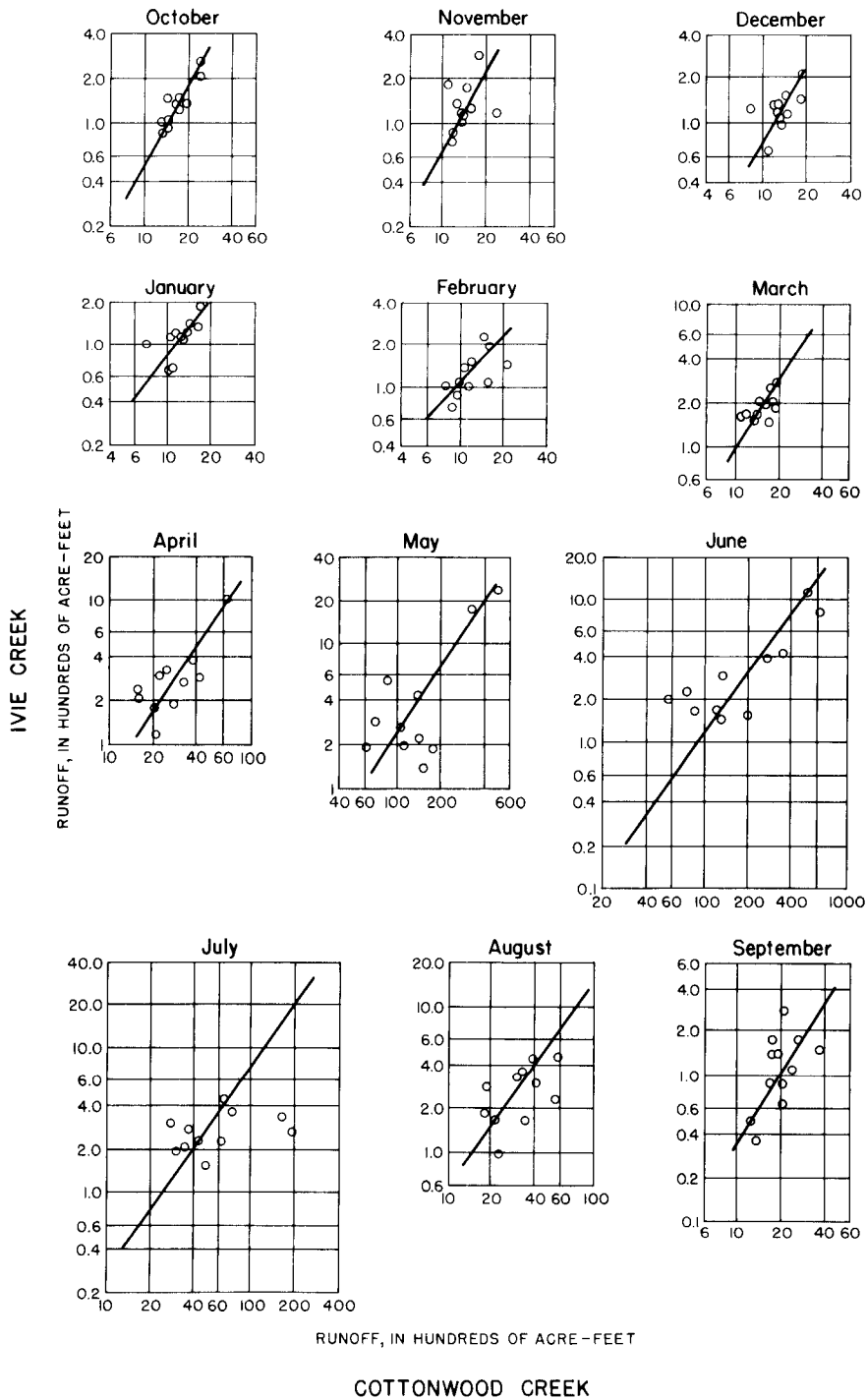
Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	-	-	-	-	-	-	-	-	-	174	-
1951	148	174	152	122	143	201	117	137	158	223	444	153	2,170
1952	146	104	99	107	109	204	1,000	2,440	809	338	468	188	6,010
1953	253	286	215	184	194	277	327	284	383	362	304	79	3,150
1954	132	128	113	144	222	257	280	220	200	205	167	102	2,170
1955	106	138	131	111	109	168	232	193	284	155	169	108	1,900
1956	91	89	109	111	105	147	185	189	163	232	97	43	1,560
1957	85	77	65	67	88	160	209	555	1,120	265	238	216	3,140
1958	203	120	145	129	145	185	371	1,750	415	442	362	133	4,400
1959	124	114	133	117	133	152	173	190	168	198	187	58	1,750
1960	103	183	124	98	104	198	265	444	144	275	282	213	2,430
1961	130	116	117	66	72	168	293	263	221	300	340	340	2,430

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1932	-	-	-	-	-	-	-	620	310	370	250	90	-
1933	90	110	70	40	60	110	150	130	590	710	400	90	2,550
1934	40	70	90	70	80	130	720	140	20	40	80	20	1,500
1935	30	40	50	60	80	120	180	210	1,000	400	200	70	2,440
1936	60	100	60	70	90	120	750	2,000	310	480	390	130	4,560
1937	110	150	110	80	110	170	370	1,300	230	430	280	190	3,530
1938	120	100	110	100	120	200	660	900	350	230	240	130	3,260
1939	110	130	110	100	100	620	980	900	130	150	140	110	3,570
1940	110	80	80	70	100	160	280	1,500	160	140	100	130	2,910
1941	100	100	110	90	100	190	190	1,300	540	500	330	150	3,700
1942	330	310	230	160	160	400	1,300	960	530	440	240	100	5,160
1943	120	130	150	120	140	230	1,100	460	160	220	290	80	3,200
1944	110	110	110	80	110	170	200	1,000	800	840	260	110	3,900
1945	130	130	130	110	120	130	150	580	330	500	390	120	2,820
1946	140	180	140	120	120	280	1,300	640	140	200	180	70	3,510
1947	110	90	80	100	140	320	450	1,100	230	470	390	160	3,640
1948	160	160	130	110	120	160	190	600	180	240	230	90	2,370
1949	130	170	160	110	130	210	820	940	520	670	320	110	4,290
1950	140	150	140	120	140	220	440	440	190	270	220	-	2,640
1962	230	240	160	110	170	360	1,100	540	270	530	320	140	4,170
1963	180	150	90	50	110	150	120	230	120	190	280	160	1,830
1964	120	100	70	70	90	80	110	440	250	400	270	90	2,090
1965	70	100	80	100	130	180	280	310	820	2,900	1,400	440	6,810

# **DIRTY DEVIL RIVER BASIN** **Ivie Creek above diversions, near Emery, Utah.---Continued.** **Runoff relations for Ivie Creek versus Cottonwood Creek**



# THE GREAT BASIN

## BEAR RIVER BASIN

10-120. Mill Creek at Utah-Wyoming State line

Location.--Lat 40°59'30", long 110°50'30", in W½ sec.17, T.3 N., R.10 E., in Utah, on right bank 2,000 ft upstream from State line and 19½ miles south of Evanston, Wyo. Altitude of gage is 7,860 ft (from river-profile map).

Drainage area.--59 sq mi, approximately.

Records available.--October 1949 to September 1962. Equivalent records available, except during irrigation season (April, May and June), at 10-125., Mill Creek near Evanston, Wyo. July 1942 to September 1948.

Estimates of streamflow.--October 1904 to June 1942, April through June 1943 to 1948, October 1948 to September 1949, and October 1962 to September 1965, based on relation of monthly runoff to that of 10-1285., Weber River near Oakley, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Mill Creek at Utah-Wyoming State line; X is monthly runoff of Weber River near Oakley, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.99	0.99	0.99	0.99	0.99	1.01	1.28	0.93	1.18	1.40	0.99	1.01
c	.84	.84	.78	.78	.78	.82	1.81	.34	1.68	2.76	1.05	1.08

Average runoff.--61 years (1904-65), 26,310 acre-feet per year (36.3 cfs).

Extremes.--1942-48; 1949-62: Maximum discharge, 690 cfs June 7, 1957; minimum, 0.9 cfs Nov. 11, 1951, result of freezeup.

Remarks.--Three small diversions for irrigation upstream from station. Estimated values of annual runoff are probably accurate within 20 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1942	-	-	-	-	-	-	-	-	-	962	468	408	-
1943	522	482	553	615	611	1,150	-	-	-	881	431	291	-
1944	497	452	443	418	357	369	-	-	-	988	382	265	-
1945	702	559	444	464	500	553	-	-	-	1,790	1,460	685	-
1946	633	153	799	774	666	1,190	-	-	-	842	610	413	-
1947	650	833	738	615	627	994	-	-	-	979	747	577	-
1948	1,110	1,030	922	774	573	837	-	-	-	541	364	249	-
1950	668	529	435	393	411	567	2,110	10,030	12,010	2,060	638	734	30,580
1951	667	858	668	559	571	643	2,090	8,730	6,790	1,460	859	434	24,330
1952	1,070	629	659	595	480	567	3,820	14,960	11,530	1,850	811	561	37,530
1953	450	424	582	559	467	683	1,540	4,690	11,350	1,380	696	282	23,100
1954	420	551	511	492	500	536	2,250	6,110	1,540	431	238	293	13,870
1955	354	386	341	328	305	367	802	6,960	3,490	557	460	314	14,660
1956	404	458	641	500	430	652	2,650	10,780	4,960	627	410	272	22,780
1957	407	449	440	389	377	472	853	7,760	19,580	3,470	845	531	35,570
1958	747	669	652	608	482	517	1,160	10,310	3,540	381	247	224	19,540
1959	362	428	419	440	451	527	1,470	5,180	8,600	1,590	424	487	20,380
1960	904	559	384	441	452	788	2,870	7,310	4,860	593	280	300	19,740
1961	476	505	430	430	444	586	1,520	5,600	1,940	252	314	481	12,980
1962	682	601	530	492	511	639	3,730	8,910	8,070	1,280	362	342	26,150

Estimated monthly and annual runoff, in acre-feet

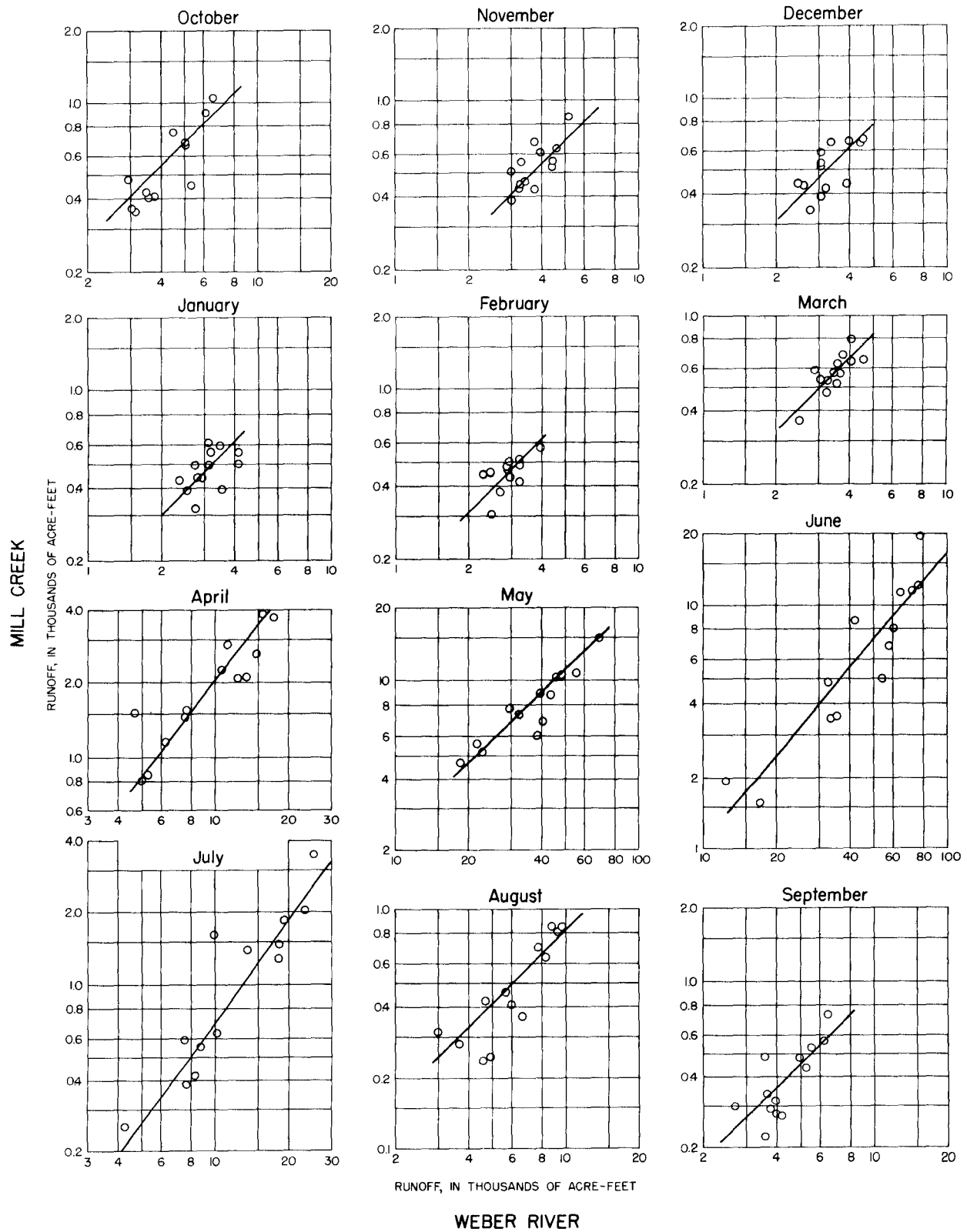
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1905	670	580	570	520	460	650	1,400	5,400	7,000	660	360	320	18,600
1906	600	480	430	410	340	500	2,300	10,200	10,600	2,600	780	620	29,900
1907	620	510	610	630	570	930	5,100	10,900	15,200	16,000	1,100	570	52,700
1908	710	580	710	550	460	530	1,900	5,900	8,900	2,400	810	490	23,900
1909	1,100	720	660	630	500	590	1,800	10,200	22,500	4,900	1,200	880	45,700
1910	940	910	910	810	640	1,800	8,700	12,800	5,000	570	410	390	33,900
1911	660	550	550	710	730	710	2,300	9,500	12,400	1,500	460	350	30,400
1912	710	620	720	620	670	700	1,000	7,900	15,600	2,200	820	650	32,200
1913	1,100	990	740	660	600	850	3,000	11,200	5,700	1,100	620	700	27,300
1914	1,200	880	770	820	690	970	4,100	16,800	12,000	1,800	700	490	41,200
1915	990	720	720	760	740	840	3,000	6,200	6,700	880	380	470	22,400
1916	690	750	850	620	610	1,000	4,300	10,000	12,400	1,500	620	430	33,800
1917	1,000	780	940	470	510	720	1,600	7,600	17,200	6,100	680	500	38,100
1918	640	610	630	630	530	800	1,500	7,400	10,200	600	380	330	24,200
1919	850	520	620	470	490	610	2,000	10,800	3,200	340	330	360	20,600
1920	760	620	530	530	550	660	940	12,900	12,500	1,400	610	460	32,500

BEAR RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Mill Creek at Utah-Wyoming State line.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	870	880	720	660	640	1,100	2,900	11,700	21,700	3,000	810	630	45,600
1922	820	730	730	660	570	700	1,400	12,800	17,800	1,500	730	480	38,900
1923	610	620	690	680	650	850	1,600	12,200	10,700	2,900	670	510	32,700
1924	900	630	590	570	590	760	1,500	9,700	2,400	330	320	280	18,600
1925	470	460	540	480	470	750	2,700	10,800	4,600	850	490	500	23,100
1926	870	620	650	470	530	820	3,700	10,600	3,600	450	410	300	23,000
1927	480	450	520	520	480	590	1,700	10,000	10,200	1,200	560	460	27,200
1928	770	800	640	570	490	850	1,700	15,300	5,600	800	470	340	28,300
1929	530	540	570	520	510	640	1,200	10,300	11,200	1,600	700	590	28,900
1930	620	510	570	470	470	710	3,400	7,400	6,000	650	630	440	21,900
1931	870	460	480	520	470	500	970	5,900	1,900	210	220	180	12,700
1932	330	380	480	470	490	620	1,900	11,900	11,900	1,300	490	340	30,600
1933	470	430	440	430	390	460	830	4,600	12,500	670	390	250	21,900
1934	380	360	400	410	370	570	2,200	4,200	460	100	170	170	9,800
1935	300	350	430	430	390	500	1,400	5,800	11,800	830	470	300	23,000
1936	420	420	480	470	440	550	3,900	16,200	5,700	960	760	530	30,800
1937	570	530	520	470	430	550	1,700	12,500	3,100	570	430	330	21,700
1938	590	610	570	520	470	610	3,000	9,800	7,900	810	500	420	25,800
1939	640	660	680	570	510	760	3,000	8,400	2,300	420	340	280	18,600
1940	470	400	380	360	360	530	1,500	8,800	1,600	290	270	270	15,200
1941	620	460	490	470	400	560	940	8,300	5,400	660	520	380	19,200
1942	650	620	600	540	480	600	3,800	7,400	8,200	-	-	-	24,700
1943	-	-	-	-	-	-	5,100	9,600	6,600	-	-	-	26,800
1944	-	-	-	-	-	-	820	10,000	9,600	-	-	-	24,600
1945	-	-	-	-	-	-	850	7,700	5,800	-	-	-	21,500
1946	-	-	-	-	-	-	5,800	9,600	5,100	-	-	-	26,600
1947	-	-	-	-	-	-	1,900	11,800	6,300	-	-	-	26,800
1948	-	-	-	-	-	-	1,600	11,800	5,200	-	-	-	25,000
1949	440	460	530	530	460	630	3,300	9,900	8,100	1,000	550	390	26,300
1963	500	410	450	430	470	480	950	8,100	6,000	730	430	390	19,300
1964	500	470	470	400	310	370	760	9,900	8,500	1,700	600	420	24,400
1965	490	460	560	490	470	450	1,700	9,000	12,600	4,500	1,100	840	32,660

**BEAR RIVER BASIN**  
**Mill Creek at Utah-Wyoming State line.—Continued.**  
**Runoff relations for Mill Creek versus Weber River**



BEAR RIVER BASIN

10-990. High Creek near Richmond, Utah

Location.--Lat 41°59', long 111°45', in SW¼SE¼ sec. 5, T.14 N., R.2 E., on right bank at forest boundary, 2 miles downstream from North Fork and 5 miles northeast of Richmond. Altitude of gage is 5,250 ft (from topographic map).

Drainage area.--16.2 sq mi.

Records available.--April to September 1944, April to September 1945 (monthly discharge only, published in WSP 1314), April 1946 to September 1952.

Estimates of streamflow.--March 1940 to March 1944, October 1944 to March 1945, October 1945 to March 1946, and October 1955 to September 1965, based on relation of monthly runoff to that of 10-930, Cub River near Preston, Idaho. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of High Creek near Richmond, Utah; X is monthly runoff of Cub River near Preston, Idaho; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.40	1.55	1.55	1.55	1.52	1.50	0.78	1.00	1.00	1.00	1.23	1.23
c	1.79	2.18	2.18	2.18	2.00	1.96	-.54	.48	.48	.43	1.28	1.28

Average runoff.--22 years (1940-52, 1955-65), 21,575 acre-feet per year (29.8 cfs).

Extremes.--1944-52: Maximum discharge, 250 cfs May 24, 1950; minimum observed, 2.6 cfs Jan. 5, 1950, result of ice jams upstream.

Remarks.--No diversion above station. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

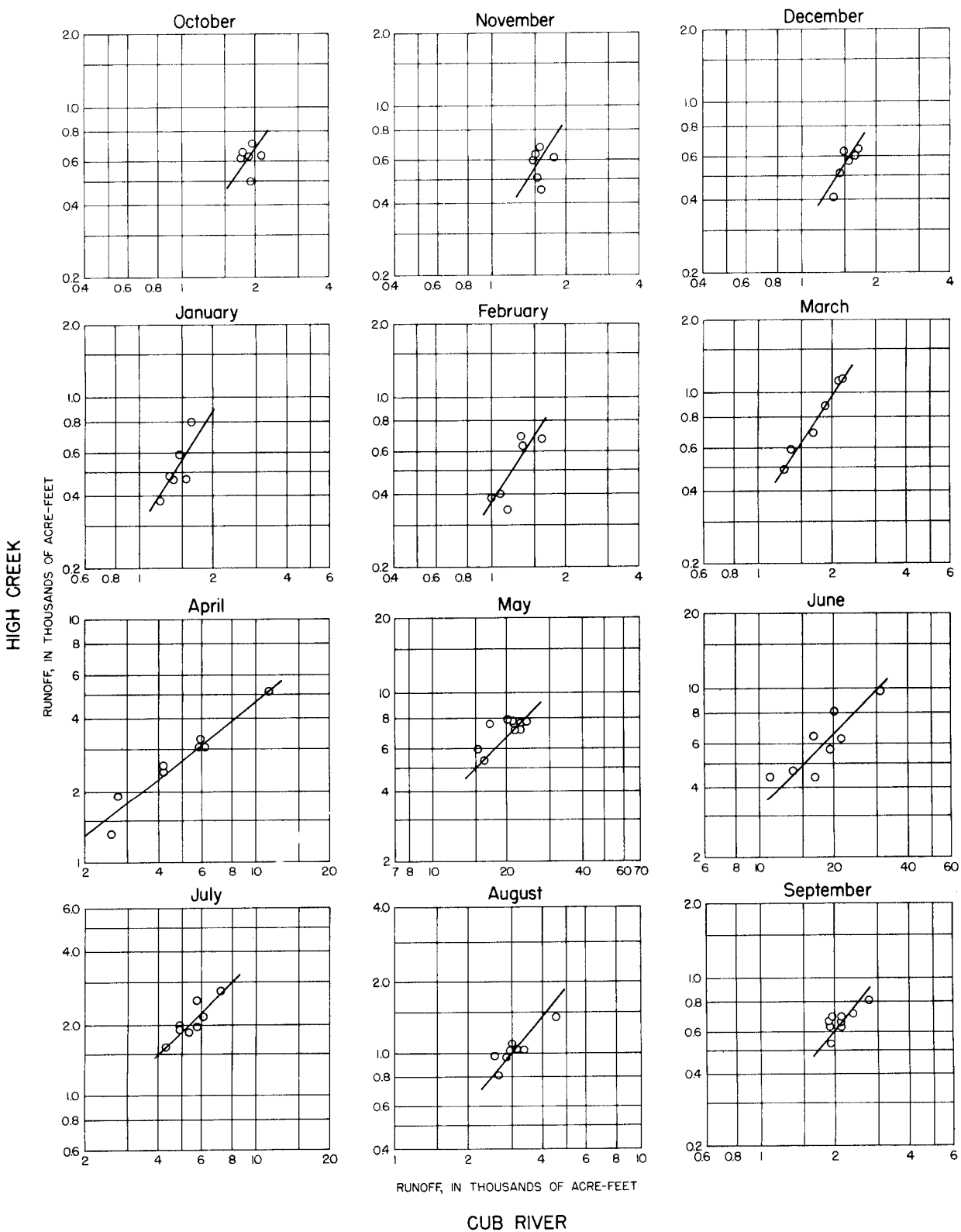
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1944	-	-	-	-	-	-	1,900	5,360	6,380	1,900	970	668	-
1945	-	-	-	-	-	-	1,320	5,920	8,170	2,770	1,110	696	-
1946	-	-	-	-	-	-	5,160	7,120	6,190	2,520	1,060	647	-
1947	706	746	649	455	626	1,110	2,570	7,630	4,640	1,910	946	689	22,680
1948	619	629	633	586	342	491	2,420	7,820	6,380	2,180	1,030	702	23,830
1949	626	503	516	476	389	885	3,060	7,470	4,480	1,600	811	535	21,350
1950	656	671	566	789	684	1,130	3,040	7,520	9,750	4,270	1,430	801	31,310
1951	638	610	600	462	674	687	3,060	7,180	4,470	1,940	1,020	626	21,970
1952	496	453	419	383	398	590	3,280	7,650	5,630	1,870	1,010	639	22,820

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1940	-	-	-	-	-	1,000	2,300	6,300	2,300	1,000	510	380	-
1941	350	340	300	290	350	700	1,700	5,600	2,700	1,100	570	410	14,410
1942	430	460	420	410	420	540	3,500	4,200	5,100	1,600	770	480	18,330
1943	460	450	440	450	540	1,000	5,300	7,100	7,000	2,800	1,200	620	27,400
1944	620	700	570	450	510	540	-	-	-	-	-	-	20,570
1945	520	500	400	370	390	560	-	-	-	-	-	-	22,720
1946	590	680	610	600	540	1,400	-	-	-	-	-	-	27,120
1956	460	440	720	760	490	990	3,400	7,600	5,200	1,700	860	550	23,170
1957	520	490	420	350	450	750	1,800	5,300	8,500	3,000	1,100	690	23,370
1958	570	510	470	420	530	680	2,000	7,600	5,300	1,700	840	570	21,190
1959	510	510	460	380	370	540	1,800	4,000	5,200	1,600	740	530	16,640
1960	640	620	460	360	370	810	2,600	5,200	3,200	1,200	620	470	16,550
1961	430	440	370	310	310	520	1,400	4,200	2,400	1,000	520	380	12,280
1962	350	380	360	340	1,000	770	4,300	6,800	4,700	1,800	840	610	22,250
1963	550	490	420	330	400	530	1,400	5,200	4,300	1,500	740	510	16,370
1964	430	450	380	340	350	390	1,800	5,100	7,600	2,800	1,000	620	21,260
1965	560	520	670	500	550	620	2,300	5,000	10,000	4,000	1,500	840	27,060



**BEAR RIVER BASIN**  
**High Creek near Richmond, Utah.-Continued.**  
**Runoff relations for High Creek versus Cub River**



# BEAR RIVER BASIN

10-1050. East Fork Little Bear River below Pole Creek, near Avon, Utah<sup>1/</sup>

Location.--Lat 41°31', long 111°45', in NE¼ sec.17, T.9 N., R.2 E., 0.2 mile downstream from Porcupine Creek, 0.4 mile upstream from Pole Creek, and 4 miles east of Avon. Altitude of gage is 5,250 ft (from topographic map).

Drainage area.--50 sq mi, approximately.

Records available.--January 1938 to September 1950.

Estimates of streamflow.--June 1896 to December 1937, and October 1950 to September 1965, based on relation of monthly runoff to that of 10-1090., Logan River above State dam, near Logan, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of East Fork Little Bear River near Avon, Utah; X is monthly runoff of Logan River above State dam, near Logan, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.00	1.00	1.00	1.00	1.39	1.91	1.21	1.21	1.10	0.99	1.00	1.00
c	1.05	1.01	1.00	.96	2.35	4.16	1.20	1.61	1.53	1.09	1.12	1.10

Average runoff.--69 years (1897-1965), 31,700 acre-feet per year (43.8 cfs).

Extremes.--1938-50: Maximum discharge, 960 cfs Apr. 18, 1946; minimum, 5.0 cfs Feb. 14, 1949.

Remarks.--No diversions above station. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1938	-	-	-	754	730	2,010	8,580	10,290	3,410	1,810	1,230	1,070	-
1939	676	694	686	676	587	2,120	5,870	3,610	1,440	839	628	581	18,410
1940	643	554	567	555	541	1,360	4,020	2,620	952	653	505	515	13,480
1941	578	499	483	470	507	855	3,300	4,330	1,200	740	570	511	14,040
1942	536	549	612	568	543	815	6,560	5,640	2,830	1,170	875	678	21,380
1943	615	595	651	704	996	1,640	12,290	6,850	3,390	1,520	1,020	774	31,040
1944	772	736	668	635	587	720	3,080	7,190	3,280	1,430	863	704	20,660
1945	664	666	666	685	669	946	3,310	8,840	7,580	2,180	1,270	926	28,400
1946	855	954	1,220	1,280	1,010	2,830	16,980	7,860	2,950	1,530	1,080	879	39,430
1947	948	871	885	744	722	1,730	5,690	5,720	2,280	1,230	891	748	22,460
1948	736	698	674	641	657	718	6,300	15,430	3,950	1,590	992	807	33,190
1949	819	772	756	716	678	1,770	10,680	8,850	3,280	1,530	996	813	31,660
1950	895	813	742	1,050	1,100	2,030	11,440	14,280	5,180	1,940	1,260	936	41,670

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1896	-	-	-	-	-	-	-	-	8,300	2,700	1,700	1,300	-
1897	1,400	1,400	1,400	1,100	1,500	3,300	10,400	21,100	5,500	2,500	1,700	1,500	52,800
1898	1,700	1,500	1,300	1,100	1,400	2,900	10,200	8,900	3,600	1,700	1,300	1,000	36,600
1899	1,100	1,000	920	1,600	2,400	6,500	11,700	10,000	8,400	5,200	2,600	2,000	53,400
1900	2,000	1,900	1,800	1,900	2,500	6,300	9,400	11,000	3,800	1,800	1,300	1,100	44,800
1901	1,200	1,200	1,100	1,100	1,500	3,200	7,100	14,300	3,500	1,600	1,300	1,100	38,200
1902	1,200	1,100	1,100	840	1,100	2,300	5,300	8,100	5,100	1,400	1,100	980	29,600
1903	1,100	1,100	1,100	1,200	1,500	3,500	7,000	6,900	4,800	2,100	1,400	1,200	32,900
1904	990	1,100	880	570	1,400	10,000	11,200	13,800	5,100	2,500	1,600	1,300	50,400
1905	1,200	1,100	1,100	1,000	1,200	2,900	5,100	4,900	2,800	1,500	1,200	940	24,900
1906	930	860	850	810	850	1,500	7,900	11,100	4,700	2,200	1,200	860	33,800
1907	780	720	880	840	1,500	7,400	22,800	18,700	9,000	4,300	2,200	1,600	70,700
1908	1,500	1,400	1,200	1,200	1,400	2,500	7,000	5,000	3,800	1,900	1,100	750	28,800
1909	850	710	630	970	790	1,700	12,800	16,000	9,200	3,700	2,200	1,200	50,800
1910	980	1,200	940	850	690	9,300	24,300	19,300	4,100	1,800	1,400	1,100	66,000
1911	1,200	980	920	900	1,500	3,500	11,700	16,000	7,100	2,400	1,300	960	48,500
1912	1,000	880	710	760	1,000	2,400	7,600	13,300	8,900	3,500	1,500	1,200	42,800
1913	1,100	920	880	890	1,100	2,900	10,800	8,500	2,300	1,300	1,000	880	32,600
1914	920	860	820	830	930	2,600	11,800	14,200	4,200	1,800	1,100	990	41,000
1915	1,000	940	800	760	840	1,600	7,100	3,900	1,700	930	720	670	21,000
1916	730	700	650	680	850	4,300	13,700	10,900	4,200	2,200	1,200	960	41,100
1917	1,000	900	860	790	830	1,500	5,300	8,300	5,300	3,000	1,500	1,200	30,500
1918	1,100	940	1,000	880	990	3,600	8,400	7,700	3,500	1,400	1,000	840	31,400
1919	920	840	820	760	850	1,700	5,700	8,800	1,900	940	740	670	24,600
1920	720	680	670	700	830	1,400	4,800	13,000	5,400	1,900	1,200	990	32,300

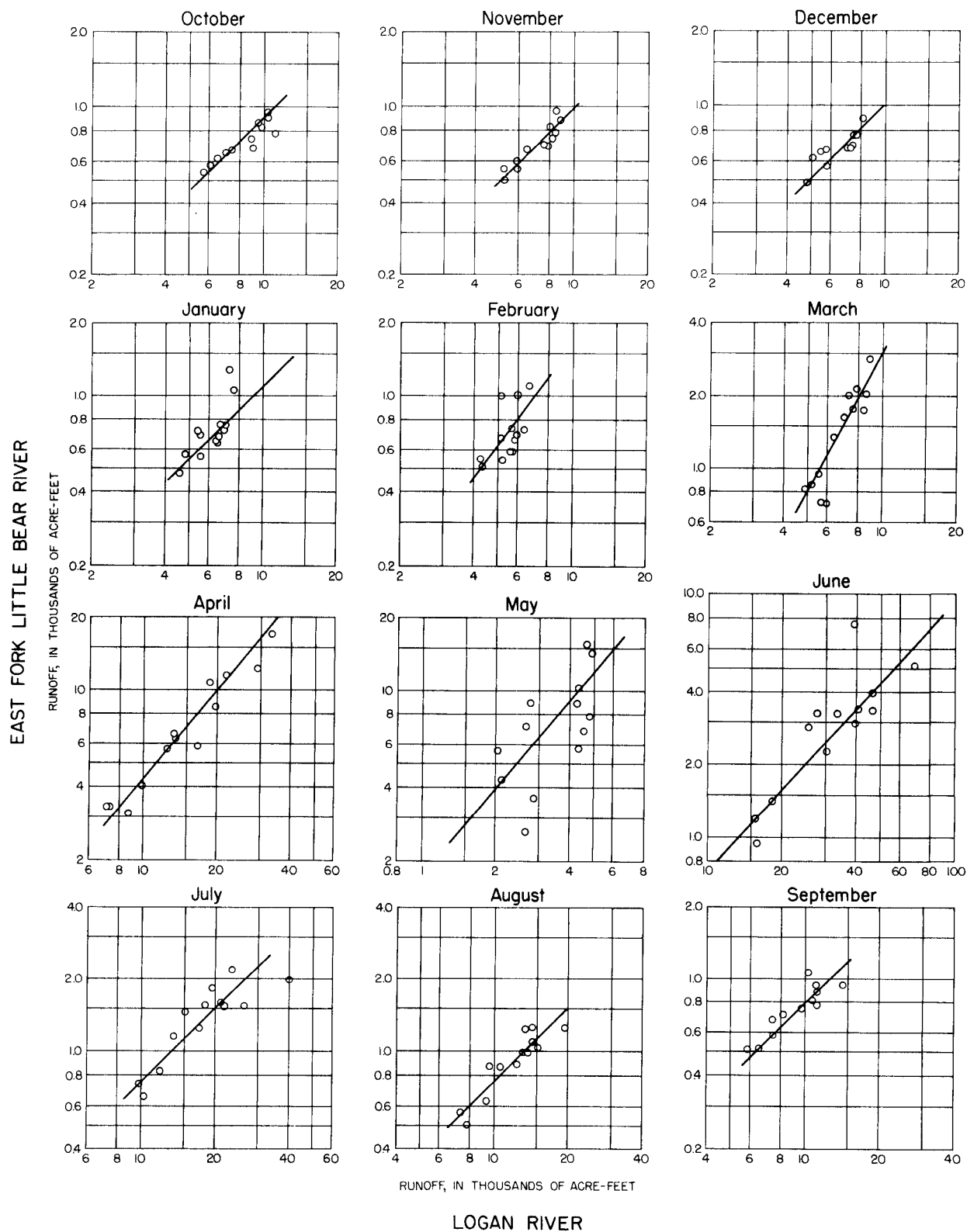
<sup>1/</sup> Previously published as East Fork of Little Bear River near Avon, Utah.

BEAR RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for East Fork Little Bear River below Pole Creek, near Avon, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	990	960	870	850	980	3,600	9,700	14,700	6,800	2,700	1,500	1,200	44,800
1922	1,200	1,000	1,100	990	1,100	2,700	6,200	12,300	5,300	2,000	1,300	1,100	36,300
1923	1,100	950	940	970	960	1,700	7,700	14,800	4,400	2,100	1,300	1,100	38,000
1924	1,100	1,100	960	900	1,100	1,700	9,700	9,500	1,700	1,000	800	700	30,300
1925	780	700	670	670	730	1,600	7,500	9,700	2,500	1,400	940	810	28,000
1926	780	750	720	710	780	2,000	8,500	6,100	1,300	860	680	610	23,800
1927	660	640	630	660	680	1,400	6,400	8,000	4,100	1,900	1,100	910	27,100
1928	950	980	890	870	960	2,900	6,400	13,200	2,900	1,400	1,000	840	33,300
1929	880	810	760	790	810	1,700	4,900	8,400	3,400	1,600	1,000	880	25,900
1930	900	810	780	760	830	1,500	7,700	5,200	2,000	1,000	790	670	22,900
1931	710	640	650	650	640	1,100	3,200	3,200	860	560	470	410	13,100
1932	440	450	470	510	490	1,000	7,100	13,100	5,100	2,300	1,200	990	33,200
1933	970	870	780	790	770	1,300	4,300	5,000	4,200	1,400	940	770	22,100
1934	750	690	670	650	660	1,500	5,700	2,300	610	480	410	380	14,800
1935	410	440	450	470	490	800	4,900	6,300	3,200	1,300	820	650	20,200
1936	630	600	550	560	600	1,100	12,700	19,100	4,500	1,800	1,200	930	44,300
1937	940	840	780	730	780	1,300	4,300	8,700	2,600	1,300	920	750	23,900
1938	790	750	730	-	-	-	-	-	-	-	-	-	32,200
1951	1,100	1,100	1,000	930	1,200	2,400	14,700	12,500	4,000	1,900	1,200	980	43,000
1952	1,000	940	890	860	940	1,600	10,000	12,900	4,000	1,700	1,100	940	36,900
1953	950	870	840	850	890	1,700	5,100	4,300	3,600	1,600	1,000	810	22,500
1954	820	790	740	740	750	1,500	5,700	6,000	1,300	900	660	560	20,500
1955	600	580	550	580	560	840	3,300	6,300	2,300	1,100	760	610	18,100
1956	660	640	900	870	850	2,100	11,600	11,800	3,600	1,400	940	760	36,100
1957	800	740	720	700	800	1,600	4,800	7,400	4,400	1,800	1,000	830	25,600
1958	870	800	780	730	840	1,500	5,800	11,200	3,300	1,300	940	780	28,800
1959	770	750	710	680	720	1,300	5,700	5,300	2,500	1,100	780	660	21,000
1960	760	680	640	640	670	1,800	7,800	6,400	1,800	930	700	610	23,400
1961	640	640	600	600	600	950	3,000	3,500	1,100	610	470	420	13,100
1962	480	480	480	500	740	1,000	13,800	9,500	2,700	1,300	890	810	32,700
1963	810	740	670	630	970	1,300	4,100	6,900	2,400	1,100	760	670	21,000
1964	680	650	600	600	610	870	3,800	6,400	3,300	1,600	970	790	20,900
1965	780	730	820	820	1,100	1,800	8,500	9,200	5,500	2,400	1,300	1,100	34,050

**BEAR RIVER BASIN**  
**East Fork Little Bear River below Pole Creek, near Avon, Utah.-- Continued.**  
**Runoff relations for East Fork Little Bear River versus Logan River**



BEAR RIVER BASIN

10-1120. Blacksmith Fork at Hardware Ranch, near Hyrum, Utah

Location.--Lat 41°37', long 111°37', in NE¼ sec.17, T.10 N., R.3 E., 0.6 mile upstream from South Cottonwood Canyon, 2.1 miles downstream from Rock Creek, and 12½ miles east of Hyrum. Altitude of gage is 5,340 ft (from topographic map).

Drainage area.--130 sq mi, approximately.

Records available.--July 1943 to September 1950.

Estimates of streamflow.--June 1896 to June 1943 and October 1950 to September 1965, based on relation of monthly runoff to that of 10-1090., Logan River above State dam, near Logan, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Blacksmith Fork at Hardware Ranch, near Hyrum, Utah; X is monthly runoff of Logan River above State dam, near Logan, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.00	1.00	1.00	1.00	1.00	1.00	0.90	1.00	1.00	0.87	1.00	1.00
c	.33	.29	.26	.26	.23	.17	-.14	.65	.77	.01	.42	.35

Average runoff.--69 years (1896-1965), 68,120 acre-feet per year (94.1 cfs).

Extremes.--1943-50: Maximum discharge, 488 cfs Apr. 18, 1946; minimum, 36 cfs Mar. 12, 1948.

Remarks.--Small diversion for irrigation of about 200 acres above station. Estimated values of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1943	-	-	-	-	-	-	-	-	-	5,020	4,760	4,180	-
1944	4,170	3,950	3,970	3,570	3,090	3,340	4,250	5,560	4,630	4,130	3,880	3,620	48,160
1945	3,710	3,610	3,460	3,460	3,430	4,040	4,370	6,130	6,770	4,420	4,180	3,600	51,180
1946	3,670	3,990	4,270	4,270	3,340	6,580	15,420	11,470	7,600	6,700	6,180	5,450	78,940
1947	5,390	4,930	4,380	3,660	3,730	5,090	5,040	6,760	5,050	4,780	4,570	4,160	57,550
1948	4,130	3,800	3,660	3,480	3,180	3,800	8,680	11,160	6,820	5,640	5,340	4,710	64,400
1949	4,630	4,360	4,150	3,830	3,570	5,480	8,720	8,200	6,140	5,770	5,460	5,050	65,360
1950	4,900	4,460	4,330	4,810	4,170	5,920	11,550	12,680	10,530	8,040	7,450	6,480	85,320

Estimated monthly and annual runoff, in acre-feet

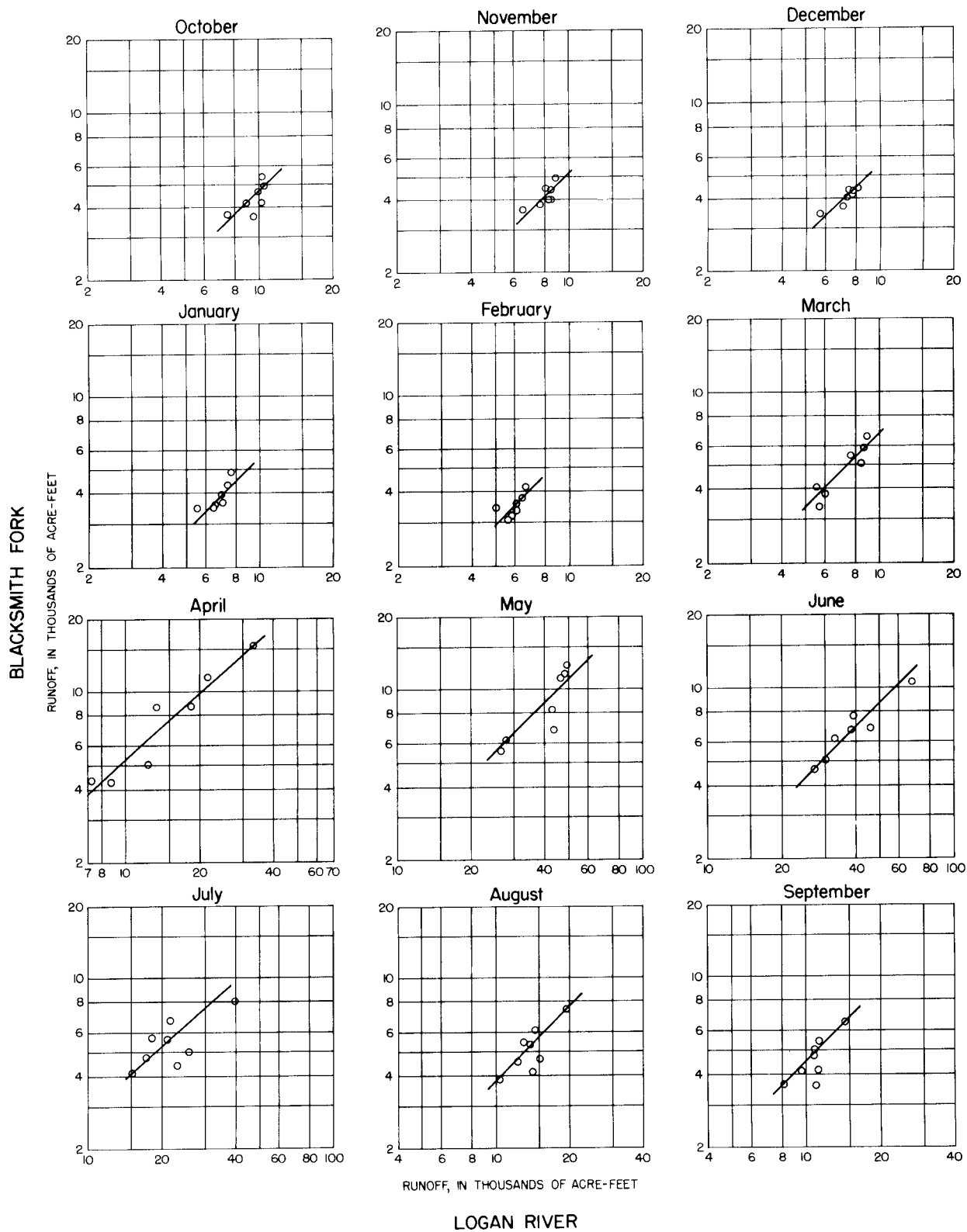
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1896	-	-	-	-	-	-	-	-	15,400	8,800	8,400	7,700	-
1897	7,500	7,300	7,500	5,800	5,500	7,100	10,100	17,800	10,600	8,200	8,800	8,400	105,000
1898	8,700	7,700	7,000	5,800	5,200	6,600	10,000	8,700	7,200	5,800	6,400	5,900	85,000
1899	5,700	5,400	5,000	8,000	7,600	10,000	10,900	9,600	15,600	15,700	13,300	11,100	118,000
1900	10,300	9,700	10,000	9,600	8,000	9,800	9,400	10,300	7,600	6,200	6,600	6,500	104,000
1901	6,300	6,100	6,000	5,800	5,400	7,000	7,700	12,800	7,000	5,700	6,800	6,500	83,100
1902	6,200	5,900	6,100	4,300	4,500	5,900	6,200	8,000	9,900	5,100	5,800	5,600	73,500
1903	5,800	5,700	6,100	5,800	5,600	7,200	7,600	7,000	9,300	7,100	7,200	6,800	81,200
1904	5,100	5,600	4,800	2,900	5,400	12,800	10,800	12,400	9,800	8,300	8,100	7,300	93,300
1905	6,500	5,900	5,900	5,300	4,700	6,600	5,900	5,300	5,800	5,200	5,900	5,300	68,300
1906	4,800	4,600	4,600	4,100	3,700	4,600	8,200	10,300	9,300	7,300	6,300	4,900	72,700
1907	4,000	3,800	4,800	4,300	5,500	10,800	18,100	16,000	16,500	13,300	11,200	8,900	117,000
1908	7,000	7,200	6,600	6,000	5,300	6,100	7,600	5,400	7,600	6,400	5,500	4,300	75,700
1909	4,400	3,800	3,500	4,900	3,500	5,000	11,800	14,100	17,000	11,800	10,900	6,800	97,500
1910	5,100	6,200	5,100	4,400	3,100	12,100	18,800	16,200	8,100	6,200	6,900	6,100	98,300
1911	6,000	5,200	5,200	4,600	5,500	7,200	10,900	14,000	13,200	7,900	6,400	5,400	91,300
1912	5,300	4,700	3,900	3,900	4,300	6,000	8,000	12,100	16,300	11,000	7,500	6,700	89,700
1913	5,500	4,900	4,800	4,600	4,300	6,600	10,300	8,300	4,900	4,800	5,100	5,000	69,100
1914	4,800	4,500	4,500	4,300	3,900	6,200	11,100	12,700	8,300	6,100	5,800	5,600	77,800
1915	5,400	4,900	4,400	3,900	3,600	4,800	7,600	4,400	3,600	3,500	3,700	3,800	53,600
1916	3,800	3,700	3,600	3,500	3,700	8,100	12,300	10,200	8,300	7,400	6,300	5,500	76,400
1917	5,300	4,700	4,700	4,100	3,600	4,600	6,200	8,200	10,200	9,700	7,700	6,700	75,700
1918	5,800	5,000	5,400	4,500	4,100	7,400	8,600	7,700	7,000	4,900	5,100	4,800	70,300
1919	4,800	4,500	4,500	3,900	3,700	5,000	6,500	8,600	4,100	3,500	3,700	3,900	56,700
1920	3,700	3,600	3,700	3,600	3,600	4,500	5,700	11,700	10,300	6,600	6,100	5,600	68,700
1921	5,100	5,100	4,700	4,400	4,400	7,300	9,600	13,000	12,900	8,800	7,800	6,900	89,600
1922	6,200	5,400	5,800	5,000	4,500	6,400	6,900	11,300	10,300	6,800	6,800	6,500	81,900
1923	5,500	5,000	5,100	4,900	4,000	5,000	8,100	13,200	8,600	7,000	6,700	6,200	79,300
1924	5,900	5,600	5,200	4,600	4,400	5,000	9,500	9,200	3,600	3,800	4,000	4,000	64,800
1925	4,000	3,700	3,700	3,500	3,300	4,900	7,900	9,300	5,200	4,900	4,800	4,600	59,800

BEAR RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Blacksmith Fork at Hardware Ranch, near Hyrum, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1926	4,000	4,000	4,000	3,700	3,400	5,400	8,700	6,300	2,900	3,300	3,400	3,500	52,600
1927	3,400	3,400	3,500	3,400	3,100	4,500	7,100	8,000	8,100	6,400	5,700	5,200	61,800
1928	4,900	5,200	4,900	4,500	4,000	6,600	7,100	12,000	6,000	5,000	5,100	4,800	70,100
1929	4,600	4,300	4,200	4,000	3,500	5,100	5,800	8,200	6,900	5,700	5,100	5,000	62,400
1930	4,700	4,300	4,300	3,900	3,600	4,600	8,100	5,500	4,300	3,800	4,000	3,800	54,900
1931	3,700	3,400	3,600	3,400	3,000	3,900	4,100	3,700	2,000	2,200	2,400	2,400	37,800
1932	2,300	2,300	2,600	2,600	2,500	3,900	7,700	11,800	9,900	7,600	6,300	5,600	65,100
1933	5,100	4,600	4,300	4,100	3,400	4,400	5,300	5,400	8,300	4,900	4,800	4,400	59,000
1934	3,900	3,700	3,700	3,300	3,100	4,600	6,600	2,900	1,400	1,900	2,100	2,200	39,400
1935	2,100	2,300	2,500	2,500	2,500	3,400	5,800	6,500	6,400	4,500	4,200	3,700	46,400
1936	3,300	3,200	3,000	2,900	2,900	3,900	11,800	16,100	8,900	6,100	5,900	5,300	73,300
1937	4,800	4,400	4,300	3,800	3,400	4,400	5,300	8,400	5,300	4,800	4,700	4,300	57,900
1938	4,100	4,000	4,000	3,800	3,300	4,900	9,600	9,600	6,900	5,100	5,100	4,600	65,000
1939	4,200	4,100	4,100	3,700	3,400	5,300	8,400	6,300	3,100	3,400	3,500	3,400	52,900
1940	3,300	3,100	3,300	3,100	3,000	4,300	5,200	5,800	2,700	2,900	3,000	2,900	42,600
1941	2,800	2,700	2,700	2,600	2,500	3,600	3,900	4,600	2,600	2,800	2,800	2,600	36,200
1942	2,700	2,700	2,900	2,700	2,500	3,300	6,900	4,400	4,300	3,800	3,600	3,400	43,200
1943	3,100	3,000	3,100	3,000	3,000	4,700	13,800	10,100	8,000	-	-	-	65,800
1951	5,900	5,700	5,400	4,800	4,700	6,000	12,900	11,400	7,900	6,300	6,200	5,600	82,800
1952	5,400	5,000	4,800	4,400	3,900	4,800	9,900	11,700	7,900	5,800	5,800	5,300	74,700
1953	4,900	4,600	4,600	4,300	3,700	5,000	6,000	4,700	7,200	5,700	5,100	4,600	60,400
1954	4,300	4,200	4,100	3,800	3,400	4,600	6,400	6,200	3,000	3,400	3,300	3,200	49,900
1955	3,100	3,100	3,100	3,000	2,700	3,500	4,300	6,500	4,900	4,100	3,900	3,500	45,700
1956	3,400	3,400	4,900	4,500	3,700	5,600	10,900	10,800	7,200	5,000	4,800	4,300	68,500
1957	4,100	3,900	4,000	3,600	3,500	4,900	5,700	7,500	8,500	6,000	5,100	4,700	61,500
1958	4,500	4,300	4,200	3,800	3,600	4,700	6,600	10,300	6,800	4,600	4,700	4,400	62,500
1959	4,000	4,000	3,900	3,500	3,200	4,400	6,500	5,600	5,100	4,100	3,900	3,800	52,000
1960	3,900	3,600	3,600	3,300	3,100	5,100	8,100	6,600	3,800	3,500	3,500	3,500	51,600
1961	3,400	3,400	3,300	3,100	2,800	3,700	4,000	4,000	2,500	2,400	2,400	2,400	37,400
1962	2,500	2,500	2,700	2,600	3,300	3,800	12,300	9,100	5,600	4,800	4,500	4,600	58,300
1963	4,200	3,900	3,700	3,200	4,000	4,400	5,000	7,000	5,000	3,900	3,800	3,800	51,900
1964	3,500	3,500	3,300	3,100	2,900	3,500	4,800	6,600	6,700	5,700	4,900	4,500	53,000
1965	4,000	3,900	4,500	4,200	4,400	5,100	8,700	8,900	10,800	8,000	6,700	6,100	75,300

**BEAR RIVER BASIN**  
**Blacksmith Fork at Hardware Ranch, near Hyrum, Utah.--Continued.**  
**Runoff relations for Blacksmith Fork versus Logan River**



WEBER RIVER BASIN

10-1325. Lost Creek near Croydon, Utah

Location.--Lat 41°10'35", long 111°24'20", in SW¼SE¼ sec.8, T.5 N., R.5 E., on right bank 0.8 miles downstream from Francis Fork, 1.6 miles upstream from Hell Canyon, and 9½ miles northeast of Croydon.

Drainage area.--133 sq mi.

Records available.--February 1921 to December 1923, May 1941 to September 1965.

Estimates of streamflow.--June 1896 to January 1921 and January 1924 to April 1941, based on relation of monthly runoff to that of 10-1090. Logan River above State dam, near Logan, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is the monthly runoff of Lost Creek near Croydon, Utah; X is the monthly runoff of Logan River above State dam, near Logan, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.69	1.68	1.68	1.68	1.67	1.83	1.57	2.01	1.96	1.70	1.69	1.69
c	3.87	3.69	3.63	3.63	3.49	4.0	2.90	5.27	5.61	4.42	4.23	4.04

Average runoff.--69 years (1896-1965), 28,640 acre-feet per year (39.6 cfs).

Extremes.--1921-23, 1941-65: Maximum discharge, 770 cfs May 10, 11, 18, 1923, from rating curve extended above 200 cfs; minimum, 1.9 cfs July 18, 19, 1961.

Remarks.--Estimated values of annual runoff are probably accurate within 30 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	-	-	-	-	1,090	2,780	6,600	17,800	5,060	1,500	1,030	952	-
1922	1,180	1,050	1,090	861	778	1,190	4,590	22,300	4,840	1,240	1,160	827	41,100
1923	953	964	941	861	666	990	5,780	25,500	5,280	1,890	910	1,120	45,900
1924	1,370	1,210	964	-	-	-	-	-	-	-	-	-	-
1941	-	-	-	-	-	-	-	2,230	722	321	296	311	-
1942	478	486	407	307	278	369	4,290	3,220	1,040	371	196	242	11,680
1943	391	448	506	413	436	982	9,940	6,880	3,010	863	514	436	24,820
1944	546	494	489	430	460	560	2,660	6,520	2,970	851	403	341	16,720
1945	497	528	534	522	644	1,030	1,920	5,500	2,980	861	517	463	16,000
1946	583	644	637	571	609	1,940	11,780	6,660	1,860	756	510	455	27,000
1947	705	595	630	492	486	1,760	3,430	5,370	2,150	940	581	519	17,660
1948	678	688	662	571	494	764	3,970	8,190	2,300	737	471	421	19,950
1949	583	594	615	553	444	960	8,650	10,980	3,550	1,130	655	584	29,300
1950	944	831	831	1,010	984	1,580	9,970	19,240	7,250	1,880	956	926	46,400
1951	998	1,260	1,150	1,180	1,280	1,450	8,780	15,680	3,980	1,460	1,030	859	39,110
1952	1,020	922	1,080	1,170	1,170	1,170	10,080	24,770	5,690	2,000	1,240	974	51,290
1953	1,040	960	948	1,050	930	1,560	3,060	5,120	3,720	1,000	666	567	20,620
1954	731	758	774	825	793	1,080	3,100	2,350	918	546	464	406	12,740
1955	565	647	617	623	581	799	2,080	5,680	1,740	593	458	368	14,750
1956	422	461	1,250	903	863	1,970	5,520	6,730	1,780	715	492	471	21,580
1957	606	668	771	861	938	1,250	3,010	10,840	3,690	914	563	565	24,680
1958	746	724	706	601	785	877	3,060	7,560	1,470	468	312	347	17,660
1959	431	595	628	472	442	832	1,950	2,640	947	344	284	471	10,040
1960	536	477	450	459	437	1,490	3,030	3,150	797	345	289	324	11,780
1961	409	446	460	461	420	684	936	851	349	179	223	315	5,730
1962	483	499	464	400	1,280	1,050	7,020	5,220	1,400	523	305	292	18,940
1963	359	402	425	516	1,040	958	2,050	5,940	1,370	510	401	412	14,380
1964	591	594	465	514	468	526	2,540	8,050	3,000	1,010	444	419	18,620
1965	426	463	1,500	994	1,090	1,200	7,620	14,690	5,040	1,010	910	862	35,800

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1896	-	-	-	-	-	-	-	-	13,000	2,200	1,300	1,300	-
1897	1,700	1,900	2,100	1,300	1,400	2,300	7,400	39,000	6,000	1,900	1,400	1,500	67,900
1898	2,200	2,100	1,900	1,400	1,300	2,000	7,200	9,100	2,900	950	820	840	32,710
1899	1,100	1,100	1,000	2,300	2,400	4,400	8,600	11,000	13,000	6,700	2,800	2,400	56,800
1900	2,900	3,100	3,400	3,200	2,700	4,200	6,500	13,000	3,200	1,100	860	960	45,120
1901	1,300	1,400	1,400	1,400	1,400	2,200	4,600	20,000	2,700	930	900	1,000	39,230
1902	1,200	1,300	1,500	800	1,000	1,600	3,100	7,800	5,300	740	690	760	25,790
1903	1,100	1,300	1,500	1,400	1,500	2,400	4,500	6,000	4,800	1,400	1,000	1,000	27,900
1904	920	1,200	950	420	1,300	6,700	8,200	19,000	5,200	1,900	1,200	1,200	48,190
1905	1,300	1,300	1,400	1,200	1,100	2,000	2,900	3,500	1,900	760	710	700	18,770

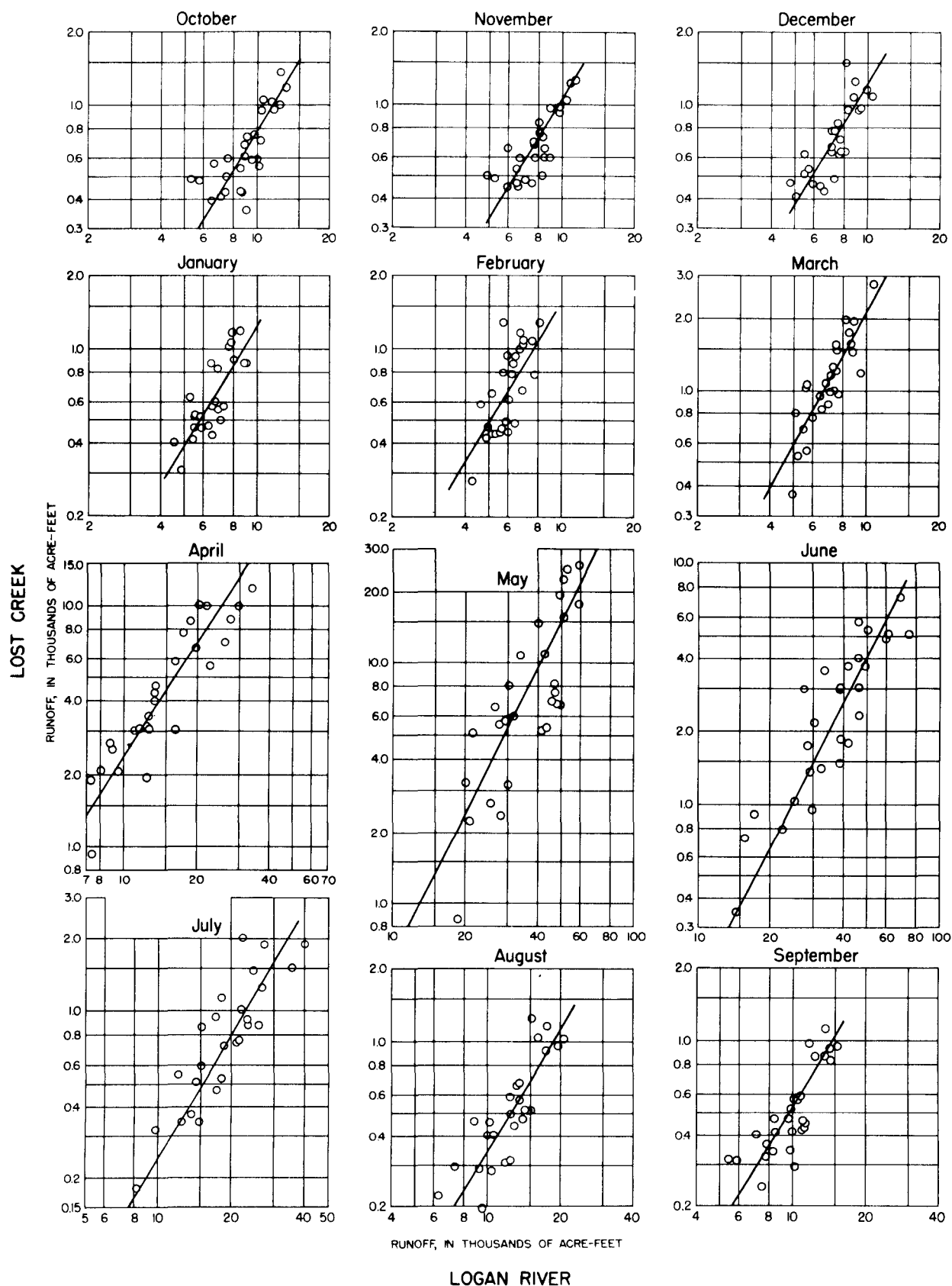


WEBER RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Lost Creek near Croydon, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1906	800	870	910	760	710	1,100	5,200	13,000	4,700	1,500	800	600	30,950
1907	600	640	970	800	1,400	4,900	21,000	31,000	15,000	4,700	2,100	1,700	84,810
1908	1,800	1,800	1,700	1,400	1,300	1,800	4,500	3,500	3,200	1,200	640	490	23,330
1909	710	630	560	1,000	650	1,200	9,800	24,000	15,000	3,700	2,000	1,100	60,350
1910	890	1,500	1,100	820	560	6,200	22,000	33,000	3,600	1,100	940	880	72,590
1911	1,200	1,100	1,000	900	1,400	2,400	8,700	24,000	9,400	1,800	830	730	53,460
1912	930	910	680	670	920	1,700	5,000	18,000	14,000	3,200	1,100	1,000	48,110
1913	1,000	970	970	890	960	2,000	7,800	8,400	1,300	660	560	630	26,140
1914	790	870	850	800	800	1,800	8,800	20,000	3,700	1,100	700	780	40,990
1915	980	1,000	820	670	700	1,100	4,500	2,400	730	350	320	400	13,970
1916	540	610	590	580	720	3,000	10,000	13,000	3,700	1,500	800	740	35,780
1917	930	920	930	730	690	1,000	3,100	8,200	5,700	2,600	1,100	1,000	26,900
1918	1,100	1,000	1,200	870	860	2,500	5,600	7,200	2,700	700	570	580	24,880
1919	790	830	840	680	730	1,200	3,400	9,000	940	360	330	400	19,500
1920	530	580	610	590	700	1,000	2,800	17,000	5,800	1,200	760	770	32,340
1921	900	1,000	930	820	-	-	-	-	-	-	-	-	40,460
1924	-	-	-	900	960	1,200	6,700	10,000	750	420	370	430	25,270
1925	610	610	610	550	600	1,200	4,900	10,000	1,500	690	500	540	22,310
1926	610	680	700	620	640	1,400	5,800	4,800	480	310	290	340	16,670
1927	450	530	540	530	550	1,000	4,000	7,500	3,600	1,100	670	670	21,140
1928	850	1,100	980	860	830	2,000	4,000	18,000	2,000	720	560	580	32,480
1929	760	790	760	720	670	1,200	2,800	8,200	2,600	930	580	630	20,640
1930	770	790	780	680	690	1,000	5,100	3,700	1,000	420	370	400	15,700
1931	520	520	580	530	500	760	1,600	1,700	230	140	150	180	7,410
1932	230	280	340	340	370	750	4,600	17,000	5,300	1,600	800	700	32,380
1933	880	880	790	730	630	960	2,400	3,500	3,800	690	500	510	16,270
1934	570	600	610	520	530	1,100	3,400	1,000	120	110	120	150	8,830
1935	200	270	310	310	370	590	2,800	5,100	2,300	590	400	390	13,630
1936	430	470	440	400	480	780	9,600	32,000	4,300	1,100	720	690	51,410
1937	820	830	790	640	640	960	2,400	8,600	1,600	650	480	490	18,900
1938	620	680	700	640	610	1,200	6,800	11,000	2,700	750	570	540	26,810
1939	650	720	740	630	620	1,300	5,400	4,800	550	320	300	320	16,350
1940	420	440	490	470	530	940	2,400	4,100	420	240	220	260	10,930
1941	330	370	350	340	390	660	1,400	-	-	-	-	-	7,720

**WEBER RIVER BASIN**  
**Lost Creek near Croydon, Utah,---Continued.**  
**Runoff relations for Lost Creek versus Logan River**



TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

10-1415. Holmes Creek near Kaysville, Utah

Location.--Lat 41°03'18", long 111°53'40", in NE¼ sec.25, T.4 N., R.1 W., on left bank 2 miles northeast of Kaysville. Datum of gage is 5,095.1 ft above mean sea level, unadjusted.

Drainage area.--2.49 sq mi.

Records available.--May 1950 to September 1965.

Estimates of streamflow.--October 1898 to April 1950, based on relation of monthly runoff to that of 10-1725. City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Holmes Creek near Kaysville, Utah; X is monthly runoff of City Creek near Salt Lake City, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.07	1.08	1.08	1.08	1.08	1.02	1.00	1.02	1.10	1.00	1.05	1.07
c	.79	.78	.78	.78	.74	.54	.45	.58	.95	.69	.79	.79

Average runoff.--67 years (1898-1965), 3,190 acre-feet per year (4.41 cfs).

Extremes.--1950-65: Maximum discharge, 36 cfs May 3, 1952; no flow for parts of several days in 1951, 1955.

Remarks.--No diversion above station. Estimated values of annual runoff are probably accurate within 20 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	-	-	-	-	-	759	473	218	146	130	-
1951	131	144	139	107	143	155	431	1,010	444	218	161	123	3,210
1952	134	132	115	111	116	131	780	1,210	579	263	217	152	3,940
1953	142	126	124	174	122	178	348	552	835	259	172	130	3,160
1954	125	121	110	113	106	115	198	223	140	99	73	68	1,490
1955	82	92	92	81	83	123	225	510	315	144	113	95	1,960
1956	108	108	146	164	106	181	259	467	263	151	123	103	2,180
1957	105	111	112	103	102	147	246	879	891	319	195	146	3,360
1958	152	121	136	112	156	185	394	1,160	493	228	162	140	3,440
1959	123	138	128	97	88	123	182	297	201	120	92	98	1,690
1960	101	88	90	93	89	215	481	570	228	155	120	91	2,320
1961	90	99	99	86	91	112	169	236	136	80	77	84	1,360
1962	97	105	101	89	162	194	675	842	555	266	182	156	3,420
1963	138	117	106	106	110	134	210	677	359	175	134	112	2,380
1964	109	105	99	93	89	106	225	1,010	814	305	201	157	3,310
1965	137	119	140	137	139	143	388	768	587	280	200	159	3,200

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	130	120	110	84	82	130	480	790	1,200	370	190	170	3,860
1900	160	150	140	130	120	180	230	450	210	120	100	96	2,090
1901	100	100	94	88	89	130	230	980	320	160	130	100	2,520
1902	110	110	110	96	87	110	280	740	410	170	130	100	2,450
1903	100	93	96	100	98	130	220	500	580	200	160	140	2,410
1904	150	130	110	100	110	170	460	1,100	570	250	190	160	3,500
1905	140	140	140	130	120	160	270	570	370	190	150	140	2,520
1906	130	130	130	130	130	210	480	980	730	310	220	190	3,770
1907	170	170	160	150	260	410	860	1,400	1,300	530	320	250	5,980
1908	200	170	170	160	160	210	320	710	980	400	270	230	3,980
1909	210	160	150	180	160	280	660	1,400	1,200	380	290	190	5,260
1910	210	180	150	140	160	400	860	1,000	500	190	140	140	4,070
1911	140	130	120	130	150	200	430	530	300	160	120	100	2,510
1912	100	94	88	86	86	120	290	860	940	280	190	150	3,280
1913	130	120	110	98	96	140	500	800	320	180	140	120	2,750
1914	110	110	100	100	100	250	580	1,200	540	250	180	140	3,660
1915	130	120	110	100	130	170	450	530	380	200	150	140	2,610
1916	130	130	130	120	140	370	630	950	490	230	180	150	3,650
1917	160	150	120	110	100	150	480	1,200	1,300	430	260	210	4,670
1918	180	150	150	140	120	250	400	710	360	190	140	130	2,920
1919	130	130	120	110	100	170	480	920	400	220	150	150	3,080
1920	150	160	100	110	130	150	430	980	630	260	200	160	3,460

TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

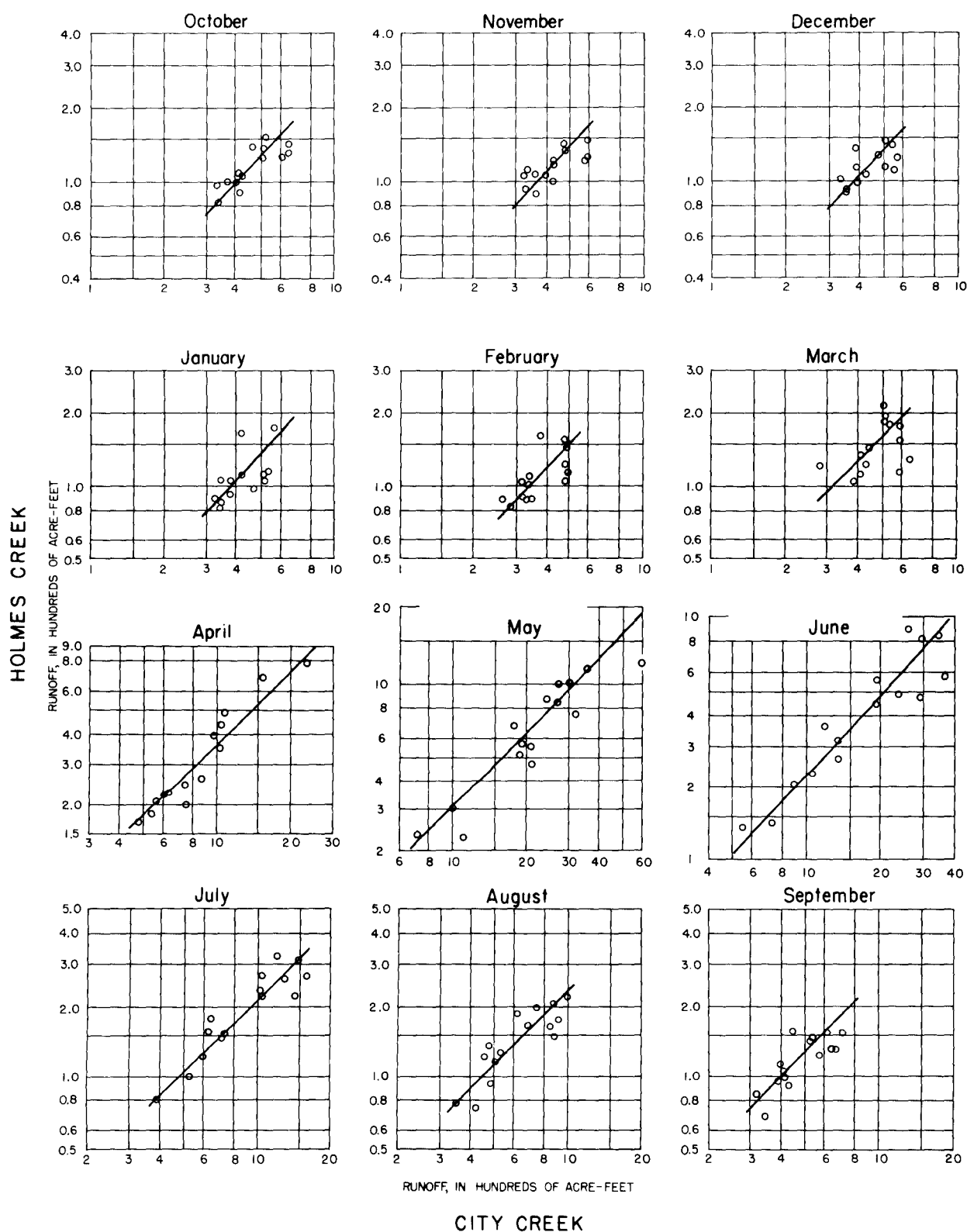
Estimated monthly and annual runoff, in acre-feet, for Holmes Creek near Kaysville, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	150	150	150	140	180	480	760	1,900	990	390	260	200	5,750
1922	180	170	160	150	130	220	630	1,600	1,100	330	230	170	5,070
1923	150	160	140	130	130	180	540	1,300	710	300	230	200	4,170
1924	190	180	170	160	160	190	400	620	240	150	120	110	2,690
1925	110	130	120	110	140	220	510	840	370	190	150	130	3,020
1926	120	120	120	110	110	210	660	820	310	180	150	140	3,050
1927	150	150	150	120	120	200	410	940	690	280	230	220	3,660
1928	200	160	140	140	140	270	450	1,400	410	200	160	140	3,810
1929	140	130	130	130	120	210	470	1,200	740	310	260	220	4,060
1930	210	200	140	130	130	170	300	420	210	140	130	140	2,320
1931	120	120	110	110	110	130	210	330	160	110	98	96	1,700
1932	98	98	97	94	100	160	430	1,000	560	220	160	130	3,150
1933	120	120	120	120	110	160	270	550	700	210	160	140	2,780
1934	130	130	130	130	110	150	170	130	72	62	59	68	1,340
1935	76	86	96	89	100	140	290	710	560	200	140	120	2,610
1936	120	130	120	120	120	270	750	1,400	570	240	160	140	4,140
1937	130	130	130	110	120	220	400	1,200	520	250	170	140	3,520
1938	140	130	130	120	120	200	580	1,000	500	220	170	140	3,450
1939	140	140	140	130	120	230	410	610	220	150	120	120	2,530
1940	120	120	120	120	130	230	470	720	260	160	130	120	2,700
1941	130	140	130	120	140	230	410	940	490	250	190	170	3,340
1942	160	150	150	150	150	230	780	980	790	330	230	200	4,300
1943	190	180	180	180	180	250	580	570	390	210	180	150	3,240
1944	130	140	130	120	120	160	330	880	600	260	190	160	3,220
1945	160	110	140	130	120	150	220	550	470	230	180	160	2,620
1946	140	140	130	120	110	200	520	610	350	180	140	120	2,760
1947	130	130	140	130	150	230	380	880	360	220	170	140	3,060
1948	140	150	140	120	97	180	450	1,000	520	210	170	160	3,340
1949	140	150	140	120	110	220	590	1,100	680	270	190	160	3,870
1950	170	160	130	130	160	230	500	-	-	-	-	-	3,210

# TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

Holmes Creek near Kaysville, Utah. Continued.

Runoff relations for Holmes Creek versus City Creek



TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

10-1425. Ricks Creek above diversions, near Centerville, Utah

Location.--Lat 40°56'25", long 111°52'00", in NW¼ sec.5, T.2 N., R.1 E., on right bank half a mile east of alternate U.S. Highway 91 and 1.2 miles north of Centerville. Altitude of gage is 4,860 ft (from topographic map).

Drainage area.--2.35 sq mi.

Records available.--May 1950 to September 1965.

Estimates of streamflow.--October 1898 to April 1950, based on relation of monthly runoff to that of 10-1725. City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is the monthly runoff of Ricks Creek above diversions, near Centerville, Utah; X is the monthly runoff of City Creek near Salt Lake City, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.22	1.22	1.22	1.22	1.20	1.20	1.18	1.14	1.28	1.26	1.24	1.24
c	1.54	1.54	1.54	1.54	1.46	1.39	1.24	1.09	1.69	1.73	1.70	1.66

Average runoff.--67 years (1898-1965), 1,960 acre-feet per year (2.71 cfs).

Extremes.--1950-65: Maximum discharge, 51 cfs May 22, 1964; minimum, 0.1 cfs Apr. 9, 1953, Feb. 3, 1955, Jan. 19, 1958, January or February 1959, Mar. 4, 1963.

Remarks.--Estimated values of annual runoff are probably accurate within 20 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	-	-	-	-	-	676	384	149	84	64	-
1951	76	76	62	72	85	100	212	765	282	124	84	59	2,000
1952	56	55	52	51	54	68	397	1,190	409	158	97	63	2,650
1953	59	58	46	63	45	74	191	501	827	153	85	57	2,160
1954	60	52	49	49	40	62	133	175	84	52	36	25	817
1955	33	40	31	30	28	44	113	433	202	85	50	36	1,120
1956	46	55	58	63	43	82	195	469	192	80	61	44	1,390
1957	51	45	52	40	46	71	131	644	651	177	80	53	2,040
1958	58	47	48	33	43	63	201	902	264	105	63	49	1,880
1959	55	52	40	42	43	55	100	276	133	61	56	45	958
1960	46	30	37	39	32	90	269	490	129	64	38	40	1,300
1961	38	29	41	30	30	52	89	146	62	24	23	27	591
1962	31	30	34	37	63	86	379	805	373	128	70	48	2,080
1963	69	54	49	41	44	52	101	464	256	92	54	52	1,330
1964	47	42	38	39	39	54	108	1,030	651	173	85	59	2,360
1965	50	53	59	54	56	59	178	563	462	186	98	76	1,890

Estimated monthly and annual runoff, in acre-feet

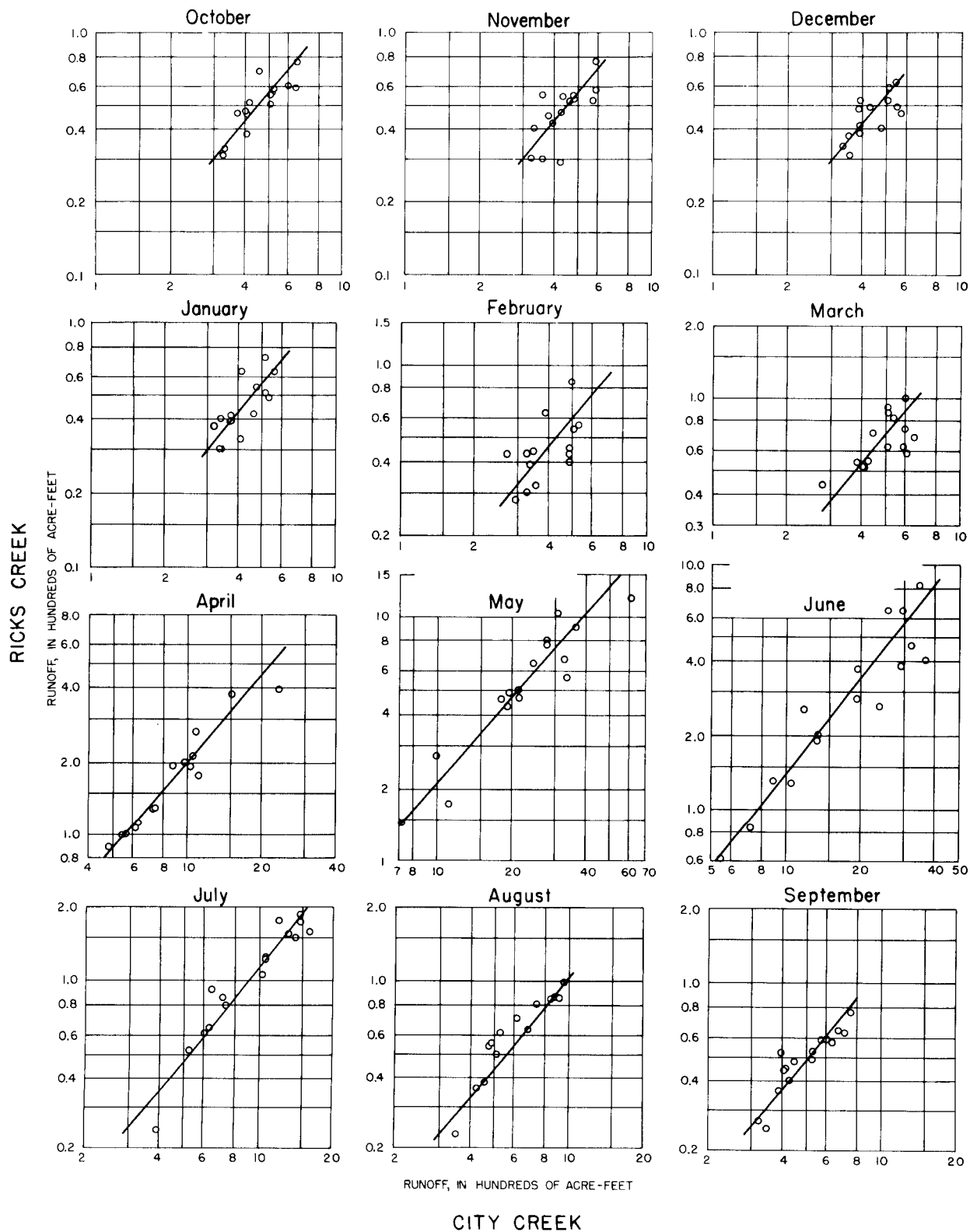
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	60	49	45	32	31	55	280	620	1,000	230	80	70	2,550
1900	74	63	57	55	48	83	120	330	130	60	40	35	1,100
1901	43	40	36	34	34	57	120	800	210	82	50	38	1,540
1902	49	44	41	37	33	46	150	580	290	90	51	39	1,450
1903	44	32	37	39	38	54	110	370	420	110	68	54	1,380
1904	68	52	45	40	44	74	270	880	410	140	81	64	2,170
1905	64	56	55	52	49	68	140	430	250	99	61	54	1,380
1906	59	51	53	53	51	98	280	790	560	190	96	78	2,360
1907	79	71	66	63	120	210	560	1,100	1,100	370	150	100	3,990
1908	93	72	73	68	65	95	180	560	790	260	130	97	2,480
1909	100	69	62	78	66	130	420	1,200	960	250	140	78	3,550
1910	100	79	63	60	65	210	560	830	360	100	57	53	2,540
1911	64	53	46	55	61	91	250	410	190	82	48	39	1,390
1912	42	36	34	32	33	48	160	690	750	170	83	60	2,140
1913	59	49	44	38	37	58	300	630	210	96	57	47	1,620
1914	50	43	40	40	39	120	350	1,000	390	140	75	57	2,340
1915	59	48	43	40	52	75	260	400	260	110	61	53	1,460

TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

Estimated monthly and annual runoff, in acre-feet, for Ricks Creek above diversions, near Centerville, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1916	59	51	52	47	56	190	390	770	350	130	79	58	2,230
1917	73	60	48	45	41	65	290	980	1,000	280	120	86	3,090
1918	82	62	60	56	49	120	230	560	240	99	58	52	1,670
1919	57	51	48	43	40	76	280	740	280	120	64	58	1,860
1920	70	64	39	43	52	66	250	800	470	150	85	66	2,160
1921	67	60	61	60	75	260	480	1,700	800	250	120	85	4,020
1922	84	73	68	62	53	100	390	1,400	890	210	100	68	3,500
1923	71	67	58	56	52	78	300	1,100	540	180	110	83	2,720
1924	87	76	61	67	66	86	230	480	150	75	47	41	1,470
1925	48	51	46	46	54	100	310	670	250	100	61	52	1,790
1926	54	47	47	45	44	96	410	650	200	96	61	56	1,810
1927	70	64	60	49	47	90	240	770	520	170	110	92	2,280
1928	97	66	59	58	58	130	260	1,200	280	110	67	55	2,440
1929	61	55	54	51	47	97	280	1,000	540	190	120	92	2,590
1930	100	88	59	55	54	77	160	310	130	68	50	53	1,200
1931	56	47	45	45	42	55	110	240	94	52	37	35	860
1932	42	38	38	36	40	70	250	850	410	130	64	50	2,020
1933	54	50	49	48	44	72	140	410	530	110	65	55	1,630
1934	59	54	54	51	44	62	80	81	38	25	21	24	600
1935	31	33	37	35	40	61	160	550	410	110	56	47	1,570
1936	52	52	48	47	49	130	480	1,200	420	130	69	55	2,730
1937	60	55	52	45	49	100	230	960	370	140	70	56	2,190
1938	64	54	53	49	46	94	360	840	360	120	70	56	2,170
1939	63	60	58	55	49	110	230	470	140	72	50	46	1,400
1940	51	46	46	49	50	110	280	560	170	81	53	47	1,540
1941	57	55	52	48	57	110	230	770	350	150	80	68	2,030
1942	73	64	61	62	60	110	500	790	610	210	110	83	2,730
1943	89	75	78	77	74	120	350	430	270	120	75	60	1,820
1944	56	56	54	48	49	70	180	710	440	150	82	64	1,960
1945	74	45	57	52	49	68	110	420	330	130	79	63	1,480
1946	66	57	52	49	45	94	310	470	230	96	57	48	1,570
1947	56	53	55	51	61	110	210	700	250	120	73	55	1,790
1948	64	61	57	49	38	80	260	830	370	120	70	66	2,060
1949	66	61	55	48	45	100	370	900	500	160	83	63	2,450
1950	81	65	53	56	66	100	300	-	-	-	-	-	2,080

**TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS**  
**Ricks Creek above diversions, near Centerville, Utah. - Continued.**  
**Runoff relations for Ricks Creek versus City Creek**





TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

10-1430. Parrish Creek above diversions, near Centerville, Utah

Location.--Lat 40°55'25", long 111°51'50", in NW¼ sec.8, T.2 N., R. 1 E., on right bank 1 mile northeast of Centerville.  
Altitude of gage is 4,600 ft (from topographic map).

Drainage area.--2.08 sq mi.

Records available.--December 1949 to September 1965. Monthly discharge only for some periods, published in WSP 1314.

Estimates of streamflow. October 1898 to November 1949 based on relation of monthly runoff to that of 10-1725., City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Parrish Creek above diversions, near Centerville, Utah; X is monthly runoff of City Creek near Salt Lake City, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.23	1.21	1.17	1.17	1.17	1.04	1.19	1.05	1.41	1.85	1.68	1.37
c	1.88	1.76	1.63	1.63	1.56	1.13	1.37	.88	2.33	3.81	3.30	2.36

Average runoff.--67 years (1898-1965), 1,350 acre-feet per year (1.86 cfs).

Extremes.--1949-65: Maximum discharge, 30 cfs May 5, 1952; minimum, 0.04 cfs Aug. 10, 11, 1961.

Remarks.--Estimated values of annual runoff are probably accurate within 20 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	36	44	45	65	236	631	287	81	44	32	1,580
1951	38	48	46	36	48	58	214	575	170	58	48	37	1,380
1952	41	34	34	34	31	45	358	980	254	58	42	30	1,940
1953	33	24	30	41	29	55	150	404	634	102	61	31	1,590
1954	34	33	25	28	25	37	101	109	40	25	13	16	486
1955	22	18	23	25	22	32	75	346	127	43	22	16	771
1956	24	27	48	43	32	64	171	305	109	35	18	16	892
1957	24	25	26	25	29	44	94	501	466	91	37	23	1,380
1958	29	28	27	27	36	48	178	744	173	43	23	20	1,380
1959	24	27	30	28	26	35	86	193	73	26	17	20	585
1960	23	20	19	20	21	63	180	291	68	21	12	13	751
1961	18.8	23.4	21.3	18.7	20.1	31.0	70.5	121	34.6	9.20	8.31	11.9	389
1962	19.7	22.6	21.4	19.9	37.5	54.5	341	554	197	57.3	23.5	17.2	1,370
1963	22.8	24.2	22.5	22.9	25.1	33.4	77.7	406	123	36.7	15.2	17.4	827
1964	19.1	24.4	20.7	22.2	22.2	27.1	87.3	674	406	98.5	34.2	22.5	1,460
1965	27.5	32.7	43.0	39.5	42.0	50.9	171	621	337	88.8	49.2	42.0	1,540

Estimated monthly and annual runoff, in acre-feet

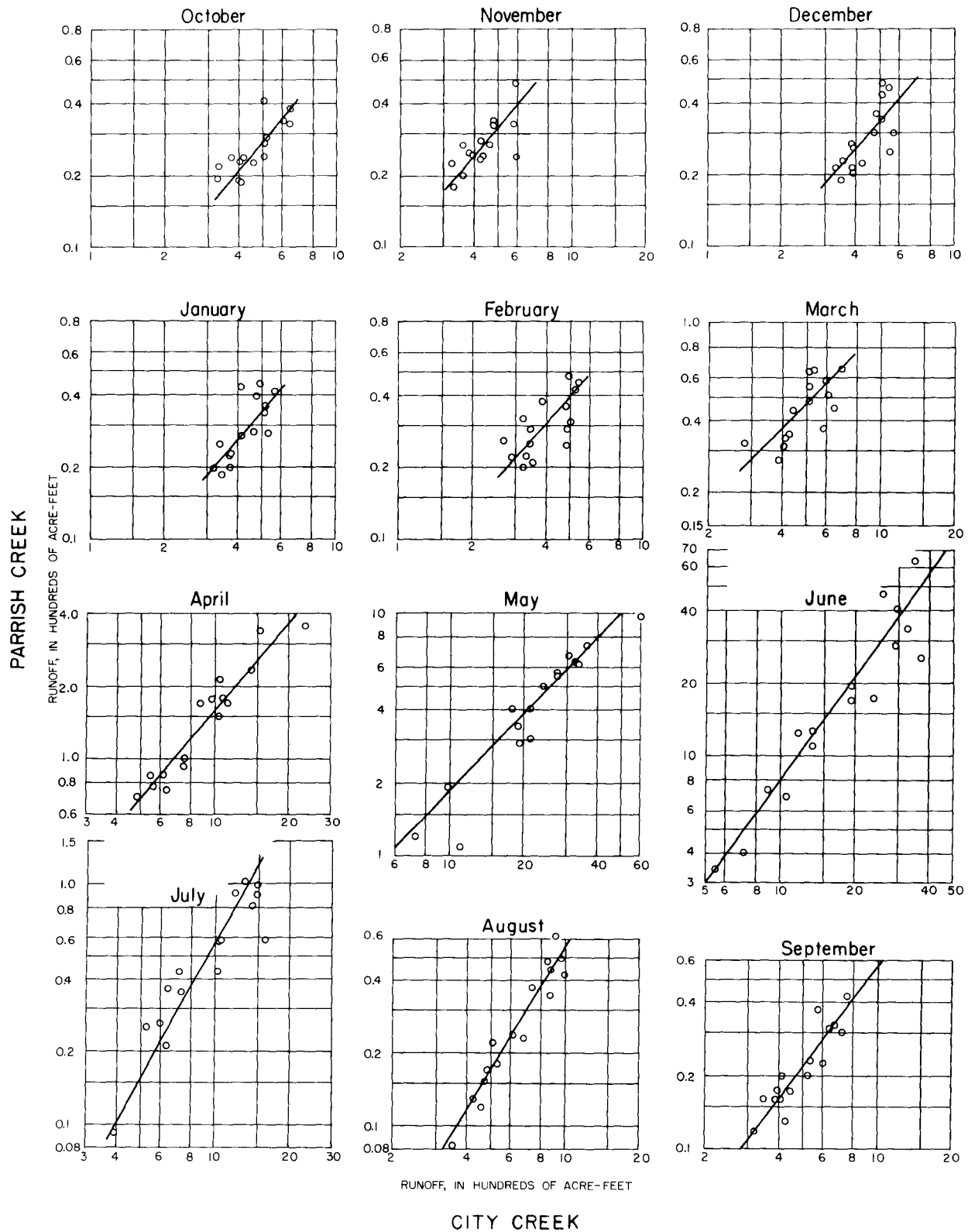
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	29	28	27	20	21	38	230	490	720	160	38	33	1,830
1900	36	35	35	33	32	54	95	270	74	22	15	15	720
1901	21	23	22	21	23	39	96	620	130	35	21	17	1,070
1902	24	25	25	23	22	33	120	460	180	40	21	17	990
1903	22	18	23	24	25	37	86	310	270	55	31	25	930
1904	33	29	27	25	29	49	210	680	260	80	40	29	1,490
1905	31	32	33	31	32	46	110	350	150	46	27	25	910
1906	29	29	32	32	34	62	230	610	370	120	50	36	1,630
1907	38	40	40	38	74	120	450	860	740	310	93	51	2,850
1908	46	41	44	41	42	61	140	440	540	190	71	47	1,700
1909	50	39	37	46	43	81	330	880	670	170	78	36	2,460
1910	49	44	38	36	42	120	450	640	230	48	24	24	1,740
1911	31	30	28	33	40	59	190	330	120	34	19	17	930
1912	21	21	21	20	22	34	120	540	510	96	41	28	1,470
1913	29	28	27	24	24	40	240	500	130	44	25	21	1,130
1914	24	25	24	25	25	72	280	770	250	77	35	26	1,630
1915	29	27	26	24	34	50	200	330	160	55	27	24	990
1916	29	29	31	29	37	110	310	600	220	70	38	26	1,530
1917	35	34	29	27	44	230	740	740	210	67	41	23	2,220
1918	40	35	36	34	32	74	180	450	150	46	26	23	1,130
1919	28	29	29	26	26	50	230	580	170	61	29	26	1,280
1920	34	37	24	26	34	44	200	620	300	84	42	30	1,480

TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

Estimated monthly and annual runoff, in acre-feet, for Parrish Creek above diversions, near Centerville, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	33	34	37	36	48	140	390	1,200	540	180	65	40	2,740
1922	41	41	41	37	35	66	310	1,000	610	130	56	31	2,400
1923	34	38	35	34	34	51	260	860	360	110	56	39	1,910
1924	43	43	43	40	44	56	180	390	86	31	19	18	990
1925	24	29	28	28	36	66	250	520	150	48	27	23	1,230
1926	26	27	28	27	29	62	330	510	120	44	27	25	1,260
1927	34	36	36	29	31	58	190	600	340	98	56	44	1,550
1928	47	37	36	35	38	79	210	860	180	52	30	25	1,630
1929	30	31	33	31	31	62	220	780	370	120	64	44	1,820
1930	50	49	36	33	35	51	130	260	76	27	21	24	790
1931	27	27	27	27	28	38	84	200	51	18	14	15	560
1932	20	21	23	22	27	47	200	660	260	65	29	22	1,400
1933	27	28	30	29	29	48	110	340	350	56	29	25	1,100
1934	29	30	33	31	29	42	62	80	19	6	6	10	380
1935	15	19	23	21	26	41	130	440	260	52	24	21	1,070
1936	26	30	29	29	32	78	390	860	270	71	31	25	1,870
1937	30	31	32	28	32	64	180	740	240	76	32	25	1,510
1938	31	30	32	30	30	60	280	650	230	61	32	25	1,490
1939	31	34	35	33	32	67	190	380	81	29	20	20	950
1940	25	26	28	29	33	69	220	450	98	34	22	21	1,060
1941	28	31	31	29	37	67	190	600	220	82	38	31	1,380
1942	35	36	37	37	39	67	400	620	410	130	56	39	1,910
1943	44	42	47	46	48	73	280	360	160	58	35	27	1,220
1944	27	31	33	29	32	47	140	560	280	84	40	29	1,330
1945	36	25	35	31	32	45	89	340	210	65	38	29	980
1946	32	32	31	30	30	60	250	380	140	44	25	21	1,080
1947	27	30	33	31	40	68	170	550	150	60	34	25	1,220
1948	31	34	35	29	25	52	210	650	240	58	33	30	1,430
1949	32	34	33	29	30	64	290	690	330	94	41	29	1,700
1950	39	37	-	-	-	-	-	-	-	-	-	-	1,580

**TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS**  
**Parrish Creek above diversions, near Centerville, Utah.---Continued.**  
**Runoff relations for Parrish Creek versus City Creek**



TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

10-1440. Stone Creek above diversions, near Bountiful, Utah

Location--Lat 40°53'40", long 111°50'40", in NW¼ sec.21, T.2 N., R.1 E., on right bank 2.2 miles east of Bountiful.  
Altitude of gage is 5,080 ft (from topographic map).

Drainage area--4.48 sq mi.

Records available--May 1950 to September 1965.

Estimates of streamflow--October 1898 to April 1950, based on relation of monthly runoff to that of 10-1725., City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X + c$$

where: Y is monthly runoff of Stone Creek above diversions, near Bountiful, Utah; X is monthly runoff of City Creek near Salt Lake City, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.17	1.17	1.15	1.19	1.18	1.41	1.20	1.19	1.45	1.74	1.76	1.61
c	1.42	1.27	1.22	1.33	1.21	1.73	1.00	1.07	2.13	3.22	3.33	2.81

Average runoff--67 years (1898-1965), 2,880 acre-feet per year (3.98 cfs).

Extremes--1950-65: Maximum discharge, 82 cfs May 5, 1952; no flow Oct. 5, 1951.

Remarks--Records include flow diverted around station by pipeline. Estimated figures of annual runoff are probably accurate within 25 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	-	-	-	-	-	1,500	593	162	69	60	-
1951	72	94	95	89	107	122	346	944	326	101	65	46	2,410
1952	68	77	79	75	74	90	1,030	1,910	588	165	80	42	4,280
1953	59	83	83	99	89	166	480	901	1,090	179	73	34	3,340
1954	51	73	73	72	76	83	212	212	73	40	20	18	1,000
1955	35	50	50	54	50	54	198	628	310	66	39	27	1,560
1956	46	60	93	90	61	159	373	645	227	58	32	22	1,870
1957	43	62	65	53	73	117	285	1,280	885	185	58	40	3,150
1958	84	76	86	80	84	127	455	1,590	394	71	43	36	3,130
1959	39	69	77	76	64	97	240	335	182	35	25	27	1,270
1960	55	49	45	50	42	145	340	450	139	32	18	15	1,380
1961	36	51	52	47	53	81	146	205	77	31	22	17	818
1962	31	38	44	49	99	118	717	1,080	415	86	30	28	2,740
1963	57	49	52	47	61	88	194	748	227	56	21	30	1,630
1964	41	59	45	43	46	65	234	1,190	809	219	83	50	2,880
1965	66	81	125	110	113	146	548	1,290	722	201	98	84	3,580

Estimated monthly and annual runoff, in acre-feet

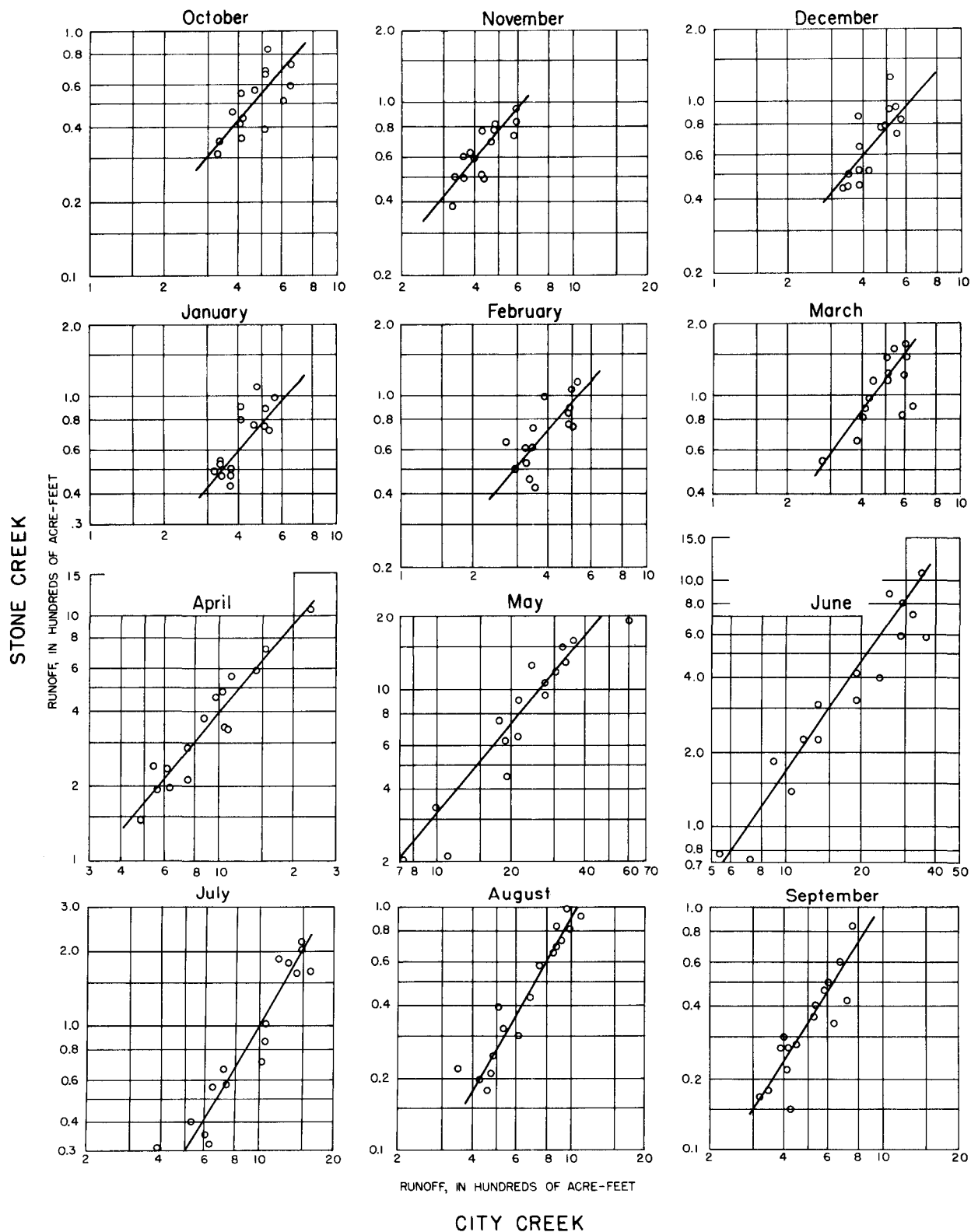
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	58	67	62	45	49	89	560	970	1,600	270	62	55	3,890
1900	72	86	78	75	74	140	240	500	150	41	23	23	1,500
1901	42	56	50	47	53	92	240	1,300	270	64	33	25	2,270
1902	49	61	57	52	52	73	300	890	380	72	33	26	2,040
1903	44	44	52	54	60	87	210	570	590	98	50	40	1,900
1904	66	70	62	56	68	120	530	1,400	570	140	64	48	3,190
1905	63	77	75	71	76	110	280	660	330	83	42	39	1,910
1906	57	70	72	72	79	170	560	1,200	800	200	81	62	3,420
1907	76	96	90	86	170	420	1,100	1,800	1,600	510	160	93	6,200
1908	89	97	98	92	100	170	350	860	1,200	320	120	84	3,580
1909	99	94	84	100	100	240	830	1,900	1,500	290	130	62	5,430
1910	97	100	85	81	100	420	1,100	1,300	490	86	38	38	3,940
1911	62	72	64	75	93	160	490	620	240	63	30	26	2,000
1912	42	51	47	45	52	75	310	1,100	1,100	170	66	45	3,100
1913	58	67	60	53	58	94	600	980	270	80	39	33	2,390
1914	49	60	56	56	60	210	700	1,600	540	140	57	42	3,570
1915	58	66	60	55	81	130	510	610	340	99	43	39	2,090
1916	57	70	71	65	87	370	780	1,200	480	120	61	43	3,400
1917	70	82	66	62	64	110	570	1,600	1,600	350	110	71	4,760
1918	79	85	81	77	76	210	450	860	310	84	40	37	2,390
1919	56	70	66	59	63	130	560	1,200	360	110	45	43	2,760
1920	68	88	54	60	80	110	490	1,300	660	150	68	51	3,180

TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

Estimated monthly and annual runoff, in acre-feet, for Stone Creek above diversions, near Bountiful, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	65	82	82	82	110	530	970	2,700	1,200	300	110	69	6,300
1922	82	98	92	83	82	190	780	2,200	1,400	230	90	53	5,380
1923	68	91	80	76	81	130	650	1,800	770	190	90	68	4,090
1924	84	100	96	90	100	150	450	740	180	58	30	27	2,100
1925	48	69	64	64	84	180	610	1,000	330	86	42	37	2,610
1926	53	64	64	61	68	170	820	1,000	250	80	42	40	2,710
1927	68	86	81	67	73	160	460	1,200	740	170	90	79	3,270
1928	93	90	80	79	90	240	510	1,800	370	93	48	40	3,530
1929	60	75	74	70	73	170	540	1,600	810	200	110	78	3,860
1930	98	120	81	75	82	130	320	470	160	50	33	38	1,660
1931	54	64	61	62	65	88	210	350	190	35	21	22	1,130
1932	42	52	52	50	63	120	500	1,300	560	120	46	35	2,940
1933	53	68	67	66	69	120	280	630	760	99	47	40	2,300
1934	57	73	74	70	69	100	150	120	38	12	9.3	13	785
1935	31	46	52	48	62	100	310	850	570	93	38	33	2,230
1936	51	71	66	65	75	230	960	1,800	590	130	51	40	4,130
1937	59	75	71	63	76	180	450	1,500	510	130	52	41	3,210
1938	62	73	73	68	71	160	710	1,300	480	110	52	41	3,200
1939	61	82	79	75	76	190	460	720	170	54	32	31	2,030
1940	50	64	64	67	79	200	550	860	210	64	35	32	2,280
1941	56	75	71	66	88	190	460	1,200	480	140	62	53	2,940
1942	70	86	82	84	93	190	1,000	1,200	880	230	92	68	4,080
1943	86	100	110	100	110	210	700	660	350	100	57	45	2,630
1944	55	76	74	66	76	120	360	1,100	610	150	64	49	2,800
1945	72	61	78	71	76	110	220	630	440	120	61	47	1,990
1946	63	77	70	68	70	160	620	720	300	80	39	34	2,300
1947	55	71	75	70	94	190	430	1,100	320	110	54	40	2,610
1948	62	82	78	67	59	140	530	1,300	510	100	52	50	3,030
1949	64	83	75	66	70	180	720	1,400	720	160	66	47	3,590
1950	78	88	73	76	100	190	600						

**TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS**  
**Stone Creek above diversions, near Bountiful, Utah.--Continued.**  
**Runoff relations for Stone Creek versus City Creek**



TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

10-1450. Mill Creek at Mueller Park, near Bountiful, Utah

Location.--Lat 40°51'50", long 111°50'10", in SE¼ sec.33, T.2 N., R.1 E., on right bank 2 miles southeast of Bountiful.  
Altitude of gage is 5,240 Ft (from topographic map).

Drainage area.--8.79 sq mi.

Records available.--April 1950 to September 1965.

Estimates of streamflow.--October 1898 to March 1950, based on relation of monthly runoff to that of 10-1725., City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Mill Creek at Mueller Park, near Bountiful, Utah; X is monthly runoff of City Creek near Salt Lake City, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.30	1.30	1.30	1.30	1.39	1.57	1.29	1.07	1.32	1.77	1.94	1.94
c	1.51	1.51	1.49	1.49	1.59	1.95	.97	.40	1.36	2.86	3.36	3.36

Average runoff.--67 years (1898-1965), 5,590 acre-feet per year (7.73 cfs).

Extremes.--1950-65: Maximum daily discharge, 140 cfs Apr. 28, 1952; minimum daily, 0.2 cfs Sept. 5-17, 1961.

Remarks.--Records include flow of a pipeline which diverts water about a quarter of a mile above station. Estimated values of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1950	-	-	-	-	-	-	1,400	2,320	1,570	488	198	118	-
1951	121	138	146	116	176	218	787	1,740	781	299	176	98	4,800
1952	112	101	105	112	111	134	2,310	4,420	1,920	518	225	124	10,190
1953	120	110	108	137	103	253	833	1,690	2,180	561	211	99	6,400
1954	99	105	106	98	97	156	444	198	90	56	37	1,930	
1955	55	79	68	72	74	108	488	1,550	614	225	96	60	3,490
1956	75	77	141	173	116	306	643	998	511	188	93	56	3,380
1957	62	69	82	77	102	196	463	2,120	1,520	376	186	105	5,360
1958	113	111	118	118	146	205	657	2,360	980	259	120	83	5,270
1959	102	93	86	84	96	159	430	581	337	117	66	59	2,210
1960	71	69	69	62	66	286	849	1,010	419	132	69	55	3,160
1961	71	94	72	68	75	146	340	623	180	49	24	23	1,760
1962	50	43	39	39	130	171	1,740	1,660	1,050	309	106	58	5,400
1963	69	68	60	55	73	118	474	1,340	492	170	71	58	3,050
1964	61	66	63	61	58	75	336	2,500	2,080	625	217	119	6,260
1965	98	91	177	129	153	212	1,000	2,240	1,610	534	239	143	6,630

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	110	85	81	58	67	140	1,200	1,700	3,100	780	190	130	7,640
1900	130	110	110	100	110	240	450	950	380	120	64	45	2,810
1901	74	70	65	60	74	140	450	2,200	610	180	95	52	4,070
1902	86	77	74	67	72	110	580	1,600	840	210	95	54	3,860
1903	78	54	67	71	85	140	410	1,110	1,300	280	150	89	3,820
1904	120	90	81	73	100	200	1,100	2,400	1,200	400	200	110	6,070
1905	110	100	100	96	110	190	540	1,200	740	240	130	89	3,640
1906	100	90	98	98	120	290	1,200	2,200	1,700	580	260	150	6,890
1907	140	130	120	120	310	800	2,400	3,100	3,200	1,500	520	250	12,600
1908	170	130	140	130	160	280	700	1,600	2,400	920	380	220	7,230
1909	190	120	110	150	160	440	1,800	3,200	2,900	840	430	160	10,500
1910	180	140	120	110	160	800	2,400	2,300	1,100	250	110	85	7,760
1911	110	93	84	100	150	270	990	1,200	570	180	85	52	3,880
1912	73	63	60	59	72	120	610	1,900	2,200	480	200	110	5,950
1913	100	86	80	70	83	150	1,200	1,800	630	230	110	71	4,610
1914	87	75	72	73	87	370	1,500	2,700	1,200	390	170	96	6,820
1915	100	84	78	72	120	210	1,000	1,100	760	280	130	85	4,020
1916	100	90	95	87	130	690	1,600	2,100	1,000	350	190	98	6,530
1917	130	110	88	82	93	170	1,200	2,700	3,200	1,000	360	180	9,310
1918	150	110	110	100	110	380	900	1,600	710	240	120	83	4,610
1919	100	90	88	78	90	210	1,200	2,100	810	310	140	97	5,310
1920	120	120	70	78	120	180	1,000	2,200	1,400	420	210	120	6,040

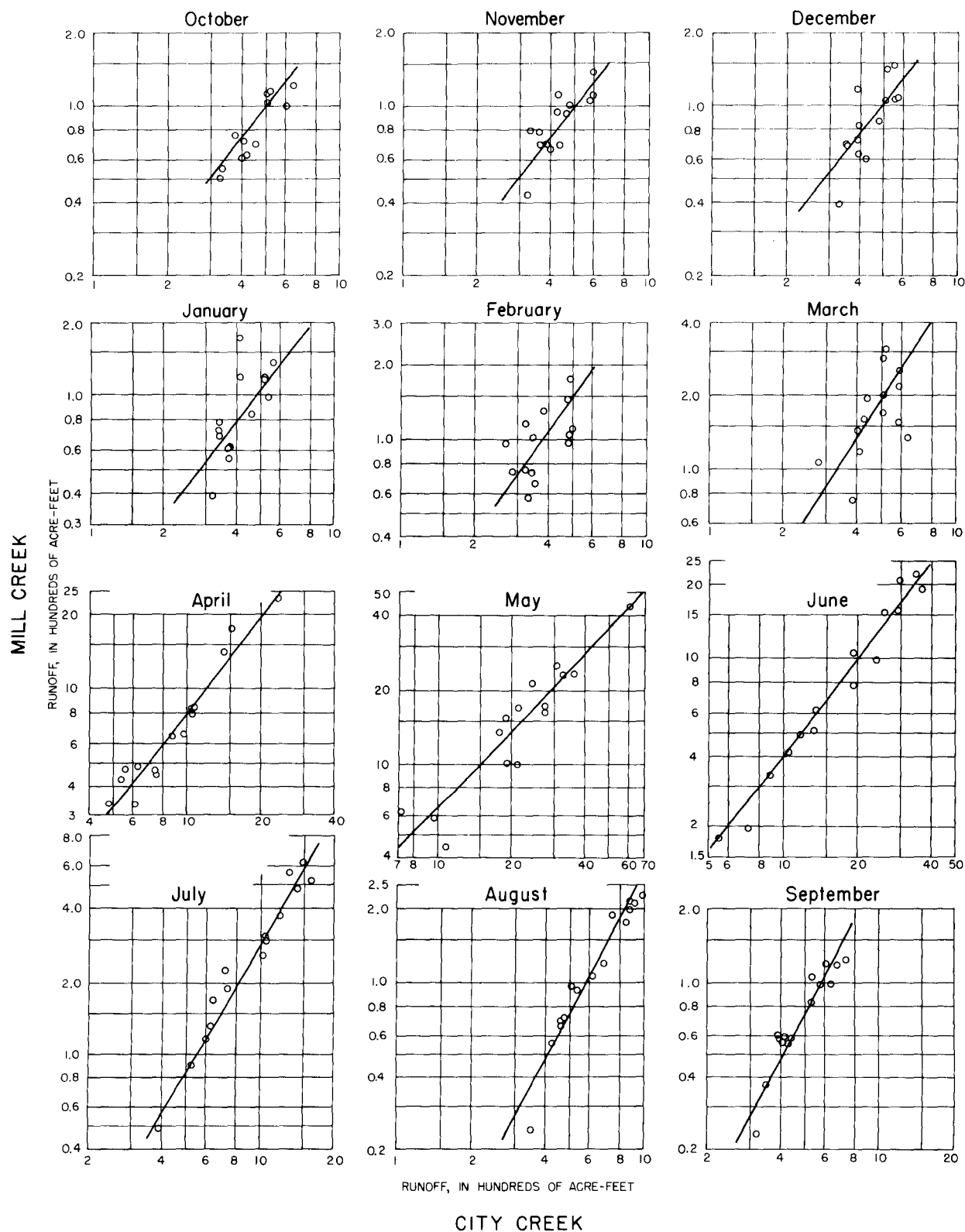
TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS

Estimated monthly and annual runoff, in acre-feet, for Mill Creek at Mueller Park, near Bountiful, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	120	110	110	110	190	1,000	2,100	4,400	2,400	860	350	180	11,930
1922	150	130	130	110	120	320	1,600	3,700	2,700	650	290	130	10,030
1923	120	120	110	100	120	220	1,300	3,100	1,600	540	290	170	7,790
1924	160	140	130	130	160	250	920	1,400	430	160	84	57	4,020
1925	84	88	84	84	130	320	1,300	1,900	740	250	130	83	5,190
1926	94	82	84	82	100	290	1,700	1,800	580	230	130	92	5,260
1927	120	110	110	90	110	260	930	2,100	1,600	490	290	210	6,420
1928	180	120	110	110	140	420	1,000	3,100	840	270	150	89	6,530
1929	110	97	100	95	110	290	1,100	2,800	1,700	600	340	200	7,540
1930	180	160	110	100	130	220	620	900	380	140	94	85	3,120
1931	97	82	80	82	95	140	300	700	270	98	59	45	2,150
1932	72	65	67	66	92	190	1,000	2,300	1,200	330	140	76	5,600
1933	96	87	88	89	100	200	540	1,200	1,600	290	140	89	4,520
1934	100	95	100	94	100	160	290	270	100	34	23	24	1,390
1935	52	56	66	61	90	160	620	1,600	1,200	270	110	71	4,360
1936	92	92	88	87	110	410	2,100	3,100	1,200	360	150	90	7,880
1937	110	97	96	84	110	310	920	2,600	1,100	380	150	92	6,050
1938	110	94	98	90	100	280	1,500	2,300	1,100	310	150	93	6,220
1939	110	110	110	100	110	330	930	1,300	410	150	92	68	3,820
1940	90	80	84	90	120	340	1,100	1,600	490	180	100	70	4,340
1941	100	97	94	88	130	330	930	2,100	1,000	410	190	130	5,600
1942	130	110	110	110	140	330	2,100	2,200	1,800	660	290	170	8,150
1943	160	130	150	150	180	380	1,500	1,200	720	310	170	100	5,150
1944	98	98	99	89	110	190	700	2,000	1,300	420	200	110	5,410
1945	130	77	110	96	110	180	420	1,200	970	330	190	110	3,920
1946	120	100	94	91	100	280	1,300	1,300	680	230	110	73	4,480
1947	98	93	100	94	150	330	850	1,900	720	310	170	92	4,910
1948	110	110	100	90	84	230	1,100	2,300	1,100	310	160	120	5,810
1949	120	110	100	88	100	310	1,400	2,400	1,500	470	200	110	6,910
1950	140	120	98	100	160	320	-	-	-	-	-	-	7,030



**TRIBUTARIES BETWEEN WEBER AND JORDAN RIVERS**  
**Mill Creek at Mueller Park, near Bountiful, Utah.—Continued.**  
**Runoff relations for Mill Creek versus City Creek**



JORDAN RIVER BASIN

10-1470. Summit Creek near Santaquin, Utah

Location--Lat 39°55'20", long 111°45'10", in NW¼NE¼ sec.30, T.10 S., R.2 E., on right bank 3½ miles southeast of Santaquin. Altitude of gage is 5,900 ft (from topographic map).

Drainage area--14.6 sq mi.

Records available--March 1910 to September 1916, October 1954 to September 1965.

Estimates of streamflow--January 1927 to September 1954, based on relation of monthly runoff to that of 10-1645. American Fork above upper powerplant, near American Fork, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Summit Creek near Santaquin, Utah; X is monthly runoff of American Fork above upper powerplant, near American Fork, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.84	1.84	1.84	1.22	1.03	1.03	0.86	1.00	1.27	1.06	1.08	1.38
c	3.04	2.96	2.96	1.10	.55	.55	.04	.58	1.92	1.02	.84	1.70

Average runoff--44 years (1910-16, 1927-65), 9,260 acre-feet per year (12.8 cfs).

Extremes--1910-16, 1954-65: Maximum discharge observed, 215 cfs June 3, 1957 (discharge measurement); minimum, 1.3 cfs Jan. 21, 1955.

Remarks--Estimated values of annual runoff are probably accurate within 30 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1910	-	-	-	-	-	968	3,030	4,000	1,260	787	621	575	-
1911	555	464	421	437	386	456	609	1,230	880	540	417	377	6,770
1912	382	323	346	329	295	338	478	3,460	4,310	911	624	526	12,300
1913	536	469	437	387	328	375	1,200	3,160	1,460	732	541	762	10,400
1914	732	619	578	382	349	592	1,980	4,720	2,230	1,120	873	613	14,800
1915	701	548	477	426	309	374	1,300	2,000	1,740	812	627	547	9,860
1916	491	434	402	354	343	664	1,680	3,580	2,480	848	621	527	12,400
1955	307	283	249	250	233	232	538	2,380	1,320	569	457	361	7,180
1956	363	299	312	328	279	331	849	1,940	969	413	365	357	6,800
1957	364	273	285	277	260	357	690	3,310	4,560	1,290	738	619	13,020
1958	603	500	415	371	345	407	895	4,610	2,140	676	611	513	12,090
1959	455	458	385	372	313	323	507	871	589	323	303	274	5,170
1960	305	243	189	194	207	250	705	2,040	981	426	344	308	6,190
1961	305	253	232	225	192	201	338	839	381	222	214	254	3,660
1962	252	226	200	175	256	390	1,600	3,120	1,920	756	562	476	9,930
1963	447	412	387	344	319	306	441	1,540	862	437	331	291	6,120
1964	283	276	252	223	193	207	382	2,790	1,810	728	515	403	8,060
1965	406	360	373	350	324	355	835	2,620	2,360	765	580	514	9,840

Estimated monthly and annual runoff, in acre-feet

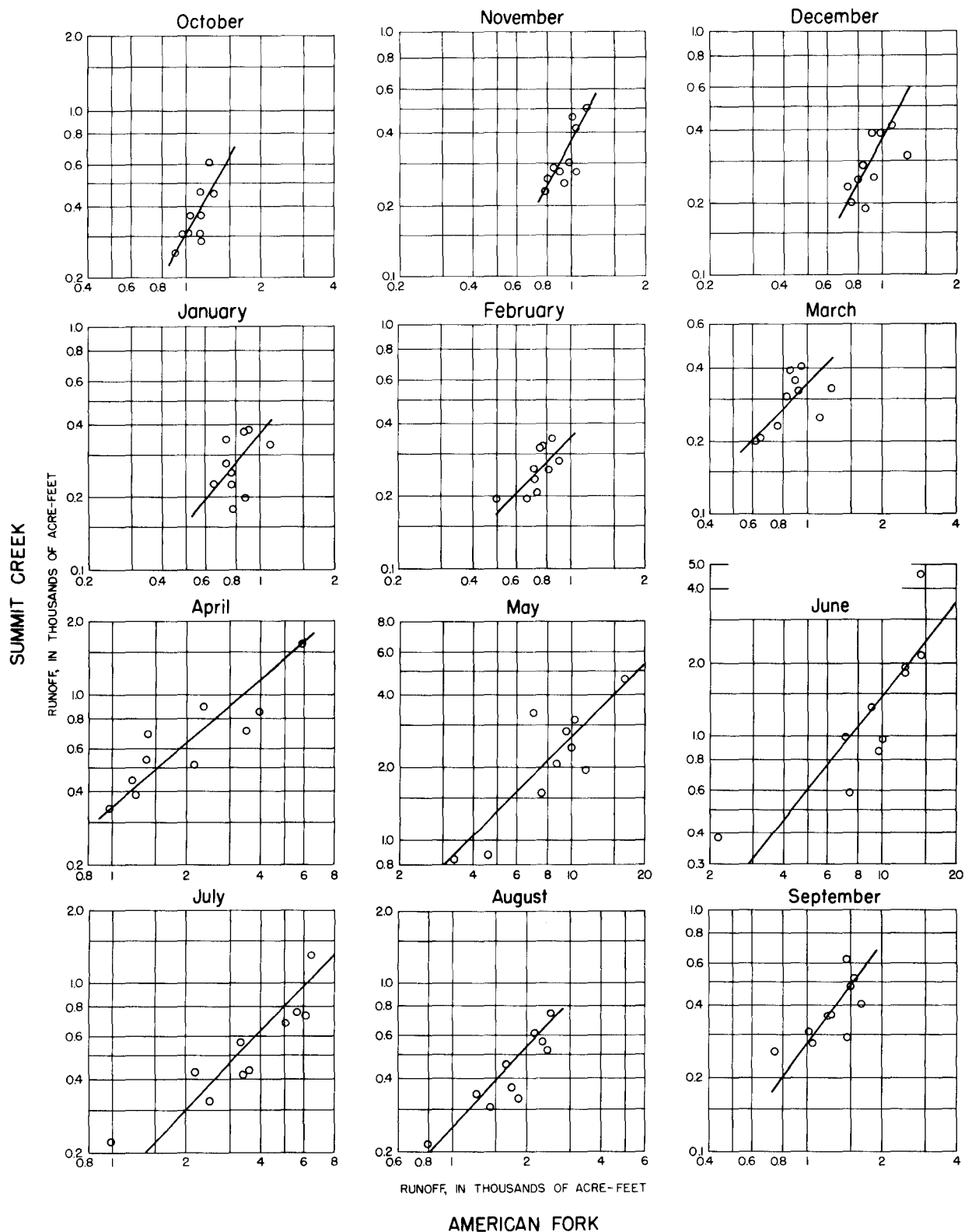
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1927	-	-	-	390	340	450	990	3,800	2,900	1,300	810	600	-
1928	660	670	480	380	300	520	870	3,500	1,200	590	450	370	9,990
1929	360	340	320	280	270	340	530	2,800	2,100	1,200	900	750	10,190
1930	680	410	260	220	200	250	1,300	1,600	770	360	480	450	6,980
1931	680	320	350	360	280	340	640	1,300	280	210	250	220	5,230
1932	240	240	200	230	240	270	860	3,400	1,900	930	600	490	9,600
1933	440	330	240	300	230	270	550	1,300	2,000	580	380	310	6,930
1934	290	300	240	180	150	430	740	740	92	110	130	130	3,530
1935	230	260	240	210	260	310	720	1,800	1,900	770	580	310	7,590
1936	260	280	190	220	160	340	1,500	4,200	1,700	860	590	500	10,800
1937	640	630	360	350	290	410	920	4,300	1,700	860	570	500	11,520
1938	680	530	680	310	240	320	1,500	3,200	1,900	760	570	480	11,170
1939	500	430	370	260	240	370	1,300	2,400	770	390	300	280	7,610
1940	360	250	190	230	220	350	940	2,400	480	250	220	210	6,100
1941	170	180	170	200	210	320	580	2,900	1,600	930	570	600	8,430
1942	710	500	360	300	230	300	1,600	2,300	1,600	720	510	410	9,540
1943	460	320	300	220	240	310	1,400	2,100	1,100	710	500	370	8,030
1944	440	400	290	300	260	270	540	2,800	1,900	900	590	460	9,150
1945	440	430	250	270	260	290	590	3,300	2,100	1,300	900	800	10,930

JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet for Summit Creek near Santaquin, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1946	840	690	470	390	300	460	1,900	3,000	1,000	490	440	360	10,340
1947	660	610	520	390	340	540	1,100	3,900	1,300	860	660	590	11,470
1948	650	630	500	350	270	290	850	4,100	2,000	660	520	390	11,210
1949	420	380	410	350	290	380	1,400	3,600	2,100	990	590	450	11,360
1950	580	630	460	390	320	480	1,400	3,100	2,300	1,000	620	510	11,790
1951	510	680	560	410	320	390	1,300	3,400	1,900	920	780	550	11,720
1952	630	470	480	340	300	310	1,300	5,600	3,100	1,300	910	670	15,410
1953	640	450	400	370	290	360	720	1,500	2,100	1,000	650	510	8,990
1954	500	470	360	340	300	380	1,000	2,300	560	370	380	320	7,280

**JORDAN RIVER BASIN**  
**Summit Creek near Santaquin, Utah.—Continued.**  
**Runoff relations for Summit Creek versus American Fork**



JORDAN RIVER BASIN

10-1475. Payson Creek above diversions, near Payson, Utah

Location.--Lat 39°58'10", long 111°41'35", in SE¼SE¼, sec.3, T.10 S., R.2 E., on left bank a quarter of a mile upstream from diversion dam for Strawberry Water Users Association powerplant, 5 miles southeast of Payson, and 12 miles upstream from Utah Lake. Altitude of gage is 5,670 ft (by barometer).

Drainage area.--18.8 sq mi.

Records available.--July 1947 to September 1962.

Estimates of streamflow.--January 1927 to June 1947, and October 1962 to September 1965, based on relation of monthly runoff to that of 10-1645. American Fork above upper powerplant, near American Fork, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Payson Creek above diversions, near Payson, Utah; X is monthly runoff of American Fork, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.34	1.34	1.34	1.23	1.19	1.19	0.89	1.01	*	0.46	0.87	1.34
c	1.58	1.54	1.54	1.17	1.04	1.04	.02	.61	*	-1.14	0.14	1.58

\* For  $X \geq 9,070$  acre-ft,  $b = 0.42$  and  $c = -1.20$

For  $X \leq 9,070$  acre-ft,  $b = 1.40$  and  $c = 2.67$

Average runoff.--38 years (1927-65), 8,610 acre-feet per year (11.9 cfs).

Extremes.--1947-62: Maximum discharge, 465 cfs May 4, 1952, from rating curve extended above 150 cfs on basis of logarithmic plotting; minimum recorded, 1.5 cfs Jan. 8, 1957.

Remarks.--Flow affected by several small reservoirs. Estimated values of annual runoff are probably accurate within 25 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1947	-	-	-	-	-	-	-	-	-	694	544	415	-
1948	389	323	323	308	315	369	1,550	4,570	1,260	736	678	564	11,380
1949	433	391	396	374	320	355	2,030	2,900	1,150	654	591	505	10,100
1950	378	301	308	321	271	337	1,470	3,170	1,190	667	578	515	9,510
1951	379	342	336	313	272	316	1,060	1,480	863	567	520	370	6,820
1952	331	283	305	292	250	312	2,080	9,630	2,080	1,080	857	723	18,220
1953	537	361	350	321	269	356	898	2,840	1,430	799	480	471	9,110
1954	352	328	317	323	296	352	1,400	1,420	582	448	449	321	6,590
1955	289	297	256	325	249	266	733	4,010	1,200	567	499	352	9,040
1956	305	306	329	321	286	332	1,360	1,490	633	555	498	333	6,750
1957	279	233	227	221	211	285	817	5,760	2,950	1,000	664	490	13,140
1958	453	391	371	345	325	388	986	4,870	1,110	694	679	463	11,080
1959	397	387	367	343	289	357	659	810	465	491	375	310	5,250
1960	284	256	246	237	248	325	1,020	2,100	745	515	510	261	6,750
1961	267	283	253	243	205	246	441	768	408	403	246	186	3,950
1962	222	196	204	206	201	236	2,510	3,550	984	633	508	403	9,850

Estimated monthly and annual runoff, in acre-feet

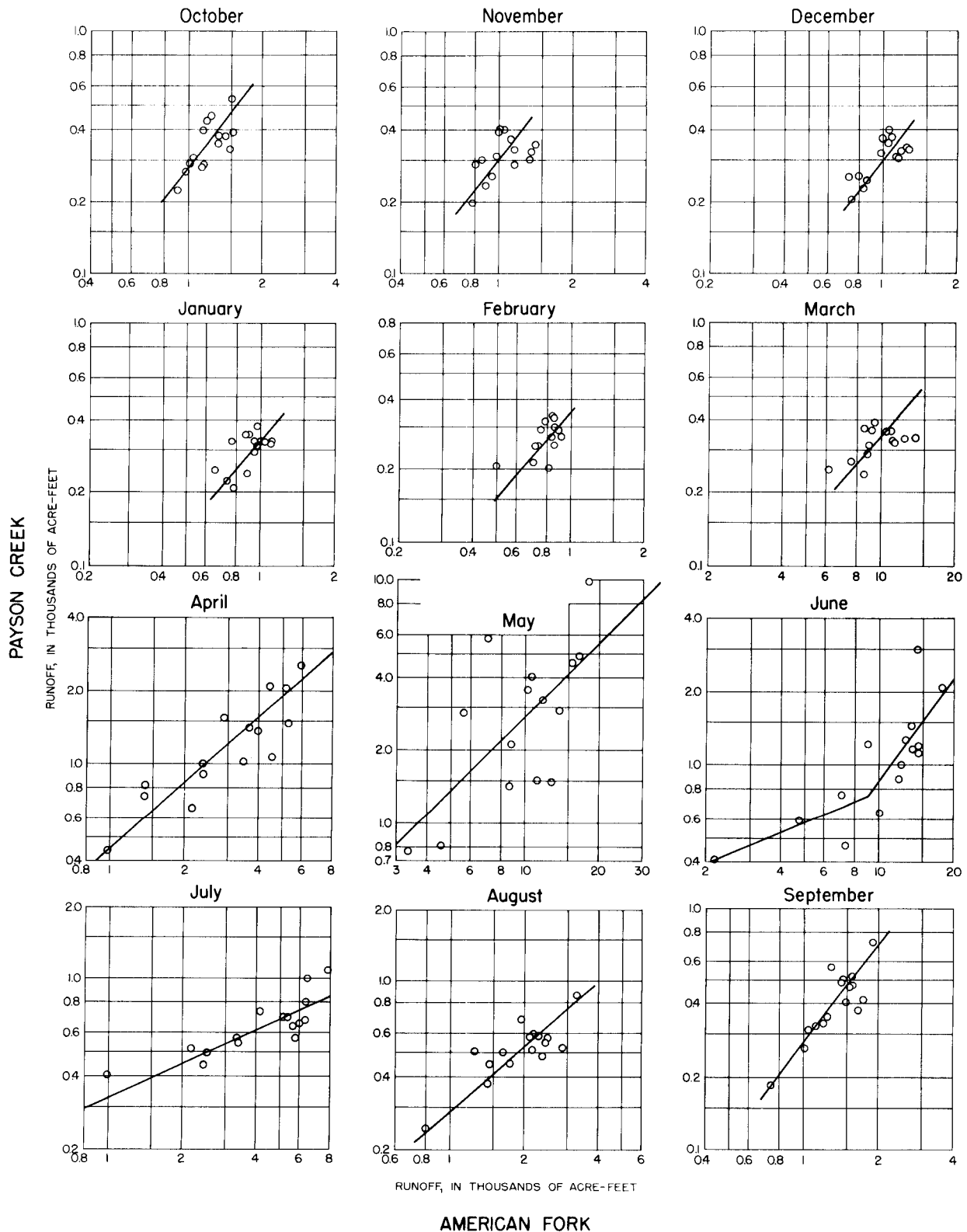
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1927	-	-	-	350	340	470	1,300	3,900	1,800	840	730	580	-
1928	480	470	360	340	280	550	1,200	3,600	720	600	460	360	9,420
1929	310	280	270	260	250	340	690	2,900	1,300	800	790	710	8,900
1930	490	320	240	200	180	240	1,800	1,700	620	480	480	440	7,190
1931	490	270	290	320	270	340	850	1,300	440	380	280	220	5,450
1932	230	220	200	200	220	260	1,200	3,500	1,200	720	580	470	9,000
1933	350	280	220	270	210	260	720	1,300	1,200	590	400	300	6,100
1934	260	260	220	160	130	440	990	760	310	290	170	140	4,130
1935	220	240	220	190	250	300	950	1,900	1,100	660	560	300	6,890
1936	240	250	190	200	140	340	2,100	4,300	1,000	700	570	490	10,520
1937	470	440	290	320	280	420	1,200	4,400	990	700	550	480	10,540
1938	490	390	460	280	230	310	2,100	3,200	1,100	660	550	460	10,230
1939	390	330	300	230	220	360	1,700	2,400	620	500	320	270	7,640
1940	310	230	190	200	200	350	1,300	2,400	530	410	250	200	6,570
1941	180	180	180	180	190	310	770	3,000	910	720	550	580	7,750
1942	500	380	300	270	210	290	2,200	2,300	920	650	510	400	8,930
1943	370	270	260	200	220	300	2,000	2,200	710	640	500	360	8,030
1944	350	320	250	270	250	260	720	2,900	1,200	710	570	440	8,240
1945	360	340	230	240	250	280	780	3,400	1,200	840	790	760	9,470

JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Payson Creek above diversions, near Payson, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1946	570	470	360	350	290	470	2,700	3,000	690	550	450	350	10,250
1947	480	440	390	350	340	580	1,500	3,900	760	-	-	-	10,390
1963	390	320	260	220	250	270	530	2,000	810	580	490	440	6,560
1964	330	320	270	240	210	200	540	2,600	1,100	740	620	530	7,700
1965	400	360	340	340	290	340	940	2,800	1,500	880	810	700	9,700

**JORDAN RIVER BASIN**  
**Payson Creek above diversions, near Payson, Utah.--Continued.**  
**Runoff relations for Payson Creek versus American Fork**



JORDAN RIVER BASIN

10-1535. Provo River near Kamas, Utah

Location--Lat 40°35'00", long 111°00'30", in NE¼ sec.2, T.3 S., R.8 E., on right bank about 1,000 ft upstream from canal carrying flow of Duchesne Tunnel, 3 miles upstream from Soapstone Creek, and 14 miles east of Kamas. Altitude of gage is 8,110 ft (by barometer).

Drainage area--29.6 sq mi.

Records available--September 1949 to September 1965.

Estimates of streamflow--October 1904 to August 1949 based on relationship of monthly runoff with that of 10-1285. Weber River near Oakley, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Provo River near Kamas, Utah; X is monthly runoff of Weber River near Oakley, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	2.43	2.43	1.54	1.54	1.54	1.54	1.30	1.00	1.00	0.67	1.31	3.41
c	6.14	6.14	2.91	2.91	2.91	2.91	2.05	.58	.58	-.98	1.49	9.31

Average runoff--61 years (1904-65), 40,480 acre-feet per year (55.9 cfs).

Extremes--1949-65: Maximum discharge, 825 cfs June 6, 1957; minimum, 1.4 cfs Oct. 25, 1964.

Remarks--No diversion above station. Flow regulated by several small lakes at headwaters which have dams and outlet works. Combined regulated capacity, 10,841 acre-ft. Regulation during July, August and September usually results in higher than normal flow. In either September or October the outlet gates are opened for the winter months. Estimated values of annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1949	-	-	-	-	-	-	-	-	-	-	-	2,360	-
1950	640	499	357	415	315	413	1,860	10,300	19,610	6,280	4,120	921	45,730
1951	387	391	521	492	439	502	1,660	13,290	16,270	6,930	3,400	2,230	46,510
1952	660	426	411	364	345	350	2,310	15,810	17,430	5,750	4,070	1,260	49,190
1953	378	333	291	278	267	393	1,200	4,560	13,720	6,000	2,860	1,700	31,980
1954	265	274	258	239	231	338	2,550	9,680	5,130	3,540	1,310	323	24,140
1955	230	264	228	215	194	309	532	10,660	7,450	4,950	2,560	992	28,580
1956	308	399	470	444	403	571	2,220	13,470	11,170	5,180	2,840	497	37,970
1957	222	203	232	215	222	246	523	6,270	21,500	5,930	4,700	2,360	42,620
1958	460	353	361	341	311	369	1,260	14,150	9,650	5,240	2,270	556	35,320
1959	216	235	233	226	236	306	1,440	7,490	8,780	5,320	2,500	739	27,720
1960	1,160	705	343	245	230	337	2,490	9,600	6,770	4,650	1,740	321	28,590
1961	400	338	268	195	174	232	763	5,730	3,470	708	512	2,690	15,480
1962	1,180	867	632	483	568	696	4,210	11,080	15,960	6,000	4,420	917	47,010
1963	411	270	215	161	278	263	545	10,300	8,820	4,700	3,010	1,670	30,640
1964	400	414	254	246	230	246	492	11,050	14,810	5,490	3,810	1,550	38,990
1965	278	296	311	307	278	324	972	8,060	19,920	8,780	4,900	2,530	46,960

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1905	680	470	380	330	270	430	950	5,900	13,000	4,500	1,800	590	29,300
1906	540	310	250	230	180	280	1,600	12,000	18,000	8,600	5,200	†3,500	50,690
1907	570	350	430	440	390	740	3,600	13,000	24,000	20,000	8,700	4,300	76,520
1908	800	480	530	360	280	310	1,300	6,600	15,000	8,400	5,500	2,700	42,260
1909	2,100	790	480	440	310	370	1,200	12,000	34,000	12,000	9,000	†5,300	77,990
1910	1,600	1,400	780	670	460	2,100	6,100	15,000	9,400	4,200	2,200	1,100	45,010
1911	690	420	370	550	560	490	1,600	11,000	20,000	6,700	2,600	840	45,820
1912	790	560	540	440	490	480	710	9,000	25,000	7,900	5,700	†3,600	55,210
1913	2,300	1,800	570	490	420	650	2,100	13,000	10,000	5,800	3,800	†4,000	44,930
1914	2,700	1,300	610	680	520	780	2,900	20,000	20,000	7,200	4,600	2,700	63,990
1915	1,800	790	540	600	570	630	2,100	7,000	12,000	5,100	2,000	2,100	35,230
1916	730	870	720	440	430	870	3,000	12,000	20,000	6,600	3,900	1,600	51,160
1917	1,900	960	840	280	330	500	1,100	8,600	27,000	13,000	4,400	2,700	61,610
1918	620	530	450	440	340	590	1,000	8,400	17,000	4,300	2,000	720	36,390
1919	1,200	370	440	290	300	390	1,400	13,000	6,400	3,300	1,600	950	29,640
1920	940	550	340	350	360	440	640	15,000	21,000	6,500	3,800	2,100	52,020



## JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Provo River near Kamas, Utah.--Continued

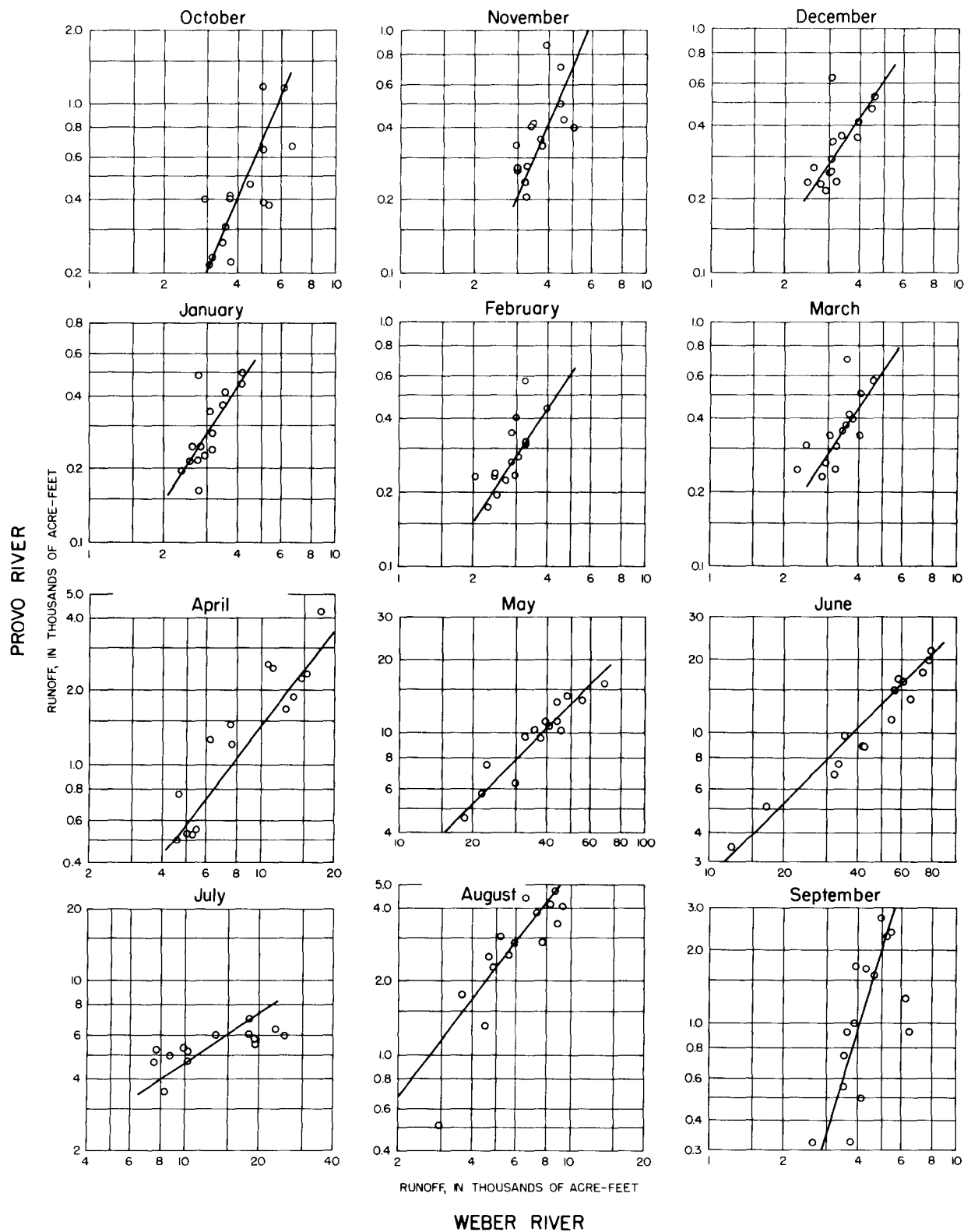
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1921	1,300	1,300	540	490	460	970	2,000	13,000	33,000	9,300	5,500	‡3,500	71,360
1922	1,100	830	570	490	390	480	960	15,000	28,000	6,600	4,800	2,400	61,620
1923	570	560	510	510	480	650	1,100	14,000	18,000	9,100	4,300	2,900	52,680
1924	1,500	580	400	380	410	540	1,000	11,000	5,000	3,200	1,600	410	26,020
1925	280	280	340	300	280	530	1,900	13,000	8,800	5,100	2,800	2,800	36,410
1926	1,300	560	470	290	340	610	2,600	12,000	7,200	3,700	2,200	480	31,750
1927	310	260	340	340	290	370	1,100	11,000	17,000	5,900	3,400	2,100	42,410
1928	990	1,100	460	380	300	640	1,200	19,000	10,000	4,900	2,700	760	42,430
1929	400	390	380	340	330	420	840	12,000	19,000	7,000	4,600	‡3,200	48,900
1930	570	350	380	290	290	490	2,400	8,300	11,000	4,500	3,900	1,800	34,270
1931	1,300	270	290	340	290	290	660	6,500	4,100	2,600	970	‡220	17,830
1932	120	180	290	290	300	400	1,300	14,000	20,000	6,200	2,900	760	46,740
1933	290	230	260	240	210	260	560	5,000	21,000	4,500	2,100	280	34,930
1934	170	150	220	230	200	350	1,500	4,500	1,200	1,800	720	‡210	11,250
1935	100	140	250	250	210	290	980	6,500	19,000	5,000	2,700	500	35,920
1936	220	220	290	290	260	340	2,700	20,000	10,000	5,400	5,100	3,400	48,220
1937	480	380	340	290	250	340	1,200	15,000	6,300	4,200	2,400	700	31,880
1938	510	530	380	340	290	390	2,100	11,000	14,000	4,900	2,900	1,500	38,840
1939	620	650	500	380	330	540	2,100	9,600	4,800	3,600	1,700	390	25,210
1940	280	190	200	190	190	310	1,100	10,000	3,500	3,000	1,300	370	20,630
1941	580	280	310	290	230	340	640	9,400	10,000	4,500	3,000	1,100	30,670
1942	660	580	420	350	300	390	2,600	8,300	14,000	4,900	2,700	930	36,130
1943	290	250	300	260	220	370	3,700	11,000	12,000	5,700	2,900	1,600	38,590
1944	550	440	330	280	250	300	560	12,000	16,000	6,300	3,400	1,500	41,910
1945	460	420	380	360	310	390	580	8,700	11,000	6,200	4,500	‡2,900	36,200
1946	540	650	430	380	290	540	4,100	11,000	9,600	4,400	2,600	1,100	35,630
1947	530	460	440	330	310	490	1,300	14,000	11,000	5,800	3,500	2,400	40,560
1948	580	470	450	420	360	490	1,100	14,000	9,600	4,400	2,600	420	34,890
1949	240	280	340	340	280	410	2,300	11,000	14,000	5,600	3,300	-	40,450

‡ Estimated on basis of August curve

# JORDAN RIVER BASIN

## Provo River near Kamas, Utah.—Continued.

### Runoff relations for Provo River versus Weber River



JORDAN RIVER BASIN

10-1560. Snake Creek near Charleston, Utah

Location.--Lat 40°29', long 111°28', in SW¼ sec.11, T.4 S., R.4 E., 600 ft upstream from mouth and 1½ miles northeast of Charleston. Altitude of gage is 5,460 ft (from river profile map).

Drainage area.--35 sq mi, approximately.

Records available.--September 1938 to September 1950.

Estimates of streamflow.--October 1904 to August 1938, and October 1950 to September 1965; based on relation of monthly runoff to that of 10-1285. Weber River near Oakley, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Snake Creek near Charleston, Utah; X is monthly runoff of Weber River near Oakley, Utah; and b, and c are constants for the individual months.

Monthly values for constants in above equation												
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.79	0.79	0.78	0.78	0.79	0.79	0.34	0.35	0.35	0.34	0.58	0.66
c	-.60	-.60	-.65	-.65	-.60	-.60	-2.08	-1.92	-1.92	-2.08	-1.21	-.92

Average runoff.--61 years (1904-65), 34,050 acre-feet per year (47.0 cfs).

Extremes.--1938-50: Maximum discharge, 126 cfs June 4, 1943; minimum, 19 cfs May 1, 1941.

Remarks.--Some diversions above station for irrigation. Estimated values for annual runoff are probably accurate within 10 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1938	-	-	-	-	-	-	-	-	-	-	-	2,260	-
1939	2,660	2,740	2,740	2,610	2,330	2,920	2,790	3,200	2,590	2,070	1,840	1,760	30,250
1940	2,180	2,010	2,220	2,230	2,040	2,220	2,380	3,060	2,360	2,000	1,750	1,810	26,260
1941	2,190	2,220	2,340	2,170	1,870	2,480	2,160	2,720	3,140	2,650	2,310	2,080	28,330
1942	2,790	2,940	2,440	2,490	2,300	2,620	2,750	3,000	3,340	2,510	2,030	2,030	31,240
1943	2,410	2,560	2,640	2,360	2,080	2,740	2,910	5,380	4,320	2,900	2,540	2,190	35,030
1944	2,890	2,970	2,710	2,490	2,230	2,710	2,970	3,330	4,220	2,970	2,330	1,910	33,730
1945	2,540	3,230	3,160	3,030	3,060	3,200	3,440	3,170	4,040	3,180	3,070	2,900	38,020
1946	3,530	3,740	3,320	3,070	2,380	3,070	3,070	3,510	3,220	2,490	2,300	2,250	35,950
1947	3,280	3,160	2,930	2,540	2,330	2,740	2,560	3,230	3,720	3,010	2,710	2,840	35,000
1948	3,090	2,860	2,800	2,570	2,260	2,430	2,660	3,320	3,520	2,830	2,600	2,490	33,430
1949	3,090	2,900	2,650	2,470	2,090	2,980	2,790	3,870	3,620	3,090	2,700	2,590	34,840
1950	3,220	2,730	2,510	2,600	2,740	3,160	2,700	3,520	3,770	3,250	2,690	2,860	35,750

Estimated monthly and annual runoff, in acre-feet

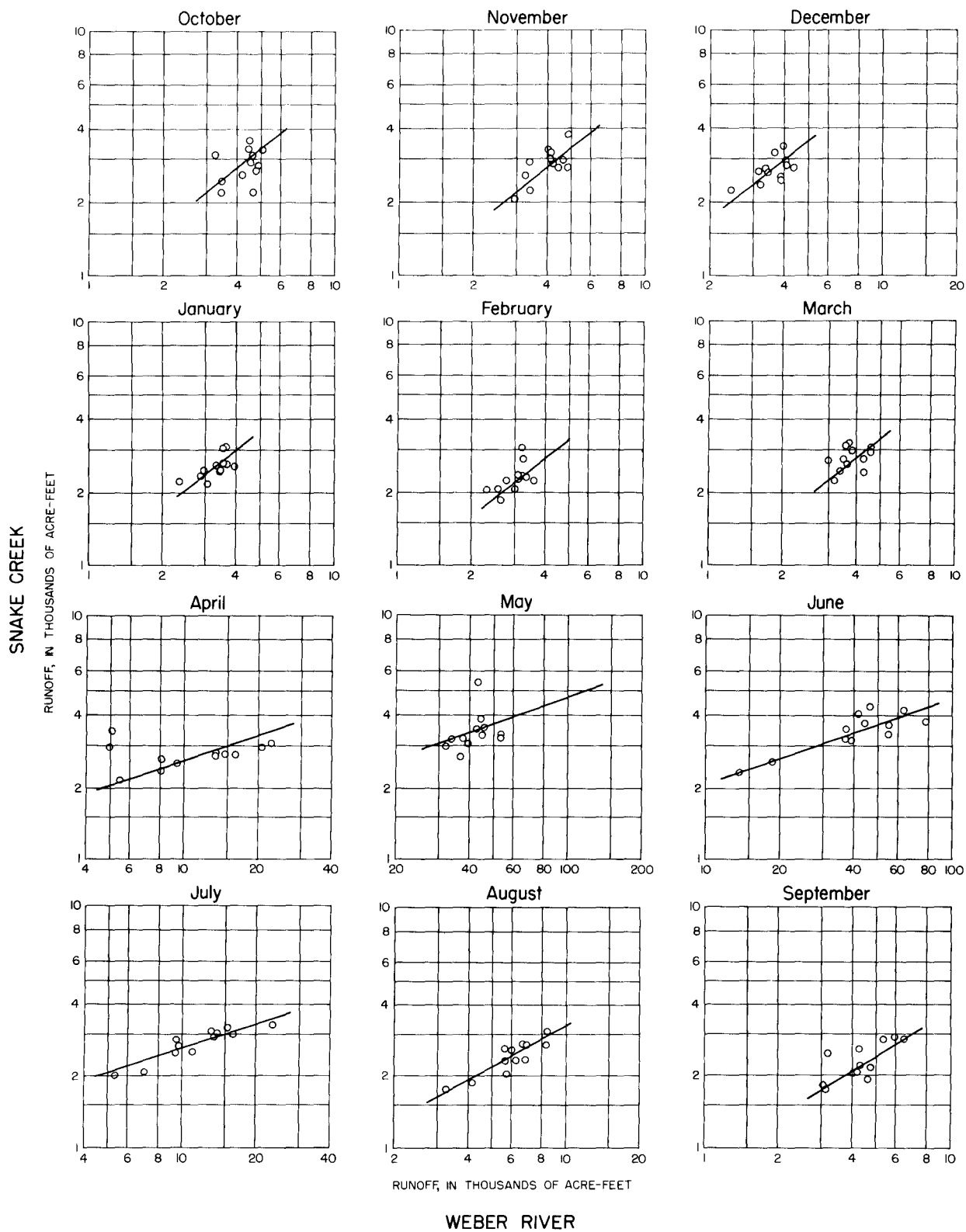
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1905	3,200	2,900	2,800	2,600	2,200	2,700	2,300	2,800	3,600	2,600	2,000	1,900	31,600
1906	3,000	2,500	2,200	2,100	1,700	2,200	2,700	3,600	4,100	3,600	3,100	3,000	33,800
1907	3,100	2,600	2,900	3,000	2,600	3,600	3,300	3,600	4,600	5,400	3,900	2,800	41,400
1908	3,400	2,900	3,300	2,700	2,200	2,300	2,600	2,900	3,900	3,500	3,200	2,600	35,500
1909	4,700	3,400	3,100	3,000	2,300	2,500	2,500	3,600	5,200	4,200	4,000	3,700	42,200
1910	4,300	4,100	4,000	3,700	2,900	6,200	3,800	3,900	3,300	2,500	2,200	2,200	43,100
1911	3,200	2,800	2,700	3,300	3,200	2,900	2,700	3,500	4,300	3,100	2,300	2,000	36,000
1912	3,400	3,000	3,300	3,000	2,900	2,900	2,200	3,200	4,600	3,400	3,300	3,000	38,200
1913	4,800	4,400	3,400	3,100	2,700	3,400	2,900	3,700	3,400	2,900	2,800	3,200	40,700
1914	5,100	4,000	3,500	3,700	3,000	3,700	3,100	4,300	4,300	3,300	3,000	2,500	43,500
1915	4,500	3,400	3,300	3,500	3,200	3,300	2,900	3,000	3,600	2,800	2,100	2,500	38,100
1916	3,300	3,500	3,800	3,000	2,800	4,000	3,200	3,500	4,300	3,100	2,800	2,300	39,600
1917	4,600	3,600	4,100	2,400	2,400	3,000	2,400	3,200	4,700	4,400	2,900	2,600	40,300
1918	3,200	3,000	3,000	3,000	2,500	3,200	2,400	3,100	4,100	2,500	2,100	2,000	34,100
1919	3,900	2,700	3,000	2,400	2,300	2,600	2,600	3,600	2,900	2,200	1,900	2,100	32,200
1920	3,600	3,000	2,600	2,600	2,500	2,800	2,100	3,900	4,300	3,100	2,700	2,400	35,600
1921	4,000	4,000	3,300	3,100	2,900	4,200	2,900	3,700	5,100	3,700	3,200	3,000	43,100
1922	3,800	3,500	3,400	3,100	2,600	2,900	2,400	3,900	4,800	3,100	3,000	2,500	39,000
1923	3,100	3,100	3,200	3,200	2,900	3,400	2,500	3,800	4,100	3,700	2,900	2,600	38,500
1924	4,200	3,100	2,900	2,800	2,700	3,100	2,400	3,500	2,600	2,200	1,900	1,800	33,200
1925	2,400	2,400	2,600	2,400	2,200	3,000	2,800	3,700	3,200	2,700	2,400	2,600	32,400

JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Snake Creek near Charleston, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1926	4,000	3,100	3,100	2,400	2,400	3,300	3,000	3,600	3,000	2,300	2,200	1,800	34,200
1927	2,500	2,400	2,600	2,600	2,200	2,500	2,500	3,500	4,100	3,000	2,600	2,400	32,900
1928	3,700	3,800	3,100	2,800	2,300	3,400	2,500	4,200	3,400	2,700	2,400	2,000	36,300
1929	2,700	2,700	2,800	2,600	2,400	2,700	2,300	3,600	4,200	3,200	3,000	2,900	35,100
1930	3,100	2,600	2,800	2,400	2,200	2,900	3,000	3,100	3,500	2,600	2,800	2,400	33,400
1931	4,100	2,400	2,400	2,600	2,200	2,200	2,100	2,900	2,500	2,000	1,500	1,300	28,200
1932	1,800	2,100	2,400	2,400	2,300	2,600	2,600	3,800	4,300	3,000	2,400	2,000	31,700
1933	2,500	2,300	2,300	2,200	1,900	2,100	2,100	2,600	4,300	2,600	2,100	1,700	28,700
1934	2,100	2,000	2,100	2,100	1,800	2,500	2,600	2,500	1,600	1,600	1,300	1,300	23,500
1935	1,700	1,900	2,200	2,200	1,900	2,200	2,400	2,900	4,200	2,700	2,400	1,900	28,600
1936	2,200	2,200	2,400	2,400	2,100	2,400	3,100	4,300	3,400	2,800	3,100	2,700	33,100
1937	2,900	2,700	2,600	2,400	2,100	2,400	2,500	3,800	2,900	2,500	2,200	2,000	31,000
1938	3,000	3,000	2,800	2,600	2,200	2,600	2,900	3,500	3,800	2,700	2,400	-	33,800
1951	3,300	3,300	3,300	3,100	2,700	2,800	2,800	3,500	3,900	3,200	3,000	2,500	37,400
1952	4,100	3,100	2,900	2,700	2,100	2,400	3,000	4,100	4,200	3,200	3,100	2,800	37,700
1953	3,500	2,600	2,400	2,500	2,100	2,600	2,400	2,600	4,100	2,900	2,800	2,100	32,600
1954	2,500	2,300	2,400	2,400	2,200	2,200	2,700	3,300	2,500	2,400	2,100	2,000	29,000
1955	2,300	2,200	2,200	2,200	1,900	1,900	2,100	3,400	3,200	2,500	2,300	2,100	28,300
1956	2,500	2,400	3,200	3,100	2,200	3,100	3,000	3,800	3,800	2,600	2,400	2,100	34,200
1957	2,600	2,300	2,000	2,100	2,000	2,300	2,100	3,100	4,300	3,500	3,000	2,600	31,900
1958	3,000	2,600	2,600	2,400	2,300	2,500	2,200	3,600	3,300	2,400	2,100	1,900	30,900
1959	2,200	2,300	2,500	2,300	1,900	2,300	2,400	2,800	3,500	2,600	2,100	1,900	28,800
1960	3,900	3,000	2,400	2,200	1,900	2,800	2,700	3,200	3,100	2,400	1,800	1,600	31,000
1961	2,100	2,200	2,100	2,000	1,800	2,100	2,000	2,700	2,200	1,900	1,600	2,400	25,100
1962	3,300	2,700	2,400	2,200	2,300	2,500	3,200	3,400	3,900	3,200	2,600	2,000	33,700
1963	2,600	2,200	2,300	2,200	2,200	2,100	2,200	3,300	3,500	2,600	2,200	2,200	29,600
1964	2,600	2,400	2,400	2,100	1,600	1,800	2,000	3,500	3,900	3,200	2,700	2,300	30,500
1965	2,500	2,400	2,700	2,500	2,200	2,000	2,500	3,400	4,300	4,100	3,800	3,600	36,000

**JORDAN RIVER BASIN**  
**Snake Creek near Charleston, Utah.--Continued.**  
**Runoff relations for Snake Creek versus Weber River**



JORDAN RIVER BASIN

10-1600. Deer Creek near Wildwood, Utah

Location.--Lat 40°24'30", long 111°32'00", in NE¼ sec.7, T.5 S., R.4 E., 1,000 ft upstream from mouth and 2 miles northeast of Wildwood. Altitude of gage is 5,300 ft (from topographic map).

Drainage area.--26 sq mi, approximately.

Records available.--September 1938 to September 1950.

Estimates of streamflow.--October 1898 to August 1938 and October 1950 to September 1965 based on the relation of monthly runoff to that of 10-1685., Big Cottonwood Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Deer Creek near Wildwood, Utah; X is monthly runoff of Big Cottonwood Creek near Salt Lake City, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.60	0.66	1.00
c	.38	.38	.30	.30	.30	.38	.51	.97	1.19	-.54	-.55	.47

Average runoff.--67 years (1898-1965), 10,450 acre-feet per year (14.4 cfs).

Extremes.--1938-50: Maximum discharge recorded, 99 cfs May 3, 1945; minimum, 4.7 cfs July 13, 1940.

Remarks.--One small diversion above station. Estimated values of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1938	-	-	-	-	-	-	-	-	-	-	-	594	-
1939	692	644	681	634	564	760	1,240	723	512	479	467	537	7,930
1940	591	589	573	610	551	686	804	573	377	345	391	477	6,570
1941	600	579	615	570	550	735	893	1,340	556	479	531	475	7,920
1942	604	564	671	738	555	636	2,010	1,470	679	515	496	538	9,480
1943	624	619	691	659	599	1,010	1,770	853	490	442	463	460	8,680
1944	632	586	622	626	582	670	786	1,650	1,050	608	525	540	8,880
1945	813	749	723	819	730	760	1,190	2,380	1,130	729	815	786	11,620
1946	833	833	785	694	555	875	2,170	1,160	698	614	546	533	10,300
1947	724	690	730	639	613	908	1,600	1,480	752	668	603	566	9,970
1948	706	706	734	690	625	633	2,090	2,490	768	653	611	526	11,230
1949	738	730	724	738	623	801	2,250	1,830	924	614	563	541	11,080
1950	628	619	626	596	679	875	2,710	2,010	1,060	678	596	609	11,690

Estimated monthly and annual runoff, in acre-feet

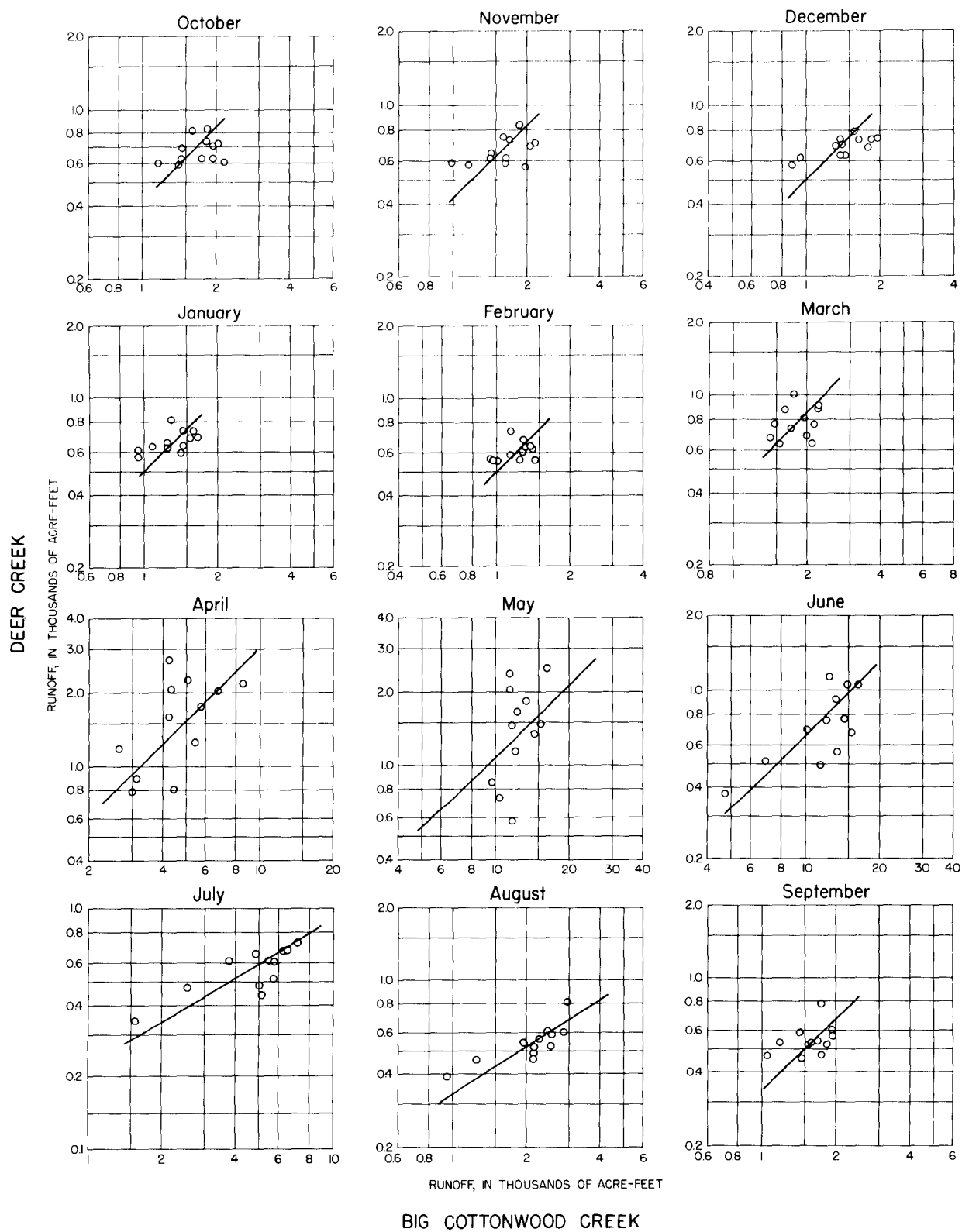
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	960	820	750	740	670	840	1,700	1,200	1,500	900	790	1,000	11,900
1900	960	850	820	740	770	830	1,200	990	660	480	530	500	9,300
1901	710	730	770	680	650	770	1,300	1,800	660	550	590	590	9,800
1902	750	700	820	710	670	640	1,300	1,400	750	500	530	560	9,300
1903	680	620	700	660	540	630	1,100	1,100	870	470	420	180	8,000
1904	800	750	800	740	770	810	1,600	1,700	1,200	1,100	670	940	11,900
1905	950	800	770	790	680	760	1,100	910	730	510	560	630	9,200
1906	830	710	810	790	740	830	1,300	1,300	780	840	900	1,100	10,900
1907	1,100	990	1,500	1,400	1,200	1,400	1,600	1,400	1,700	1,500	1,100	1,200	16,100
1908	1,300	1,100	1,100	1,000	880	890	1,500	1,300	1,100	900	810	1,100	13,000
1909	1,500	1,200	1,100	1,200	1,100	1,100	1,800	1,700	2,100	1,100	1,100	1,800	16,800
1910	1,800	1,700	1,900	1,700	1,300	2,400	3,300	1,900	920	620	800	1,000	19,300
1911	1,400	1,100	1,300	1,200	1,200	1,200	1,300	1,100	1,100	670	690	730	13,000
1912	990	740	770	760	680	720	1,100	1,400	1,600	760	850	1,000	11,400
1913	1,300	1,100	960	850	780	850	2,000	1,500	740	640	650	800	12,200
1914	1,100	760	840	790	630	1,200	1,900	1,900	1,100	780	740	860	12,600
1915	1,200	900	800	710	670	850	2,000	960	740	570	600	730	10,700
1916	830	760	810	810	830	1,600	1,900	1,300	970	690	760	990	12,200
1917	1,400	860	910	920	790	770	1,400	1,300	1,500	960	890	1,200	12,900
1918	1,200	900	970	900	820	1,300	1,500	1,200	1,000	560	620	760	11,700
1919	1,100	840	860	790	680	900	1,900	1,700	500	460	630	810	11,200
1920	1,100	1,100	960	910	790	910	1,200	2,100	1,200	690	740	920	12,600
1921	1,200	1,100	1,000	1,000	1,100	1,800	1,700	2,100	1,900	960	920	1,100	15,900
1922	1,200	970	1,200	1,000	840	990	1,400	2,000	1,600	780	840	930	13,800
1923	970	920	1,000	1,000	850	990	1,500	1,900	1,200	890	780	960	13,000
1924	1,300	920	950	850	800	740	1,300	1,300	450	440	490	550	10,100
1925	690	680	650	770	850	1,200	1,700	1,600	710	620	640	850	11,000

JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Deer Creek near Wildwood, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1926	900	730	800	710	670	990	1,900	1,500	520	440	560	560	10,300
1927	820	720	890	1,000	700	920	1,500	1,500	1,200	710	680	860	11,500
1928	1,000	1,100	1,100	1,000	870	1,200	1,400	1,800	620	510	580	630	11,810
1929	790	740	790	740	650	900	1,300	1,500	1,100	720	700	940	10,870
1930	950	710	800	700	660	760	1,800	930	540	410	560	700	9,520
1931	1,100	700	740	680	610	640	1,200	900	270	300	390	400	7,930
1932	530	490	570	520	550	700	1,400	1,600	890	600	570	630	9,050
1933	720	630	630	630	510	730	1,000	930	1,200	530	520	500	8,530
1934	590	510	540	520	480	760	1,200	540	100	200	290	230	5,960
1935	320	390	530	470	500	510	920	910	1,000	530	440	340	6,860
1936	400	380	390	400	390	630	2,000	1,800	660	500	540	450	8,540
1937	500	480	500	410	450	660	1,000	1,500	580	470	420	440	7,410
1938	750	580	750	530	480	780	1,800	1,500	880	520	520	-	9,680
1951	750	820	900	770	750	690	1,200	1,300	960	640	740	610	10,130
1952	910	690	780	720	730	690	2,000	1,900	1,300	800	810	760	12,090
1953	800	690	1,000	790	660	860	1,200	860	1,200	740	700	640	10,140
1954	780	710	750	720	660	740	1,200	1,000	390	430	450	430	8,260
1955	550	570	620	580	510	540	830	1,300	760	510	510	420	7,700
1956	510	560	860	870	580	740	1,200	1,200	780	500	520	540	8,860
1957	650	590	680	640	600	780	980	1,400	1,300	820	720	740	9,900
1958	800	710	780	730	680	760	1,300	2,100	1,100	570	610	620	10,760
1959	680	580	700	620	580	620	1,000	900	830	470	490	600	8,070
1960	860	610	610	580	570	940	1,700	1,300	640	390	450	450	9,100
1961	560	530	590	500	450	510	720	720	290	270	380	510	6,030
1962	510	490	500	490	740	660	1,800	1,300	990	720	600	500	9,300
1963	610	510	520	510	510	500	720	1,100	860	500	460	550	7,350
1964	560	570	580	550	440	460	840	1,400	1,000	750	650	650	8,450
1965	680	650	940	920	890	740	1,200	1,100	1,100	840	800	1,100	10,960

**JORDAN RIVER BASIN**  
**Deer Creek near Wildwood, Utah.—Continued.**  
**Runoff relations for Deer Creek versus Big Cottonwood Creek**





JORDAN RIVER BASIN

10-1655. Dry Creek near Alpine, Utah

Location.--Lat 40°28'35", long 111°45'25", in NE¼ sec.18, T.4 S., R.2 E., on right bank 2 miles northeast of Alpine and 3½ miles upstream from Fork Creek. Altitude of gage is 5,320 ft (from topographic map).

Drainage area.--9.82 sq mi.

Records available.--July 1947 to September 1955. Annual maximum only November 1959 to September 1965.

Estimates of streamflow.--October 1898 to June 1947, and October 1955 to September 1965, based on relation of monthly runoff to that of 10-1685., Big Cottonwood Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Dry Creek near Alpine, Utah; X is monthly runoff of Big Cottonwood Creek near Salt Lake City, Utah; b, and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.37	1.35	1.35	1.35	1.35	1.35	1.30	1.29	1.29	1.20	1.37	1.37
c	1.92	1.81	1.76	1.72	1.70	1.72	1.55	1.64	1.70	1.42	1.92	1.92

Average runoff.--67 years (1898-1965), 15,930 acre-feet per year (22.0 cfs).

Extremes.--1947-55, 1959-65: Maximum discharge not determined, occurred Aug. 3, 1951; maximum discharge observed, 597 cfs Aug. 25, 1961. 1947-55: Minimum discharge, 1.5 cfs Oct. 13, 1954.

Remarks.--Estimated figures of annual runoff are probably accurate within 25 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1947	-	-	-	-	-	-	-	-	-	1,670	690	415	-
1948	451	505	494	446	368	442	1,220	4,710	3,830	1,040	452	320	14,280
1949	352	347	340	332	315	552	2,440	4,740	6,030	1,190	522	462	17,620
1950	563	524	424	445	400	533	1,790	3,600	3,940	1,390	446	384	14,440
1951	322	387	436	429	403	579	2,030	4,840	5,020	1,640	1,070	417	17,570
1952	332	360	353	324	261	278	2,510	7,370	6,440	1,800	694	420	21,140
1953	308	270	249	243	219	437	1,110	2,180	6,340	1,580	463	235	13,630
1954	256	297	274	255	324	407	2,190	4,500	1,490	589	289	229	11,100
1955	227	325	305	315	263	260	591	5,320	4,590	777	404	228	13,600

Estimated monthly and annual runoff, in acre-feet

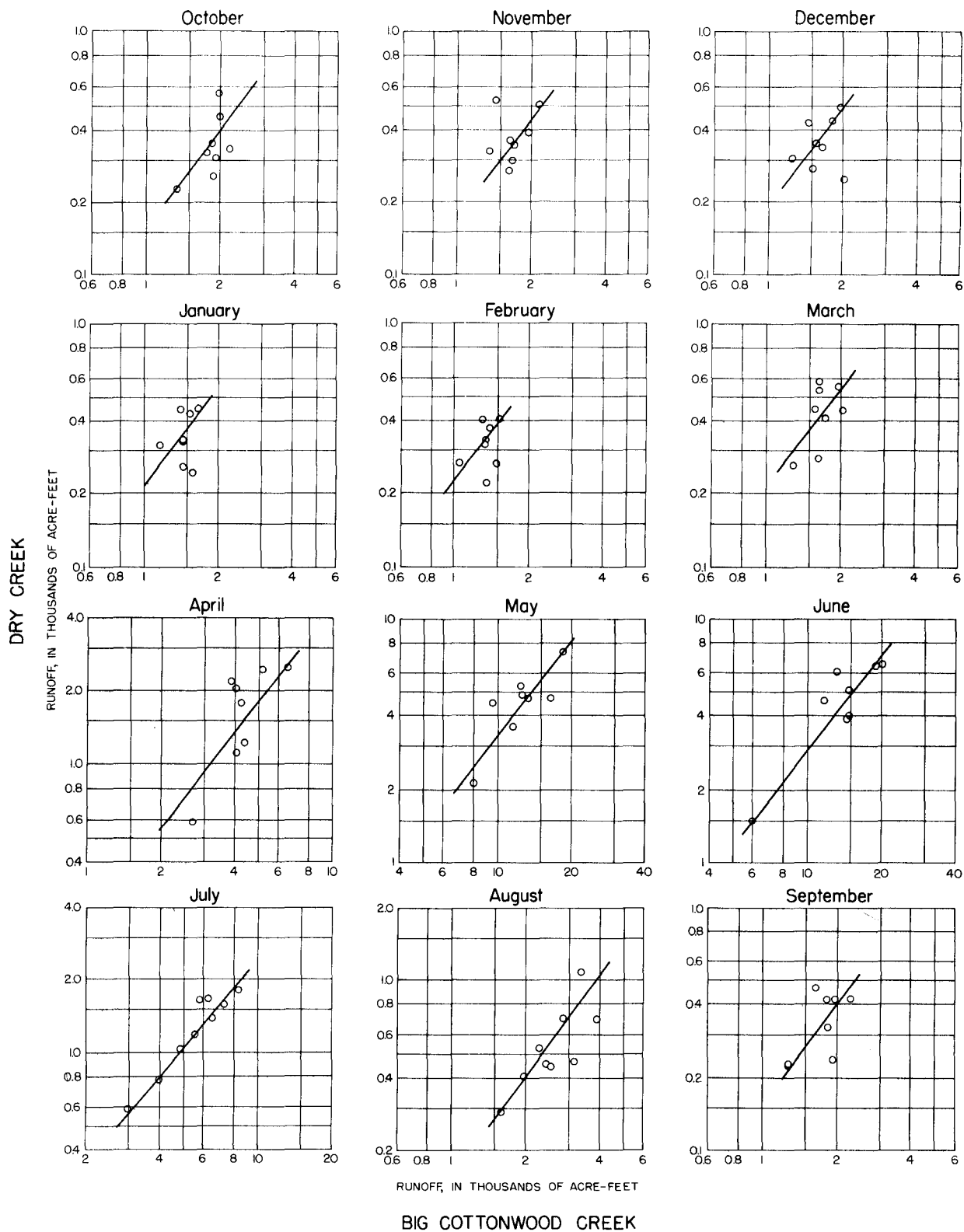
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	480	430	340	360	340	540	2,100	3,700	8,300	2,400	950	710	20,650
1900	480	450	380	360	410	530	1,400	3,000	2,900	700	420	270	11,300
1901	310	360	350	320	330	470	1,400	6,300	2,900	900	520	340	14,500
1902	340	340	380	340	340	370	1,500	4,600	3,500	760	410	310	13,190
1903	300	300	300	310	250	360	1,100	3,200	4,200	680	260	67	11,330
1904	380	380	360	360	410	510	1,900	5,900	6,400	3,400	690	630	21,320
1905	480	410	350	400	350	470	1,200	2,700	3,300	780	460	370	11,270
1906	390	350	370	400	380	520	1,500	4,400	3,600	2,100	1,200	840	16,050
1907	590	550	860	900	720	1,100	1,900	4,600	9,800	6,900	1,800	840	30,560
1908	750	650	590	540	490	580	1,800	4,100	5,900	2,400	1,000	760	19,560
1909	870	700	570	730	620	800	2,200	5,900	12,700	3,700	1,900	1,600	32,290
1910	1,100	1,100	1,200	1,100	840	2,300	5,000	6,800	4,500	1,200	990	710	26,840
1911	780	650	700	720	710	900	1,400	3,500	5,600	1,400	720	450	17,530
1912	500	370	350	370	350	430	1,300	4,800	9,400	1,700	1,100	710	21,380
1913	740	600	470	430	420	540	2,600	5,000	3,400	1,200	640	510	16,550
1914	590	390	390	400	310	860	2,500	7,100	5,500	1,800	840	560	21,240
1915	620	490	360	340	330	540	2,600	2,800	3,400	970	540	450	13,440
1916	390	390	380	410	460	1,300	2,500	4,200	4,800	1,500	890	670	17,890
1917	830	460	430	490	420	470	1,600	4,500	8,200	2,700	1,200	840	22,140
1918	650	480	480	470	450	950	1,700	4,000	5,000	940	590	480	16,190
1919	560	450	410	400	350	580	2,400	5,800	2,100	660	600	510	14,820
1920	610	600	470	480	420	590	1,400	8,000	6,600	1,500	840	620	22,130
1921	630	630	540	590	640	1,500	2,000	8,100	11,300	2,700	1,300	780	30,710
1922	620	540	620	550	460	660	1,600	7,400	9,100	1,800	1,100	620	25,070
1923	490	500	510	550	470	660	1,700	6,800	6,300	2,300	930	650	21,860
1924	690	500	470	430	430	460	1,500	4,400	1,800	600	370	300	11,950
1925	310	330	280	390	470	880	2,200	5,300	3,200	1,200	620	550	15,730

## JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Dry Creek near Alpine, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1926	440	360	360	340	340	660	2,500	5,000	2,200	590	480	310	13,580
1927	390	360	430	390	350	600	1,700	5,300	6,400	1,500	720	560	18,700
1928	540	610	540	540	480	900	1,600	6,800	2,700	810	500	370	16,390
1929	360	370	360	360	320	580	1,500	5,100	5,400	1,600	750	640	17,340
1930	480	350	360	340	330	470	2,300	2,700	2,200	510	460	420	10,920
1931	570	340	330	320	300	370	1,300	2,600	920	270	220	200	7,740
1932	210	210	230	220	260	420	1,600	5,700	4,300	1,100	480	60	15,090
1933	320	300	260	290	240	450	1,100	2,700	6,400	860	400	270	13,590
1934	250	220	220	220	220	470	1,300	1,300	260	130	120	93	4,800
1935	100	160	210	190	230	270	920	2,700	5,100	860	280	150	11,170
1936	140	150	140	150	160	360	2,600	6,300	3,000	740	430	230	14,400
1937	200	210	190	160	200	390	1,100	5,200	2,500	670	260	220	11,300
1938	340	260	340	230	220	490	2,300	4,900	4,300	810	410	250	14,850
1939	260	280	280	240	210	600	2,000	3,400	1,700	470	210	200	9,850
1940	250	170	160	200	220	540	1,600	4,100	1,100	260	140	170	8,910
1941	190	210	180	200	230	440	980	5,300	4,300	1,100	560	340	14,030
1942	450	440	420	400	370	590	2,700	4,100	5,000	1,200	440	290	16,400
1943	250	270	300	290	320	470	2,200	3,200	3,500	1,100	440	260	12,600
1944	330	330	300	290	280	340	940	4,300	5,400	1,200	440	320	14,470
1945	300	330	300	300	280	360	800	4,000	3,800	1,600	690	340	13,100
1946	350	400	350	380	310	620	3,700	4,300	2,900	740	390	280	14,720
1947	410	460	440	350	360	640	1,500	5,900	3,700	-	-	-	16,540
1956	200	250	410	450	280	460	1,300	4,000	3,600	770	410	290	12,420
1957	290	270	290	300	290	480	1,000	4,600	6,900	2,000	790	460	17,670
1958	380	350	350	350	350	470	1,400	8,300	5,400	990	560	360	19,260
1959	290	270	310	280	280	360	1,100	2,600	3,900	660	350	350	10,750
1960	410	290	260	260	270	620	2,100	4,100	2,800	460	290	230	12,090
1961	220	240	240	210	200	280	660	1,900	1,000	220	210	270	5,650
1962	200	210	190	210	390	390	2,200	4,100	4,900	1,500	550	270	15,110
1963	250	230	210	220	240	270	670	3,500	4,200	760	310	300	11,160
1964	230	260	240	240	190	240	820	4,800	5,000	1,700	640	390	14,750
1965	300	310	460	490	490	450	1,400	3,500	5,800	2,100	970	780	17,050

**JORDAN RIVER BASIN**  
**Dry Creek near Alpine, Utah.--Continued.**  
**Runoff relations for Dry Creek versus Big Cottonwood Creek**



JORDAN RIVER BASIN

10-1660. Fort Creek at Alpine, Utah

Location.--Lat 40°27'55", long 111°46'45", in SE¼ sec.13, T.4 S., R.1 E., on right bank three-quarters of a mile north of Alpine and ½ miles upstream from mouth. Altitude of gage is 5,050 ft (from topographic map).

Drainage area.--6.55 sq mi.

Records available.--July 1947 to September 1955.

Estimates of streamflow.--October 1898 to June 1947, and October 1955 to September 1965, based on relation of monthly runoff to that of 10-1685., Big Cottonwood Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Fort Creek at Alpine, Utah; X is monthly runoff of Big Cottonwood Creek near Salt Lake City, Utah; b, and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	1.00	1.00	1.00	1.00	1.00	1.20	1.22	1.34	1.37	1.00	1.00	1.00
c	.97	.85	.85	.81	.74	1.29	1.35	2.25	2.77	1.41	1.13	1.07

Average runoff.--67 years (1898-1965), 6,390 acre-feet per year (8.83 cfs).

Extremes.--1947-65: Maximum discharge occurred July 18, 1965, discharge not determined, probably exceeded 1,000 cfs.  
1947-55: No flow occurred at times during summer months of 1951, 1954-55.

Remarks.--One diversion above station for irrigation. Estimated figures of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1947	-	-	-	-	-	-	-	-	-	244	232	155	-
1948	156	270	263	285	275	320	1,020	2,150	823	233	222	176	6,190
1949	116	287	251	215	236	558	1,890	1,850	871	228	175	184	6,860
1950	232	271	254	291	360	492	1,010	1,460	769	234	152	153	5,680
1951	186	235	251	207	239	370	938	1,480	658	187	229	144	5,120
1952	240	209	190	184	196	326	2,290	3,360	1,400	303	237	195	9,130
1953	287	243	246	319	247	448	845	1,150	1,830	205	157	134	6,110
1954	192	237	218	175	303	390	1,160	952	266	157	134	131	4,320
1955	179	195	195	189	184	274	648	1,910	943	178	144	137	5,180

Estimated monthly and annual runoff, in acre-feet

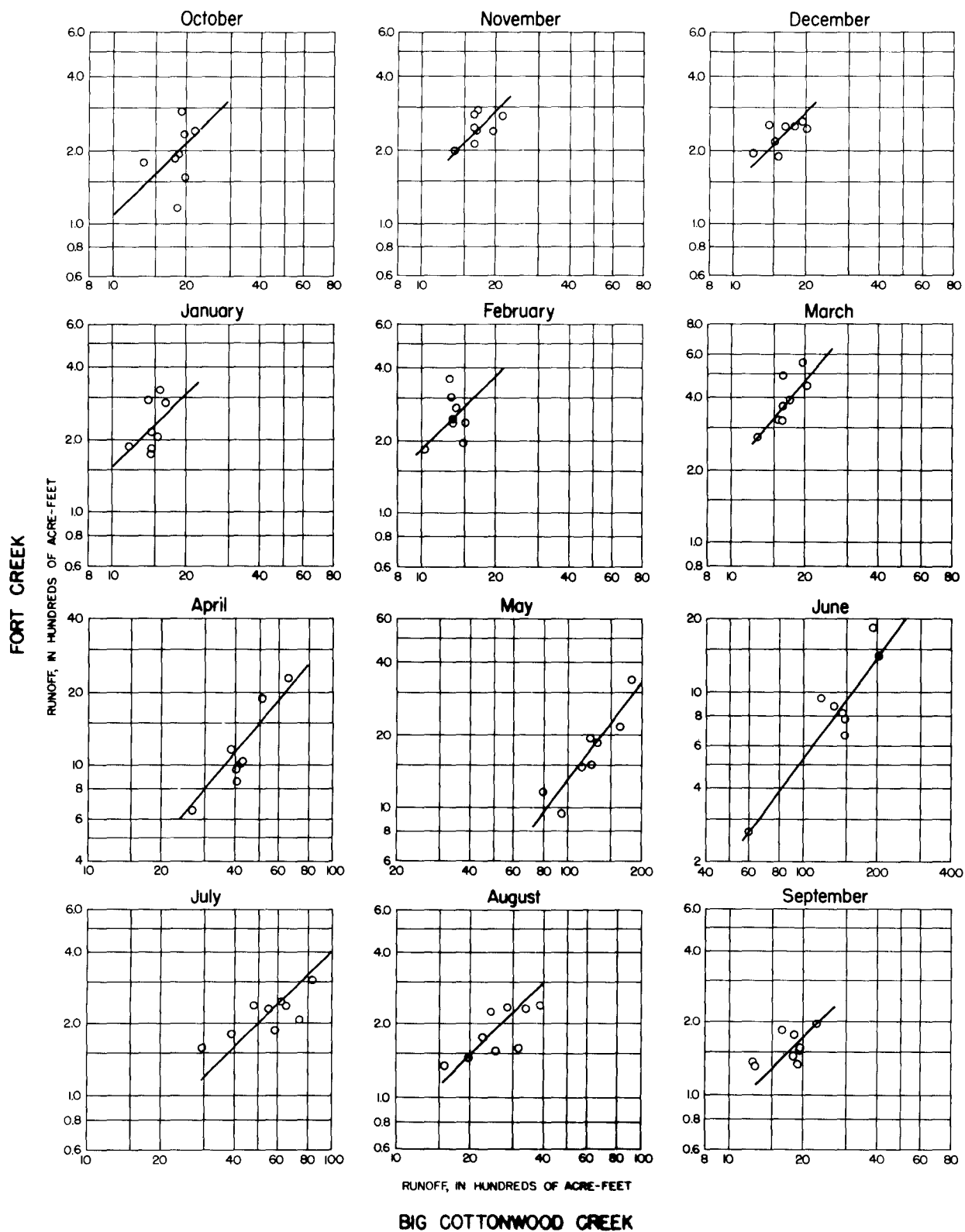
Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	240	280	210	230	250	460	1,700	1,500	1,600	390	280	260	7,400
1900	240	290	230	230	290	450	1,100	1,200	540	140	150	130	5,000
1901	180	250	220	210	240	410	1,200	2,500	540	170	180	150	6,200
1902	190	240	240	220	250	330	1,200	1,800	640	150	150	140	5,600
1903	170	210	200	200	200	320	930	1,300	800	140	110	47	4,600
1904	200	250	230	230	280	440	1,600	2,300	1,200	520	220	240	7,700
1905	240	270	220	240	250	400	980	1,000	620	150	160	160	4,700
1906	210	240	230	250	270	450	1,200	1,700	670	350	340	290	6,200
1907	280	340	420	450	440	870	1,500	1,800	2,000	950	440	300	9,800
1908	340	380	320	310	330	490	1,500	1,600	1,100	400	290	270	7,300
1909	380	400	310	380	390	650	1,800	2,400	2,600	570	460	470	10,800
1910	460	570	540	530	490	1,600	3,800	2,800	840	210	280	260	12,400
1911	350	380	360	380	430	730	1,200	1,400	1,100	240	220	190	7,000
1912	250	250	220	230	250	380	1,000	1,900	1,900	300	310	260	7,200
1913	340	360	270	260	290	460	2,000	2,000	640	200	210	200	7,200
1914	280	260	240	240	230	700	2,000	2,900	1,000	310	250	220	8,600
1915	290	310	230	220	240	460	2,100	1,100	630	190	180	190	6,100
1916	210	260	230	250	310	990	2,000	1,600	920	260	260	250	7,500
1917	370	290	260	280	290	410	1,300	1,800	1,600	440	330	300	7,700
1918	300	310	280	280	310	770	1,400	1,600	960	180	190	200	6,800
1919	270	290	250	240	250	490	1,900	2,300	370	130	200	210	6,900
1920	290	360	270	280	290	500	1,100	3,200	1,300	260	250	230	8,300
1921	300	370	300	330	400	1,200	1,600	3,300	2,300	440	350	280	11,200
1922	300	330	340	310	310	560	1,300	3,000	1,800	310	310	240	9,100
1923	250	310	290	310	310	560	1,400	2,800	1,200	390	270	240	8,300
1924	320	310	270	260	300	400	1,200	1,700	320	120	140	140	5,500
1925	170	230	180	240	310	710	1,700	2,100	590	220	200	220	6,900

JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Fork Creek at Alpine, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1926	230	250	230	220	250	560	2,000	2,000	390	120	170	140	6,600
1927	210	240	250	240	260	510	1,400	2,100	1,200	270	220	220	7,100
1928	270	360	300	310	320	730	1,300	2,800	490	160	170	160	7,400
1929	200	250	220	230	240	500	1,200	2,000	1,000	280	230	240	6,600
1930	240	240	220	210	250	410	1,800	1,100	410	110	160	180	5,300
1931	280	230	210	210	220	330	1,000	1,000	160	64	96	100	3,900
1932	140	160	160	160	200	370	1,300	2,300	810	200	170	160	6,100
1933	180	210	180	190	190	390	890	1,100	1,200	170	150	130	5,000
1934	150	170	150	160	180	410	1,100	490	41	34	62	59	3,000
1935	80	130	150	140	180	250	770	1,100	970	170	110	86	4,100
1936	100	130	110	120	140	320	2,100	2,500	540	150	150	110	6,500
1937	130	160	140	120	160	340	880	2,000	450	140	110	110	4,700
1938	190	190	210	160	180	420	1,800	2,000	800	160	150	120	6,400
1939	160	200	190	170	170	510	1,600	1,300	310	100	92	100	4,900
1940	150	140	120	150	180	460	1,300	1,600	190	61	70	90	4,500
1941	130	160	130	150	190	390	820	2,100	800	200	190	150	5,400
1942	230	280	250	240	270	500	2,100	1,600	950	230	160	140	7,000
1943	150	200	200	190	240	400	1,700	1,200	640	200	160	130	5,400
1944	190	230	200	190	220	300	790	1,700	1,000	230	160	140	5,400
1945	170	230	200	200	220	320	680	1,600	710	280	220	150	5,000
1946	200	260	220	240	230	520	2,800	1,700	540	150	140	130	7,100
1947	220	290	260	220	260	530	1,200	2,400	690	-	-	-	6,700
1956	130	190	240	270	220	390	1,100	1,600	670	150	150	140	5,300
1957	170	200	200	200	220	420	830	1,800	1,300	340	240	190	6,100
1958	200	240	220	220	250	400	1,200	3,400	1,000	190	190	160	7,700
1959	170	200	200	190	210	320	890	1,000	730	130	130	150	4,300
1960	220	210	170	180	210	520	1,600	1,600	520	99	120	120	5,600
1961	140	180	170	150	160	250	570	740	170	54	91	130	2,800
1962	130	160	140	150	280	340	1,800	1,600	930	270	180	130	6,100
1963	150	170	150	160	190	250	570	1,400	780	150	120	140	4,200
1964	140	190	170	170	160	220	690	1,900	950	300	210	170	5,300
1965	170	220	270	290	330	390	1,100	1,400	1,100	350	280	280	6,180

**JORDAN RIVER BASIN**  
**Fort Creek at Alpine, Utah.—Continued.**  
**Runoff relations for Fort Creek versus Big Cottonwood Creek**



JORDAN RIVER BASIN

10-1722. Red Butte Creek at Fort Douglas near Salt Lake City, Utah

Location.--Lat 40°46'50", long 111°48'20", in NW¼ sec.35, T.1 N., R.1 E., on right bank 0.35 mile upstream from dam forming Red Butte Reservoir, 1½ miles northeast of Fort Douglas, and 5 miles east of Salt Lake City post office. Altitude of gage is 5,400 ft (from topographic map).

Drainage area.--7.25 sq mi.

Records available.--October 1963 to September 1965. Figures of monthly discharge for January 1942 to September 1963, collected by the Corps of Engineers, U. S. Army, available in files of the U.S. Geological Survey, Salt Lake City District Office.

Estimates of streamflow.--October 1898 to December 1941 based on relation of monthly runoff to that of 10-1725., City Creek near Salt Lake City, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is the monthly runoff of Red Butte Creek at Fort Douglas near Salt Lake City, Utah; X is the monthly runoff of City Creek near Salt Lake City, Utah; b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	2.29	2.27	2.27	2.20	2.28	2.20	1.50	1.40	1.34	1.46	1.83	1.94
c	4.29	4.06	4.03	3.81	3.96	3.81	1.89	2.03	1.98	2.33	3.24	3.43

Average runoff.--67 years (1898-1965), 2,660 acre-feet per year (3.68 cfs).

Extremes.--1963-65: Maximum discharge, 31 cfs May 13, 1964; minimum, 0.5 cfs Oct. 7, 12, 1963.

Remarks.--No regulation or diversion above station. This drainage basin has been designated as a hydrologic bench mark. Estimated values of annual runoff are probably accurate within 15 percent.

Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1942	-	-	-	123	129	235	1,010	770	495	249	130	82	-
1943	92	109	119	118	131	221	368	236	195	109	78	59	1,840
1944	86	101	100	100	93	139	420	769	554	245	130	92	2,830
1945	104	123	111	107	102	140	232	302	308	156	111	79	1,880
1946	93	104	112	106	99	218	588	385	223	127	86	73	2,210
1947	106	126	140	119	136	262	509	511	327	160	111	89	2,600
1948	108	126	135	119	117	157	644	718	337	162	116	78	2,820
1949	115	115	125	101	94	222	859	723	450	211	127	107	3,250
1950	151	127	112	117	149	253	602	912	459	218	131	114	3,340
1951	127	175	226	149	168	210	415	593	266	150	130	85	2,690
1952	127	175	120	140	142	203	1,490	535	243	199	138	138	5,100
1953	136	143	144	174	158	229	572	694	498	226	129	91	3,190
1954	95	123	131	136	119	156	225	149	99	69	48	48	1,400
1955	61	76	81	71	67	93	255	311	166	81	60	46	1,370
1956	52	75	111	126	87	165	261	241	131	71	45	31	1,400
1957	53	81	82	74	133	143	317	781	532	235	129	90	2,650
1958	88	95	109	99	111	170	622	1,050	348	188	116	93	3,090
1959	98	109	121	120	111	136	172	187	104	78	65	75	1,380
1960	82	61	60	66	66	160	376	263	134	59	31	25	1,380
1961	46	61	65	61	59	79	102	100	47	42	11	16	689
1962	26	56	58	59	75	85	451	539	244	104	46	39	1,780
1963	47	64	80	64	74	79	163	385	174	81	54	50	1,320
1964	43	59	56	51	57	65	259	971	478	243	126	88	2,500
1965	99	105	163	157	190	219	686	996	458	248	171	142	3,630

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1899	86	90	83	50	44	86	640	540	880	330	120	120	3,070
1900	130	140	130	130	100	180	210	250	100	67	43	38	1,520
1901	47	62	56	54	52	92	220	730	170	97	62	44	1,690
1902	61	75	72	64	49	63	290	490	240	110	63	46	1,620
1903	51	40	60	70	64	84	190	290	350	140	96	76	1,510
1904	110	99	83	75	83	150	590	820	350	190	120	97	2,770
1905	100	120	120	120	100	130	270	350	210	120	82	76	1,800
1906	83	99	120	120	110	*210	630	720	470	250	160	130	3,100
1907	140	180	180	170	*320	*560	1,500	1,100	920	550	310	220	6,150
1908	200	190	210	190	180	*210	360	470	680	360	240	190	3,480
1909	240	170	150	240	180	*310	1,100	1,200	830	340	260	130	5,150
1910	230	220	160	150	180	*550	1,500	770	300	120	73	73	4,330
1911	98	100	89	130	150	*200	530	320	160	96	57	45	1,980
1912	45	52	49	51	49	66	300	610	640	220	130	89	2,300
1913	85	92	81	68	60	94	680	540	170	120	74	61	2,120
1914	62	72	68	75	66	*260	830	970	330	180	110	83	3,110
1915	84	88	78	72	120	150	560	320	210	140	81	73	1,980

## JORDAN RIVER BASIN

Estimated monthly and annual runoff, in acre-feet, for Red Butte Creek at Fort Douglas, near Salt Lake City, Utah.--Continued

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1916	83	98	110	98	130	*490	960	700	290	170	120	85	3,330
1917	130	130	97	90	74	120	650	940	910	400	220	160	3,920
1918	160	140	140	130	100	*270	480	470	190	120	77	71	2,350
1919	80	98	96	83	71	150	640	670	230	160	86	83	2,450
1920	120	150	65	84	120	120	540	730	390	200	130	100	2,750
1921	110	130	150	150	230	*700	1,200	1,800	680	350	210	150	5,860
1922	170	190	180	160	120	*230	960	1,400	760	280	180	110	4,740
1923	120	160	140	130	120	160	760	1,100	450	240	180	150	3,710
1924	180	200	200	180	190	200	480	390	120	88	56	49	2,330
1925	59	95	90	94	130	*230	710	590	210	130	81	71	2,490
1926	72	84	90	89	83	*210	1,000	560	160	120	81	79	2,630
1927	120	150	140	100	95	*190	490	700	440	220	180	180	3,000
1928	210	160	140	140	140	*300	570	1,100	230	130	93	76	3,290
1929	90	110	120	110	95	*210	610	990	470	260	210	180	3,460
1930	230	270	140	130	120	160	310	230	110	78	62	73	1,910
1931	75	84	83	89	77	85	180	170	73	58	40	38	1,050
1932	44	55	61	62	72	130	540	790	340	160	89	65	2,410
1933	73	94	98	100	85	140	260	330	450	140	90	76	1,940
1934	84	110	120	110	85	110	130	48	28	24	17	20	890
1935	26	43	59	56	69	100	300	470	340	130	72	60	1,720
1936	68	100	97	98	100	*300	1,200	1,100	350	170	97	78	3,760
1937	88	110	110	93	100	*220	480	920	310	180	99	79	2,790
1938	97	110	120	110	90	*200	850	780	300	150	99	80	2,990
1939	95	130	140	130	100	*240	490	390	110	84	60	58	2,030
1940	65	81	89	100	110	*250	620	470	140	96	66	60	2,150
1941	79	110	110	100	130	*240	490	690	290	190	120	110	2,660
1942	130	150	150	-	-	-	-	-	-	-	-	-	3,650

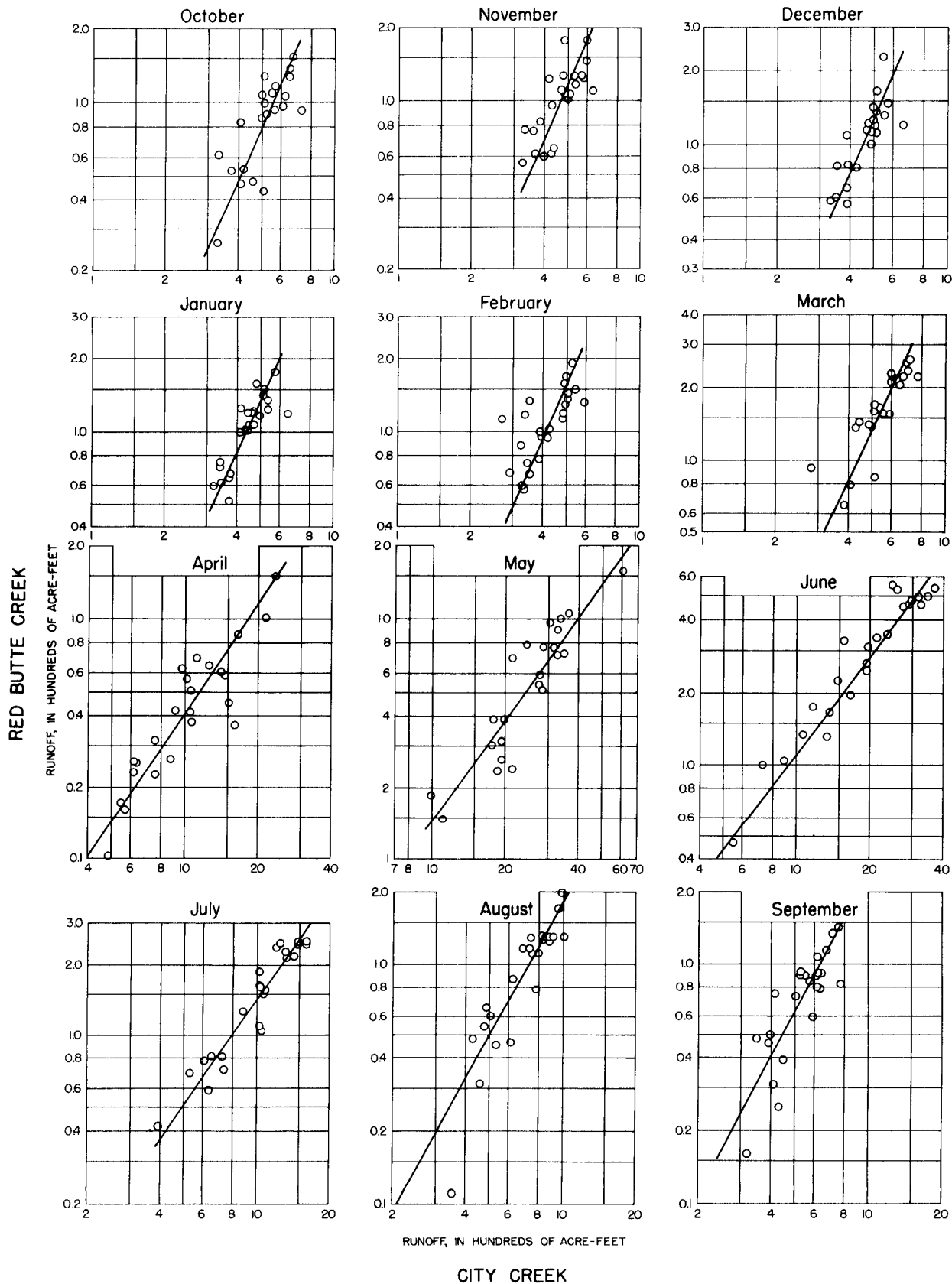
\* Use April curve for City Creek runoff of 600 acre-ft or more during February and March.



# JORDAN RIVER BASIN

## Red Butte Creek at Fort Douglas, near Salt Lake City, Utah.—Continued.

### Runoff relations for Red Butte Creek versus City Creek



## SEVIER RIVER BASIN

10-2110. Twin Creek near Mount Pleasant, Utah

Location.--Lat 39°29'30", long 111°24'25", in NW¼ sec.30, T.15 S., R.5 E., on right bank 3½ miles southeast of Mount Pleasant, Utah. Altitude of gage is 6,500 ft (from topographic map).

Drainage area.--5.9 sq mi, approximately.

Records available.--October 1954 to September 1965.

Estimates of streamflow.--March 1944 to September 1954. Based on relationship to that of 10-2325. Chalk Creek near Fillmore, Utah. The regression equation used is

$$\log Y = b \log X - c$$

where: Y is monthly runoff of Twin Creek near Mount Pleasant, Utah; X is monthly runoff of Chalk Creek near Fillmore, Utah; and b and c are constants for the individual months.

Monthly values for constants in above equation

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
b	0.90	0.90	0.90	0.90	0.63	0.38	0.38	0.73	0.58	0.97	0.85	0.85
c	.01	.01	.01	.01	-.67	-1.32	-1.22	-.24	-1.19	.09	-.18	-.18

Average runoff.--21 years (1944-65), 6,670 acre-feet per year (9.22 cfs).

Extremes.--1954-65: Maximum discharge, 488 cfs July 31, 1965 (from rating curve extended above 70 cfs); minimum discharge 1.8 cfs Mar. 18, 1955.

Remarks.--Records exclude the flow of Twin Creek Tunnel for 1955 through 1958. Estimated values of annual runoff are probably accurate within 15 percent.

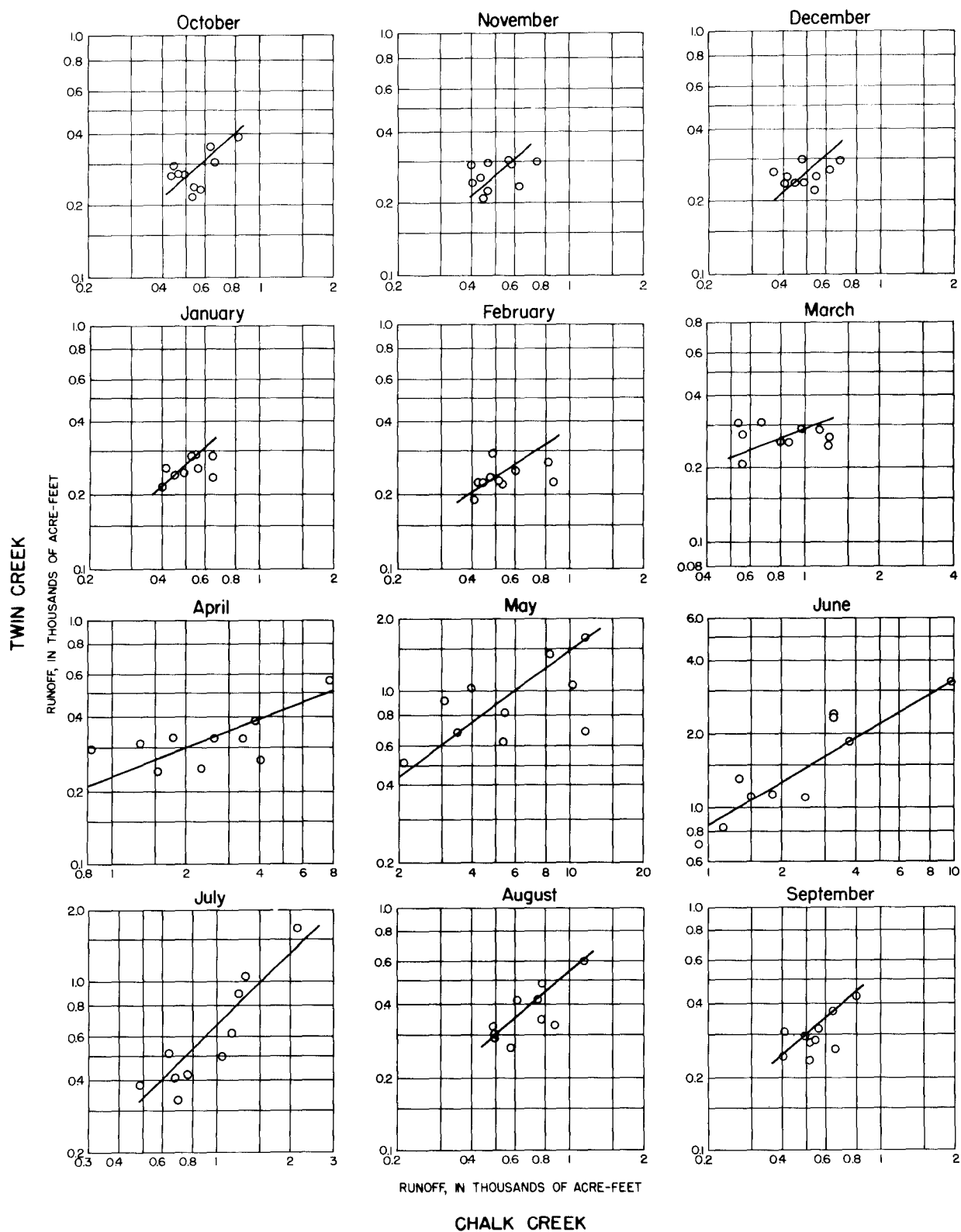
Monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1955	218	212	240	246	222	252	249	615	1,100	498	347	279	4,480
1956	242	225	222	233	248	290	323	1,020	1,110	408	289	245	4,860
1957	271	245	240	249	219	256	267	673	3,270	1,690	598	424	8,400
1958	389	300	298	284	268	283	381	1,660	2,380	616	329	260	7,450
1959	306	308	270	290	223	308	311	510	716	382	323	306	4,250
1960	296	294	234	240	233	266	324	817	1,140	420	301	236	4,800
1961	270	299	252	215	190	209	242	686	827	330	267	282	4,070
1962	235	235	252	253	222	247	566	1,420	2,400	1,060	481	372	7,740
1963	353	296	301	288	295	308	298	915	1,330	514	412	297	5,610
1964	270	258	268	256	222	276	328	1,040	1,860	885	416	317	6,400
1965	288	266	255	252	228	273	372	654	2,550	1,950	671	498	8,260

Estimated monthly and annual runoff, in acre-feet

Water year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Annual
1944	-	-	-	-	-	310	380	2,100	3,100	1,400	590	450	-
1945	410	360	350	350	270	300	370	1,900	2,500	1,400	750	510	9,470
1946	430	400	390	360	290	300	420	840	1,500	700	490	370	6,490
1947	380	640	650	470	440	430	460	1,700	2,000	1,400	680	470	9,720
1948	430	420	470	410	340	340	460	1,600	1,700	860	500	390	7,920
1949	350	340	340	360	280	290	400	1,000	1,500	780	450	390	6,480
1950	350	340	330	330	310	290	380	1,100	1,600	780	400	360	6,570
1951	330	300	310	300	240	240	220	580	1,100	440	280	230	4,570
1952	270	230	260	310	300	290	530	2,500	2,800	1,300	600	450	9,840
1953	400	380	390	390	340	340	360	1,200	2,100	970	570	380	7,820
1954	350	320	310	340	280	280	330	700	940	490	320	290	4,950

**SEVIER RIVER BASIN**  
**Twin Creek near Mount Pleasant, Utah.--Continued.**  
**Runoff relations for Twin Creek versus Chalk Creek**



**PUBLICATIONS OF THE UTAH DEPARTMENT OF NATURAL RESOURCES,  
DIVISION OF WATER RIGHTS**

(\*)—Out of Print

**TECHNICAL PUBLICATIONS**

- No. 1. Underground leakage from artesian wells in the Flowell area, near Fillmore, Utah, by Penn Livingston and G. B. Maxey, U.S. Geological Survey, 1944.
- No. 2. The Ogden Valley artesian reservoir, Weber County, Utah, by H. E. Thomas, U.S. Geological Survey, 1945.
- \*No. 3. Ground water in Pavant Valley, Millard County, Utah, by P. E. Dennis, G. B. Maxey, and H. E. Thomas, U.S. Geological Survey, 1946.
- \*No. 4. Ground water in Tooele Valley, Tooele County, Utah, by H. E. Thomas, U.S. Geological Survey, in Utah State Eng. 25th Bienn. Rept., p. 91-238, pls. 1-6, 1946.
- \*No. 5. Ground water in the East Shore area, Utah: Part I, Bountiful District, Davis County, Utah, by H. E. Thomas and W. B. Nelson, U.S. Geological Survey, in Utah State Eng. 26th Bienn. Rept., p. 53-206, pls. 1-2, 1948.
- \*No. 6. Ground water in the Escalante Valley, Beaver, Iron, and Washington Counties, Utah, by P. F. Fix, W. B. Nelson, B. E. Lofgren, and R. G. Butler, U.S. Geological Survey, in Utah State Eng. 27th Bienn. Rept., p. 107-210, pls. 1-10, 1950.
- No. 7. Status of development of selected ground-water basins in Utah, by H. E. Thomas, W. B. Nelson, B. E. Lofgren, and R. G. Butler, U.S. Geological Survey, 1952.
- \*No. 8. Consumptive use of water and irrigation requirements of crops in Utah, by C. O. Roskelly and Wayne D. Criddle, 1952.
- No. 8. (Revised) Consumptive use and water requirements for Utah, by W. D. Criddle, K. Harris, and L. S. Willardson, 1962.
- No. 9. Progress report on selected ground water basins in Utah, by H. A. Waite, W. B. Nelson, and others, U.S. Geological Survey, 1954.
- No. 10. A compilation of chemical quality data for ground and surface waters in Utah, by J. G. Connor, C. G. Mitchell, and others, U.S. Geological Survey, 1958.
- No. 11. Ground water in northern Utah Valley, Utah: A progress report for the period 1948-1963, by R. M. Cordova and Seymour Subitzky, U.S. Geological Survey, 1965.
- No. 12. Reevaluation of the ground-water resources of Tooele Valley, Utah, by Joseph S. Gates, U.S. Geological Survey, 1965.

- \*No. 13. Ground-water resources of selected basins in southwestern Utah, by G. W. Sandberg, U.S. Geological Survey, 1966.
- No. 14. Water-resources appraisal of the Snake Valley area, Utah and Nevada, by J. W. Hood and F. E. Rush, U.S. Geological Survey, 1966.
- No. 15. Water from bedrock in the Colorado Plateau of Utah, by R. D. Feltis, U.S. Geological Survey, 1966.
- No. 16. Ground-water conditions in Cedar Valley, Utah County, Utah, by R. D. Feltis, U.S. Geological Survey, 1967.
- No. 17. Ground-water resources of northern Juab Valley, Utah, by L. J. Bjorklund, U.S. Geological Survey, 1968.
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